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Summaries the key findings, outcomes or information in your report
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Contents

Eating Disorders among Female University Students and its' Relation with their Body Attitudes and Mindful Eating

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Abstract:

Eating disorders are a major public health issue faced by female university students. Anorexia nervosa, bulimia nervosa, and binge eating often have a variety of irreversible and life threatening medical complications. Despite disordered eating attitudes and body image dissatisfaction are common among female college students, mindful eating makes a conscious food choices and eating healthfully. ***The aim of the study was to***: Assess eating disorders among university female students and its relation to their body attitude and mindful eating behaviors. **Study design:** Correctional descriptive design. **Settings:** This study was conducted at two faculties affiliated to Tanta University that were chosen randomly. **Subjects:** A multistage randomized sample of 627 female students at the previous mentioned settings. **Study tool:** A structured questionnaire schedule was used to collect the necessary data. It consisted of four parts: Socio-demographic characteristics of the study subjects, eating disorders scale (EDDS), body attitude test (BAT) and mindful eating questionnaire. **Results:** Nearly one quarter of the studied subjects had eating disorders while 30.9% of them were at risk of developing eating disorders. Binge eating disorder was the most frequent among the studied subjects, followed by bulimia nervosa while anorexia nervosa was of the least frequency. About one third of the study subjects had negative attitude toward their body, and 61.4% of them reported moderate level of mindfulness of eating behavior. Positive

correlation was observed between eating disorders and negative body attitude, while negative correlation was found between eating disorders and mindfulness of eating behaviors of the study subjects. **Conclusion ,recommendations:** Female students who had poor mindful eating and negative body attitude are more prone to eating disorders. So, community mental health nurse should implement educational programs to modify unhealthy eating habits and correct body image distortion in female university students

Key words: Body attitude; Eating disorders, Female university students, Mindful eating

Introduction:

Adolescence and young adulthood have been identified as important developmental periods for exploring and establishing eating and weight related condition, health habits, and beliefs. Because many body and weight related conditions and behaviors are established during that periods persist across the life span, the adolescence and young adulthood offer potent developmental windows for assessing predictors and risk factors eating pathology [1, 2].

Eating disorders are one of the most prevalent psychiatric problems faced by adolescent and young women. Eating disorders (EDs) are characterized by abnormal eating habits, where the individuals' attitude toward weight and shape as well as their perception of body shape are disturbed, their behaviors aiming to achieve or maintain a slim body shape [3]. There is evidence from a variety of sources that symptoms of eating disorders and dissatisfaction with body weight are pervasive in university population [4,5]. Whereby inaccurate perception of body weight can trigger abnormal eating behaviors and eating disorders among those predisposed, especially in stressful situations. Even if university students appear to be in good health, there is a frequent onset of risky behaviors among them [6].

Eating disorders are associated with functional impairment, emotional distress, and medical complication and with increased risk for obesity, anxiety disorders, chronic fatigue, chronic pain, depressive disorders, suicide attempts and substance abuse .There are three qualitatively different type of eating disorders anorexia nervosa, bulimia nervosa, and binge eating disorders [7].

Anorexia nervosa (AN) and Bulimia nervosa (BN) involve excessive concern with body weight and shape, and use of inappropriate or extreme behaviors to control weight [8]. The hallmark of AN is the individual's refusal to maintain or

attain a normal body weight. Suggested guidelines are a body mass index (BMI) of 17.5 or less , or body weight less than 85% of that expected [9]. Other diagnostic criteria include: fear of obesity even though the individual is underweight, amenorrhea, and disturbance in body shape and size perception [8].

In BN, the individual may be slightly underweight, of normal weight, overweight, or obese. The primary criteria for a diagnosis of BN are behavioral: The individual binges and engages in compensatory methods to prevent weight gain at least twice a week for a 3- month period on average. Other criteria include: excessive influence of body weight and shape on self-evaluation. Two subtypes of BN are identified: purging type, in which the individual uses laxative, vomiting, diuretics, or enemas to prevent weight gain, and non-purging in which the individual engages in excessive exercise as the regular method of preventing weight gain[8].

Binge Eating Disorder (BED) is commonly known by compulsive overeating or consuming abnormal amounts of food while feeling unable to stop and a loss of control, often leads to development of unwanted weight gain or obesity, which can indirectly reinforce further compulsive eating, and not regularly engage in the compensatory behaviors to avoid weight gain as seen in bulimia nervosa. From a clinical point of view EDs are an important cause of morbidity and mortality in adolescent girls and young adults women [10].

Eating disorders are more common in societies with excessive concern about appearance and weight. EDs are more noticed in females and rarely in males [11]. In last decads, the Egyptian society prefers large female body size and regards plumpness as a sign of feminine beauty. These concepts are thought to provide protection against EDs. However, nowadays, increasing globalization, influence of mass media together with rapid social changes, and adoption western lifestyle play an important role on changing the attitude and behaviors of the younger generation in our society with more swinging toward the western values [12]. This mismatch of cultures caused by the intrusion of western ideas caused body image disturbance among women and plays the main role in developing EDs. In our society, the transition from high school and living with parents to relatively independent lifestyle at university together with a competitive and vulnerable environment along with adoption of new social relations can lead to unhealthy behaviors among university students [13].

Thus understanding population that does not receive clinical care, such as those at risk of eating disorders is particularly important for early detection and treatment.

Body attitude concern is defined as the degree of satisfaction about oneself as regard size, shape, and general appearance [14]. Body image un-satisfaction is mostly encountered in the period of adolescence. Worries about oneself silhouette are associated with eating disorders and loss of self- confidence [15]. A study conducted on undergraduate students at Assuit university in Egypt found 40% of the female students and 25.6% of male students having mild to marked body image concern [16]. It is widely accepted that girls are at great risk of body dissatisfaction and eating disorders, and that both a low and a high body mass index (BMI) have been shown to influence weight control behaviors. Body dissatisfaction has been shown to be strongly related to social norms, culture and ethnicity [17].

Obese women who perceived themselves as obese attempted to lose weight. This indicates that more realistic body size perceptions are associated with less weight gain. Individuals who feel dissatisfaction with their body image are more likely to engage in behaviors to fight discomfor. Attitude against fat and obesity inclinations were reported among university students in Arab countries. Heightens the attention toward social norms associated with appearance, which may increase the risk of students utilizing unhealthy body change modalities [18].

According to Sciverse Scopus search, there are many published articles on eating disorders among women in Arab countries. However, only few were carried out in female university students [12, 19-21]. Studies from the USA and European countries indicated that female university students had a high prevalence of EDs [22,23]. University students have several factors that increase their risk of eating disorders such as peer pressure , academic stress, living in dormitories clear relationships, social interaction, and high life expectation [24,25].

Mindfulness has been of increasing interest in the field of eating disorder treatment because of its salutary effects across a range of behavioral health issues. Mindful was adapted to better understanding and modify dietary behaviors. It can be defined as "an enhanced attention to and awareness of current experience or present reality". Mindful eating can be used to describe as a nonjudgmental awareness of physical and emotional sensation while eating or in a

food-related environment**.** Mindfulness is most divided in to two separate elements: self-regulation of attention in the present moment (the attention elements), and paying attention nonjudgmental (the acceptance elements) ***(26)*** .

It has been suggested that increased awareness of the process involved in food choice and decreased behavioral automaticity in regard to food choice is based on awareness of physical and emotional sensation associated with eating, and may help individuals to recognize and respond to internal cues of hunger and satiety[27,28]. Because mindful engenders awareness of why one eats, it may be a helpful weight loss or maintenance. Mindful awareness toward eating may minimize automatic reaction and impulses reaction, thereby fostering self- regulation, and decrease eating disorders [29,30].

Individuals higher in acting with awareness may stop and think regarding their actions before continuing to engage in maladaptive eating disorder behaviors[31]. Additionally, higher acting with awareness may enable individuals to recognize potential triggers to eating disorder behaviors. This supported by study show that acting with awareness is negatively associated with symptoms of anorexia and bulimia nervosa [32]. Reviews of mindfulness based interventions specifically focused on eating behaviors showed improvement in binge eating, restricted eating, emotional and external eating, It was proposed that those patients with eating disorders had deficit in awareness or recognized of internal body signal especially hunger, and often confused signal with emotion such as unable to distinguish hunger from anxiety [33].

Community mental health nurses have an important role in prevention and early detection of at risk adolescents. Those nurses should organize and implement specific strategies and programs to promote positive body image and mindful eating for female students and their parents either at school or university settings [34].

Significance of the study

Body image dissatisfaction is often associated with many eating disorders ranging from minor to severe conditions. University female students have several risk factors that increase their risk of eating disorders. Studies have shown that early detection and treatment of EDs can lead to full recovery. Mindful eating behavior is conceptualized as being aware of the present moment when one is eating, paying close attention to the effect of the food on the senses, and noting the physical and emotional sensation in response to eating. A literature review indicated that

there is a dearth of literature available on eating disorders among women in Arab countries. However, only few studies were carried out regarding the prevalence of EDs among Egyptian's university students. Therefore, **the aim of this study** was to assess the relation between eating disorders among female university students and its relation to their body attitude and mindful eating behaviors.

Research questions:

1- What are the types of eating disorders among university female students?
2- What is female students body attitude
3- What are the levels of mindfulness of eating behaviors among female students?
4- What are the relations between levels mindfulness of eating behaviors and body attitude with eating disorders among female university students?

Subjects and method

Study design

Correctional descriptive study design was utilized to conduct the present study.

Settings:

The current study was conducted at two faculties out of nine non-medical faculties affiliated to Tanta University which were selected randomly using simple random technique to represent faculties of Tanta University (Faculty of education and Faculty of arts).

Subjects:

A convenience sample of 627 female students at the previous mentioned settings during the academic year 2018/2019 who were willing to participate were included in the study according to the following inclusion criteria: Egyptian adolescent female students aged 18-22 years who were free from chronic diseases such as cardiac, diabetic, arthritis, endocrine disorders, neurological disorders, or psychiatric disorders expect eating disorder.

The sample size was calculated using Epi-Info software statistical package, created by World Health Organization and Center for Disease Control and Prevention, Atlanta, Georgia, USA version 2002[35] . The sample size was found at N >584. This number was increased to 627 students to increase the validity of the study results.

Tools of data collection

A structured questionnaire schedule that was developed by the researchers based on a thorough review of literatures [36-38]. It consisted of the following parts:

Part I: Socio-demographic data of the studied subjects:

It included pertinent data about the faculty students such as age, residence, family monthly income, parents' education and occupation.

Part II: Assessment of eating disorders among female students using Eating

Disorders Diagnostic Scale (EDDS): Eating disorders scale (EDDS) assessed diagnostic criteria for anorexia nervosa, bulimia nervosa, and binge-eating disorders. This scale developed by ***Stice E et al, (2000)*** [36]**.** It is self-reported questionnaire, consisted of 22 items. This scale combination of the following : ***four items*** had four likert scale from zero (not at all) to 4 (extremely), ***nine items*** had dischotomous score, ***seven items*** had behavioral frequency score, and ***two open end questions*** about weight and height. The items numbers 2, 3,4,19, 20, and 21 covered criterion of anorexia nervosa. Items numbers 3,4 ,5,6,8,15,16, and 17 covered criterion of bulimia nervosa while the items numbers 5,6,7,9,10,11, 12,13,14,15,16,17, and 18 cover criterion of Bing eating disorders.

The diagnosis scale items were as follows:

A diagnosis of DSM-1V anorexia nervosa is made if an individual reports: ***(a)*** Height and weight data on items 19 and 20 that result in a body mass index **= Kg/M** ^{2} of less than 17,5, ***(b)*** a fear of weight gain or becoming fat as indexed by a score of 4 or greater on item 2, ***(c)*** undue influence of body weight or shape on self- evaluation as indexed by a score of 4 or greater on either item 3 or 4, ***(d)*** Amenorrhea in post menarcheal females as indexed by a 3 on item 21. If an individual meets the first and fourth criteria above, it is not necessary for the individual to endorse the second and third criteria.

A diagnosis of DSM-IV bulimia nervosa is made if an individual reports (a) regular eating binges marked by a perceived loss of control and the consumption of a large amount of food as indexed by a response of yes to item 5, and 6. The a response of greater than 2 on item 8; (b) regular use of compensatory behaviors as indexed by a response of 8 or greater on the sum of items 15, 16, 17, and 18; and (c) undue influence of body weight or shape on self-evaluation as indexed by a score of 4 or greater on either item 3 or 4.).

A diagnosis of DSM-IV binge-eating disorder is made if an individual reports (a) regular eating binges marked by a perceived loss of control and the consumption of a large amount of food as indexed by a response of yes to item 5, a yes to item 6, and a response of greater than 2 on item 7; (b) an endorsement of at least three of the features that may be associated with binge eating as indexed by a yes response to at least three of the features described in items 9, 10, 11, 12, and 13; (c) marked distress regarding binge eating as indexed by a yes response to item 14; and (d) the absence of any compensatory behaviors as reflected by a 0 response to items 15, 16, 17, and 18).

Computerized scoring statements of this scale were ordered and calculated to determine type of eating disorders, and calculated number for each type of eating disorders In addition to, determined risk of eating disorders that almost criteria.

Note: Height was measured by using centimeters a measuring scale, and the weight was measured by using a platform weighing scale. Subsequently, the body mass index (BMI) was calculated by researchers as follows: BMI = weight in kg ÷ (height in cm)^2. The students' weight was evaluated according to their BMI

Weight description	BMI
Underweight if the BMI	Less than 17.50
Average (normal) weight if the BMI	17.50 to 24.99
Over weight if the BMI	25.00 to 29.99
Obese if the BMI	30 or more

Part III: Assessment of body attitude among female students by using Body Attitude Test (BAT):

Body attitude test (BAT) was developed by ***Probst M et al, 1995*** [(37)]. It is a 20-items self- reported questionnaire used to assess concerns about body shape among females. The test consisted of four subscales: Negative appreciation of body size (Seven items), lack of familiarity with one's body (Seven items), and General dissatisfaction (Three items), and Rest factor (Two items). The students' responses were rated on five point likert scale from 0 (never) to 4 (always). Negative items (items 4 and 9) were reversely scored. The total score of the studied students ranged between zero and 80. The total student's score was summated up and converted into percent. The high score indicates a negative attitude towered the body. The students' body attitude was categorized as follow:

- Positive attitude if the score less than 50% of total score
- Negative attitude if the score ≥ 50%

Part IV: Assessing mindfulness of eating behavior among female students using Mindful Eating Scale.

This scale that was developed by ***Framson. C et.al, 2009*** [(38)]**.** It composed of 28 items used to describe a non-judgmental awareness of physical and emotional sensations associated with eating. The questionnaire had five subscales; ***Disinhibition*** (eight items) which examines an individual's ability to avoid eating when full, ***Awareness*** (seven

items) examines an individuals' ability to be observe the texture, taste, and smell of food, ***External Cues*** (six items) evaluates an individuals' tendency to engage in eating in response to external cues, ***Emotional Response*** (four items) examines an individuals' likelihood of eating in response to negative emotions , and ***Distraction*** (three items) that examines an individuals' ability to focus on just eating while avoiding any distractions.

The responses were rated on four point likert scale from 1 (never/rarely) to 4 (always / usually). Negative items were

reversely scored, these items included (items No. 3,4,6,8, 16, 17, 19, 22,23,24,25, 26, 27, 28). The total score ranged between (28 to112). The higher scores indicate a higher level of mindfulness about eating behaviors. The levels of mindful to eating behaviors and its' were determined as the follows:

- **Lower level of mindful**: less than 50 % of total score.
- **Moderate of mindful**: 50 % to 70 % of total core
- **Higher level of mindful:** more than 70% of total score,

Method

1- Obtaining approvals.

Official letters to conduct the study were obtained by the researchers from faculty of nursing Tanta University, directed to the Dean of the identified faculties of Tanta University to obtain their approval and cooperation for carrying out the study.

2- Ethical considerations.

Informed consent was obtained from the ethical committee of faculty of nursing then; informed consent was obtained from the studied students to participate in the study after informing them about the purpose of the study, the confidentiality and privacy of any information given to the researchers. The nature of the study didn't cause harm or pain for the entire sample.

3- Developing the tools.

The structured questionnaire schedule was developed based on literature review and was translated into Arabic language by the researchers. The developed and translated tool was distributed to a jury of five academic professors in community health nursing and psychiatric nursing department to test its content and face validity. Accordingly, corrections and modifications were done. A pilot study was carried out on (about 10 % of the target sample) (n= 60 students) to test the tool for relevance, clarity and reliability. Those students were later excluded from the study sample.

Cronbach's Alpha revealed reliability of the translated Arabic tool as follow: for body attitude it was 0 .831, for the mindful eating scale was 0.705 while for eating disorder scale, it was 0.754 and for the total questionnaire, it was 0. 753 which indicate high reliability level

4- The actual study:

- The collection of the data continued during a period of three months starting from February until the end of Aril 2019.
- The studied students were met in teaching room of the selected faculties.
- The questionnaire schedule was administered to each student individually to fulfill it by herself with the attendance of the researchers for guidance and clarification when needed.
- Height was measured to the nearest centimeter using a measuring scale without footwear.
- The weight was measured using a platform weighing scale with students wearing light clothing.

5- Statistical analysis

The collected data were organized, tabulated and statistically analyzed using Statistical Package of Social Studies (SPSS) version 20. For numerical data, the range, mean and standard deviation were calculated. The association between two variables was calculated by Pearson's correlation coefficient (r). For categorical variables, the number and percentage were calculated. Differences between categories of each variable were statistically analyzed using chi square test (X^2). Whenever chi square was not suitable, Monte Carlo tests were used as tests of significance. The level of significance was adopted at $p < 0.05$.

Results:

Table (1) shows the distribution of the studied students according to their socio-demographic characteristics. It was clear that, less than two thirds of the studied students were less than 20 years old (60.6 %) with mean ages of 19.725 ± 1.318 years. About two thirds of them (64.8 % and 69.1 %) were from rural residence and had just enough family income respectively. In addition, the table shows that, the highest frequencies of the their fathers had graduated from universities and working as employees (41.9% and 32.5%) respectively while the highest frequencies of their mothers had secondary school education and were housewives (38.9 % and 70.3%) respectively.

Figure (1) shows eating disorders among the studied female university students. It was clear that, less than half of the studied students had no eating disorders (43.1), less than one third of them (30.9 %) were at risk for eating disorders and more than

one quarter of them (26 %) had eating disorder regardless its type.

Table (2) shows the distribution of the studied female students according to different types of eating disorders. The tables shows that, less than one quarter of the studied subjects (24.4 % and 19.5 %) were at risk for binge eating disorder or bulimia nervosa disorder respectively. Meanwhile, More than 12% of them had eating disorders in the form of binge eating or bulimia nervosa (12.6 % and 12.4 %) respectively. As for Anorexia nervosa, the majority of the studied students (86.1 %) had no anorexia, 9.6 % of them were at risk of developing anorexia and only 4.3 % of them had anorexia.

Figure (2) presents the distribution of female university students according to their body weight. This figure revealed that, more than half of the studied female students had normal weight (56.9 %) compared with more than one quarter of them were overweight (26.3%), while 11.5 % of them were obese. The mean of their BMI was 24.28 ± 4.504.

Figure (3): Illustrates the distribution of the studied female students according to their total score of body attitude. More than two thirds of the studied students (68.9%) had positive attitude toward their bodies while less than one third of them had negative body attitude (31.1%).

Table (3) presents the relation between studied students' body attitude and their body weight. Statistical significant difference was observed between students' body weight and their level of body attitude (p= <0.001). Nearly about two thirds of the studied students with positive body attitude were of normal body weight (66.4%).

Figure (4) illustrates the distribution of the studied students according to their total level of mindful of eating behavior. It was observed that 61.4% of the studied students reported moderate mindful eating behavior while nearly about one third of them reported high mindful eating behavior (32.1%). Only 6.5 % of the studied students reported low mindful eating behavior .

Table (5) illustrates the correlation between studied students' body attitude, mindful eating behavior and their eating disorders. Strong significant negative correlations were observed between the studied students' total score of mindful eating behavior and Bulimia nervosa, binge eating and total score of eating disorders (p= 0.003, 0.001 and <0.005). Furthermore, Strong significant negative correlations were observed between the studied students' total score of body attitude and anorexia nervosa, bulimia nervosa, binge eating and total score of

eating disorders (p= 0.001, <0.001, <0.001 and 0.001) respectively.

Table (1): Distribution of the studied students according to their socio-demographic characteristics (No=627).

Socio-demographic characteristics	(n = 627)	%
Age:		
< 20 years	380	60.6
≥ 20 years	247	39.4
Mean ± SD	19.725 ± 1.318	
place of residence:		
Rural	406	64.8
Urban	221	35.2
Family income:		
Enough and saving	136	21.6
Just enough	433	69.1
not Enough	58	9.3
Fathers' education:		
Illiterates/Read and write	54	8.6
Basic education	114	18.2
High school(secondary)	263	41.9
University education	196	31.3
Fathers' occupation:		
Governmental employee	204	32.5
Free business	171	27.3
Professional work	136	21.7
Retired	59	9.4
Worker	50	8
unemployed	7	1.1
Mothers' education:		
Illiterates/Read and write	108	17.2
Basic education	90	14.4
High school(secondary)	244	38.9
University education	185	29.5

Mothers' occupation:		
House wife	441	70.3
An employee	85	13.6
Free business	3	0.5
Professional work	89	14.2
Retired	4	0.6
Worker	5	0.8

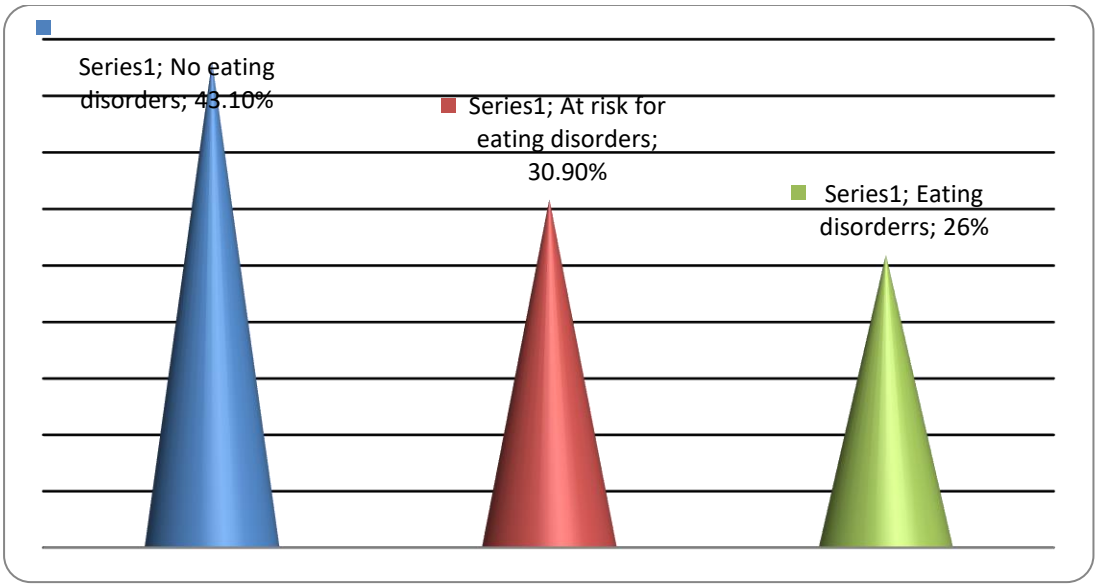

Figure (1): Description of eating disorders among female university students

Table (2): Distribution of the studied female students according to different types of eating disorders (No=627).

Eating Disorder	No	%
Binge eating:		
No Binge eating	395	63.0
risk for Binge	153	24.4
Binge	79	12.6
Bulimia:		
No Bulimia	427	68.1
risk for Bulimia	122	19.5
Bulimia	78	12.4
Anorexia:		
No Anorexia	540	86.1
risk for anorexia	60	9.6

Anorexia	27	4.3

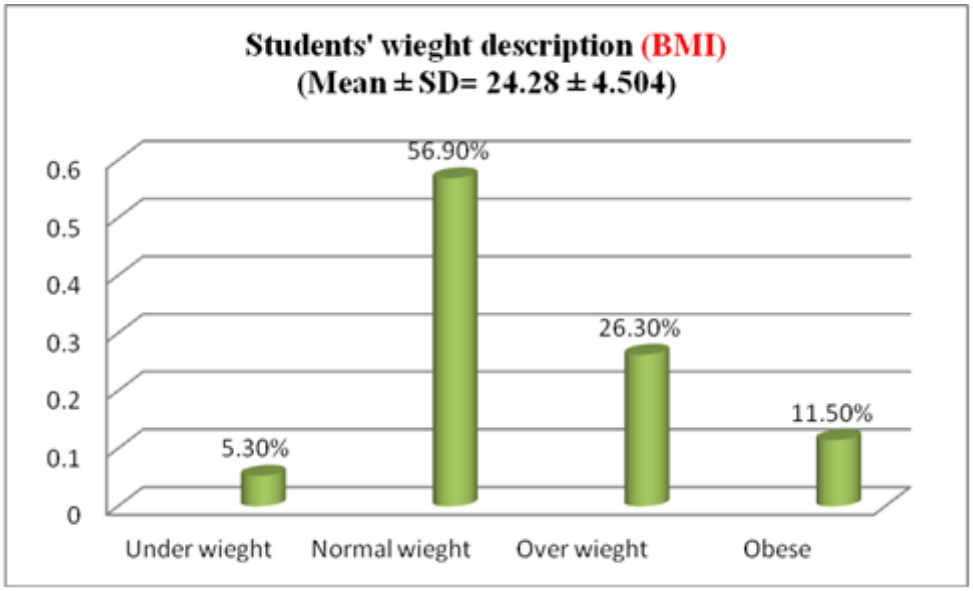

Figure (2): Distribution of female university students according to their body weight

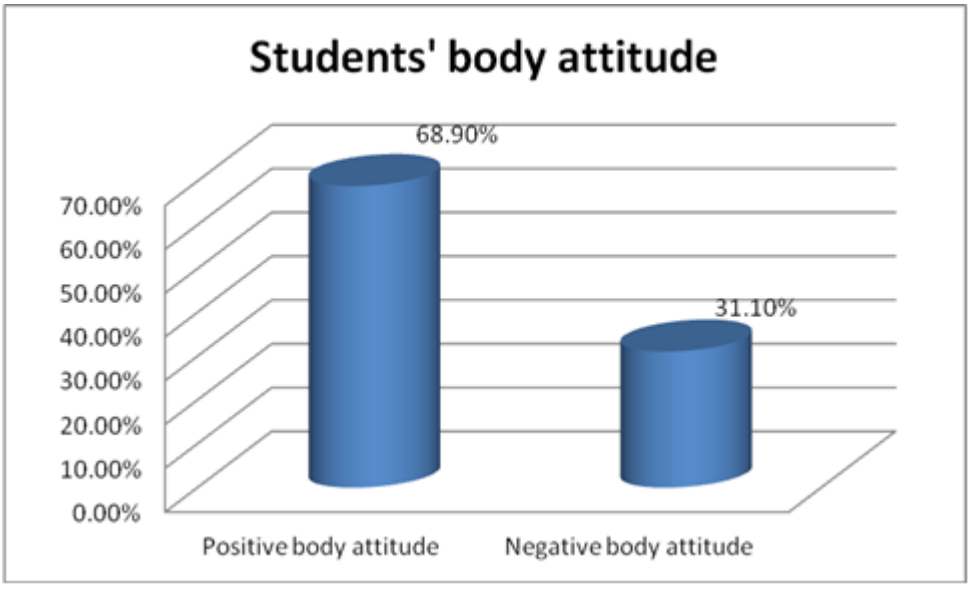

Figure (3): Distribution of the studied female students according to their total score of body attitude.

Table (3): Relation between studied students' body attitude and their body weight description (No=627).

Level of body attitude	Students' body weight description								
	Under weight n = 33		Normal weight n = 357		Over weight n =165		Obese n = 72		Total (No = 627)
	No	%	No	%	No	%	No	%	
Positive body attitude	24	5.6	287	66.4	97	22.4	24	5.6	432
Negative body attitude	9	4.6	70	35.9	68	34.9	48	24.6	195
X^2 P	72.607 <0.001*								

*Statistically significant at <0.05

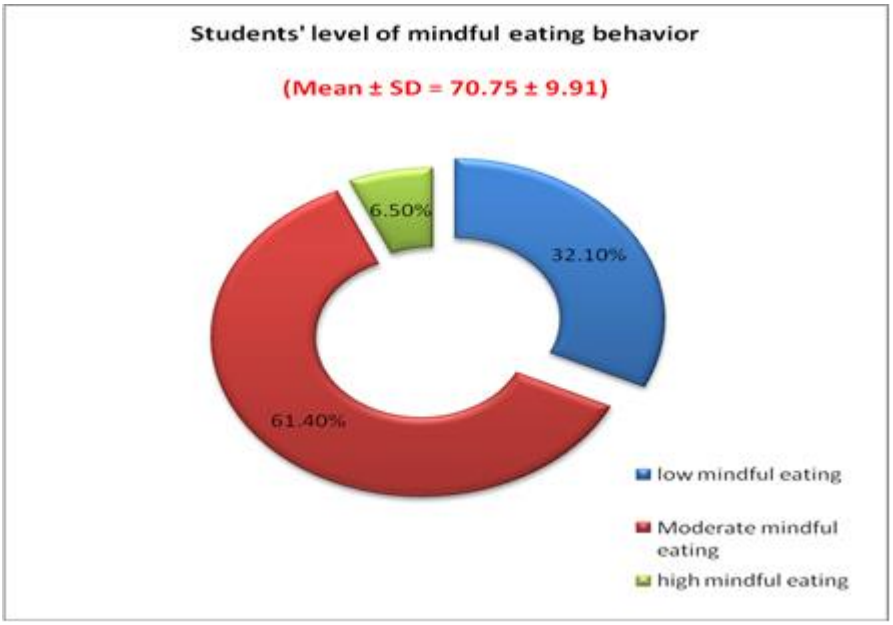

Figure (4): Distribution of the studied students according to their total level of mindful of eating behavior.

Table (4): Relation between students' body weight description, and level of mindful of eating behavior.

level of mindful eating	Students' body weight description								
	Under weight n = 33		Normal weight n = 357		Over weight n= 165		Obese n = 72		Total (n = 627)
	No	%	No	%	No	%	No	%	
Low mindful eating	12	6	96	47.8	66	32.8	27	13.4	201
Moderate mindful eating	19	4.9	245	63.6	86	22.3	35	9.2	385
High mindful eating	2	4.9	16	39	13	31.7	10	24.4	41
X^2 P	23.146 0.001*								

*Statistically significant at <0.05

Table (5): Correlation between studied students' body attitude, mindful eating, and behavior with their eating disorders.

Eating disorders	Total score of mindful eating		Total body attitude score	
	r	P	r	P
Anorexia nervosa	-.039	.326	-.129**	.001
Bulimia nervosa	-.118**	.003	.356**	<0.001
Binge eating	-.131**	.001	.231**	<0.001
Total score of eating disorders	- .112**	<0.005	-.129**	.001

** Statistically significant at <0.05

Discussion

Recently, in Egypt, the view of physical appearance particular the drive for slenderness has become increasingly important. The view of thinness is moving from a sign of malnutrition, poverty, and infectious disease to a sign of health, wealth, and prosperity, this lead to emergence of eating disorders (EDs) clearly among youth female. The current study is carried out on female students of Tanta University. Nearly about one third of the studied subjects were risky of eating disorders, and more than one quarter of them were diagnosed with one type or more of these disorders. This result may be attributed to the influence of the imported culture from West countries via social media. Such culture emphasize that the thin body is the attractive one. In turn, the adolescent students imitate this culture without proper reasoning.

This result is in consistent with other Egyptian studies. ***Fawzi M.et al,(2010)*** reported that, 30% of their sample from secondary school in Sharkia Governorate had eating disorders [(39)]. However the study by ***Eladaw N. et al*, *(2018)*** on the prevalence of eating disorders that applied in the weight management centers in Tanta city, it found that two thirds of young female clients of attended those centers were complaining from symptoms with EDs [(12)]. This result suggested that EDs are common among young Egyptian females. They view the thin body is attractive, healthy and self- disciplined, and standard of feminine beauty, however, the overweight is unattractive, lazy probably incompetent.

By comparing the present study with a similar studies carried out in Arab countries among young females, It was found that, the study of ***Eapen V. et al, (2006)*** in the United Arab Emirates reported that 23.4% of adolescent girls in their sample had eating disorders [(40)]. Another study that conducted by ***Al-Adawi S. et al, (2002)*** in Oman found that 29.4% of their adolescents sample had EDs[(41)].

In the same line similar studies that conducted at Far East region such as the study by ***Yu J. et al*, *(2015)*** in China, assessed the current status of disordered eating attitudes among university students and found that, the proportion of disordered eating attitudes among female was 4.0% [(42)]. **Pattanathaburt P. (2013)** examined the prevalence rates of eating disorders among Thailand female undergraduate students and found that, slightly more than half of the students had normal Body Mass Index (BMI), and a few of them had problematic eating behaviors [(43)].

Moreover, the study of ***Ko N. et al, (2015)*** in Vietnam who examined disordered eating behaviors among university students reported that, 45.3% of the participants were underweight, and concluded that a tendency in young females in urban Vietnam to be underweight and to develop disordered eating symptoms and drive for thinness and body dissatisfaction [(44)]. In addition, the study conducted by ***Naeimi A. et al, (2016)*** in Iran to assess the risk of eating disorder among University students of medical sciences, they found that 9.5% of their study sample had a risk of eating disorders [(13)].

When turn our view to west countries, It was found that ***Martínez-González L, et al, (2014)*** in Spanish assessed the prevalence of eating disorders in college students and its associated factors in young Spanish university uniHcos project, and their results illustrated that 19.5% from their sample were females who have the criteria of developing an eating disorder. Those females at risk of ED more frequently had depression, menstrual pains and perceived poor health[(45)].

Moreover, ***Tavolacci M. et al, (2015)*** in France, carried out a study to determine the prevalence of eating disorders among 3,457 university students, and concluded that eating disorders are highly prevalent among university students in France and associated with other behavior risks, stress, and depression[(3)].

Based on all of these studies and from our point of view, it can be concluded to that, the increasing trend of global internet and social networks use, which facilitated accessibility of information regarding western standards of beauty in non-western countries lead to relative vulnerability of young female to internalization of western cultures. This is considered the important factor for eating disorders among young female in our society.

It is important to mention that the present study focused on the type of eating disorders among female university students. It was found that more than one third of the studied subjects were between risky for and had binge eating disorder, and around one third of them was between risky for and had bulimia nervosa. This means that the Bing eating disorders is clearly obvious among our study subjects, followed by bulimia nervosa, while anorexia nervosa comes in the last. This may be explained by the following: ***First;*** most of studied sample haven't skinny bodies, where the more than half of them have normal body weight, and more than one third were either overweight or obese. ***Second;*** despite the influence of Egyptian

female with western culture; such as desire to be thin. This was not translated into healthy weight management behaviors, such as a balanced diet, and exercising regularly. This may be attributed to lack of nutritional awareness, and poor health habits. It is still the eating pattern of diet with high calories or carbohydrate that is prevalent among families diet in middle or lower socio-economic class. ***Third;*** Fast food snack is common at university during a full day, peer pressure for consumption of certain food of meals. In addition, no control over food consumption due to living at university dormitory, and finally academic stress like exams and achievements. This current status leads to dissatisfaction of young females about their physical appearance and appear their psychological problems.

The present study showed that, around one third of study subjects have negative body attitude and this attitude have positive correlation with the three type of EDs "binging, bulimia, , anorexia". This means that, the negative body attitude is one of the predisposing factors to increase eating disorders among female university students. It explained why Bing EDs and bulimia EDs present among studied sample of normal weight, overweight or obese. Body attitude is a subjectively personals' satisfaction about their own body. The young female are in a critical stage of self- identification that is greatly influenced by accepting own physique and body appearance. They prone to imitate the ideal body shape, and may be have a distortion of their self- esteem (**Arnett J. 2000)** [(46)].

The finding of the present study is supported by ***Eladawi N.et al, (2018)*** who found that, more than half of obese young female in their study were at risk of eating disorders [(12)]. Also, the study by ***Abdulrahman O. et al, (2016)*** found that, the prevalence of disordered eating attitude was 33.6% among female students, and obese students had double risk of disordered eating attitude compared to non-obese students [(47)].

Furthermore, ***Tanebaum H. et a,l (2016)*** studied over weight perception and its' association with weight control among 902 Chinese female college students. They found that, 46% of female subjects had an inaccurate perception of their current weight status; they suggested that self-perception of weight status may have a greater impact on weight control behavior [(48)]. Similar observations have been reported among youth in study by ***Niu J. et al, (2014)*** [(49)].

In relation to mindful eating, the present study revealed that, more than half of female subjects had moderate level of

mindfulness about their eating behaviors, and around one third had lower level. Moreover, there are a significant negative correlation between mindfulness and Bing eating, and Bulimia nervosa. This suggested a link between awareness deficits among those female students and their eating specific symptoms. Thus, it answered our research question.

Our finding go in the same line with the result of ***Lattimore P. et al, (2017)*** who evaluated the relationships between interceptive awareness, mindfulness and eating disorders symptoms in female at risk of an eating disorders, and reported that, lower mindfulness was associated with drive for thinness, and emotion dysregulation. Additionally, the high impulsivity that presents in patients with bulimia nervosa also related to lower level of mindfulness [(33)].

Recently ***Sala M. et al, (2019)*** examined whether facets of mindfulness differ among person with eating disorders by longitudinal study, and found that clients were a lower acting with awareness, those prospectively predicted higher drive for thinness and bulimic symptoms [(18)]. This result is supported by ***Compare A. et al, (2012)*** who stated that lower mindful awareness most strongly implicated in eating disorder pathology [(50)].

Avoidance of unpleasant emotions and reduced coping skills may play a role in eating disorders, those who at risk for EDs tend to use avoidant or impulsive style of coping, and often overeat in response to stress, and consuming excess calories in an automatic ways. In addition to many obese individuals have lost the ability to recognize or respond to internal cues of hunger, taste, and fullness [(51)]. By promoting mindfulness toward emotional state and eating behaviors, that may increase the ability among those persons to recognize and respond to internal state, and improve wellbeing. So, continuous effort should be done to assess mindful eating behaviors and body image among adolescent to protect them from developing serious eating disorders.

Conclusion:

According to the findings of the present study, it can be concluded that the risk of eating disorders is relatively high among the studied university female students particularly regarding binge eating and bulimia nervosa. Generally, about one third of the studied females were at risk for eating disorders and more than one quarter of them categorized as having eating disorders. Negative body attitude and lower mindful eating behavior had a predictive role as there was a positive correlation between eating disorders and

negative body attitude, and negative correlation between eating disorders and mindfulness of eating behaviors among study subjects.

Recommendations:

Based on the results of the present study the following recommendations are suggested:

1- Educational programs should be developed to rectify unhealthy eating habits, promote exertion and correct body image distortion in adolescence.

2- Emphasize the importance of focusing on those at risk students which are incorporated in the DSM-V.

3- Community mental health nurse should implement programs to improve mindfulness of eating behaviors and pattern among adolescence and young women.

4- Future research should also include binge eating disorder which is supposed to be the most prevalent eating disorders in both adolescents and adults.

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Effect of Implementing Nursing Intervention Program about Early Detection and Prevention of Acute Kidney Injury on Critically Ill Patients' Clinical Outcome

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Abstract: Acute Kidney Injury is considered as a life threatening condition that affects critically ill patients. It is associated with high morbidity and mortality rate**..** **Aim**: evaluate the effect of implementing nursing intervention program about early detection and prevention of acute kidney injury on critically ill patient's clinical outcome. **Design**: A quasi experimental research design was utilized. **Subjects**: convenience sample of 60 adult patients at the anesthesia Intensive Care Unit of Tanta University Hospital, divided into two groups (control and study group) 30 patients in each. **Results:** The majority (96.7%) of patients in both control and study group had high level of National early warning sign score (NEWS) on admission. There was a significant difference between control and study patients in relation to renal recovery, referred to nephrologists, Patients who received RRT and hospital mortality with P= 0.004. More than half (53.3%) of the study group had normal urine output ≥0.5 mL/kg per hour for >6 hours after one week compared to low percentage of patients (6.7%) in control group. There was a significant difference between control and study sample to length of hospital stay and status on discharge after one week with p= (0.000 and 0.015) respectively. **Conclusion:** improved patient' clinical outcome in study sample compared with control group**.** **Recommendations**: Integrating nursing intervention program into plan of care to replace the traditional nursing care plan.

Keywords: AKI, nursing intervention program, Clinical Outcome

Introduction

Acute kidney injury (AKI) is a rapid deterioration in the function of kidney over hours to days. It is under recognized disorder that results in acid-base, fluid and electrolyte imbalance and inability to excrete nitrogenous wastes from the body [(1)]. Recognition of acute kidney injury depend on serum creatinine (Cr) measurement and is clinically manifested as a reversible acute increase in serum creatinine levels and blood urea nitrogen over the course of hours to weeks [(2)].

Evidences suggest that acute kidney injury had replaced the older term and concept of acute kidney failure in clinical practice and if relatively small changes occurred in kidney function, it may results in poor patient outcomes [(3)]. This condition is encountered in 18-65% of the critically ill patients at intensive care unit with compromised diseases. It has serious effects on patients' outcomes and increased mortality rate from 40 to over 70 %[(4-6)].

However, previous studies reported that the incidence of acute kidney injury in acutely ill patients have been limited because there was differences in definition and classification of acute kidney injury [(7)]. Study in Egypt about clinical characteristics and incidence of acute kidney injury in patients admitted at intensive care units of Alexandria university hospitals reported that 11% of acutely ill patients in intensive care unit acquired acute kidney injuries[(8)].

There are many risk factors for developing acute kidney injury in patients admitting into intensive care units including; dehydration, hypovolemia, sepsis, older age, preexisting renal disease, diabetes mellitus, heart failure, and many medications such as ACE inhibitors, vasopressors, aminoglycosides and NSAIDs [(9-10)].

The causes of acute kidney injury are classified as prerenal, intrinsic and post renal causes. However the intrinsic causes of acute renal failure are the most common and comprising 88% of all cases of acute kidney injury [(11-12)]. The clinical manifestation of acute kidney injury including; increased creatinine, urea, metabolic waste retention, fluid accumulation, electrolyte and acid-base imbalance, such as hyperkalemia, hyponatremia. In addition, acute kidney injury is associated with other organ systems dysfunction, including respiratory, cardiovascular and neurologic dysfunction [(13)].

Acute kidney injuries pose a significant burden for the healthcare system.The best approach for an effective early detection and management of acute kidney injuries

relies on early diagnosis, development of a broader definition of AKI, and a marker with more sensitivity than serum creatinine should be identified [14].

Fortunately, new classification systems of acute kidney injury have been developed to solve these problems such as; AKIN (Acute Kidney Injury Network), RIFLE (Risk, Injury, Failure, Loss of Kidney Function, and End-stage Kidney Disease). In addition the discovery of new biomarkers for detection of kidney injury, continuous evaluation of kidney function, administration of appropriate fluid resuscitation and medication strategy, will change the way of management of renal patients [15-17].

Urine output is included in the RIFLE and AKIN classification systems as a criterion for the diagnosis of AKI, however this criterion has been confirmed by a few prospective studies. Although it is recognized that hydration status, use of diuretics and hemodynamic status will affect urine volume and that severe AKI can occur with normal urine output, the ADQI group decided that the use of decline in urine flow might be a sensitive marker of renal dysfunction. Therefore, accurate measuring hourly urine output would be a sensitive marker of acute kidney injury [17, 18].

An effective clinical risk assessment for acute kidney injury in the ICU and prompt intervention is important for early identification of high-risk patients and provides an opportunity to develop strategies for prevention, early diagnosis and treatment of acute kidney injury [19]. Therefore the aim of this study is to evaluate the effect of implementing nursing intervention program about early detection and prevention of acute kidney injury on critically ill patient's clinical outcome.

Significance of the study:

Acute kidney injury (AKI) is recognized as a very common problem in critically ill patients, and is strongly associated with increased resource utilization, and higher short-term and long-term mortality regardless of the underlying cause**.** Therefore early identification and diagnosis of high-risk patients for acute kidney injury provides an opportunity to develop strategies for prevention and early treatment of acute Kidney Injury**.**

Aim of the study:

Evaluate the effect of implementing nursing intervention program about early detection and prevention of acute kidney injury on critically ill patients clinical outcome.

Hypotheses:

H1: Critically ill patients who exposed to nursing intervention program about early detection and prevention of acute kidney injury will exhibit decreased mortality rate and improved renal recovery than patients in control group

H2: Critically ill patients who exposed to nursing intervention program about early detection and prevention of acute kidney injury wil lexhibit normal level of serum creatinine level, blood urea nitrogen, serum potassium, sodium rate and urine output amount than patients in control group

H3: Critically ill patients who exposed to nursing intervention program about early detection and prevention of acute kidney injury will exhibit short duration of ICU stay than patients in control group

Research design: A quasi-experimental research design was utilized in this study.

Setting:

This study was conducted at anesthesia critical care unit affiliated to emergency hospital of Tanta University. The intensive care unit was consisted of 5 rooms and each room had 5 beds.

Subjects:

A convenience sample of 60 patients who were acutely ill, divided into 2 groups, 30 patients in each. Control group 1 received routine unit care, and study group received intervention program for early detection and prevention of acute kidney injury in ICU. The sample size of patients was calculated based on power analysis equation.

Inclusion criteria: Adult Patients' age ranged from (18 to 60) years, newly admitted patients

Exclusion criteria included Patient had acute or chronic renal failure.

Tools of data collection: Two tools were used to collect data pertained to this study.

Tool (I): Patient' physiological health assessment, it was developed by the researcher after reviewing recent literature [17-20] and consisted of three parts:

Part (1): Sociodemographic characteristics and clinical data.

It consisted of two main sections: **the first section** included sociodemographic data such as Patient's age, sex, marital status, educational level, occupation and residence.

The second section covered medical data such as date of admission, diagnosis, duration of ICU stays, previous hospitalization and past medical history, smoking and present medical history and drug used.

Part (2) : Risk Prediction Assessment of Acute kidney Injury[20], this tool was used to assess the risk factors of acute kidney injury and were classified into three categories; medical risk prediction (heart failure, Liver disease, Past history of AKI, diabetes , neurological impairment or disability, hypovolemic, hematological malignancy symptoms or

history of or risk factors long-term catheter, use of iodinated contrast agents and use of nephrotoxic drugs) while surgical risk prediction included post cardiac surgery and emergency surgery and Mixed risk prediction included mix of medical and surgical risk factors.

Part (3): National early warning score (EWS) Tool, this part was developed by Royal College of Physicians (2017) [21] it was used to assess acute-illness severity when patients present acutely to hospital to track their clinical condition, alert the clinical team to any clinical deterioration and trigger timely clinical response.it consisted of six physiological observations (Respiration rate, oxygen Saturations, temperature, systolic Blood Pressure (BP), heart rate, level of Consciousness). Each individual observation generates a score. Each scores 0–3 and individual scores are added together for an overall score.

Scoring system

The score was graded into three trigger levels:

- A low National early warning score (EWS) score (1–4) indicated that patients need prompt assessment by a competent registered nurse or equivalent, who should decide whether a change to frequency of clinical monitoring or an escalation of clinical care is required.
- A medium National early warning score (EWS) score (5–6) is indicated that patients need prompt an urgent review by a clinician
- A high National early warning score (EWS) score (7 or more) indicated that patients need prompt emergency assessment by a clinical team .

National Early Warning Score (NEWS) 2

Physiological Score parameter	3	2	1	Score 0	1	2	3
Respiration rate (per minute	≤8		9–11	12–20		21–24	≥25
SpO2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg	≤90	91–100	101–110	111–219			≥220
Pulse (per minute	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Tool II: Patients 'Clinical outcome assessment:

This was used three times during the study on admission, 3rd day, and one week post implementation of nursing intervention program. It comprised two parts:

Part (1) Acute kidney injury network (AKIN) Assessment tool. This tool was developed by Mehta et al (2007) [22], and adopted by the researcher. It was used to assess severity and stage of acute kidney injury, it depended on two main parameter serum creatinine and urine output. Patients were diagnosed with acute kidney injury by the AKIN when they have at least one of the following within the past 48 hours: by the sudden decrease (in 48 h) of renal function, defined by an increase in absolute serum creatinine level of at least 26.5 μmol/L (0.3 mg/dL) or by a percentage increase in serum creatinine level≥50% (1.5× baseline value), or by a decrease in the urine output (documented oliguria <0.5 mL/kg/h for more than 6 h); it classified into four stage; No acute kidney injury, Risk 1 (early stage), Injury 2(moderate stage) and Failure (sever stage)

Scoring system

-No acute kidney injury: Normal serum creatinine level, or <1.5x from baseline

and urine output ≥0.5 mL/kg per hour for >6 hours

-**Stage 1** (risk class); it considered an absolute increase in SCr ≥26.5 μmol/L (0.3 mg/dL).

Stages 2 (risk injury classes), it considered an increase in SCr >2-3 times from baseline and decrease in urine output <0.5 ml/kg/h for >12 h

Stage 3 (failure classes), Increase in serum creatinine level to >3x from baseline, or ≥4.0 mg/dL (≥354 μmol/L) with acute increase ≥0.5 mg/dL (≥44 μmol/L) and urine output <0.3 ml/kg/h for ≥24 or anuria ≥12 h.

Part (2): Assessment of Patient 'Status on discharge (prognosis) and Renal recovery, this part was developed by the researcher after reviewing the related literature [14,18,19] It include assessment of the mortality rate, renal recovery, renal replacement therapy, referral to nephrologists, lab investigation mainly serum creatinine, blood urea nitrogen, serum electrolyte, urine output, duration of hospital stay and status of patient on discharge.

Method

Ethical consideration: An official permission to conduct the study was obtained from directors of ICU Unit. Written consent was obtained from patients to be included in the study after explanation of the purpose of the study. Each patient has the right to withdraw from the study at any time without any rational. Patients' privacy was respected and confidentiality of each patient was assured through coding of all data.

Content validity: All tools of the study were tested for content validity by five jury specialized in the field of critical care nursing and nephrology medicine from Tanta University and the necessary modifications were done.

The Reliability of tools had acceptable internal consistency by cronback'salpha. Reliability of risk Prediction Assessment of Acute kidney Injury was 0.95, National early warning score (EWS) Tool was **0.91** and Acute kidney injury network (AKIN) Assessment was 89.

A pilot study was conducted on 10% of sample of the study to test the feasibility and applicability of the study tools. The necessary modifications were done accordingly and the pilot study subjects were excluded from the actual study.

Procedure: The study was conducted on three phases which included assessment, implementation and evaluation phase.

1. Assessment phase:-

- A primary assessment was carried out by the researcher on the first day for all patients at the previously mentioned setting to determine who meet the

inclusion criteria of the study. Assessment of patient bio-sociodemographic data was obtained by the researcher from the patient or patient 'medical record using the developed questionnaire (tool I part (1),

- Assessment of risk prediction assessment of acute kidney injury was done by using tool 1 part (2), National early warning score (EWS) was done every day to assess acute-illness severity to track their clinical condition, alert the clinical team to any clinical deterioration and trigger timely clinical response by using tool 1 part (3)

2-Implementation phase:

- In this phase the researcher provided the nursing intervention program from the date of admission until discharge for risk patients. The researcher started the nursing intervention program as follow:
- Patients were screened for predictor variables within 48 h of ICU admission. Baseline and acute risk factors were recorded at the time of screening and serum creatinine was measured daily for up to 7 days.
- Monitoring output charts every shift, using different classification system of acute kidney injury for risk patient and measured by tool II part 1.
- Identification of risk factor through complete patient history, medication history, including over-the-counter medicines and herbal remedies, and including medications taken prior to admission or started after it. Recognizes medications which may increase the risk of AKI in a specific clinical context.
- Baseline assessment of patients including temperature, pulse rate, BP, respiratory rate, oxygen saturation, and AVPU (Alert/ responsive to Voice/Pain/Unresponsive) status in an acutely unwell patient and measured through national early warning score tool.
- Assessing renal function and estimating the serum creatinine and urine output is the first step in assessing the risk of AKI
- Monitors the patient’s fluid and electrolyte levels and physical indicators of potential complications every day from patient 'admission.
- Reducing metabolic rate through encouraged patient 'bed rest and fever and infection are prevented or treated promptly.
- The patient is assisted to turn, cough, and take deep breaths frequently to prevent atelectasis and respiratory tract infection.

- Prevent toxic drug effects, closely monitor dosage, duration of use, and blood levels of all medications metabolized or excreted by the kidneys.

Statistical design: Data was collected and analyzed by computer programmed SPSS (ver.16) **Field work**: Data were collected over a period of six months from May 2019 to October 2019.

3-Evaluation phase: Patient 'outcome was assessed by using tool (II) on 3rd day, and one week post implementation of the nursing intervention program for the study group and routine care for the control group.

Results

Table (1) illustrated that more than one third (36.7%) of control group aged from 30 to less than 40 years old compared to 40.0% of patients in study group, with the mean age was 39.20±9.375 and 41.53±11.20 in control and study group respectively. Also, the majority (80.0%) of control group were male compared to (76.7%) in study one, near to two third (60.0%) of study group were single compared to (43.3%) in control group.

Table (2) shows that more than half (53.3 and 56.7%) of both control and study group respectively had past history of hypertension while diabetes mellitus was reported among (50.0% and 53.3%) of both groups respectively, about two third (60.0%) of control group were smoker compared to one half (50.0%) of study one.

As regard current diagnosis, it was observed that near to one quarter (23.3%) of control group had respiratory disorders and trauma compared to (26.7% and 23.3%) of the study one. Neuro muscular diseases were encountered among 40.0% of patient in control group compared with 36.7% in study group. Also, previous hospitalization was reported among more than one half (56.7%) and half (50.0%) of both control and study groups respectively.

Table (3) found that no significant difference was observed among control and study group in relation to three categories of acute kidney injury risk prediction. Regarding medical risk prediction, it was observed that all patients (100%) in both control use of nephrotoxic drugs. Also, diabetes mellitus, liver disease were reported among (50.0% and 46.7%) of control group respectively compared to (53.35 and 40.0%) of study group. A significant difference was observed

Table (4) illustrates that the majority (96.7%) of patients in both control and study group had high level of National early warning sign score (NEWS) on admission. This indicates that these

Patients need higher level of care to identify and respond to deteriorating patients. After one week, most (96.7%) of patients in control group had high level compared to (86.7%) of the study one. A significant difference was found among control and study groups after one week where p= 0.005.

Table (5) shows that more than one third (43.3%) of control group classified as risk for acute kidney injury on admission compared to 30% after one week. Also more than half (56.7%) of control group hadn't acute kidney injury on admission and the percentage decreased to (36.7%) after one week of implementation of nursing intervention program.

As for study group, more than half (56.7%) of study group classified as risk for acute kidney injury on admission compared to 26.7% after one week. However more than one third (33.3%) of them hadn't acute kidney injury and the percentage increased to most of them (70.0%) after one week. A significant difference was found among both control and study group post one week of implementation of nursing intervention program P= 0.14

Table (6) shows significant differences among control and study group in relation to sodium level at 3rd day and after one week of study with p= 0.002 and 0.000 respectively. As for potassium level, a significant difference was found among both control and study group after one week of study while p= 0.002.

Also, the mean levels of urea were increased 56.97±18.62, 71.67±22.92 and 80.70±30.59 among control group throughout the three period of study respectively. Moreover, it was 56.97±18.62 and decreased to 44.40±9.68 and 42.30±10.11 among study group along three period of study. In relation to serum creatinine level, significant differences were reported among control and study group through the three period of the study while p= 0.024, 0.000, and 0.000 respectively.

Table (7) shows a significant difference between control and study group in relation to renal recovery, referred to nephrologists, Patients who received RRT and hospital mortality with P= 0.004 . Renal recovery was presented as (66.7%, 76.7%) in control and study group respectively. On the other hand, less than two third (60.0%) of control group was referred to nephrologists compared to (23.3%) among study group. Also, hospital mortality was presented as

(23.3%) and (10.0%) among both control and study group respectively. Regarding urine output, a significant difference was observed among control and study group.

Table (8) shows a significant difference between control and study group to length of hospital stay and status on discharge after one week with p= (0.000 and 0.015) respectively. The mean lengths of hospital stay were 11.10±1.807 in control and 9.20±1.669 in study groups. Also, near to (23.3%) of patient in control group had completely recovery compared to (60.0%) of study group.

Table (9) represents that near to one quarter (23.3%) from patients among control group had hypertension hadn't acute kidney injury and one fifth (20.0%) of them was at risk for kidney injury. As for study group, significant difference was observed in relation to past history and AKI outcome

assessment where p= 0.009, since 13.3% of them who had hypertension, liver diseases and diabetes were classified at risk. While more than one third (40.0% and 36.7%) of them hadn't AKI risk respectively. there was insignificant difference among both groups in relation to smoking and the acute kidney injury network outcome assessment where P >0.05

Table (10) represents that no significant difference was observed in relation to Patients' mortality rate, renal recovery, received RRT and referral to nephrologists among control group with p=0.172. On the other hand a significant difference was reported among study group since near two thirds of patients hadn't risk for acute kidney injury and had renal recovery with p= 0.010

Table (1): Distribution of the studied patients according to their socio demographic characteristics

Characteristics	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	N	%	N	%	
Age (in years)					
▪ <30	6	20.0	3	10.0	
▪ 30- 40	11	36.7	12	40.0	2.627
▪ 40- 50	9	30.0	7	23.3	0.453
▪ ≥50	4	13.3	8	26.7	
Range	**(22-56)**		**(23-59)**		t=0.875
Mean ± SD	**39.20±9.375**		**41.53±11.20**		P=0.385
Sex					
▪ Male	24	80.0	23	76.7	FE
▪ Female	6	20.0	7	23.3	1.00
Marital status					
▪ Married	9	30.0	4	13.3	
▪ Single	13	43.3	18	60.0	3.796
▪ Divorced	6	20.0	4	13.3	0.284
▪ Widow	2	6.7	4	13.3	
Educational level					
▪ Illiterate	4	13.3	4	13.3	
▪ Read and write	6	20.0	7	23.3	
▪ Basic primary education	4	13.3	3	10.0	0.803
▪ Diploma	5	16.7	7	23.3	0.977
▪ Secondary education	2	6.7	2	6.7	
▪ University education	9	30.0	7	23.3	
Occupation					
▪ Work	20	66.7	19	63.3	FE
▪ Not work	10	33.3	11	36.7	1.00
Residence					
▪ Urban	16	53.3	16	53.3	FE
▪ Rural	14	46.7	14	46.7	1.00

FE: Fisher's Exact Test

Table (2): Distribution of the studied patients according to their clinical data.

Clinical data	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	N	%	N	%	
Hypertension	16	53.3	17	56.7	
Cardiac disease	8	26.7	13	43.3	
Malignancy	6	20.0	5	16.7	0.271
Respiratory disease	18	60.0	14	46.7	0.602
Liver disease	14	46.7	12	40.0	
Diabetes	15	50.0	16	53.3	
Smoker	18	60.0	15	50.0	FE 0.604
Diagnosis of current admission					
▪ Respiratory disorder	7	23.3	8	26.7	1.253
▪ Neuro muscular	12	40.0	11	36.7	0.869
▪ GIT	4	13.3	3	10.0	
▪ Trauma	7	23.3	7	23.3	
▪ Cardiac disorder	0	0.0	1	3.3	
Previous hospitalization					
▪ No	17	56.7	15	50.0	FE
▪ Yes	13	43.3	15	50.0	0.796

FE: Fisher's Exact Test

Table (3): Distribution of the studied patients according to their risk prediction assessment of acute kidney injury among the studied groups.

Risk prediction assessment of acute kidney injury	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	N	%	N	%	
# Acute kidney injury risk prediction					
1.Medical risk prediction	12	40.0	13	43.3	1.067
2.Surgical risk prediction	1	3.3	4	13.4	0.302
3.Mixed risk prediction	17	56.7	13	43.3	
# Medical risk prediction	8	26.7	13	43.3	
- Heart failure	14	46.7	12	40.0	
- Liver disease	8	26.7	11	36.7	
- Past history of AKI	15	50.0	16	53.3	
- Diabetes	5	16.7	7	23.3	
- Neurological impairment or disability	7	23.3	15	50.0	**4.593**
- .Hypovolemic	6	20.0	5	16.7	**0.032***
- Hematological malignancy	6	20.0	3	10.0	
- Symptoms or history of or risk factors	5	16.7	3	10.0	
- long-term catheter	10	33.3	4	13.3	
- Use of iodinated contrast agents	30	100.0	30	100.0	
Use of nephrotoxic drugs					
- vasopressors	8	26.7	13	43.3	
- diuretics	16	53.3	17	56.7	
- Ca channel blockers	11	36.7	13	43.3	0.067
- ACEI	16	53.3	17	56.7	0.795
- ARB	14	46.7	15	50.0	
- NSAIDs	19	63.3	14	46.7	
- Aminoglycosidesyes	15	50.0	16	53.3	
Surgical risk prediction					
▪ Post cardiac surgery	7	23.3	5	16.7	1.725
▪ Emergency surgery	10	33.3	15	50.0	0.422
▪ None	13	43.3	10	33.3	

More than one answer was chosen. * Significant at level P<0.05.

Table (4): Distribution of the studied patients according to the National early warning score (NEWS) throughout periods of study.

NEWS	The studied patients (n=60)											
	Control group (n=30)						Study group (n=30)					
	On admission		At 3rd day		After one week		On admission		At 3rd day		After one week	
	N	%	N	%	N	%	N	%	N	%	N	%
▪ (5-6) Medium	1	3.3	0	0.0	1	3.3	1	3.3	0	0.0	4	13.3
▪ (≥7) High	29	96.7	30	100.0	29	96.7	29	96.7	30	100.0	26	86.7
χ^2 , P	1.023 , 0.600						5.506 , **0.047***					
Range	**(6-17)**		**(7-18)**		**(6-17)**		**(6-19)**		**(7-17)**		**(6-13)**	
Mean ± SD	**10.53±3.14**		**11.53±2.99**		**10.27±2.97**		**11.00±3.35**		**11.77±2.57**		**8.40±1.85**	
F , P	1.453 , 0.239						**13.181 , 0.000***					
Control Vs Study t P	0.557 0.580		0.324 0.747		**2.922 0.005***							

t : Independent sample test
* Significant at level P<0.05.

Table (5): Distribution of the studied patients according to the AKIN (the Acute Kidney Injury Network (AKIN) outcome assessment throughout periods of study.

AKIN AKI outcome	The studied patients (n=60)												
	Control group (n=30)						χ^2 P	Study group (n=30)						χ^2 P
	On admission		At 3rd day		After one week			On admission		At 3rd day		After one week		
	N	%	N	%	N	%		N	%	N	%	N	%	
▪ Not AKI														
▪ Risk (early)	17	56.7	11	36.7	11	36.7		10	33.3	14	46.7	21	70.0	
▪ Injury	13	43.3	15	50.0	9	30.0	**15.36**	17	56.7	13	43.3	8	26.7	**8.587**
(moderate)	0	0.0	4	13.3	8	26.7	**0.018***	3	10.0	3	10.0	1	3.3	**0.045***
▪ Failure (sever)	0	0.0	0	0.0	2	6.7		0	0.0	0	0.0	0	0.0	
Control VS Study χ^2 P	5.348 0.069		0.646 0.724		**10.628 0.014***									

* Significant at level P<0.05.

Table (6): Mean scores of lab investigation among the studied groups throughout periods of study.

Investigation outcomes	Range Mean ± SD							
	Control group			F P	Study group			F P
	On admission	At 3rd day	After one week		On admission	At 3rd day	After one week	
Sodium level (Na)	(131-148) 140.07±4.64	(136-155) 143.57±4.68	(135-155) 145.77±4.11	**12.334** **0.000***	(131-148) 140.07±4.64	(133-148) 139.87±4.27	(133-148) 139.77±4.40	0.036 0.965
Control Vs Study **t** **P**	0.000 1.00	**3.198** **0.002***	**5.460** **0.000***					
Potassium level (K)	(3.3-5.3) 4.29±0.63	(3.3-5.4) 4.23±0.64	(3.3-5.9) 4.72±0.74	**4.649** **0.012***	(3.3-5.3) 4.41±0.64	(3.3-5.3) 4.29±0.63	(3.3-5.3) 4.16±0.60	1.171 0.315
Control Vs Study **t** **P**	0.690 0.493	0.387 0.700	**3.190** **0.002***					
Blood Urea nitrogen	(32-99) 56.97±18.62	(6-110) 71.67±22.92	(6-170) 80.70±30.59	**7.143** **0.001***	(32-99) 56.97±18.62	(31-66) 44.40±9.68	(31-66) 42.30±10.11	**10.434** **0.000***
Control Vs Study **t** **P**	0.00 1.00	**6.003** **0.000***	**6.529** **0.000***					
serum Creatinine level	(0.0-2.9) 1.13±0.82	(0.2-3.1) 1.75±0.79	(0.0-3.3) 2.25±0.83	**14.267** **0.000***	(0.0-2.3) 0.70±0.63	(0.0-2.0) 0.69±0.55	(0.0-2.0) 0.79±0.59	0.269 0.765
Control Vs Study **t** **P**	**2.323** **0.024***	**6.039** **0.000***	**7.854** **0.000***					

t : Independent sample test * Significant at level P<0.05.

Table (7): Distribution of the studied patients according to their renal function recovery outcome post one week of implementation of nursing intervention program.

Outcome	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	N	%	N	%	
Patient' mortality.	7	23.3	3	10.0	
Renal Recovery.	20	66.7	23	76.7	**8.297**
Patients who received RRT	6	20.0	3	10.0	**0.004***
Referral to Nephrologists	18	60.0	7	23.3	
Urine output					
• ≥0.5 mL/kg per hour for >6 hours	2	6.7	16	53.3	**30.976**
• <0.5 mL/kg per hour for >6 hours	9	30.0	14	46.7	**0.000***
• <0.5 mL/kg per hour for >12 hours	17	56.7	0	0.0	
• <0.3 mL/kg per hour for ≥24 hours, or anuria for 12 hours	2	6.7	0	0.0	

* Significant at level P<0.05.

Table (8): Distribution of the studied patients according to length of hospital stay and prognosis post one week of implementation of nursing intervention program.

	Control group (n=30)		Study group (n=30)		
Length of hospital stay					
Rangse	(8-15)		(7-14)		**t=4.230**
Mean ± SD	11.10±1.807		9.20±1.669		**P=0.000***
Prognosis					
▪ Refereed	16	53.3	9	30.0	**8.40**
▪ Complete recovery	7	23.3	18	60.0	**0.015***
▪ Died	7	23.3	3	10.0	

Table (9): Comparison between the acute kidney injury network (AKIN) Assessment outcome and past medical history among the studied groups post one weak of implementation of nursing intervention program.

Past medical history and comorbidities	The studied patients (n=60) AKI outcome assessment															
	Control group (n=30)								Study group (n=30)							
	Not AKI		Risk		Injury		Failure		Not AKI		Risk		Injury		failure	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1.Hypertension	7	23.3	6	20.0	3	10.0	0	0.0	12	40.0	4	13.3	1	3.3	0	0.0
2.Cardiac disease	3	10.0	2	6.7	3	10.0	0	0.0	9	30.0	3	10.0	1	3.3	0	0.0
3.Malignancy	1	3.3	2	6.7	3	10.0	0	0.0	3	10.0	2	6.7	0	0.0	0	0.0
4.Respiratory disease	8	26.7	5	16.7	5	16.7	0	0.0	10	33.3	3	10.0	1	3.3	0	0.0
5.Liver disease	5	16.7	4	13.3	3	10.0	2	6.7	8	26.7	4	13.3	0	0.0	0	0.0
6.Diabetes	5	16.7	6	20.0	3	10.0	1	3.3	11	36.7	4	13.3	1	3.3	1	3.3
χ^2 , P	4.204 , 0.240								**9.403 , 0.009***							
Smoker	6	20.0	5	16.7	6	20.0	1	3.3	11	36.7	3	10.0	1	3.3		
χ^2 , P	1.044 , 0.791								1.548 , 0.461							

* Significant at level P<0.05.

Table (10): Comparison between the acute kidney injury network (AKIN) Assessment outcome and patient' mortality rate, renal recovery, receiving renal replacement therapy and referral to nephrologists post one weak of implementation of nursing intervention program.

Items	The studied patients (n=60) acute kidney injury network (AKIN) Assessment outcome													
	Control group (n=30)								Study group (n=30)					
	Not AKI		Risk		Injury		Failure		Not AKI		Risk		Injury	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1. Patients' mortality.	3	10.0	2	6.7	2	6.7	0	0.0	3	10.0	0	0.0	0	0.0
2. Renal Recovery.	8	26.7	6	20.0	5	16.7	1	3.3	19	63.3	4	13.3	0	0.0
3.Patients received RRT	0	0.0	3	10.0	2	6.7	1	3.3	0	0.0	3	10.0	0	0.0
4.Referral to Nephrologists	1	3.3	8	26.7	7	23.3	2	6.7	2	6.7	5	16.7	0	0.0
χ^2 , P	5.00 , 0.172								**9.167 , 0.010***					

* Significant at level P<0.05.

Discussion

Acute kidney injury is an increasingly common and potentially catastrophic complication in critically ill patients. Therefore nursing intervention program about early detection and prevention of acute kidney injury for critically ill patients is very important to improve patient's clinical 'outcome. The current result showed that there was no statistically significant differences between both study and control groups concerning patients' sociodemographic characteristics. This indicated the homogeneity of the two selected groups; therefore any difference between them can be due to the applied of nursing intervention program of early detection and prevention of acute kidney injury. However the present finding found that more than one third of patients of control and study group aged ranged from 30 to less than 40 years old and were male. This result was in congruent with Shamali (2016)[23] who stated that the majority of studied critically ill patients were at this mean age

Cigarette smoking increasing risk for acute kidney injury and causes a decrease in GFR in diabetic patients with normal or near-normal renal function. In this regard, the current study showed that, more than half of both control and study group had hypertension, diabetes mellitus and were smoker which increased risk for occurrence of acute kidney injury. The same finding was reported by Maddatu et al. (2017) [24] who stated that heavy smoker patients are at risk for the development and progression of diabetic nephropathy.

Regarding current diagnosis, the findings of the present study showed that the most common diagnosis of both groups had respiratory disorders, trauma and neuro muscular diseases. These medical problems may increase risk of acute kidney injury in critically ill patients. This finding was similar with Panitchote et al. (2019) [25] concluded that severe acutely illness, diabetes, respiratory disorders and acidosis were associated with development of acute kidney injury.

Early identification of patients at risk for acute kidney injury can provide adequate strategies for prevention and treatment. The result of this study revealed that diabetes mellitus, nephrotoxic drugs, liver disease and emergency surgery were predictors of acute kidney injury in our study. No significant difference was observed among two groups in relation to surgical risk prediction. This result was consistent with Neyr (2018)[19] and Malhotra et al (2017) [20] who found that congestive heart failure, nephrotoxic exposure, chronic liver disease and sepsis

were identified as a risk prediction score for acute kidney injury in the intensive care unit.

Regarding distribution of the studied patients according to the National early warning sign score (NEWS). It was found that the majority of patients in both control and study group had high level of national early warning sign score (NEWS) on admission which indicated that patients need prompt emergency assessment by a clinical team. However, national early warning sign score was decreased in study group than control group after one week. This indicated good prognosis of patients in study group who managed by nursing intervention program since National early warning sign score (NEWS) assess acute-illness severity. Similarly Scott et al (2019) [26] reported that Early Warning Scores (EWS) are widely recommended for recognizing patients at risk and deterioration of patients condition and higher scores indicating that a patient is more unwell.

Regarding distribution of the studied patients according to the acute kidney injury network outcome assessment (AKIN). The current study showed that a significant difference was found among control and study group after one week where majority of patients in study group hadn't acute kidney injury compared to only one third of patients in control group. Also nearly one third of patients in control group had classified as risk Injury (moderate) to acute kidney injury compared to only three percent of patient in study group. This may be attributed to the effect of nursing intervention program about early detection and prevention of acute kidney injury. This finding was consistent with Shafie et al. (2016) [8] who used kidney injury network scale to classify degree of acute kidney injury and reported that more than one third of study sample classified as risk and nearly on half of sample classified as injury for acute kidney injury .

Regarding Mean scores of lab investigation among the studied groups throughout periods of study**,** our result revealed an improved of Na and K level among study group after one week compared with control group. Also, the mean levels of urea and serum creatinine level were improved among study group after one week compared with control group. This indicated improved renal function. This result was agreed with Work Group KDIGO (2013) [27] who confirmed that serum creatinine level has been used for many years as a marker of renal function in both acute and chronic kidney failure.

Also Potter et al. (2017)[28] stated that Potassium and Sodium bicarbonate were shown to be more responsive markers in acute kidney injury than serum creatinine and NEWS. On the other hand Makris (2016) [29] reported that serum creatinine level is not an ideal molecular marker for the diagnosis of acute kidney injury and also didn't differentiate between changes in kidney function and structural kidney damage.

Concerning distribution of the studied patients according to their renal function recovery outcome after one week**.** The present finding revealed that there was a significant difference between control and study group in relation to renal recovery, referred to nephrologists, Patients who received renal replacement therapy and patients' mortality rate. Most of the patients in study group that received nursing intervention program had renal recovery and low percentage of them had low mortality rate and referred to nephrologists compared to control group. Similarly, Meier et al. (2011) [30] concluded that low hospital mortality rate for the patients with hospital acquired acute kidney injury who received continues evaluation and intervention and Patients with fully recovered HA-AKI during their hospital stay had lower mortality rate. Also Balasubramanian et al. (2011)[31] reported that timely nephrologic interventions to prevent acute kidney injury improved renal outcomes.

Regarding urine output, more than half of the study group had normal urine output ≥0.5 mL/kg per hour for >6 hours after one week compared to low percentage of patients in control group with significant difference was observed among control and study group. In this regard Allen et al. (2020)[32] stated that urine output can detect acute kidney injury eleven hours earlier than serum Creatinine level and urine output was included in the diagnostic criteria for acute kidney injury. On the other hand, Macedo et al (2011)[18] concluded that there was no significant difference between assessing urine output every hour for the detection of episodes of oliguria, and identifying patients with AKI.

Concerning distribution of the studied patients according to length of hospital stay and status on discharge after one week**.** There was a significant difference between control and study group to length of hospital stay and status on discharge after one week. The mean lengths of hospital stay were longer in control group compared to study group. Near to two third of study group had completely recovery compared to control group.

Kellum et al. (2017) [33] reported that the shortest hospital lengths of stay were associated with best prognosis and completely recovery. Similarly Huber et al. (2018) [34] concluded that acute kidney injury (AKI) is associated with a prolonged ICU and hospital stay. Furthermore, patients suffering from AKI have higher rates of short- and long-term mortality.

According to comparison between the acute kidney injury network outcome assessment and past medical history and comorbidities after one weak of study. The present findings illustrated a significant difference was observed among study group in relation to past history and acute kidney injury network outcome assessment, where one third of patients that had hypertension hadn't risk to acute kidney injury . This could be due to effect of nursing intervention program that included continuous observation and management of patient who at risk for acute kidney injury.

However, only minority of the patients who had hypertension, liver diseases and diabetes compared to one fifth of control group that classified as risk for acute kidney injury. This can be explained as hyperglycemia induces release increased production of reactive oxygen species that increase risk of acute kidney injury. This is congruent with Bennet et al. (2010) [35] who confirmed that the comorbidities associated with acute kidney injury and classified as risk for acute kidney injury including hypertension, diabetes mellitus, vascular disease, and chronic renal disease.

Regarding comparison between the acute kidney injury network outcome assessment and patients' mortality rate, renal recovery, receiving renal replacement therapy (RRT) and referral to nephrologists. The present result showed that the patients' mortality rate, renal recovery, Patients who received RRT and referral to nephrologists was not different among patient reaching risk to injury in control group. This findings were in agreement with Ali et al. (2007) [36] who reported that there were no significant differences in relation to RRT requirement, mortality among patient had risk to injury and concluded that acute kidney injury assessment outcome did not, predict the long-term outcomes of mortality. Similarly, Mandelbaum et al. (2011)[37] stated that there was no clear risk difference between the patients with stage I and II of acute kidney injury and risk of mortality rate

Conclusions

The majority of patients in both control and study group had high level of National early warning sign score (NEWS) on

admission which indicates that these Patients need higher level of care to identify and respond to his deterioration. The length of hospital stay in control group was long relatively than study group. Application of early identification and prevention of acute kidney injury program decreased patients' mortality rate, receiving of renal replacement therapy, improved renal recovery and urine output per day compared with control group.

Recommendations

Based on the findings of this study, the following recommendations are suggested; nursing intervention program about early detection and prevention of acute kidney injury for critically ill patients should be implemented routinely for risk patients in intensive care unit. Integrating nursing intervention program into plan of care to replace the traditional nursing care plan. Replication of the study on large probability sampling

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Efficacy of Application of Clinical Leadership Competencies Program on Charge Nurses Based on Self Need Assessment

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Abstract

Background: Clinical leadership plays a significant role for emphasizing the responsibility of charge nurses and contribute to developing and empowering their leadership capacity. Competent charge nurse need to be aware of the enablers, opportunities, strategic points and cultures of work environment they were operating. **Objective:** to study Efficacy of application of clinical leadership competencies program on charge nurses based on self-need assessment. **Setting:** Tanta Main University Hospital ICUs. **Subjects:** All (78) charge nurses working at studied ICUs. **Tools:** Three tools were used, Tool I: Self-assessment of charge nurse development need for clinical leadership skills and capabilities. Tool II: Knowledge assessment on clinical leadership competencies. Tool III: Clinical leadership competency level assessment. **Results:** Charge nurses 87.2% had high level of needs and importance regarding clinical leadership skills and capabilities development. Preprogram charge nurses 98.7%, 94.9% respectively showed poor level of knowledge and competency of clinical leadership, changed significantly at $p< 0.001$ post program to be 94.9%, 96.2% respectively. **Conclusion:** Charge nurses at Main University Hospital ICUs knowledge and competency of clinical leadership were at low level, they were lacking knowledge for developing clinical leadership and have great need for program about clinical leadership competencies to improve their leadership role. Immediately after application of successful clinical leadership competency program, they significantly improved their leadership knowledge and competency. **Recommendation:** Charge nurses should contribute to clinical leadership development by attendance of formal education programmes, case-conferences, workshops, distance learning, e-learning and self-directed learning.

Key words: charge nurses, clinical leadership, clinical leadership competencies.

INTRODUCTION

Leadership development for charge nurse is important for decreasing all costs of which are associated with quality of care[1]. Charge nurse act as a leader who plays a pivotal role in ensuring quality patient outcomes and have an abilities to interpret and integrate concepts into specific clinical and managerial performance while also determining and monitoring outcomes. [2] There is need to coordinate and integrate care accessible by nurses and charge nurses collaborations. Registered clinical charge nurses leadership knowledge, skills, and ability to develop targeted care coordination and integration competencies for a more robust skill is important for harmonized imperatives clinical leadership changes. [3] Assessment for charge nurses Clinical leadership competences and developing mechanisms which address their leadership deficits at individual, team, department and organizational levels are necessary.[4,5] Development of charge nurses' clinical leadership concerns quality, safety and effectiveness development.

Assessment of charge nurses competency for shared responsibility within those in leadership positions is important to work together across professional boundaries and to secure the needed recognition influence. [6] Also to assure that their clinical leadership capacity can be harnessed, developed and deployed in the interests of patient care.[7] Such as include flexibility, self-awareness, communication skills, knowledge of administrative tasks and soft skills in working with people. [8,9] Competencies of charge nurse in clinical leadership for delivering high quality services to patients being through vital competent seven core domains of leadership framework namely: personal qualities, working with others, managing services, improving services and setting direction, creating the vision and delivering the strategy[10, 11]

Personal qualities, the first domain, demonstrates as set of behaviours and skills that enable charge nurses to function appropriately in the clinical setting. These includes developing self-awareness by being aware of their own values and principles, managing self by prioritizing and organizing, continuing personal development through experience and feedback. [12] Working with others, the second domain focused on the ability to lead, collaborate with others on work activities by interpersonal relationships which develops linkages by working in partnership with the patient and other healthcare providers. [13] Managing services domain comprising the planning or lay outing phases, managing resources

by knowing what resources are present, managing people, and managing performance by holding the accountability for service outcomes [14].

Improving services domain consisting of ensuring patient safety, and encouraging improvement and innovation. Setting direction domain brings in the knowledge and evidence by gathering information, making decisions, and evaluating impact by evaluating outcomes. Creating the vision is the sixth domain which included in effective clinical leadership through creating a compelling vision for the future, and communicating this within and across organisations. Finally, the seventh is the delivering the strategy domain, involves delivering the strategy by developing and agreeing strategic plans that place patient care at the heart of the service, and ensuring that these are translated into achievable operational plans [12].

Clinical leadership competency skills developed for charge nurse leaders at the bedside can let them to identify work inefficiencies, motivate nurse colleagues to act, and lead change by initiatives to correct problems. [15] They also recognize their responsibility to act to improve the delivery of patient care services, envision better ways to deliver patient care services and engage others in testing innovations. The results of charge nurse leaders' clinical leadership are enhanced patient care, improved patient outcomes and patient satisfaction, and the attainment of a healthy practice environment [16]. Programs for development of clinical leadership enhance self-confidence, improve care, job satisfaction and enhance leadership skills and capabilities in such areas as team effectiveness, communications, change management and management of conflict[17] .

Clinical leadership competency training program for charge nurses might provide strength, inspiration and knowledge to increases understanding about clinical leadership [18] .As well as empower the new charge nurse to become a role model for nursing staff and to be facilitator for nurses improvements in nursing care practice [19] .Therefore present study aims to develop charge nurses' clinical leadership competencies through planning and application of an educational training program and evaluating its efficacy on their knowledge, skills and awareness of clinical leadership qualities which will increase their job satisfaction decision making skills and patient safety.

AIM OF THE STUDY

The aim of this study was to design, apply and evaluate efficacy of educational program for charge nurses to develop their

clinical leadership competencies based on their self-need assessment

Research hypothesis

- Charge nurses are in need for clinical leadership competencies program**.**
- Charge nurses' competencies in clinical leadership expected to be improved after application of the designed program

Subjects and method

Study design: Quasi experimental research design was used to achieve the aim of present study. Such design fits the nature of the problem under investigation[20].

Setting

The present study conducted at Tanta Main University Hospital five ICUs namely: neonatal, medical, coronary, neurology and chest.

Subjects

The study subjects consisted of all (n=78) charge nurses working at studied ICUs. Charge nurses at neonatal (n=26), medical (n=23), coronary (n=160), neurology (n=10) and chest (n=3).

Tools

The data of the study collected using three tools:

Tool (I): Self-assessment of charge nurse development need for clinical leadership skills and capabilities. This tool was developed by **Fealy, et al (2010)** [21]. It contains 3 parts as follows:-

Part (a) Characteristics of subjects' such as age, marital status, education level, years of experience, gender and previous in-services education courses.

Part (b) Self-need assessment scale which include a list of clinical leadership skills and capabilities that charge nurse demonstrate to develop their clinical practice.

Part (c) Scale self-assessment for importance which includes list of (61) charge nurse perceived for each statement at part (b) list of clinical leadership skills and capabilities that charge nurses demonstrated to develop their clinical practice needed for their effective performance as clinical leader.

Each of part (b) and (c) included statements under the following items:

1- Improving the environment for care delivery.

3- Skills for clinical leadership.

2- Personal and professional development.

Scoring system

Responses of charge nurses' self-assessment scale were measured in 5 points likert scale ranging from (1-5) for parts b and c as follows:-

- Score of part (b)

1 = I have no need, 2 = I have low need, 3 = I have moderate need, 4 = I have high need and 5 = I have very high need

The need score represented varying levels as following:

- High need level > 75%
- Moderate need level 60 % -75%
- Low need level < 60%

- Score of part (c)

1 = Not Important, 2 = Little Important, 3 = Moderately Important, 4 = Important and 5 = Very Important

The importance score represented varying levels as following:

- High importance level >75%
- Moderate importance level 60%-75%
- Low importance level <60%

Tool (II): Knowledge assessment on clinical leadership competencies

This tool was developed by researcher according to relevant recent literature to collect data from charge nurses about clinical leadership competencies. It included 10 questions in form true and false for each of the following competencies:-

- Clinical leadership concept and role of charge nurse
- Personal quality competency
- Working with other competency
- Managing service competency
- Improving service competency
- Setting direction competency
- Creating vision competency
- Delivering the strategy

Scoring system

Responses of charge nurses for each item of knowledge questionnaire scored by one for correct answer and zero for wrong answer.

Charge nurses' knowledge level was computed as follows:

- Level of good knowledge > 75 %
- Level fair knowledge 60 % < 75 %
- Level of poor knowledge < 60 %

Tool (III): Clinical leadership competency level assessment

This tool developed by researcher include situations about each of the seven clinical leadership competencies including personal quality competency, working with other competency, managing service competency, improving service competency, setting direction competency, creating vision competency and delivering the strategy.

Scoring system

Each situation took 10 scores and each question scored one for correct answer and zero for wrong answer.

Charge nurses' level of competency was computed as follows:-

- High level competency > 75 % score equal 8 - 10
- Fair level competency 75 % - 60 % score equal 6 - 7.5
- Poor level competency < 60 % score equal 0 - 5

Method

An official letters from Faculty of Nursing Tanta university authorities were generated to manager of the main university hospital, and the chive of ICU understudy to obtain their permission to conduct the study.

Ethical consideration

1- The aim of the study was explained and made clear to the charge nurses of the selected ICU units to gain their cooperation and get informed consent. Confidentiality and privacy of charge nurses' relevant information will be ascertained and the right of withdrawal from the study will be reserved

2- After reviewing of related literature and different studies in this field, the study tools (II), (III) were developed by the researcher and use of relevant literature reviews.

3- Tools of data collection were presented to a jury of nine experts in the area of nursing administration to check the content validity and use of relevancy of items. The nine experts were one professor, assistant professor and lecturer from Alexandria Faculty of Nursing, Tanta Faculty of Nursing and Beni Suef Faculty of Nursing respectively.

4- The experts' responses were represented in four points rating score ranging from (4 to 1). 4 = strongly relevant, 3 = relevant, 2 = little relevant, and 1 = not relevant. Necessary modifications were done including: clarification, omission of certain questions and adding others and simplifying work related words. The face validity was 92.36% and the content validity was 91.9% for self-assessment of charge nurse development need for clinical leadership skills and capabilities nursing and for tool (III) was 86.68%.

5- Reliability of tools (I) were tested using Cronbach Alpha coefficient test. Its values tool (I) was 0.945, tool (II) was 0.734, tool (III) was 0.792 respectively.

6- A pilot study was conducted on 10 of charge nurses randomly selected to test tools clarity and applicability, then needed correction were done. Those nurses not included in the study subjects. Pilot study served to estimate the time required for filling questionnaire sheet. The estimated time needed to complete the questionnaire items were approximately 20 minutes for need assessment tool (I) and 50 minutes for knowledge test tool (II).

Data collection phase

7- Self-assessment of charge nurse development need for clinical leadership skills and capabilities tool (I) was used before implementing the program

8- Knowledge assessment of charge nurses clinical leadership competencies tool (II) was used before implementation of program.

9- Levels of charge nurses' clinical leadership competencies assessment tool (III) was used before implementation of program.

10- The charge nurses were divided into ten groups. The program contains eight sessions, each session 2 hours, each group took 16 hours. The program was conducted at their units for duration of 4 months.

Construction of educational program

The first step of educational program was the statement of instructional objectives. The objectives were derived from the self-need assessment data from tool (I) and literature review.

General instructional objectives

The main objective of the program implementation was to develop charge nurses' clinical leadership knowledge and competencies.

Specific objectives

At the end of the program the charge nurses should have develop clinical leadership knowledge and competencies through:

- Identify clinical leadership concept and charge nurse role
- Specify personal quality development competency
- Explain working with other competency
- Explain managing service competency
- Discuss service competency development
- Identify setting direction competency
- Specify creating vision competency
- Identify delivering strategy competency and practice solving situations about clinical leadership competencies.

Program contents

The content was designed, method of teaching and evaluation was identified. The content was selected after carful assessment of subject needs. Simple and scientific language was used. The clinical leadership competency program.

Eight sessions (knowledge and situations) under eight topics as follows:

Session 1. Clinical leadership concept and charge nurse role

Session 2. Personal quality development competency

Session 3. Development of working with other competency

Session 4. Development managing service competency

Session 5. Improving service competency development

Session 6. Development setting direction competency

Session 7. Developing of creating vision competency

Session 8. Development of the delivering the strategy competency

Selection of teaching method

The selection of teaching method was carried out according to subject needs and content of clinical leadership competency program. The methods used were lectures, group discussion, example from life, and situations.

Teaching aids

The teaching aids used for attainment of program objectives were data show, handout, flow sheets, pens and paper.

Implementation of program

- The study was carried out on 78 charge nurses, divided into ten groups. The program time was 16 hours for each group. One session every day for 8 days, every session was 2 hours. Program was conducted for charge nurses at their working units. They preferred to start sessions at 11am to 1 pm as it was the most suitable time for them. The charge nurses were informed about objectives of the program. The researcher built good relationship and motivated them to participate and share in program activities.
- The program was implemented in the charge nurses' units at main university hospital the following flow sheet used to illustrate the session activities carried out.

Statistical analysis: Statistical presentation and analysis of the present study was conducted, using the mean, standard Deviation, paired student t-test, chi-square and Linear Correlation Coefficient [r]tests by SPSS V20.

RESULTS

Table (1) charge nurses characteristics showed that 62.8% have age ranged from 20-29 years while 3.8% aged over forty. Three quarter of charge nurses' were married, 94.9% have bachelor degree and 5.1% have master degree. About third of charge nurses either have < 5, 5-10, > 10 or more than ten years of experience and more than half of charge nurses have less than five years and 20.5% have ten years' experience in their units. One third of charge nurses were from neonatal intensive care unit, and about one quarter from medical. The rest were from coronary, neurology and chest intensive care units. High percent 87.2% of charge nurses were female and 53.8% attained in-

service education and training related to clinical leadership role.

Figure (1) shows overall levels of charge nurses needs and importance for clinical leadership skills and capabilities development. Majority of charge nurses had high level of needs and importance regarding clinical leadership skills and capabilities development.

Figure (2): shows levels of charge nurses' need for items of clinical leadership skills and capabilities development. Majority of charge nurses reported high need for improving environment for care delivery, followed by skills of clinical leadership development and personal and professional development.

Figure (3): shows levels of charge nurses' importance for items of clinical leadership skills and capabilities development. The majority of charge nurses appointed high importance for improving environment for care delivery, followed by skills of clinical leadership personal, professional development.

Table (2) Ranking mean score of charge nurses' needs and importance for items of improve environment for care delivery revealed that the high need is distribute duties of team members according to experience, with mean score 4.09 ± 1.23 and most important is identifies priorities with service of emergency and improvement, with mean score 4.24 ± 1.16. While the lowest (28) need ranking was for mean score 2.67 ± 1.50 and for important mean score 2.82 ± 1.52 were both for the item of involves patients and their families in their treatment care plans. The mean need score ranged from 4.09 ± 1.23 to 2.67 ± 1.50 and importance mean score ranged from 4.22 ±1.10 to 2.82 ± 1.62. There was statistical significance difference between charge nurses mean score of needs and importance of coordinates, makes patients aware of their rights and unit polices, participates in multidisciplinary decision making and considers social and cultural backgrounds when interacting with others.

Table (3) illustrates ranking mean score of charge nurses' needs and importance of clinical leadership skills development items. The ranking of items revealed that the high need was for items of motivates nursing team to provide optimal patient care with mean score 3.91 ±1.19 and high important was for items of makes decision based on best available information with mean score 3.96 ± 1.24. While the lowest rank for need and important both were for item of be accountable for the resource implications of nursing staff practice with mean score 3.40 ± 1.46. There was statistical significance difference between charge nurses mean score of needs and

importance for items creates alternative solutions to address problems.

Table (4) represents mean score of charge nurses' needs and importance related to items of personal and professional clinical leadership development. The ranking of items revealed that the high need and importance was for item of participates in continuing professional development education with mean need score 3.71 ± 1.29 with mean importance score 3.67 ± 1.36. While the lowest need ranking (14) have mean score 3.14 ± 1.54 and lowest importance mean score 3.10 ± 1.55 were for the same item offers constructive criticism to nursing staff. The items cope effectively with work pressure and acts as a mentor to nursing staff constitute the second need with both equal means (3.67) =2, 3 rank of importance respectively.

Figure (4) shows levels of charge nurses' overall knowledge about clinical leadership pre and post-test program. Majority of charge nurses were at poor level of knowledge of clinical leadership pre-program changed post program to be majority had good level of clinical leadership knowledge.

Table (5) Shows levels of charge nurses' knowledge of items of clinical leadership competencies pre and post program. The table reveled that charge nurses' overall knowledge of all items of leadership competencies were improved statistically significant post than pre-program at $p \leq 0.05$. Charge nurses 98.7%, 96.2%, 79.5%, 65.4%, 47.4% and 44.9% showed poor level of knowledge for items of developing and creating vision, delivering the strategy, development of setting direction, personal quality development, development of working with others and development of managing services of clinical leadership preprogram respectively. Equal percent (80.8%) of charge nurses showed poor knowledge about clinical leadership concept and role of charge nurses and improving services development. But post program range (97.4 - 94.9) showed good level of clinical leadership knowledge.

Figure (5) shows overall level**s** of charge nurses' clinical leadership competency pre and post program. Majority of charge nurses had poor level overall clinical leadership competency preprogram, changed to be majority of charge nurses' had high level of overall competency post program.

Table (6) shows charge nurses' clinical leadership competency level pre and post program. There is statistical significance difference between charge nurses' clinical leadership competency level pre and post-program at $p \leq 0.05$. Preprogram all charge nurses showed poor competency level for development of delivery strategy

competency. While range (88.5%-80.8%) showed poor competency about personal quality development, developing of creating vision and development of working with other. Charge nurses 73.1%, 62.8%, 20.5% also showed poor competency level of improving service development, development setting direction, and development managing service competency. But post program range (96.2% - 97.4%) of charge nurses showed high level knowledge in all items of clinical leadership competencies.

Figure (6) Shows Correlation between charge nurses' knowledge and competency for clinical leadership at pre-program. There was positive significance correlation between charge nurses' knowledge and competency for clinical leadership at pre-program.

Figure (7) Shows Correlation between charge nurses' knowledge and competency for clinical leadership at post-program. There was positive significance correlation between charge nurses' knowledge and competency for clinical leadership at post-program.

Characteristics of charge nurses

Table (1): Distribution of the studied nurses according to characteristics of subjects (n=78)

Subjects' characteristics	No.	%
Age		
20 – 29	49	62.8
30 – 39	26	33.3
≥40	3	3.8
Min. – Max.	23.0 – 45.0	
Mean ± SD.	29.54 ± 4.49	
Marital status		
- Married	59	75.6
- Single	19	24.4
Educational level		
- Bachelor's degree	74	94.1
- Master's degree	4	5.1
Your experience since graduation		
<5	28	35.9
5 – 10	25	32.1
≥10	25	32.1
Min. – Max	٠,٠ – ٢٠,٠	
Mean ± SD.	7.18 ± 4.41	
Units		
- Neonatal	26	33.3
- Medical	23	29.5
- chest	3	3.8
- Neurology	10	12.8
- Coronary	16	20.5
Experience in your working unit		
<5	40	51.3
5 – 10	22	28.2
≥10	16	20.5
Min. – Max.	٠,٠ – ١٤,٠	
Mean ± SD.	5.40 ± 4.01	
Gender		
- Female	68	87.2
- Male	10	12.8
Attendance of in-service education training in clinical leadership role		
- Yes	42	53.8
- No	36	46.2

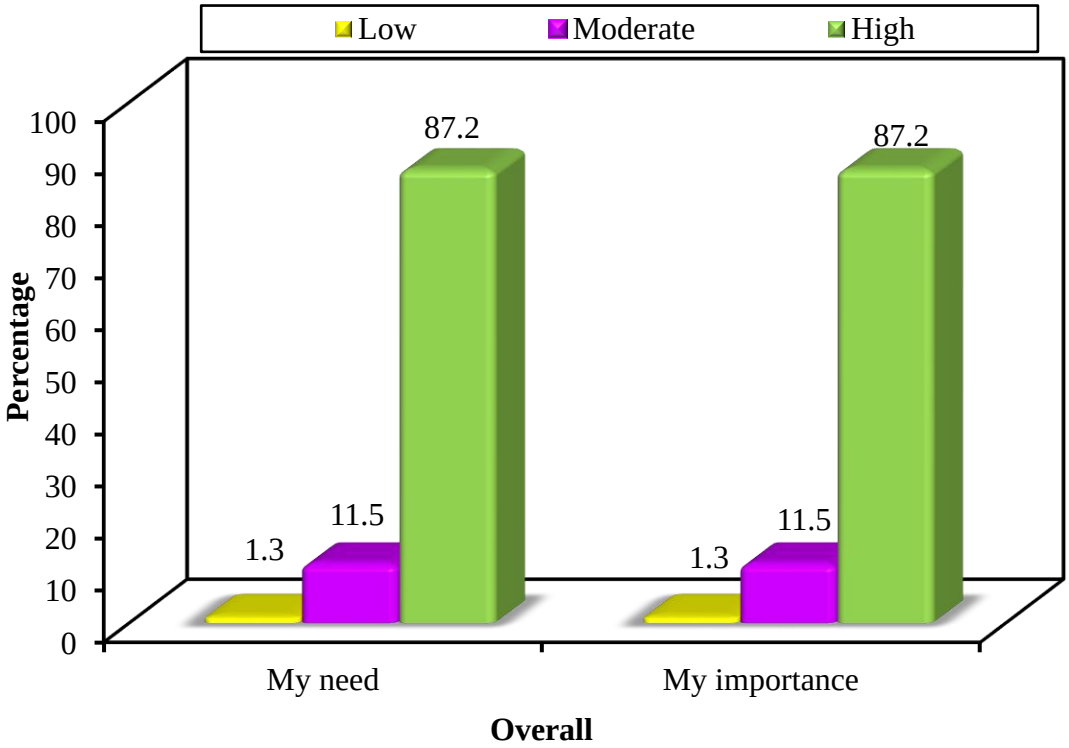


Figure (1): Levels of charge nurses' overall need and importance for clinical leadership skills and capabilities development preprogram

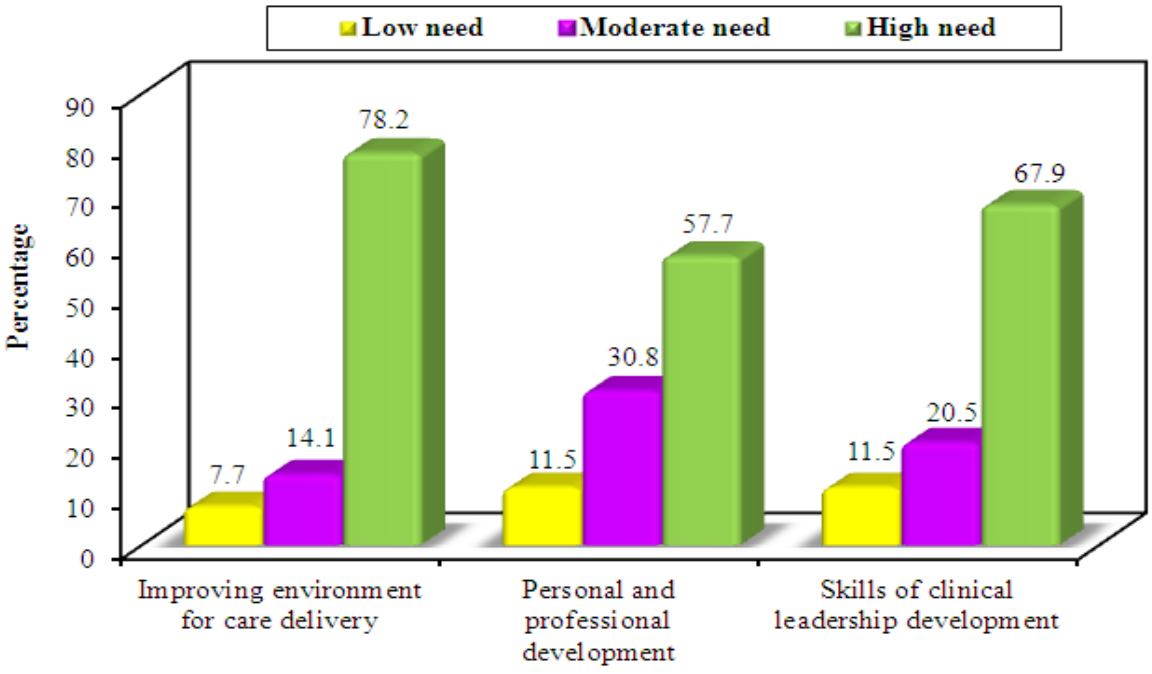


Figure (2): Levels of charge nurses' need for items of clinical leadership skills and capabilities development (n = 78).

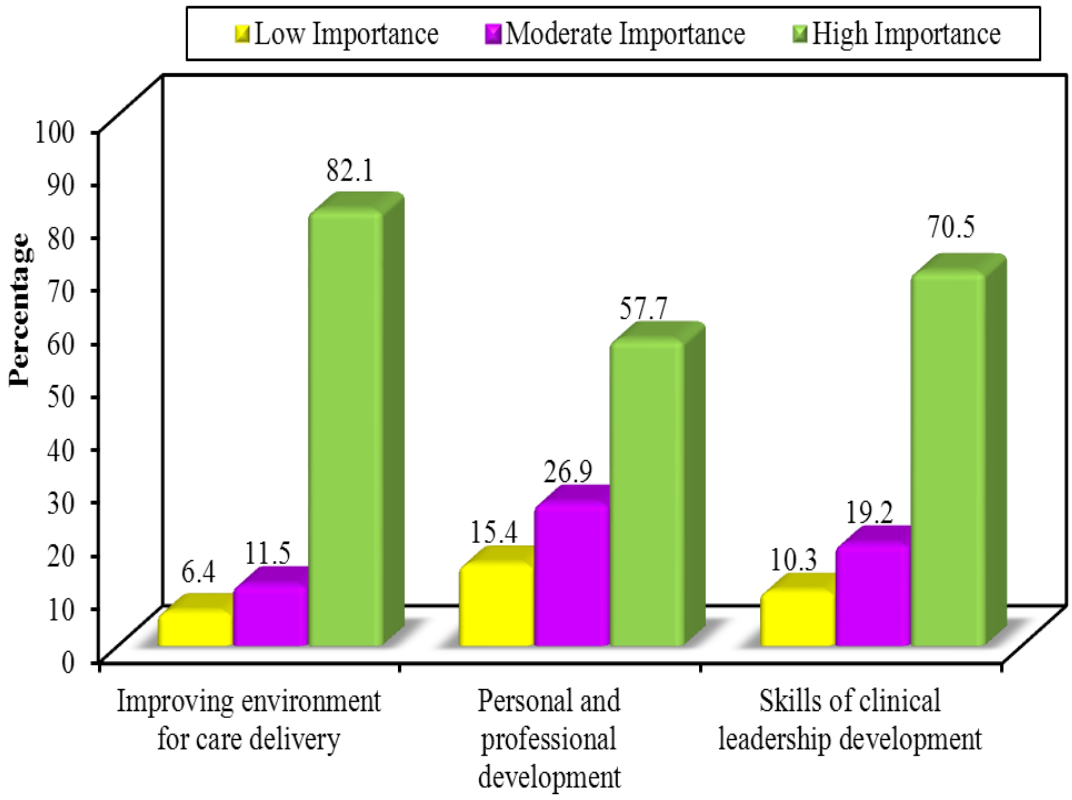


Figure (3): Levels of charge nurses, importance for items of development clinical leadership skills and capabilities (n = 78)

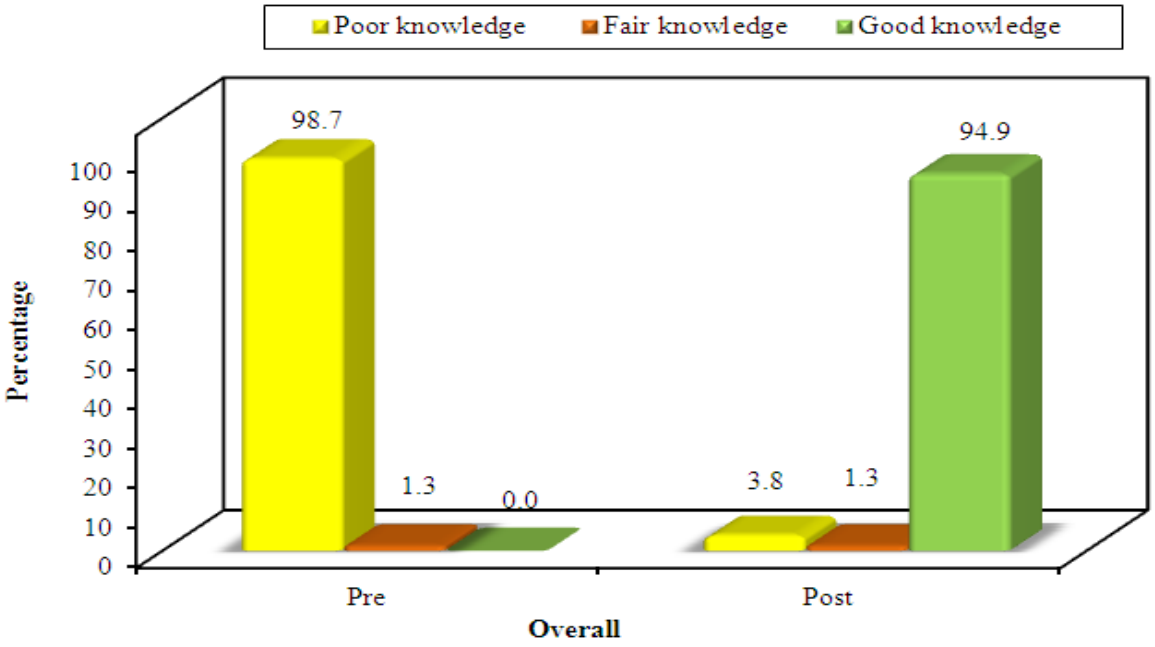


Figure (4): Levels of charge nurses' overall knowledge about clinical leadership pre and post program

Table (2): Ranking mean score of charge nurses' needs and importance for improve environment for care delivery items (n = 78)

Improving environment for care delivery items	Need		Importance		t	p
	Mean ± SD.	Rank	Mean ± SD.	Rank		
1. Coordinates care in work setting	3.82 ± 1.37	**16**	4.22 ± 1.10	**2**	2.876*	0.005*
2. Assesses the capacity of nursing staff work	3.99 ± 1.19	**7**	4.13 ± 1.07	**3**	1.008	0.316
3. Ensures that adequate resources are available	4.01 ± 1.24	**4**	4.03 ± 1.32	**8**	0.093	0.926
4. Identifies priorities with service of emergency and improvement	4.04 ± 1.33	**2**	4.24 ± 1.16	**1**	1.304	0.196
5. Distribute duties of team members according to experience	4.09 ± 1.23	**1**	4.13 ± 1.20	**3**	0.240	0.811
6. Ensures that team members carry out duties appropriately	3.96 ± 1.27	**9**	4.03 ± 1.25	**8**	0.405	0.687
7. Protects the dignity, privacy and confidentiality of patients	3.91 ± 1.39	**10**	4.00 ± 1.27	**10**	0.854	0.396
8. Involves patients and their families in their treatment care plans	2.67 ± 1.50	**28**	2.82 ± 1.52	**28**	0.973	0.334
9. Treats team members with compassion, tact, sensitivity and respect to their needs	3.88 ± 1.16	**11**	3.92 ± 1.21	**12**	0.303	0.763
10. Creates a culture of trust and ethical behavior	3.85 ± 1.25	**14**	3.90 ± 1.21	**14**	0.379	0.706
11. Monitors patient satisfaction with standards of care	3.85± 1.21	**14**	3.76 ± 1.31	**18**	0.596	0.553
12. Orients new nursing staff to the work place	3.87 ± 1.31	**13**	4.04 ± 1.12	**7**	1.250	0.215
13. Orients nursing students to the work place	3.82 ± 1.18	**16**	3.92 ± 1.05	**12**	0.905	0.368
14. Encourages nursing staff to communicate concerns about standards of care.	4.0 ± 1.04	**6**	3.88 ± 1.17	**16**	0.894	0.374
15. Creates a non-blame climate in which staff can report errors.	3.77 ± 0.95	**20**	3.65 ± 1.11	**24**	0.932	0.354
16. Reports critical incidents to line manager	3.58±1.34	**25**	3.63 ± 1.30	**25**	0.383	0.703
17. contributes to development of clinical nursing practice guidelines	3.82 ± 1.07	**16**	3.73 ± 1.14	**20**	0.841	0.403
18. Ensures that outcomes of care and nursing interventions are documented	4.04± 1.21	**2**	4.12 ± 1.09	**6**	0.559	0.577
19. Ensures patient care is based on current evidence-based best practice	3.88 ± 1.08	**11**	3.69 ± 1.28	**21**	1.433	0.156
20. Work within my own scope of nursing practice standards	3.62 ± 1.25	**24**	3.69 ± 1.11	**21**	0.604	0.548
21. Makes patients aware of their rights and unit polices	3.69± 1.37	**22**	3.32 ± 1.56	**27**	2.650*	0.010*
22. Acts to uphold patients' rights	3.69 ± 1.25	**22**	3.54 ± 1.36	**26**	1.126	0.264
23. Stimulates nursing staff to insure patient safety.	4.01 ± 1.18	**4**	4.13 ± 1.06	**3**	0.932	0.354
24. Participates in multidisciplinary decision making as risk management.	3.41 ± 1.24	**27**	3.69 ± 1.07	**21**	2.360*	0.021*
25. Provides clear and concise instructions to nursing team according to situation	3.99 ± 1.03	**7**	3.90 ± 1.15	**14**	0.740	0.462
26. Represents nursing perspective at discussions and unit meetings	3.79 ± 1.14	**19**	3.76 ± 1.21	**18**	0.309	0.758
27. Prepares concise and accurate written documents and reports using appropriate professional language	3.77± 1.21	**20**	3.97 ± 1.06	**11**	1.600	0.114
28. Considers social and cultural backgrounds when interacting with others	3.56 ± 1.32	**26**	3.85 ± 1.12	**17**	2.257*	0.027*

p: p value for **Paired t-test** for comparing between my need and my importance
*: Statistically significant at $p \leq 0.05$

Table (3): Ranking mean score of charge nurses needs and importance related to skills clinical leadership development items (n = 78)

Skills of clinical leadership development items	Need		Importance		t	p
	Mean± SD.	Rank	Mean± SD.	Rank		
1. Develops effective working relationships with the interdisciplinary team	3.78 ± 1.16	**4**	3.73 ± 1.28	**9**	0.463	0.645
2. Motivates nursing team to provide optimal patient care	3.91 ±1.19	**1**	3.83 ± 1.28	**6**	0.736	0.464
3. Fosters the development of a shared vision within the nursing team	3.63 ± 1.19	**12**	3.54 ± 1.23	**15**	0.776	0.440
4. Builds integrated interdisciplinary teams to ensure optimal care.	3.63 ±1.14	**12**	3.56 ± 1.25	**14**	0.560	0.577
5. Manages and resolving conflicts effectively	3.78 ± 1.22	**4**	3.86 ± 1.20	**5**	0.660	0.511
6. Accepts accountabilities for own actions	3.59 ± 1.41	**14**	3.68 ± 1.25	**12**	0.895	0.374
7. Empower team members to be responsible and accountable for their actions	3.85 ± 1.17	**2**	3.88 ± 1.21	**4**	0.327	0.744
8. Acts appropriately when professional standards are compromised	3.67 ± 1.21	**11**	3.81 ± 1.14	**7**	1.311	0.194
9. Recognizes the roles of other health care provider in the work setting	3.69 ±1.33	**9**	3.69 ± 1.33	**11**	0.000	1.000
10. Realize the financial aspects of healthcare delivery	3.41 ± 1.52	**18**	3.45 ± 1.47	**18**	0.344	0.731
11. Be accountable for the resource implications (e.g. costs) of nursing staff practice	3.31 ± 1.49	**19**	3.40 ± 1.46	**19**	0.776	0.440
12. Initiates change to optimal care goals.	3.58 ±1.26	**16**	3.51 ± 1.30	**16**	0.534	0.595
13. Responds effectively to changes in the work place environment (e.g. your unit)	3.59 ± 1.34	**14**	3.73 ± 1.31	**9**	1.107	0.272
14. Identifies and addressing the underlying causes of problems	3.76 ± 1.26	**7**	3.92 ± 1.08	**3**	1.812	0.074
15. Contributes to resolution of nursing staff and organizational nursing team problems	3.73 ± 1.20	**8**	3.78 ± 1.20	**8**	0.542	0.589
16. Anticipates unexpected obstacles to problem resolution	3.44 ± 1.37	**17**	3.50 ± 1.36	**17**	0.672	0.504
17. Knows when to seek advice and support to deal with problems	3.69 ± 1.11	**9**	3.67 ± 1.20	**13**	0.231	0.818
18. Creates alternative solutions to address problems	3.77 ± 1.31	**6**	3.95 ± 1.17	**2**	2.019*	0.047*
19. Makes decision based on best available information	3.82 ± 1.31	**3**	3.96 ± 1.24	**1**	1.468	0.146

p: p value for **Paired t-test** for comparing between my need and my importance

*: Statistically significant at $p \leq 0.05$

Table (4): Ranking mean score of charge nurses needs and importance related to personal and professional development items (n = 78)

Personal and professional development items	Need		Importance		t	P
	Mean ±SD.	Rank	Mean ± SD.	Rank		
1. Demonstrates commitment to continuous lifelong learning	3.64 ± 1.14	**6**	3.46 ± 1.30	**8**	1.645	0.104
2. Participates in continuing professional development education	3.71 ± 1.29	**1**	3.67± 1.36	**1**	0.327	0.744
3. Constructive in receiving criticism and suggestions from supervisors and team of work	3.65 ± 1.14	**4**	3.54 ± 1.27	**5**	0.877	0.383
4. Recognizes own strengths and weaknesses	3.53 ± 1.33	**7**	3.67 ± 1.26	**1**	1.131	0.262
5. Copes effectively with work pressure	3.67 ± 1.30	**2**	3.65 ± 1.41	**3**	0.087	0.931
6. Contributes to the professional development of nursing work team	3.65 ± 1.19	**4**	3.44 ± 1.33	**9**	1.521	0.132
7. Recognizes and acknowledging the contributions of nursing team	3.44 ± 1.18	**11**	3.36 ± 1.29	**12**	0.736	0.464
8. Acts as a mentor to nursing staff	3.67 ± 1.19	**2**	3.54 ± 1.34	**5**	1.010	0.316
9. Offers constructive criticism to nursing staff	3.14 ± 1.54	**14**	3.10 ± 1.55	**14**	0.349	0.728
10. Participates in professional nursing conferences	3.33 ± 1.29	**12**	3.49 ± 1.21	**7**	1.466	0.147
11. Consider effect of current issues, trends and policies on nursing profession.	3.50 ± 1.28	**8**	3.44 ± 1.34	**9**	0.500	0.618
12. Networking across organizational and professional boundaries	3.26 ± 1.37	**13**	3.18 ± 1.41	**13**	0.705	0.483
13. Understands the impact of internal organizational politics on the work of the nursing profession	3.45 ± 1.30	**10**	3.38 ± 1.39	**11**	0.560	0.577
14. Represents the interest of the nursing profession at the national policy-maker level.	3.46 ± 1.23	**9**	3.55 ± 1.19	**4**	0.748	0.457

p: p value for **Paired t-test** for comparing between need and importance

*: Statistically significant at $p \leq 0.05$

Table (5): Levels of charge nurses' knowledge of items of clinical leadership competencies pre and post program. (n=78)

Clinical leadership competency items	Pre						Post						^{MH}p
	Poor knowledge < 60 %		Fair knowledge >60<75%		Good knowledge >75%		Poor knowledge < 60 %		Fair knowledge >60< 75%		Good knowledge >75%		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Clinical leadership concept and role of charge nurse	63	80.8	11	14.1	4	5.1	4	5.1	0	0.0	74	94.9	<0.001*
Personal quality development competency	51	65.4	21	26.9	6	7.7	2	2.6	1	1.3	75	96.2	<0.001*
Development of working with others competency	37	47.4	31	39.7	10	12.8	2	2.6	0	0.0	76	97.4	<0.001*
Development managing services competency	35	44.9	35	44.9	8	10.3	3	3.8	0	0.0	75	96.2	<0.001*
Improving services competency development	63	80.8	11	14.1	4	5.1	2	2.6	1	1.3	75	96.2	<0.001*
Development of setting direction competency	62	79.5	16	20.5	0	0.0	1	1.3	2	2.6	75	96.2	<0.001*
Development of creating the vision competency	77	98.7	0	0.0	1	1.3	3	3.8	1	1.3	74	94.9	<0.001*
Delivering the strategy competency	75	96.2	3	3.8	0	0.0	4	5.1	0	0.0	74	94.9	<0.001*

MH: **Marginal Homogeneity Test**

p: p value for comparing between pre and post

*: Statistically significant at $p \leq 0.05$

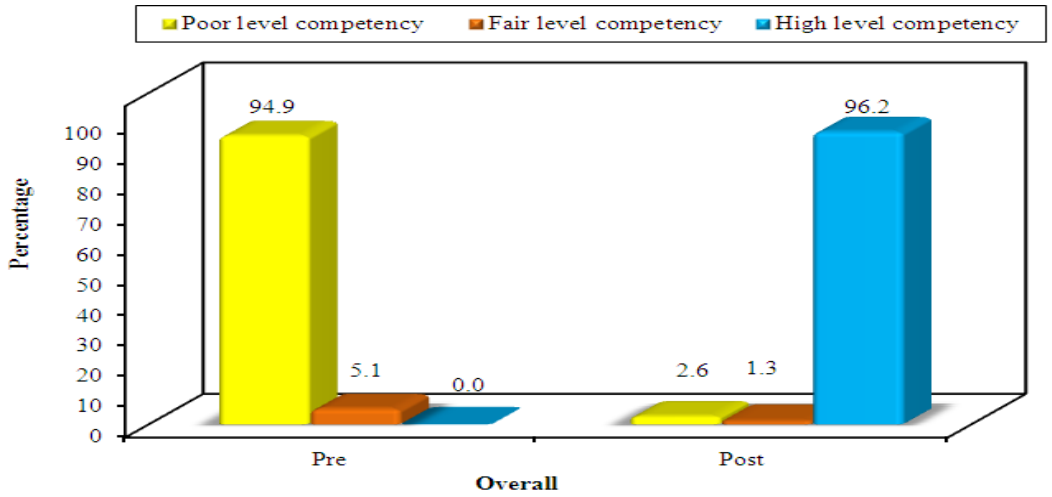


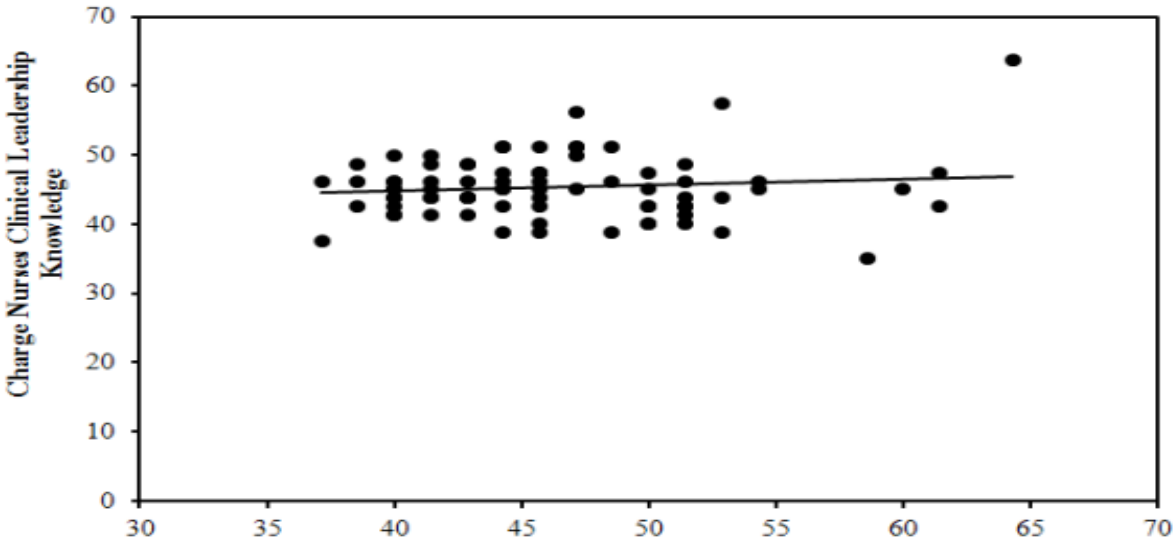
Figure (5): Overall level of charge nurses clinical leadership competency (n=78)

Table (6): Charge nurses' level of clinical leadership competencies pre and post program (n=78)

Clinical leadership competency	Pre						Post						^{MH}p
	Poor level competency <60%		Fair level competency >60%-75%		High level competency >75%		Poor level competency <60%		Fair level competency >60%-75%		High level competency >75%		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Personal qualities development competency	69	88.5	6	7.7	3	3.8	1	1.3	2	2.6	75	96.2	<0.001*
Development of working with other competency	63	80.8	12	15.4	3	3.8	2	2.6	0	0.0	76	97.4	<0.001*
Development managing service competency	16	20.5	50	64.1	12	15.4	2	2.6	0	0.0	76	97.4	<0.001*
Improving service competency development	57	73.1	9	11.5	12	15.4	3	3.8	0	0.0	75	96.2	<0.001*
Development setting direction competency	49	62.8	14	17.9	15	19.2	2	2.6	0	0.0	76	97.4	<0.001*
Developing of creating vision competency	64	82.1	5	6.4	9	11.5	2	2.6	0	0.0	76	97.4	<0.001*
Development of delivering strategy competency	78	100	0	0.0	0	0.0	2	2.6	1	1.3	75	96.2	<0.001*

p: p value for comparing between pre and post

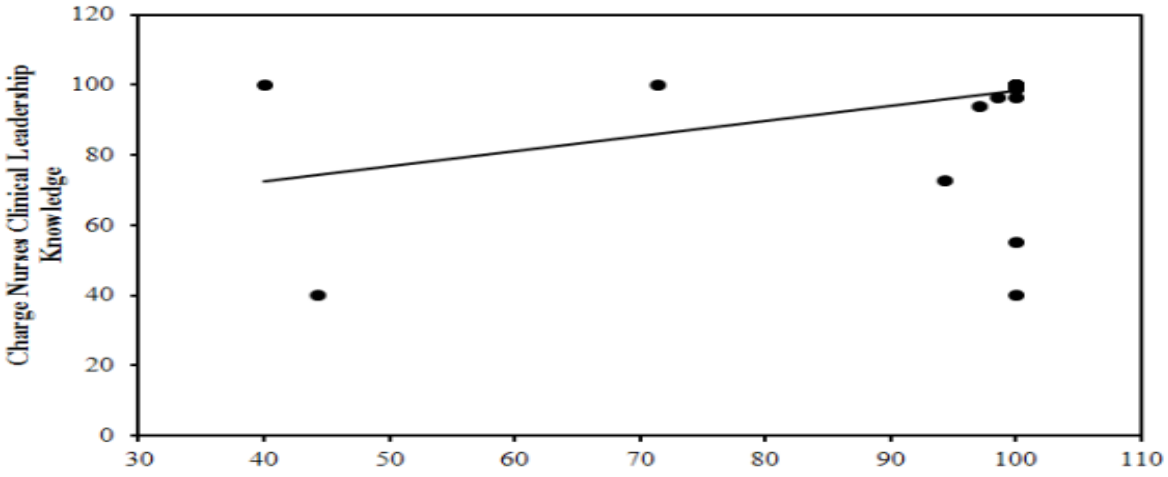
*: Statistically significant at $p \leq 0.05$



Charge Nurses Clinical Leadership Competency

****Correlation is significant at the 0.01 level (2-tailed).**
*** Correlation is significant at the 00.05 level (2-tailed).**
(-) Minus = inverse or negative correlation

Figure (6) Correlation between charge nurses' knowledge and competency for clinical leadership at preprogram (n=78)



Charge Nurses Clinical Leadership Competency

****Correlation is significant at the 0.01 level (2-tailed).**
*** Correlation is significant at the 00.05 level (2-tailed).**
(-) Minus = inverse or negative correlation

Figure (7) Correlation between charge nurses' knowledge and competency for clinical leadership at post-program. (n=78)

Discussion

Clinical leadership in nursing is essential for optimizing and improving the environment of care delivery and patient care outcomes, as well as enhance charge nurses' self-confidence and increase their leadership skills and capabilities. [22] Clinical leadership competencies play significant role in emphasizing the responsibility of charge nurses for demonstrating appropriate behaviors contributing the leadership developing process and empowering their leadership capacity. [23]

Needs of Charge Nurses

Results of present study revealed that preprogram charge nurses showed high overall needs of clinical leadership for care delivery. Actually, charge nurses were at poor level of overall knowledge and competencies about clinical leadership. Those charge nurses' self-need assessment devoted that their upper most needs were improving the environment for care delivery, skills of clinical leadership, personal and professional development. This finding explained charge nurses lack of specific training that focused on clinical leadership. They need education program to improve their knowledge skills and capabilities. About half of those charge nurses inter clinical areas without orientation leadership program and the rest not refreshed their clinical leadership skills yet.

The fact is that those charge nurses showed important need for improvement in distributing duties of team members, identify priorities of services of emergency and ensure that outcomes of care and nursing interventions are documented. As well as they have important need to stimulate nursing staff to insure patient safety and to insure that adequate resources are available. Really they need to be prepared by post-graduation training programs to increase their clinical leadership development, improving and coordinating care delivery. **Mc Carthy et al. (2019) [24]** reflected that clinical nurse leaders had high level of overall need assessment of clinical leadership development. Also, **Fealy, et al. (2015) [25]** emphasized that clinical nurse leaders expressed a high need of clinical leadership competency development.

Charge nurse showed needs and importance to involve patients and their families in their treatment care plans, may be due to charge nurses neglect and ignoring patients' autonomy, not contribute patients' right and consider it' too much time-consuming. They may prefer that the important decisions made away from bedside. They also not motivating or empowering nursing team

for providing optimal patient care and for being accountable for their action and not manage nurses' conflicts. Really those charge nurses in ICUs seem to be overwhelmed with motivating nursing team without effect and they prefer offering encouragement only. **Grindel, (2016)** [26] confirmed that when clinical nurse leaders exhibit a high level of clinical leadership skills, they motivate nurse colleagues and others to act.

Preprogram results showed that charge nurses showed needs and importance for being accountable for the resource implications. Most probably those charge nurses were exhausted, lack self-confidence and had poor work conditions, such as work overload, unfairness, lack of control over local resources and low collegial support. **Choudhry, Armstrong and Dregan (2017)** [27] stated that nurses need adequate resources not only to support and promote their practice but also to conduct patient assessment and perform treatment. When charge nurses were accountable for resources they create positive practice environments and deliver high quality care.

Charge nurses of present study showed need and important of clinical leadership personal and professional development, indicating that they are lacking personal and professional autonomy deficient in self-professional awareness, and not consider effect of organizational politics and polices on nursing profession. They need to be effectively cope with work pressure, contribute to team work and continuing professional education. They need to recognize own strengths and weaknesses. Actually, those charge nurses are in need for participation in continuing professional development while they are missing it because they obliged to participate for issues of career growth opportunities on their nursing profession.

Although continuous professional development can improve their knowledge, problem solving and clinical decision making skills, as well as their ability to provide evidence based nursing care to patients. **Price and Reichert (2017)** [28] revealed that ongoing professional development is an expressed need and expectation for clinical nurses across various career stages. Ongoing training, education and professional development opportunities help to ensure clinical competency, continuous growth in their practice and provide optimal quality patient care. Contrary to **Macaden, et al. (2017)** [29] found that clinical nurse leaders receiving management and clinical leadership development education not significantly affect clinical leadership characteristics.

Preprogram charge nurses showed need for offer constructive criticism to nursing staff. It is important to encourage charge nurses to be role model, provide feedback, and guide novice nurses to achieve goals. They must welcoming positive criticism from nursing staff and consequentially ensure that they deliver efficient and safe quality care. They need to be constructive in receiving criticism and suggestions from team work and should recognizes their own strengths and weaknesses. However the effective clinical leaders required to be self-aware and openness to criticism to challenges others, **Panneerselvam, (2018)** [30] asserted that nursing professionals should give significance attention to constructive criticism because it provides opportunity to self-assess for their skills and capabilities.

Knowledge of Charge Nurses

Preprogram charge nurses showed poor level of overall clinical leadership knowledge, and gave false answers for developing and creating vision, delivering the strategy, development of setting direction, personal quality development, development of working with others and managing services of clinical leadership. Also, they showed poor knowledge about clinical leadership concept, role of charge nurses and improving services development. This may be attributed to their low training and limited educational sources, and attendance of program about leadership development. So, they were unequipped with enough knowledge and need to be engage to formulate strategic plans, support and inspire others responsible for delivering strategic, educational and operational plans.

Apparently that clinical leadership program helped participants to innovate and improve their leadership knowledge and performance. The knowledge of most of present study charge nurses had significantly improved in majority of the items immediately post program due to their attendance of program sessions. As the program explained aspects related developing leadership knowledge and competencies in ICU clinical sittings. **Goktepe, et al. (2018)** [31] stated that clinical nurse managers' had poor clinical leadership knowledge preprogram but application of the managerial program made a key contribution towards enhancing clinical nurses' professional skills and clinical leadership competencies. Also **Jeon, et al. (2015)** [32] showed that development of clinical leadership qualities framework helped middle nurse managers to improve their skills and capabilities in clinical care processes with their management accountabilities.

Preprogram charge nurses showed lack of knowledge about all items of personal quality development for acting with integrity, self-awareness, role in continuing personal development and managing herself. Those charge nurses may need to recognize their own value and understand how these can affect their integrity and judgment. As well as participate in continuing professional development activities, uphold personal and professional ethics and values, taking into account the hospital' values and respecting others (culture, beliefs and abilities, religious, ethnic backgrounds as well as age and gender). They specially lacked knowledge about development of working with others, developing networks, building and maintaining relationships, encourage contribution and role in working within team. This results may be explained in terms of charge nurses not understand the goals of building and maintaining relationships and how to maintain it.

Theoretically speaking charge nurses are need to build social networks and relationships with contribution on delivering and improving patients' services. Working in partnership with patients and colleagues require opportunity for sharing of information, resources and actively seek the views of others. Through building and maintaining relationships by listening, supporting others as well as gaining trust and understandings. Creating an environment require others to have the opportunity to share their thoughts and ideas without fear of criticism but with encouragement to engage in decision making constructively. Working within teams require everyone to have a clear role, responsibilities and purpose. In this respect **Miehl, (2018)** [33] found that effectively working within others in the areas of clinical leadership, the nurse managers expect to be prepared for being an advocate, communicating effectively, influencing nursing practice and upholding a professional nursing practice.

Results revealed that post program there are significant change of charge nurses' managing services knowledge of clinical leadership. Their knowledge changed from preprogram poor level to good level post program of clinical leadership. Really they need to understand how to manage and develop nursing staff and required to become more actively involved in planning process. It is essential to incorporating feedback from others including patients, service users and colleagues. **Mendis and Paton (2014**) [34] found that participants recognized a high need to be aware of massively untapped resource, managing resources and ensure

effective and appropriate utilization of human and fiscal resources. In same line**, Jasper, et al (2010)** [35] identified that charge nurses planning, managing resources, managing nursing staff and managing performance are the most important themes in development of a program targeted leadership roles at different levels.

Charge nurses lack knowledge for ensuring patient safety and their role in facilitating transformation. Most probably this results due to their need to identify and quantify risk to patients using information from a range of sources, they not use systematic ways of assessing risk to change and minimise risk, and not monitor the effects and outcomes of change. They need to appreciate the technological transformation as information system that can influence every aspect of nursing care services and encouraging its improvement and innovation. Contradicting the present study **Cathro (2016)** [36] found that charge nurses had high level of role functions and maintained a watchful eye over key patient safety. **Casey, et al. (2011)**[3] reported that the nurses with high level of clinical leadership had high level of ensuring patient safety, negotiating and facilitating transformational and reform in corporates of care delivery and managing relationships

Charge nurses in the present study showed poor knowledge regarding creating vision and not understand that they should align their vision with the wider health and care agenda. This result may be due to those charge nurses need to understand basic knowledge to share in developing the vision for hospital, understand meaning of vision and how this vision achieve hospital goals. Senior charge nurses must attend nursing forum and committees to help in reframe vision. In same line, **Stanley, et al. (2017)** [37] found that respondents had low level of vision and it is not a dominant feature in clinical leadership. While **Boamah, et al. (2018)** [38] found that formal nursing leaders had high level of vision, support, staffing, resources, and leadership, with the competencies, abilities, knowledge, skills, and motivation of nursing staff, are integral to the achievement of better patient outcomes.

Competencies of Charge Nurses

Results of present study revealed that preprogram charge nurses showed poor level of overall clinical leadership competencies, and showed poor competency level for development of each of delivering strategy, personal quality, creating vision and working with others. Most probably their insufficient

knowledge about clinical leadership behaviors prevent them to be competent in managing services development or setting good direction for nursing team. **Harmon (2018) [39]** revealed that the chief nursing officer and senior leadership team had highly strategically thinker, strategic planning, and creative visionary skills that enhance effective leadership team. While **Martin, et al. (2012) [40]** said that senior charge nurses and those with managerial responsibility experienced poor in delivering strategy competencies of clinical leadership.

Preprogram charge nurses had poor level of competency of personal quality development, they cannot recognize that their own values and principles influence own behavior and impact on staff. As well as cannot seek feedback from others on strengths and limitations to modify their behavior. They cannot identify impact of their stress emotion on their behaviour and on others. Indeed those charge nurses need to learn from others and share knowledge and experience, ensure plans and actions are flexible, plan their workload and activities to fulfil work requirements and commitments, without compromising their own health. **Magnusson, et al. (2014) [41]** found that new registered nurses had high level of self-awareness, communication, after providing supportive leadership educational program and may facilitate increased confidence and competence with delegation and supervision.

Preprogram charge nurses had poor level of competency for working with others as they found no importance for encouraging others to contribute ideas or to appreciate the efforts of others within the team. They not respect the team's decision and not put their selves forward to lead team. This result reflect that charge nurses in ICUs are in highly need to be competent in giving and receiving feedback to promote teamwork and to create an atmosphere of respect relationship. **Anonson, et al. (2014) [42]** reported that nurse leaders who had good communication skills are capable of interacting with their nursing staff and co-workers and determining the most effective ways to assist them. Also, **Quince, et al. (2014) [43]** asserted that working within team skills is preferred clinical leadership skill among medical students.

Result of present study revealed that preprogram charge nurses' had poor competency level for managing services. Apparently those charge nurses were not clever to identify and address performance issues, cannot plan organized team work and they haven't structured approach to plan nursing care. Beside they can't monitor resources effectively but they

waste it. Ideally, to manage the resources effectively, leadership training program seems essential, also it is necessary to hold educational classes in order to enhance the nurses' awareness on effective supply chain and storage of the items in the unit stock. **Enterkin, et al. (2013)** [44] showed that ward leaders not deliver safe effective services within allocated resource of wider organizational networks, because they were overloaded with work in clinical area.

Results of present study revealed that preprogram, majority of charge nurses couldn't know how to setting direction, make decisions about future, and cannot evaluate impact of previous decisions and actions. In fact these results contributed that those charge nurses may lack participation in putting nursing team mission, vision, goals and objectives. They not trained on decisions making process and future issues' of the organization. Really those charge nurses need to be more self-directed in giving decision making and accept effective polices. **Nibbelink, and Brewer (2018)** [45] explained that charge nurses employ a variety of factors and processes informally, while experienced nurses are the important resources for decision making. They asserted that nurse decision making in acute care is highly demanding and improved understanding of decision making in this environment can help to guide future efforts to support nursing practice.

Beside **Montalvo (2015)** [46] reported that hospital nurses lived experience of power at their clinical settings had high understanding of sociopolitical needs and choose to be engaged in political situations. And **Uzarski, and Broome, (2019)** [47] supported that many leaders not always made strategic resources and they develop work planning and make recommendations for their application to other schools engaging in strategic team planning periodically. **Saarnio and Isola (2016)** [48] study about nurse managers' visions of future challenges in health care organizations, revealed that nurse managers have the ability to identify challenges in the future that they can influence by carrying out change management procedures.

Preprogram charge nurses cannot align strategy with local, national and health care system requirements. They cannot engage a wide range of stakeholders when formulating strategic plans, but they works to develop strategy in isolation without input or feedback from others. This results may contributed to those charge nurses overlook their role in the strategic plan of health organization and they focus only on

nursing care. **Waddell, et al. (2017) [49]** described and quantified the experiences of nurse leaders working to influence policy and to build consensus for priority skills and knowledge, useful in policy efforts within the context of a nursing conceptual framework. They reported that strategy is to enhance collaboration between a hospital or health center's nursing department and the organization's office of government relations, which fosters interest and opportunities for nurses to participate in legislative advocacy.

Present study post program results revealed that majority of charge nurses had positive significance improvement in their knowledge correlated significantly with their competency about clinical leadership. The fact is that their knowledge and competency level were unsatisfied preprogram implementation, but it was significantly increased to become at good level post program. This indicate the continuous need for periodical clinical leadership training program for all and specially newly appointed charge nurses to increase effective developing clinical leadership qualities. As well as to increase their self-awareness to utilize clinical leadership competencies and their performance for nursing care. Indeed clinical leadership training program assist those professional charge nurses to demonstrate on how to be at good level of clinical leadership competencies.

Conclusion ,recommendation

Conclusion

Charge nurses of Tanta Main University Hospital ICUs were at high level of overall needs and importance for clinical leadership competencies development. Improving environment for care delivery is the upper most need while personal and professional development was the lowest one. They were lacking knowledge and skills clinical leadership pre-program. But application of successful leadership program improved significantly charge nurses' clinical leadership knowledge and seven competencies including personal quality, working with other, managing service, improving service, setting direction, creating vision and delivering strategy.

Recommendations

1. Intensive Care Units conduct periodic surveys of clinical leadership competencies' need assessment for charge nurses.
2. Inform charge nurses by their job descriptions and responsibilities of ICUs clinical leadership.
3. Charge nurses should contribute to clinical leadership development by attendance of formal education programs, case-conferences,

workshops, distance learning, e-learning and self-directed learning.

4. Provide supportive clinical supervision and on-the-job leadership training and mentorship for clinical staff.
5. Faculty of nursing curricula should include self-awareness, personal and professional growth as values and skills for clinical leadership competencies.

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Relation between Problematic Internet Use and Mental Health Status of Technical Nursing Students in Tanta City

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Abstract

Background: Students are believed to be at a high risk with a marked increase in their internet usage worldwide. Problematic Internet use (PIU) is characterized by a lack of control over the concern, encouragement, or problems related to anxiety, stress and depression as a result of its use. ***Aim of the study:*** to identify the relation between problematic internet use and mental health status of technical nursing students in Tanta city. ***Design*****:** A descriptive design was used in this study. This study was conducted at two secondary technical nursing schools and the technical health institute (nursing branch) in Tanta city. ***Subjects****:* A convenient sample of 273 students in the above mentioned schools was included in the study. Three tools were used by the researchers to obtain the necessary data, the structured questionnaire schedule, General health questionnaire (GHQ-28) and the Internet Addiction Test (IAT). ***Results:*** More than half of the studied students had frequent problems related to internet usage (56.4%) and about one third of them (31.9%) had a significant problems. *S*lightly less than two fifths of the studied subjects (38.8 %) had poor mental health. Significant differences were observed between the studied level of internet usage and their age, sex and social level (P= <0.001, 0.009 and 0.034) respectively. ***Conclusion:*** There were strong significant positive correlation between the level of internet usage and students' mental health status. ***Recommendations:*** Further studies needed to develop and implement rehabilitation programs, for students with psychological problems related to excessive internet usage.

Keywords: *Problematic Internet Use, Technical Nursing Students, Mental Health and subjective happiness.*

Introduction

Internet becomes a critical part of modern life. As a medium of information and communication, it has an important place in social and academic life of nursing students in many societies. Today's students have unprecedented access to modern technology and use them in expected and unexpected ways. They spend many hours a day using it [1,2]. The internet is the most effective tool in all different areas of science, business, education, culture and politics. It brings a huge change and convince; people spend more and more time online, ranged from 19 to 68 hours per week. Worldwide, internet users were 1.2 billion in the year 2000 and increased to 3.17 billion in 2015. According to the internet usage statistics in Egypt, internet users are 54.6 % of the population in 2015, compared to 35.6% in 2012. More than 80% of the Egyptian internet café clients are young people [3-7].

However, while the internet has become a major information and communication medium for the students, the number of unhealthy or excessive internet users among them has also grown remarkably [5]. Problematic internet use refers to the excessive use of internet and significantly influences one's normal life including psychological, family and social life [6]. It is a maladaptive use of the internet that can lead to social and functional impairment [7 , 8]

Problematic Internet Use (PIU) is a heterogeneous construct. Two features appear fundamental to its conceptualization. The first refers to the aspects of internet use, as excessive or compulsive, along with preoccupation with and loss of control over use of the internet. The second refers to various adverse consequences of spending too much time on the internet, such as neglecting social activities, relationships, health and work or school duties, and altering sleep and eating habits in a detrimental way [4,9].

Problematic internet use or overuse is not just a matter of using the internet to perform, or using an average amount of time on computers. Instead, compulsively use the internet, to such an extent that it is given priority over all other responsibilities which also affect time and attention to school work, domestic and responsibilities at home, and even interaction and relationships. Some examples and activities of internet overuse may include chatting online, playing online video games, or visiting sexually illicit or pornographic sites [10]. Five negative internet technology (IT) related issues were identified: techno-stress, information overload, multitasking, addictions, and technology misuse [11,12-14].

School age is a unique and formative time. It is a time of self-disclosure and conflict to find a balance between autonomy and connectedness. It is a period in which an individual face major physical, psychological, body and brain changes. It may begin as early as age 6 and extend until age 24. This age group represents one fifth of the global population. In Egypt, according to Egypt Demographic Profile 2018, the age group of 15-24 years represent 18.94% of the total population [15,16]. Whilst most of students have good mental health, multiple physical, emotional and social changes can make them vulnerable to mental health problems. They are vulnerable to misuse of internet technology if they have not been taught how to use it adequately or if they are without supervision when using it [17].

Technical nursing students are those students who enrolled in secondary nursing schools or institutes. Their ages ranged between 15-19 years. In general, those nurses are at a critical period of addiction vulnerability, based on their educational, social and also neurobiological factors. With regard to the internet they are more vulnerable and at risk as they have easy access to the internet and flexible timetables. Furthermore, they tend to be less self-regulative, and also have less ability to control their enthusiasm for internet activities [18-24].

Promoting psychological well-being and protecting students from adverse experiences and risk factors which can impact their potential to thrive aren't only critical for his or her well-being during adolescence, but also for their physical and mental health in adulthood. Community health nurse and psychiatric nurse play an important role in promoting students' physical and psychological health, control health risk behavior to maintain normal development and managing actual and potential health problems facing them while using the internet [25]. They play a critical role especially at the primary level of prevention. The contact of these nurses with the students offers an opportunity to implement primary level of prevention in a most effective manner. This level of prevention might be instituted through such approaches as health promoter, educator, health screener, care provider and leader for health policies and programs [26].

Significance of the study

The internet now is used as a tool to acquire new information, make contact with various social groups, and expand personal relationships. Recently,

researches on the adverse effects of internet use have gained

a great importance [4]. Researchers have identified that the continuous use of internet results in a lot of psychological and mental disorders like anxiety, depression, stress and obsessive compulsive disorder. Furthermore, they found that Problematic Internet Use was associated with sleep problems including subjective insomnia and poor sleep quality [27,28]. However, there is currently insufficient data on internet use among technical school nurses. So, the aim of this study was to identify the relation between problematic internet use and mental health status of technical nursing students in Tanta city.

Aim of the study:

The aim of this study was to identify the relation between problematic internet use and mental health status of technical nursing students in Tanta city.

Research question;

Is there a relation between problematic internet use and mental health status of technical nursing students?

Subjects and Method

Subjects:

Study design: Descriptive research design was utilized to conduct this study.

Setting: This study was conducted at two secondary technical nursing schools (one school for male students and the other one for female students) in addition to the Technical Health Institute (nursing branch) in Tanta city that affiliated to Ministry of Health and Population.

Study subjects:

A convenient sample of 273 students of both sexes (92 Boys and 181 girls) enrolled in the previous mentioned settings during the academic year 2017/ 2018 that represent all the students from grade one to grade five who were willing to participate in the study who were live with their biological parents and who were free from any physical or psychological problems were included in the study.

Tools of the study:

Three tools were used to collect the necessary data as follow:

Tool I: Structured questionnaire schedule that consisted of three parts as follow:

Part (1): Socio-demographic characteristics of the study subjects which was developed by the researchers based on reviewing the recent related literatures, as age, sex, grade, birth order, residence, type of family, family income and daily expense.

Part (2): The Family Affluence Scale (FAS) which developed by Curries 2008 [29] to assess the social level , the economic status of the students. It consists of four

items as: number of cars does the family own, if the students have bedroom, the number of travel on vacation with their families during the past year and number of computers do their families own.

Scoring system;

FAS score ranged between 0-9. The FAS score was calculated by summing the responses to these four items, and the respondents were grouped into low social level (0–2), middle social level (3–5), and high social level (6–9).

Tool II: Mental health status of the studied students:

Part (1) General health questionnaire (GHQ-28) [30]:

It was developed by **Goldberg in 1978**; it included 28 items to measure emotional distress in medical settings. The GHQ-28 has been divided into four subscales: **somatic symptoms** (items 1–7); **anxiety/insomnia** (items 8–14); **social dysfunction** (items 15–21), and **severe depression** (items 22–28). Each item is accompanied by four possible responses: not at all, no more than usual, rather more than usual, and much more than usual, scored from 0 to 3 for each response with a total possible score ranging from 0 to 84.

Scoring system;

The students' mental health status was categorized as follow:

- Good mental health: (< 60 %) = < 50 point of total score.
- Poor mental health: (≥ 60 %) ≥ 50 point of total score.

Part (2): The Subjective Happiness Scale (SHS) [31].

The Subjective Happiness Scale (SHS) scale that was developed by Lyubomirsky and Lepper (1999) to assess the extent of overall subjective happiness among students was adopted by the researchers. It consisted of 4-items and assessed with a five-point Likert scale rated from 1 to 5. The total score of the scale ranged from 4 - 20. This score was converted into a percent score, and classified into the following three categories:

- Not happy < 50 % of the total happiness score.
- Happy 50-70 % of the total happiness score.
- Very happy > 70 % of the total happiness score.

Tool III: Internet Addiction Test (IAT):

The internet addiction test is a reliable and valid measure of addictive use of internet, developed by **Dr. Kimberly Young [32].** It consists of 20 items that measures mild, moderate and severe level of internet addiction answered in five likert scale ranging from 1 (rarely) to 5 (Always). The minimum score is 20 and the maximum is 100. The higher score indicates the greater

problematic internet use. Young suggests that a score of 20-49 points is an average online user who has complete control over his/ her usage. A score of 50- 79 signifies frequent problems due to internet usage, and the score of 80- 100 means that the internet is causing significant problems.

Method

1-Obtaining approvals

Official permission to conduct the study was obtained from faculty of nursing to the responsible authorities to facilitate the researchers' work.

2- **Ethical considerations**:

- Approval of the ethical committee was obtained before conducting the study
- Informed consent was obtained from the students to participate in the study after explanation of the aim of the study.
- They were informed about their rights to refuse or withdraw at any time.
- The anonymity of participants was respected.
- The confidentiality of the information obtained was ensured.
- The privacy of the students was asserted.
- The study didn't cause harm to the studied subjects.

3-Developing the tools

- The study tools were developed by the researchers based on literature review. The developed tools were tested for content and face validity by a jury of 5 academic professors in community and psychiatric health nursing. Accordingly corrections and modifications were done.
- The reliability of the study tools were tested using Cronbach's Alpha test. It was 0.845 for all questionnaire variables, 0.857 for tool II and 0.919 for tool III which indicate a high reliability of studied tools.
- A pilot study was carried out on ten percent of study sample (27 students) to test the tool for its relevance and clarity. Modifications were done accordingly. Data collected from pilot part of the study were excluded from the final sample.

4- The actual study

- The collection of the data continued during a period of three months starting from beginning February2018 to April 2018.
- The data was collected by administering the questionnaire to each student individually to complete it by his / herself with the attendance of the researcher to offer guidance and clarification when needed.
- The average time spent for collecting

data from each student was approximately 30-40 minutes to complete the questionnaire.

5- Statistical analysis

The collected data were organized, tabulated and statistically analyzed using Statistical Package of Social Studies (SPSS) version 23. For numerical data, the range, mean and standard deviation were calculated. The association between variables was calculated by Pearson's correlation coefficient (r). For categorical variables, the number and percentage were calculated. Differences between categories of each variable were statistically analyzed using chi square test (X^2). The level of significance was adopted at $p < 0.05$.

Results:

Table (1) shows socio demographic characteristics of studied students. It was clear that more than two thirds of the studied subjects were females in the age group of 17 – 20 years (66.3% and 68.2%) respectively. More than two fifths of them were the oldest child who enrolled in the third grade and had a daily expense of 5-10 pound or more than 10 pounds per day (41%, 86.5%, 41.8% and 40.7%) respectively. As regard the monthly income and residence, the table showed that nearly two thirds of the studied students had adequate income and from rural areas (63 %and 63.7%) respectively. More than half of them live with extended families (58.3%) and the majority of them had excellent academic achievement (81%).

Fig (1) presents the distribution of the studied subjects according to the mean of net connection. It was clear that the majority of the studied subjects use the mobile phone as a mean of net connection (86%).

Fig (2) illustrates the distribution of the studied subjects according to their social level. More than half of the studied subjects (55.7%) were of low social level and slightly less than two fifths of them (39.9%) were from the middle social class

Fig (3): shows the distribution of the studied subjects according to their level of subjective feeling of happiness. The figure showed that about one quarter of the studied subject had feeling of unhappy (23%) while only 4.8 % of the reported that they were very happy. Nearly about three quarters of the studied students (72.2%) reported that they were happy.

Table 2: presents the distribution of the studied sample according to mental health status. Generally, slightly less than one fifth of the studied subjects (38.8 %) reported poor mental health. The total mean score of the students' mental health was 60.728 ± 12.124. As regard somatic manifestation, it was clear that more than

one quarter of them had high level of somatic manifestation (25.6%), while more than half of them had a higher level of insomnia/ anxiety (57.5%) and high level of social dysfunction (62.3%). As for depression status, more than one third of the studied subjects had severe level of depression (35.5%).

Fig (4) illustrates the distribution of the studied subjects according to total mental health score. It was obvious that slightly less than two fifths of the studied subjects (38.8 %) had poor mental health.

Concerning the level of the problems that internet use cause, **fig (5)** showed that more than half of the studied students reported that they have frequent problems related to internet use (56.4%) and about one third of them (31.9%) reported significant problems related to internet usage.

Table (3): Presents the relation between levels of the problems that internet use cause and the general health status of the studied students. This table shows nearly about one third of the studied students had a high level of insomnia / anxiety and classified as having frequent or significant problems due to use of internet (28.9 % and 22.3%) respectively. Furthermore, less than one fifth of them categorized had frequent or significant problem due to internet use were described as severe depression (17.2% and 15.8%) respectively. However, around one fifth of the studied students with poor mental health status were classified as having frequent or significant problems due to internet use (19% and 17.2%) respectively. Significant differences were observed between the level of the problems due to internet use and students' mental health status, insomnia/anxiety level and depression (p= 0.001, 0.15 and 0.003) respectively.

Table (4) presents the relation between socio-demographic characteristics of studied students and their level of problems caused by internet use. It was clear that more than one third of the studied subjects with frequent problems of internet use (38.5%) were in the age group 7-20 years and about one fourth of the same age group had significant problems of internet use (23.4 %). More than one third of the studied subjects with frequent problems and about one fifth of those with significant problems of using internet were females (37.7% and 18.3%). About one quarter of the studied subjects of low or middle social level had frequent problems (28.6% and 24.2%) respectively.

Furthermore, the highest percentages of the studied students with significant problems related to internet use were found among the students of low and

middle social level (17.9% and 13.2%) respectively compared to only 0.7% of the students of high social class. As regard the school grade, the table showed that the highest percentages of students with frequent and significant problems of internet use were found among the 3rd grade students (26% and 16.5%) respectively.

The students of large families (five or more) particularly the extended families showed the highest frequencies of frequent and significant problems of internet use than those of small families (31.1% and 16.1%) and (33% and 19%) respectively. The percentages of students with frequent and significant problems of internet use were found among the middle students of rural residence with adequate family income who use the mobile phone as a mean of net connection (20.1% and 13.2%, 35.9% and 19%, 33.7 and 20.5%, 74.6% and 27.1%) respectively. Significant differences were observed between the studied level of problems caused by internet use and their age, sex and social level (P= <0.001, 0.009 and 0.034) respectively.

Table (5) shows the correlation between studied subjects' social level, mental health, happiness and level of problems caused by internet use. There were significant positive correlations between the level of the problems caused by internet use and students' mental health status and their social level (p <0.001and 0.022) respectively, while no significant correlations were found between level of happiness of the studied subjects and their level problems of internet use(p= 0.317).

Table (6) shows the correlation between mental health status, happiness and problems caused by internet use and the socio-demographic characteristics of the studied subjects. The table showed that there were significant positive correlations between the level of the studied subjects' level of problems caused by internet use and their age, study grade and birth order (p= 0.001, 0.001 and 0.017) respectively which means that the older students of higher academic grade have higher level of problematic internet use. Furthermore, strong significant correlation was observed between the sex of the studied subjects and their mental health status (p= 0.008). On the other hand, significant negative correlation was found between sex of the students and their level of internet usage (p=0.024). Also, negative significant correlation was found between the student birth order and their mental health status (p= 0.020).

Table 1: Socio demographic characteristics of studied students (No=273).

Socio demographic characteristics	No	%
Age		
Less than 17 years	32	11.7
17 -20 years	186	68.2
More than 20 years	55	20.1
Mean ±SD	18.63 ± 1.72	
Range	15-23	
Sex		
Males	92	33.7
Females	181	66.3
Grade		
1st grade	34	12.5
2nd grade	43	15.8
3rd grade	127	46.5
4th grade	41	15.0
5th grade	28	10.2
Birth order		
The oldest	112	41.0
The middle	99	36.3
The youngest	62	22.7
Monthly income		
Adequate and saving	61	22.3
Adequate	172	63.0
Inadequate	40	14.7
Daily expense		
Less than 5 pounds	48	17.5
5-10 pounds	114	41.8
More than 10 pounds	111	40.7
Residence		
Urban	99	36.3
Rural	174	63.7
Family type		
Nuclear family	94	34.4
Extended family	159	58.3
Single parent family	20	7.3
Academic achievement		
Weak	13	4.8
Good	39	14.2
Excellent	221	81.0

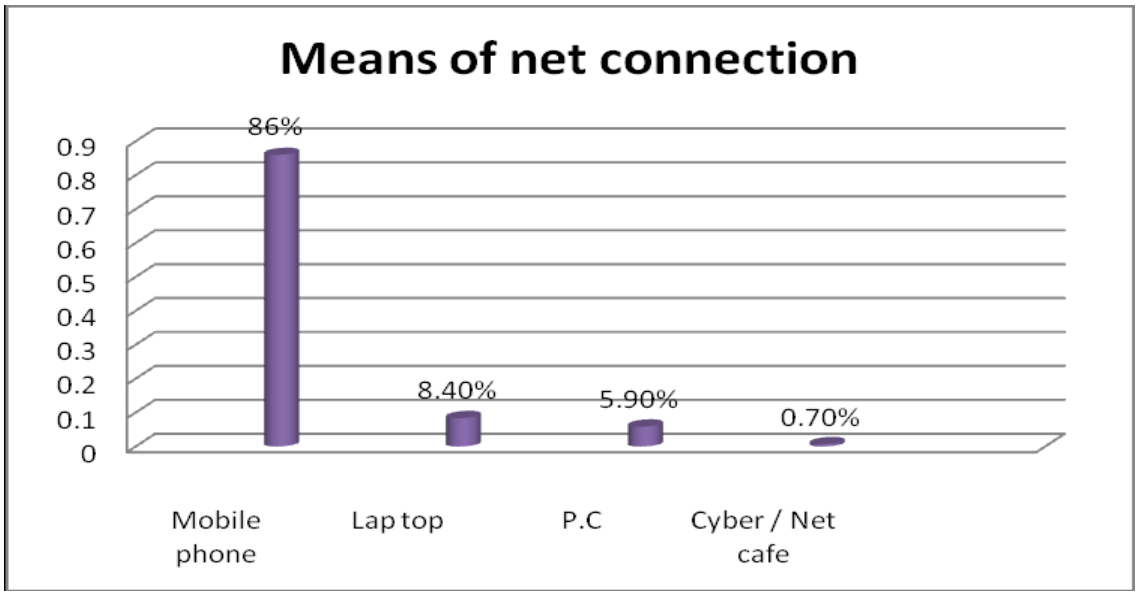

Fig (1): Distribution of the studied subjects according to the means of net connection

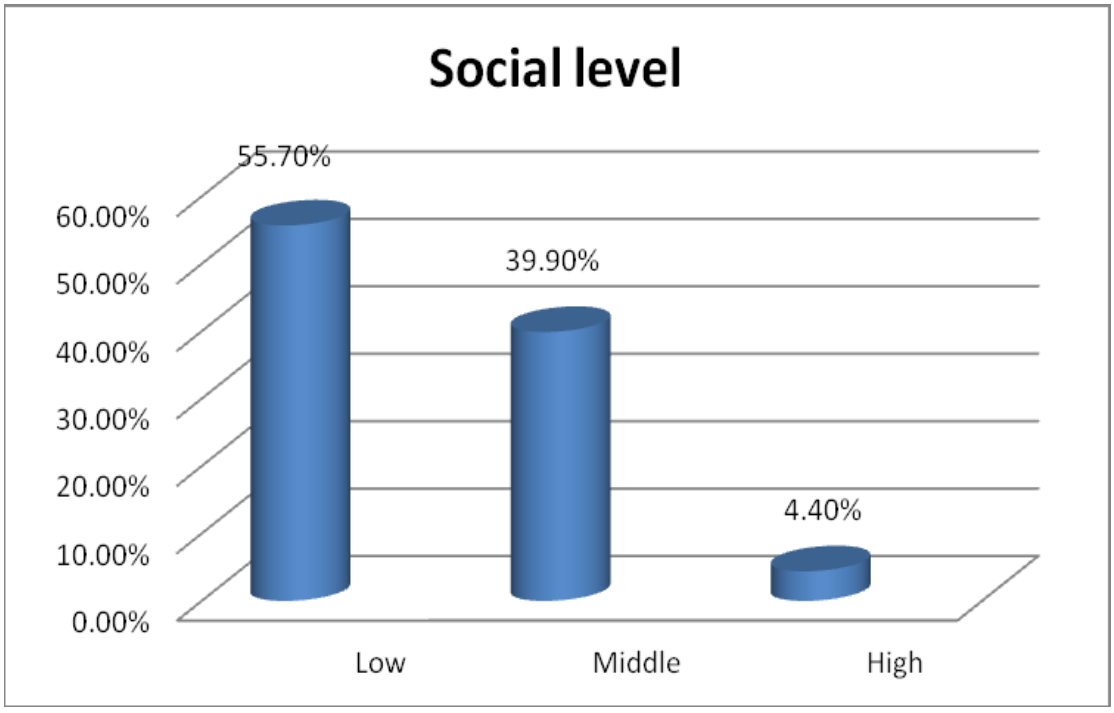

Fig (2): Distribution of the studied subjects according to their social level

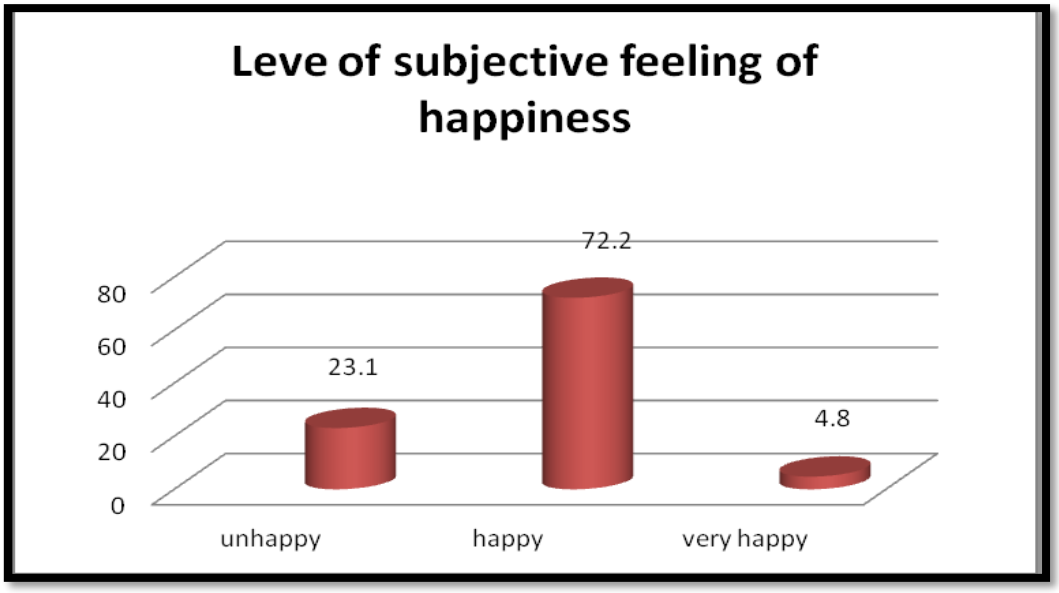

Fig (3): Distribution of the studied subjects according to level of subjective feeling of happiness

Table 2: Distribution of the studied sample according to mental health status

Dimensions of mental health status	No	%
Somatic manifestation		
Lower level of somatic manifestations	203	74.4
Higher level of somatic manifestations	70	25.6
Mean ±SD	14.12 ± 3.81	
Range	7-28	
Insomnia / anxiety		
Lower level of insomnia / anxiety	116	42.5
Higher level of insomnia / anxiety	157	57.5
Mean ±SD	16.1319± 4.76015	
Range	7-28	
Social dysfunction		
Low social dysfunction	103	37.7
High social dysfunction	170	62.3
Mean ±SD	16.5018 ± 3.69033	
Range	8-27	
Depression		
Mild depression	176	64.5
Severe depression	97	35.5
Mean ±SD	13.9560 ± 5.17185	
Range	7-28	
Mental health status		
Good mental health	167	61.2
Poor mental health	106	38.8
Mean ±SD	60.728 ± 12.124	
Range	36-93	

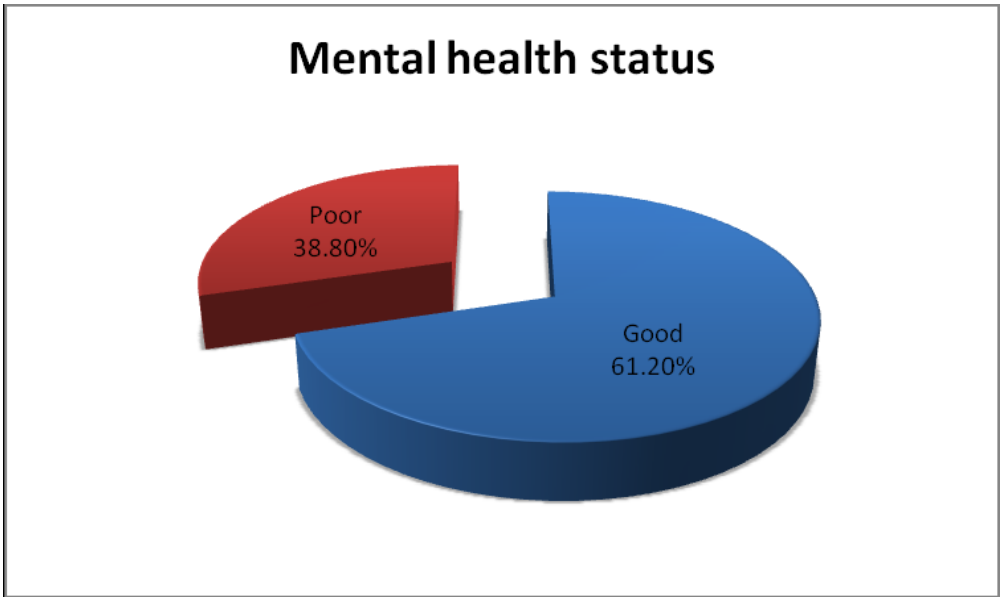

Fig (4): Distribution of the studied subjects according to total mental health score

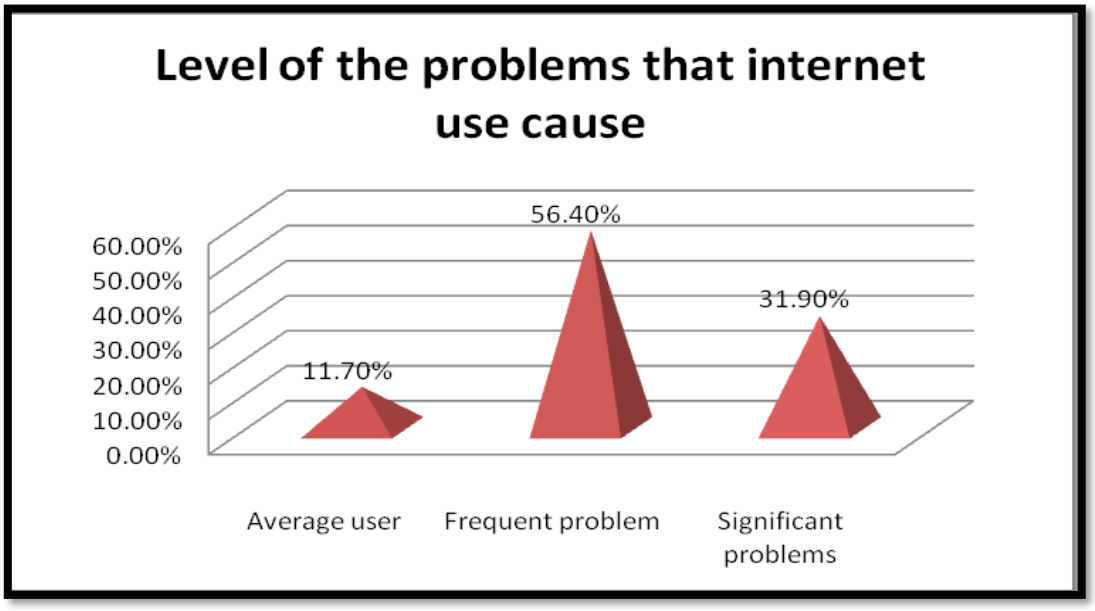

Fig (5): Distribution of the studied subjects according to level of the problems that internet use cause

Table (3): Relation between the level of problem that internet use cause and studied students' general health status.

Dimensions of general health questionnaire	level of problems that internet use cause					
	Average user		Frequent problem		Significant problem	
	No	%	No	%	No	%
Somatic manifestation						
Low level of somatic manifestation	26	9.5	117	42.9	60	22
High level of somatic manifestation	6	2.2	37	13.6	27	9.9
X^2	2.335					
P	0.311					
Insomnia / anxiety						
Lower level of insomnia / anxiety	15	5.5	75	27.5	26	9.5
Higher level of insomnia / anxiety	17	6.2	79	28.9	61	22.3
X^2	8.340					
P	0.015*					
Social dysfunction						
Low social dysfunction	15	5.5	59	21.6	29	10.6
High social dysfunction	17	6.2	95	34.8	58	21.2
X^2	1.877					
P	0.391					
Depression						
Mild depression	25	9.2	107	39.2	44	16.1
Severe depression	7	2.6	47	17.2	43	15.8
X^2	11.626					
P	0.003**					
Mental health status						
Good mental health	25	9.2	102	37.4	40	14.7
Poor mental health	7	2.6	52	19	47	17.2
X^2	13.99					
P	0.001**					

Table 4: Relation between socio-demographic characteristics of the studied students and their level of problems caused by internet use (No=274).

Socio-demographic characteristics	level of problems caused by internet use							
	Average use		Frequent problems		Significant problems		X^2	P
	No	%	No	%	No	%		
Age								<0.001**
Less than 17 years	11	4	20	7.3	1	0.4	26.153	
17 -20 years	17	6.2	106	38.5	64	23.4		
More than 20 years	4	1.5	29	10.6	22	8.1		
Sex								
Males	4	1.5	51	18.7	37	13.6	9.496	0.009**
Females	28	10.3	103	37.7	50	18.3		
Grade								
1st grade	9	3.3	21	7.7	4	1.5		
2nd grade	7	2.6	24	8.8	12	4.4	15.287	0.054
3rd grade	11	4	71	26	45	16.5		
4th grade	3	1.1	23	8.4	15	5.5		
5th grade	2	0.7	15	5.5	11	4		
No of family members								0.051
Three or less	2	0.7	22	8.1	19	7	9.446	
Four members	5	1.8	47	17.2	24	8.8		
Five or more	25	9.2	85	31.1	44	16.1		
Birth order								
The oldest	18	6.6	63	23.1	31	11.4	4.440	.350
The middle	8	2.9	55	20.1	36	13.2		
The youngest	6	2.2	36	13.2	20	7.3		
Family income								
Adequate and save	6	2.2	38	13.9	17	6.2	3.639	.457
Adequate	24	8.8	92	33.7	56	20.5		
Inadequate	2	0.7	24	8.8	14	5.1		
Daily expense								
Less than 5 pounds	4	1.5	26	9.5	18	6.6	8.311	.081
5-10 pounds	20	7.3	65	23.8	29	10.6		
More than 10 pounds	8	2.9	63	23.1	40	14.7		
Residence								
Rural	24	8.8	98	35.9	52	19	2.349	.309
Urban	8	2.9	56	20.5	35	12.8		
Family type								
Nuclear family	12	4.4	53	19.4	29	10.6	.510	0.973
Extended family	17	6.2	90	33	52	19		
Single parent family	3	1.1	11	4	6	2.2		
Social level								
Low	25	9.2	78	28.6	49	17.9	10.409	.034*
Middle	7	2.6	66	24.2	36	13.2		
High	0	0.0	10	3.7	2	0.7		
Means of net connection								
Mobile phone	28	10.3	130	47.6	74	27.1		
Lap top	2	0.7	13	4.8	8	2.9	1.076	0.983
P.C	2	0.7	10	3.7	4	1.5		
Cyber / Net cafe	00	0.0	1	0.4	1	0.4		
Academic achievement								
Weak	0	0.0	7	2.6	6	2.2	7.258	0.123
Good	4	1.5	17	6.2	18	6.6		
Excellent	28	10.3	130	47.6	63	23.1		

Significant at <0.05

Table 5: Correlation between studied students'social level, mental health, happiness and level of the problems caused by internet use.

	Level of problems caused by internet use	
	r	**p**
Mental health	0.331	<0.001**
Happiness level	0.113	0.317
Social level	0.256	0.022*

**. Correlation is significant at the 0.01 level.
*. Correlation is significant at the 0.05 level

Table 6: Correlation between mental health status, happiness level and level of problems caused by internet use and the socio-demographic characteristics of the studied subjects

Sociodemographic data	Mental health status		Happiness level		Level of problems caused by internet use	
	r	**p**	**r**	**p**	**r**	**p**
Age	- .043	0.482	.038	0.531	..225	0.001**
Sex	0.160	0.008**	.103	.091	-.137	.024*
Grade	-.106	0.081	-.016	0.791	0.196	.001**
Birth order	-.141	.020*	-.064	.289	0.145	0.017*
Daily expense	0.005	0.935	.092	.128	.052	0.391
Residence	-0.050	0.407	.011	0.859	0.078	0.200

**. Correlation is significant at the 0.01 level.
*. Correlation is significant at the 0.05 level

Discussion

Internet now has become indispensable for both individual and societal life. As the result of technology revolution worldwide, the accessibility, duration, and dependence level on internet increased day by day. Nursing students use the internet for learning and providing information, but they are also at risk of problematic internet use. [33,34]. Scientific studies have found that excessive use of internet is related to a variety of negative psychosocial consequences [33]. Therefore, the present study aimed to identify the relation between problematic internet use and mental health status of nursing students in Tanta city.

As regard to the mean of net connection, the majority of our subjects use mobile phone as a mean of net connection. This can be attributed to the availability of mobile phones and the accessibility of mobile net connection throughout the world. This result was supported by the results of **Shaheen et al (2016)[35]**, **Parel and Thomas (2017)[36]**, and **Gopala VV et al. (2014)[37],** who mentioned that the majority of their subjects were predominantly use mobile phone for internet connection as the primary object for the internet usage. In contrast, this result disagree with the result of **Aylaz et al. (2015)[38]** who found that 74.4% had a computer at home. They connected to the internet mostly at home and in internet cafes.

As for the degree of internet use, the current study revealed that only 11.7 % of the studied subjects were average user of internet while the majority of them were identified to have frequent and significant problem related to internet usage. This result was in agreement with **Khalil etal (2016) [39]** who reported that 38.4 % and 2.1 % of their participants were categorized as moderate to severe internet addiction and with **Parel and Thomas (2017)[36]** who reported that about 17.52% of students reported with no addiction while problematic use of internet was prominent feature among the rest of their subjects ranging from mild, moderate and sever net addiction.

In the same line the result of **Mohamed et al (2019)[40]** who found that The majority (82.3%) of participants reported frequently staying online longer than intended. Meanwhile, the current result contradict with the result of **Cao et al (2011)[41] .** In their study, they identified only 8.1% of the students with problematic Internet users. Moreover, there have been several studies about the prevalence rate of Internet addiction in the middle and Far East. Among those studies an Iranian study

done by **Mazhari (2012)[42]** examining the

prevalence of IA among medical students as she found that 21% of the students were identified as problematic Internet users, and **Kheirkhah et al. (2010)**[43] investigated the prevalence of Internet addiction in the Mazandaran province as they found that 22.8% of the Internet users were Internet addicts. From the researchers' point of views, this variation could be related to cultural diversity among participants or different tools that were used to measure the internet usage level among the participants.

It was reported that as problematic internet use increased, the general individuals' health declined and insomnia associated with increased prevalence of depressive symptoms emerged [6]. In this regard, the current study revealed that more than one quarter of the studied students had low level of psychosomatic manifestation and more than one third of them had low level of mental health status. More than one third of them categorized as severe depression while more than half of them were categorized as of higher level of insomnia / anxiety and high level of social dysfunction.

This is in agreement with the study of **Malak et al, 2017[44]** who revealed that Jordanian school students had high prevalence of anxiety and depression indicating a relationship between anxiety, depression and IA. They explained this as the school students aged 12-18 undergo many developmental changes leading them to experience social and psychological problems, therefore Internet is considered as rich environment to fulfill their needs and forget their problems. As for the relation of problematic use of internet and the general health of the studied subjects, the current result indicated that there was strong significant positive correlation between level of internet use and mental health condition of the studied subjects. This result is in agreement with the results of **Andersona et al (2016) [45].**

Additionally, an Australian study which concluded that the links between PIU and anxiety, social anxiety, depression and general psychological distress have been examined mainly as predictors, and less as potential consequences of PIU, across predominantly Asian populations (Korean, Singaporean) [46]. Finally, there have been contradictory findings considering the association between psychotic symptoms and PIU, with one study that support our results and suggesting that an increase in psychotic symptoms over two-months related to significantly higher PIU **(Mittal et al, 2013) [47],** and a second study which

disagree with ours, resulting in no significant associations (**Dong et al, 2011)** [48].

A statistically significant relationship was found between level of insomnia / anxiety and problematic internet use. Nearly about one quarter of the studied student who were categorized as frequent or significant problems related to internet use were described to had high level of insomnia / anxiety. This result was in the same line of the result of **Aylaz et al. (2015)** [38] who reported that there was a statistically significant relationship between sleeping problems and problematic internet use among their participants. Furthermore, the current results revealed that the prevalence of severe depression among the studied students was statistically related to the problematic internet use.

This result is support the finding of other studies (**Malak et al.2017, Çam, et al 2015, Goel ae al,2013 and Tang at al,2014)** [44, 49-51] indicating a relationship between anxiety, depression and problematic use of internet. This can be explained as adolescents undergo many developmental changes leading them to experience social and psychological problems, therefore internet is considered as rich environment to fulfill their needs and forget their problems.

Risk factors for problematic internet use have been reported to include social factors as age, gender, birth order, level education, unsatisfactory financial situation and social leveling [38]. Many studies have investigated gender differences in internet addiction (**Kaynak et al, 2018 [52], Şahin, 2011 [53], Tonioni et al, 2012 [54] ;and Wu et al, 2015 [55].** These studies found that the "Internet addiction" total scores, and the problems in social relationships subscale scores were higher in male nurses than in their female colleagues.

This result disagree with the result of the current study which revealed that there was a significant negative correlation between internet problematic use and the sex of the studied students and the females were more apt to have either frequent or significant problem related to internet use. This can be attributed to the Arab culture particularly in rural areas in Egypt that restrict the hiking of females so, they tend to spend their time using internet seeking for companionship, building social relationship and sharing feelings and ideas. In the same line, other studies **(Aylaz at.al, 2015 [38], , Malak et al, 2017 [44] and Rücker et al, 2015 [56]** reported that the average girls seem to be affected more by the negative results of the internet more than boys.

One of the findings of this study was that the high prevalence was among students

aged 17-20 years. Significant positive correlation was observed between the age of the studied subjects and the problematic internet use. This indicates that this group is more prone to excessive Internet usage than younger adolescents. This may be explained as the older adolescents experience serious problems associated with studying. This supported by **Wu et al. (2016)** [(55)] who reported that late adolescents (aged 15-18) had a higher prevalence of IA compared to early adolescents (aged 11-14). On the other hand, this result disagree with the study of **Ko et al, (2012)** [(57)] who indicated that age was associated with IA in junior high school male students.

The current study revealed that significant positive correlation was observed between the students' academic grade and problematic internet use. It showed that the prevalence of frequent or significant internet use was higher in the third grade and the higher grades. This may attributed to the stresses that those students face during preparation of assignments and other assigned duties needed for clinical assessment and studying for examination. The findings of this study are contradict with a previous researches (**Sasmaz et al, 2013** [(58)] **and Malak et al, 2017** [(44)] that showed the prevalence of IA was higher in the first secondary class than the second secondary.

The current results showed that significant difference was observed between students' social level and problematic internet use indicated that students of low social level had high rates of frequent or significant problematic use of internet. This may be because of the students of high social level can spend much of their times in traveling or at clubs or gem while those of low social level haven't this chance of recreation so, they spend their times on internet either for gaming or for communication with their peers. This result stresses the need of these families for interventions and strategies regarding the risks of Internet and PIU. Excessive internet use among adolescents was correlated with poorer financial standards, as was found in previous studies (**Lam *et al*, 2009** [(59)]**; Tsai *et al*, 2009** [(60)]**.**

Additionally, the finding of the current study is similar to past research findings of **Wu et al. (2016)** [(55)] study who documenting that adolescents with low family income had high rates of IA. Meanwhile, this result inconsistent with the findings of **(Malak at al,2017** [(44)] **and Alhantoushi et al, 2014** [(61)] who mentioned that students with high family income had high percentage of IA. They attributed their result to the assumption

that high-income families obtain both computer and internet connection services at home.

Subjective happiness is a state of mind or feeling characterized by pleasure or satisfaction. Since subjective happiness is correlated to satisfying relationships, positive emotions, self-perceptions of well-being, satisfaction with life, the negative effect of internet addiction on subjective happiness seems very reasonable. The result of current study revealed that nearly about three quarters of the studied subjects were feeling happy while less than one quarter of them were unhappy. However, the result of this study revealed that no significant correlations were found between the level of problematic internet use and level of happiness among the studied students.

This finding is inconsistent with previous research (**Akın 2011**) **(62)**, which found that a more problematic Internet use is associated with a lower subjective happiness. A greater dependent use of the Internet was negatively linked to psychological well-being and subjective happiness.

Conclusion

In the light of the results of the current study it was concluded that, the majority of the studied students have a frequent and significant problem in relation to internet usage which has a devastating effect on the students' mental health. Significant positive correlation was found between mental health status and the level of problems caused by internet use. The students with significant problems related to internet use reported poor mental health status. Also, it was concluded that the most affected students were females of the age group of 17-20 years old. Significant positive correlations were observed between the level of internet usage and the students' age, grade and birth order where the older students of higher academic grade were classified as having frequent or significant problematic internet use. In addition, significant positive correlations were found between studied students' mental health status and their sex and birth older.

Recommendations

- Health-promotion strategies should be implemented and evaluated in respond to problematic internet use.
- Emphasizing the role of multimedia in advocating sound internet usage.
- Further studies needed to develop and implement of rehabilitation programs, for students with psychological problems related to excessive internet usage.
- Professional monitoring in collaboration with community-based

mental health centers, youth counseling centers, and other similar facilities is needed to provide affected students with solution-oriented professional support.

- Future studies need to develop and implement rehabilitation programs, such as camp or therapeutic schools, for students with problems related to excessive internet usage, and to verify the effects of such programs.

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Effect of Implementing a Protocol of Nursing Care on Peripheral Venous Access Complications for Patients Undergoing Chemotherapy

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Abstract: Background: Cancer is a group of disease that is characterized by uncontrolled growth of abnormal cells. Chemotherapy is a vital treatment for cancer but in the same time it is associated with serious complications that are need standard of nursing care. **Aim of the study:** Evaluate the effect of implementing a protocol of nursing care on peripheral venous access complications for patients undergoing chemotherapy. **Design and Setting:** A quasi-experimental research design was used to collect data from Clinical Oncology and Nuclear Medicine Department of Tanta University Hospital**. Subjects:** A convenience sampling of (60) patients who were undergoing chemotherapy . They were divided into two equal groups; study and control; each group consisted of (30) patients. **Tools:** Three tools were used for data collection, Tool (I); Bio- socio-demographic and structured interview schedule evaluate patients' knowledge, Tool (II); Vein quality assessment to assess the quality of vein and Tool (III): Peripheral venous access complications assessment tool. **Results:** As a result of this study, it was determined that there was highly significant improvement in the total level of patients' knowledge, vein quality, visual infusion phlebitis and there was decrease in the incidence of extravasation among study group at 2nd month and post ending protocol of care compared to control group. **Conclusion and Recommendation:** Aprotocol of care has positive effect on reducing peripheral venous access complications among chemotherapeutic patients. So it was recommended that oncology nurses should follow protocol of nursing care while administrating chemotherapy for patients to decrease incidence of peripheral venous access complications.

Key words: Chemotherapy, peripheral venous access complications, Protocol of Nursing Care.

Introduction

Cancer is a group of disease that are characterized by uncontrolled growth of abnormal cells. It spreads directly to the surrounding tissue and to other body organs [1,2]. The most common cancers that are estimated in 2018 are breast, lung and bronchus cancer, prostate cancer, colon and rectum cancer, bladder cancer, leukemia, pancreatic and liver cancer [3]. The global cancer burden has been doubled in the last 30 years of the 20th century and will be doubled again by 2020 and nearly triple by 2030 worldwide and expected to increase three times more than by 2050 according to the National Plan for Cancer Control 2017-2020 [4]. In 2018, it is estimated 1,735,350 new cases of cancer will be diagnosed in the United States and most of them will die from the disease [3].

Cancer is a series of pathological events over a period of many years, during which frequent changes occur through a number of stages due to many risk factors [5]. Early diagnosis of cancer is essential for effective treatment because every type of cancer requires a specific treatment regimen that encompasses one or more modalities of treatment [6]. The goals of cancer treatment are to control the tumor progress and to improve patients' quality of life. Many treatment options for cancer including; surgery, chemotherapy, radiation therapy, hormonal therapy and targeted therapy [7]. Chemotherapy is one of the most commonly prescribed cancer treatment modality [8], it may be given for a purpose of curative intent or to palliate symptoms, chemotherapeutic agents act by killing cells that are dividing rapidly as one of the main properties of the most cancer cells [9].

Chemotherapy is the most widespread cancer treatment modality which is used to control cancer progress [10]. Most chemotherapeutic drugs are administered directly into a vein by using a peripheral intravenous catheter, this allow drugs go directly to cancer cells [11]. Peripheral intravenous cannulas allows rapid administration of medication, but also they are associated with serious complications including; phlebitis, extravasation, infection, skin hyper pigmentation and hypersensitivity reactions [12]. Phlebitis is defined as an inflammatory response to intravenously chemotherapeutic drugs [13], it may leads vein damage associated with pain, erythema and swelling [14]. The incidence of phlebitis has been reported as 70% worldwide [15]. Extravasation is leakage of intravenous drugs into surrounding perivascular tissue or subcutaneous spaces. It may cause severe

reactions as; tissue damage, pain, redness, swelling, tissue necrosis and permanent dysfunctional area of vein [16, 17].

Other serious complications include; thrombosis of the veins which may occur due to local effect of chemotherapeutic agents on the endothelium [18]. Hypersensitivity reactions are also occur; the severity ranged from mild to life-threatening problem as fever, allergy, urticaria, swelling and flushing of the face [19, 20]. Cancer Patients who are receiving chemotherapy through peripheral vascular access devices need designed protocol of care to avoid these complications, oncology nurses are responsible for safe and timely administration of intravenous treatments to the patients through venous catheter and management of any possible complication [21]. It is widely recognized that early detection and management of peripheral venous access complications are critical for prevention of potentially serious adverse outcomes for chemotherapeutic patients [22]. Key elements of protocol of nursing care regarding prevention of the occurrence of peripheral venous access complications include re-evaluating of basic knowledge for nurse related to assessment, insertion, management [23], ongoing monitoring of the venous access site after removal of the device help to reduce complications. Oncology nurse plays vital role in the delivery of care, patient education about the importance of identifying and managing adverse reaction of chemotherapy treatment as; selection of the optimal device and site for cannula insertion; proper site preparation, management, and good removal of venous access which help in prevention of peripheral venous access complication [24,25]. So this study will be done to evaluate the effect of implementing a protocol of nursing care on peripheral venous access complications for patients undergoing chemotherapy.

Significance of the study:-

Chemotherapy is one of the main cancer treatment modalities that provide cure for cancer patients [26], which are given through intravenous catheter insertion that is performed in up to 70% - 80% of cancer patients [27,28]. Chemotherapy drugs can have severe complications due to repeat exposure to IV cannulation; as phlebitis, extravasation, infection and hypersensitivity reactions [13]. So the nurses should be able to understand these complications of chemotherapy and able to provide supportive care for these patients to control complications and allow more patients to benefit from receiving chemotherapy at full dose on schedule and improve quality of care[29]. Hence there is urgent need to design protocol of nursing care to supply oncology nurses with the

chance to earn the necessary, knowledge and skills for safe chemotherapy administration.

Aim of the study

Evaluate the effect of implementing a protocol of nursing care on peripheral venous access complications for patients undergoing chemotherapy.

Research hypothesis

1- Post implementation of the protocol of nursing care, the study group exhibited improve in knowledge regarding chemotherapy, peripheral venous access complications, aseptic technique and hypersensitivity and infection than the control group.
2- Post implementation of the protocol of nursing care, the study group are expected to have minimal peripheral venous access complications than control group who received routine hospital care.

Research design:

A quasi-experimental research design was used in the present research.

Setting:

The study was conducted at the Clinical Oncology and Nuclear Medicine Department of Tanta Main University Hospital.

Subjects:

A convenience sampling of (60) patients who were undergoing chemotherapy in the above previously mentioned settings. The sample size was calculated based on Epidemiological Information 7 statistical Program. The final acceptable sample size was estimated to be (60) patients. They were divided into two equal groups; each group consisted of (30) patients as following: **Study group,** Consisted of (30) patients who were managed with protocol of care that was designed and implemented by the researcher. **Control group,** Consisted of (30) patients who were managed with routine hospital care.

Inclusion criteria:

-Adult conscious cancer patients.

-Newly diagnosed patients.

-Planned to receive chemotherapy according to the following type; alkylating agents, anti metabolites, antitumor antibiotics and plant alkaloids.

-Duration of chemotherapy cycles ranged from 2-6 months.

Exclusion criteria:

Previous history of chemotherapy or hormonal treatment and previous venous complications.

Tools of the study:

Three tools were used to collect the data for this study. These tools aimed to evaluate the effect of implementing protocol of nursing care on peripheral venous access complications for patients

undergoing chemotherapy, which included the following:

Tool (I): Bio- socio-demographic and Structured Interview Schedule: It was developed by the researcher after reviewing of the related literatures [19,20,30]. It was comprised of three parts:-

Part (I): Socio- demographic data of the patients: which included; patient's code, age, sex, marital status, level of education, occupation and residence.

Part (II): patients' clinical data: which included; past medical history, current diagnosis, methods of treatment, duration of disease, duration of chemotherapy and the use of anti-inflammatory drugs.

Part (III): Patients' Knowledge Assessment Sheet: Include the the following:

a- Knowledge about chemotherapy (10) questions which included; definition, preparation before administration, precautions, method of administration, types of drugs, side effect, drug preparation area, and specific intervention for veinless disorder and nursing care of cannula.

b- Knowledge about peripheral venous access complications related to chemotherapy (9) questions which included; purpose of peripheral venous access cannula, signs and symptoms and management of phlebitis, extravasations and infiltration.

c- Knowledge about aseptic technique (7) questions which included; importance and components of infection control measures, early response to infection, preventive measures and care.

Scoring system of knowledge:

Correct and complete answer scored (2)

Correct and incomplete answer scored (1)

Don't know or incorrect answer scored (0)

The total scoring system of patients' knowledge was (26) classified as the following:

-Good → > 75% of the total score

-Fair → ≥ 60% - 75% of the total score

- Poor → < 60% of the total score

Tool (II): Vein Quality Assessment Tool:

Vein quality assessment tool was developed by **Jacobson 1999** [31] and **Lenhardt 2002** [32] and was modified by the researcher after an extensive review of related literature [33] to assess the quality of vein before and after application of peripheral venous access according to the following criteria:-

Vein quality	Scoring System	Vein character	vein puncture site	Management
Good	3	Vein is large, soft, easily visible and palpate when tourniquet is applied.	Forearm	Cannula inserted by the researcher.
		Vein is large, soft, resilient in hand and antecubital fossa, small and thin in forearm.	Hand	
Fair	2	Veins are small, thin, scarred or difficult to palpate in forearm –hand.	forearm	Cannula inserted by the researcher.
		Small, thin veins in hand, veins in forearm not palpable or visible.	Hand	
Poor	1	Vein unable to be seen or palpated, small, fragile veins easily rupture in hand and forearm.	Forearm	Cannula inserted by the researcher

Scoring system: - There are three categories of vein quality as following:- (3) indicated good vein quality, (2) indicated fair vein quality and (1) indicated poor vein quality.

Tool (III): Peripheral Venous Access Complications Assessment Tool:

It was comprised of three parts:

Part (I): Visual Infusion Phlebitis scale (VIP Scale):

It was developed by **Andrew Jackson (1998) [(34)]**, and evaluated by **Gallant and Schultz (2006) [(35)]**. It was used for indicating the first stages of phlebitis, when intravenous cannulas were to be replaced [(36)].

This scale was consisted of 6 grades that ranged from (0-5) where (0) indicated no signs of phlebitis to (5) indicated advanced stage of thrombophlebitis. It was scored on a scale of 0–5 as following: -

Grade	Clinical Criteria to identify phlebitis
Grade (0) : No signs of phlebitis	IV site appears healthy
Grade (1) : Possibly first signs of phlebitis	● Slight pain near IV site or ● Slight redness near IV site
Grade (2) : Early stage of phlebitis **(**Two signs are evident)	● Pain at IV site ● Redness and swelling
Grade (3): Medium stage of phlebitis **(**All signs are evident)	● Pain along path of cannula ● Redness around site and swelling
Grade (4): Advanced stage of phlebitis or start of thrombophlebitis **(** All signs are evident)	● Pain along path of cannula ● Redness around site ● Swelling ● Palpable venous cord
Grade (5): Advanced stage of thrombophlebitis **(**All signs are evident)	● Pain along path of cannula ● Redness around site and swelling ● Palpable venous cord

Part (II): Extravasation of Chemotherapeutic Agent scale:

It was adopted from British Columbia Cancer Agency, Approved By: Provincial Systemic Program Committee, first developed at1997 and last revised at 2016 [37, 38, 39]. It was used to assess the severity of extravasation at the time of detection, and determine the appropriate level of intervention.

Scoring system; It was consisted of 5 grades from (0-4) as following; (0) indicated no symptoms, (1) indicated mild symptoms, (2) indicated moderate symptoms, (3) indicated severe symptoms and (4) indicated worst symptoms

Grade	0	1	2	3	4
Color	Normal	Pink	Red	Blanched center surrounded by red	Blackened
Integrity	Unbroken	Blistered	Superficial skin loss	Tissue loss exposing s.c tissue	Tissue loss bone ,muscle with necrosis
Edema	Absent	Non pitting	Pitting	-	-
Skin temperature	Normal	Warm	Hot	-	-
Mobility	Full	Slightly limited	Very limited	Immobile	-
Pain	0	1-3	4-6	7-9	10
Fever	Normal	Elevated		-	-

Part (III): Hypersensitivity and infection Assessment sheet:

It was developed by the researcher after extensive review of related literature [40] to detect the presence of chemotherapy related to S,S of infection and hypersensitivity**.** It included (10) questions.

Scoring system of knowledge: Correct and complete answer scored (2), correct and incomplete answer scored (1)and don't' know or incorrect answer scored (0). Total scoring system of patients' knowledge was (10) classified as the following:

-Good → > 75% of the total score

-Fair → ≥ 60% - 75% of the total score

- Poor → < 60% of the total score

Ethical consideration:

The necessary official permission was obtained from the directors of the Clinical Oncology and Nuclear Medicine Department of Tanta Main University Hospital. Informed consent was taken from every patient after explanation aim of the study to participate in the study. Confidentiality and privacy was taken into consideration regarding data collection. A code number was used instead of name. The patient was informed the right to withdraw from the study at any time with no reason.

Methods of data collection:

1- All tools of the study were developed by the researcher after reviewing literature [32] to collect data except tool (II) ;Vein Quality Assessment was developed by **Jacobson 1999** [31] and **Lenhardt 2002** [32], and tool (III) part (I);Visual Infusion Phlebitis was first developed by **Andrew Jackson (1998)** [34], Part (II); Extravasation of chemotherapeutic agent was adopted from British Columbia Cancer Agency, first developed at 1997 and last revised at 2016 [37, 38, 39].

2-All tools were reviewed for content validity by a panel of (5) expertise in the field of Oncology and Nuclear Medicine and Medical Surgical Nursing as well as protocol of nursing care, Their opinions were elicited regarding tools format and consistency, it was calculated and found to be = (98%).

3-All tools were tested for reliability using Cronbuch`s alpha test; it was 0.745 for tool (I) Part (III) and 0.628 for tool (II), 0.804 for tool (III) Part (I) and 0.712 for tool (III) Part (II).

4- Pilot study was conducted on (10%) of patients to test the feasibility, clarity, relevance and organization of the tools and to determine any obstacles that may be encountered during the period of data collection; needed modification was done.

The pilot study excluded from the study subjects.

5-A convenience sample of 60 patients was selected and divided equally into two equal groups; study group was received A protocol of nursing care, control group was received only routine hospital care.

6- The collection of the data for the present study was carried out within the period from October 2017 to the end of May 2018.

7- The present study was conducted through four phases (assessment, planning, implementation and evaluation) and it was continued for each **study patient** individually till the end of chemotherapy:-

Assessment phase;

Assessment of the baseline data for chemotherapeutic patients' was carried out by the researcher immediately once within admission to the department by using Tool (I), Tool II and Tool III to assess patients' knowledge, vein quality assessment and peripheral venous access complications for both control and study groups before implementation of the protocol of care for the studied patients. Each interview questionnaire took approximately one hour.

Planning phase;

Objectives of the study were prepared based on the needs of the patients. The protocol of care was designed by the researcher based on the study subjects' assessment and extensive reviews of related literature [(41-47)]. An illustrative structured colored booklet was prepared and written in simple Arabic language supported by illustrative pictures as a guide for the study group and different methods were used as video, group discussion and power point and demonstration and re-demonstration for the practical part. A booklet was given to each patient during sessions to refresh their knowledge. The protocol of care was carried out through (4) sessions.

Implementation phase;

Study group; A protocol of nursing care was applied by the researcher from the date of admission throughout (4) basic sessions at the time of chemotherapy infusion for each patient until last chemotherapy session in the morning shifts as the following; ***The First session;*** The researcher met each participant individually in the chemotherapy administration ward to inform them regarding knowledge which included; chemotherapy definition, precautions, method of administration, types of drugs, how to deal with veinless disturbance, and peripheral venous access complications, take about 30 minutes and instruct them about any abnormal sensation during the

infusion to allow for prompt intervention, it took about 30 minutes.

The second session: was given to the patients regarding knowledge about care of cannula, aseptic technique precautions, management and preventive measures of infection, take about 30 minutes.

The third session: **Venipuncture session:** This session aimed to protect vein during insertion of cannula in addition to decrease complications due to the chemotherapy infusion. It was implemented by the researcher, for about 10 minutes and included the following: assess patient's risk factors regarding occurrence of complications, teach the patient about relaxation techniques to relief stress, instructing patient to make exercise for hands with a rubber ball daily between treatments, moist heat was applied to the patient's arms for 5-10 minutes to dilate vein and local vein manipulation was used to aid dilation through; appropriate use of a tourniquet or blood pressure cuff to encourage pooling of venous blood, milking the veins from proximal to distal (elbow to hand , Gently striking the surface of the vein and proper care of the vascular access with chlorhexidine and flushing it with normal saline.

The fourth session: - Chemotherapy infusion session; -This session aimed to administer chemotherapy with minimal complications .This session took about 2-4 hours to infuse the chemotherapy according to the ordered protocol for the patients. It was performed by the researcher with regard to the following: wear personal protective equipment, give premedication to the patient at least 20-30 minutes before chemotherapy, Dextrose 5 % (D5W) or normal saline (NS) were commonly used to wash the vein prior to the actual administration of chemotherapy, chemotherapy agents were administered according to written policies and procedures in sequence of vesicant, irritant, non-irritant using proficient intravenous therapy skills and techniques, in the case of occurrence of any problem for the study group, the researcher firstly stopping the infusion then removing the cannula and applying warm compresses in case of phlebitis, while in case of extravasation the researcher was attaching 10 ml syringe and trying to aspirate the extravasated solution from under the skin then removing the syringe and injecting 10 ml NS into the cannula, then removing the cannula, covering the skin with sterile dressing , take about 2-4 hours.

- Control group; received the routine nursing care provided to the patients by oncology nurses. The routine nursing management in the Clinical Oncology and Nuclear Medicine Department at Tanta

University Hospital done by nurses includes the following: detect cannulation size (20-22) and insert it to patient. administer chemotherapy as doctor order and cold compresses in case of complications and discontinuation of chemotherapy.

Evaluation phase:-

- Evaluation was done for both study and control groups by using tool (I) part III to evaluate patients' knowledge regarding chemotherapy, peripheral venous access complications, aseptic technique and hypersensitivity and infection, once pre implementing, 2nd month and post completion of protocol of care. Tool (II) used to assess severity of extravasation at the time of detection, and determine the appropriate level of intervention, once pre implementing, 2nd month and post completion of protocol of care and Tool (III) used to assess peripheral venous access complications once pre implementing, 2nd month and post completion of protocol of care.
- Comparison was done between both groups to evaluate the effect of implementing a protocol of nursing care on peripheral venous access complications for patients undergoing chemotherapy.

Methods of data analysis: Data was collected then tabulated and statistically analyzed using Statistical Package for Social Sciences (SPSS) version 25. Data expressed as number and percentage. t-test is used to determine significant for numeric variable. A probability level of p-value ≤0.01was adopted as a level of significance for testing the research hypotheses.

Results:

Table (1) illustrated the distribution of the patients according to their Socio-demographic characteristics. As regard to age, it was observed that nearly one third (33.3%) from study group were in the age (50-60) year and more than one quarter (30%) from control group were in the age (30 < 40) year and (40 <50) year respectively. Also the table revealed that (70%) and (56.7%) of the study and control groups were females respectively and nearly half (43.3%) of the study group had secondary education while (40 %) of the control group had both secondary and university education, also three quarters (73.3%) of both groups were married. In addition (56.7%) and (33.3%) of the study and control groups were house wives respectively.

Table (2) illustrated the distribution of the studied patients according to their clinical data. Concerning to the current diagnosis and method of treatment, it was found that the majority of the study and control groups were breast cancer and about

(100%) had undergone antimetabolites chemotherapy treatment. Regarding duration of chemotherapy, it was found that the mean duration of chemotherapy was (3.48±0.636) , (3.63±0.628) in the study , control groups respectively and (30%) and (53.3%) of the study and control groups' patients hadn't previously used anti-inflammatory drugs.

Table (3) illustrated the distribution of the studied patients according to their total level of knowledge about chemotherapy throughout all intervention periods of the study. **Concerning to the study group;** it was observed that, there was statistical significant improvement in the patients' total level of knowledge about chemotherapy pre , immediate implementation of protocol of care at p value < 0.001 and at immediate , post the protocol of care at p value 0.044. **In relation to control group;** there was no statistical significant difference in the patients' total level of knowledge.

Table (4) showed the distribution of the studied patients according to their total knowledge about peripheral venous access complications throughout all intervention periods of the study. **Concerning to the study group;** the table showed that, there was statistical significant improvement in the patients' total level of knowledge about peripheral venous access complications pre , immediate implementation of protocol of care at p value <0.001 and at immediate , post the protocol of care at p value 0.038. **In relation to control group;** there was no statistical significant difference in the patients' total level of knowledge.

Table (5) showed the distribution of the studied patients according to their total knowledge about aseptic technique throughout all intervention periods of the study. **Concerning to the study group;** it was observed that, there was statistical significant improvement in the patients' total level of knowledge about aseptic technique pre , immediate implementation of protocol of care at p value < 0.001. **In relation to control group;** there was no statistical significant difference in the patients' total level of knowledge.

Table (6): showed the distribution of the studied patients according to their total knowledge about hypersensitivity and infection throughout all intervention periods of the study. **Concerning to the study group;** the table showed that, there was statistical significant improvement in the patients' total level of knowledge about hypersensitivity and infection pre , immediate implementation of protocol of care at p value <0.001and at immediate , post the protocol of care at p value 0.050. **In relation to control group;** there was

no statistical significant difference in the patients' total level of knowledge.

Table (7) showed the distribution of the studied patients according to vein quality assessment throughout all intervention periods of study. **Concerning to the study group;** the table showed that, there was a statistical significant improvement regarding vein quality assessment among the studied patients, where (63.3%) had good vein quality pre protocol of care, whereas about (93.3%, 100%) of the patients had good vein quality at the 2nd month and post the completion of the care respectively. **Concerning to the control group;** there was no significant difference in their vein quality where (76.7%) of the patients had good vein quality pre care, whereas about (50%) of the patients had good vein quality at the 2nd month and (43.3%) had fair vein quality post completion of care.

Table (8) showed the distribution of the studied patients according to visual infusion phlebitis throughout all intervention periods of the study. The table revealed that there was significant improvement in the study group after the completion of the protocol of care, on the other hand there were deterioration in the VIP scale among control group at the 2nd month of the care. Where the majority of the studied patients of both the study and control groups had no signs of phlebitis (90%, 83.3%) respectively pre protocol of care. After 2 months of the protocol of care, there were about (70%) of the study group had no signs of phlebitis while in the control group nearly to half of the patients (46.7%) had developed possibly first signs of phlebitis. Post completion of the protocol of care ,nearly all of the study group patients (96.7%) had no signs of phlebitis ,while in the control group; about one third (33.3%) of the patients had developed medium stage of phlebitis and one quarter (20%) of them had developed early stage of phlebitis.

Table (9): showed the distribution of the studied patients according to extravasations of chemotherapeutic agent scale throughout all intervention periods of the study. **In relation to color,** all of the studied both groups had normal color prior to care. After 2 months and completion of the care, it was found that about (93.33, 100%) study group patients had normal color, while half of one third of control group had blanched center surrounded by red post routine care. **As regard to edema**, the majority of the studied patients of both the study and control groups didn't have edema (86.67%, 93.33%) prior to care. After 2 months and completion of the care, it was found that about (73.33, 93.33%) of the study patients didn't have edema,

while about (63.33%) of the control group patients had non pitting edema post routine care. There was significant improvement for study group. **According to skin temperature;** all the study group patients had normal skin temperature throughout all intervention period of study. Comparing to control patients where about (53.33 and 63.33%) of them had warm temperature after 2 months and post routine care respectively. **In relation to mobility**; there was a high statistical significant difference in the mobility of control group patients representing deterioration from full mobility post 2 month (96.67%) to (80%) post routine care respectively**.**

Table (10) showed correlation between socio demographic data of the studied patients and their total knowledge pre and post the protocol of care. **Concerning to the study group,** the table revealed that, there was a significant negative correlation between total knowledge score of the study group patients and their age post protocol of care, while there was a significant positive correlation between the total knowledge of the study group and their educational level and being employees post protocol of care. **Comparing to the control group,** there was a significant positive correlation between the total knowledge of the control group and their educational level and being employees pre the routine care.

Table (1): Distribution of the patients according to their socio-demographic characteristics.

Characteristics	The studied patients (n=60)				χ^2 P
	Study group (n=30)		control group (n=30)		
	N	%	N	%	
Age (in years)					
▪ (21-<30) years	6	20.0	4	13.3	
▪ (30-<40) years	5	16.7	9	30.0	1.765
▪ (40-<50) year	9	30.0	9	30.0	0.623
▪ (50-60) years	10	33.3	8	26.7	
Mean ± SD	42.57±11.96		42.03±9.84		P=0.851
Sex					
▪ Male	9	30.0	13	43.3	FE
▪ Female	21	70.0	17	56.7	0.422
Marital status					
▪ Married	22	73.3	22	73.3	1.067
▪ Single	2	6.7	4	13.3	0.587
▪ Widow	6	20.0	4	13.3	
Educational level					
▪ Illiterate	6	20	5	16.7	1.067
▪ Read and write	3	10	1	3.30	0.587
▪ Secondary education	13	43.3	12	40	
▪ University education	8	26.7	12	40	
Occupation					
▪ Not work	5	16.7	9	30.0	
▪ Employee	6	20.0	10	33.3	4.291
▪ Manual work	2	6.6	1	3.3	0.232
▪ House wife	17	56.7	10	33.3	
Place of residence					
▪ Rural	24	80.0	27	90.0	FE
▪ Urban	6	20.0	3	10.0	0.472

Table (2): Distribution of the studied patients according to their clinical data.

Clinical data	The studied patients (n=60)				χ^2 P
	Study group (n=30)		Control group (n=30)		
	N	%	N	%	
Current diagnosis					
▪ Ovarian cancer	1	3.3	1	3.3	15.92 0.318
▪ Lymphoma	3	10.0	1	3.3	
▪ Sinus tumor	2	6.7	2	6.7	
▪ Breast cancer	10	33.3	9	30.0	
▪ Lung cancer	4	13.3	2	6.7	
▪ Colon cancer	4	13.3	2	6.7	
▪ Testicular cancer	4	13.3	5	16.6	
▪ Anal cancer	2	6.6	7	23.4	
#Types of chemotherapy					
▪ Alkylating agents	25	83.3	20	66.7	9.210 0.353
▪ Antimetabolites	30	100	30	100.0	
▪ Antitumor antibiotics	15	50.0	16	53.3	
▪ Plant alkaloids	10	33.3	10	33.3	
Duration of chemotherapy (in months) Mean ± SD	3.48±0.636		3.63±0.628		t=0.918 P=0.362
Use of anti-inflammatory drugs					
▪ No	21	70.0	16	53.3	FE 0.288
▪ Yes	9	30.0	14	46.7	

#More answer was chosen.

FE: Fisher's Exact Test

Table (3): Distribution of the studied patients according to their total level of knowledge about chemotherapy throughout all intervention periods of the study

Knowledge about chemotherapy			Study group (n=30)						Control group (n=30)					
			Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
			N	%	N	%	N	%	N	%	N	%	N	%
Poor (<60%)			16	53.3	0	0.0	0	0.0	15	50.0	12	40.0	9	30.0
Fair (≥60% - 75%)			12	40.0	1	3.3	7	23.3	14	46.7	13	43.3	15	50.0
Good (> 75%)			**2**	**6.7**	**29**	**96.7**	**23**	**80.0**	**1**	**3.3**	**5**	**16.7**	**6**	**20.0**
Chi-square	**X^2**	**Pre , Immediate**	**48.824**						**3.037**					
	P-value		**<0.001****						**0.219**					
	X^2	**Immediate ,Post**	**4.043**						**0.662**					
	P-value		**0.044***						**0.718**					

***significant at p <0.05** ****High significant at p <0.0**

Table (4): Distribution of the studied patients according to their total knowledge about peripheral venous access complications related to chemotherapy throughout all intervention periods of the study.

Knowledge about chemotherapy			Study group (n=30)						Control group (n=30)					
			Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
			N	%	N	%	N	%	N	%	N	%	N	%
Poor (<60%)			12	40.0	0	0.0	0	0.0	16	53.4	13	43.3	14	46.7
Fair (≥60% - 75%)			17	56.7	2	6.7	8	26.7	13	43.3	15	50	14	46.6
Good (> 75%)			1	3.3	28	93.3	22	73.3	1	3.3	2	6.7	2	6.7
Chi-square	X^2	Pre , Immediate	48.980						0.787					
	P-value		<0.001**						0.675					
	X^2	Immediate , Post	4.320						0.072					
	P-value		0.038*						0.965					

Table (5): Distribution of the studied patients according to their total knowledge about aseptic technique throughout all intervention periods of the study. .

Knowledge about chemotherapy			Study group (n=30)						Control group (n=30)					
			Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
			N	%	N	%	N	%	N	%	N	%	N	%
Poor (<60%)			13	43.3	0	0.0	0	0.0	12	40.0	10	33.3	11	36.7
Fair (≥60% - 75%)			17	56.7	0	0.0	2	6.7	13	43.3	15	50.0	14	46.7
Good (> 75%)			0	0.0	30	100.0	28	93.3	5	16.7	5	16.7	5	16.7
Chi-square	X^2	Pre , Immediate	60.00						0.325					
	P-value		<0.001**						0.850					
	X^2	Immediate , Post	2.069						0.082					
	P-value		0.150						0.960					

***significant at p <0.05**

****High significant at p <0.01**

Table (6): Distribution of the studied patients according to their total knowledge about hypersensitivity and infection throughout all intervention periods of the study.

Knowledge about chemotherapy			Study group (n=30)						Control group (n=30)					
			Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
			N	%	N	%	N	%	N	%	N	%	N	%
Poor (<60%)			17	56.7	1	3.3	0	0.0	16	53.3	15	50.0	14	46.7
Fair (≥60% - 75%)			13	43.3	1	3.3	7	23.3	9	30.0	6	40.0	11	36.6
Good (> 75%)			0	0.0	28	93.4	23	76.7	5	16.7	2	10.0	5	16.7
Chi-square	X^2	Pre , Immediate	52.508						0.961					
	P-value		<0.001**						0.619					
	X^2	Immediate , Post	5.990						0.578					
	P-value		0.050*						0.749					

***significant at p <0.05.** ****High significant at p <0.01**

Table (7): Distribution of the studied patients according to Vein Quality Assessment throughout all intervention periods of study.

Vein Quality Assessment (VQA)		Study group (n=30)						Control group (n=30)					
		Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
		N	%	N	%	N	%	N	%	N	%	N	%
• Good		19	63.3	28	93.3	30	100.0	23	76.7	15	50.0	9	30.0
• Fair		10	33.3	1	3.3	0	0.0	5	16.7	11	36.7	13	43.3
• Poor		1	3.3	1	3.3	0	0.0	2	6.7	4	13.3	8	26.7
Chi-square	X2			9.087		2.069				4.601		3.000	
	P-value			0.011*		0.355				0.100		0.223	

*** Significant at P < 0.05**

Table (8): Distribution of the studied patients according to Visual Infusion Phlebitis (VIP scale) throughout all intervention periods of the study.

Visual Infusion Phlebitis (VIP)		Study group (n=30)						Control group (n=30)					
		Pre the protocol of care		At 2nd month of the care		Post the completion of care		Pre the protocol of care		At 2nd month of the care		Post the completion of care	
		N	%	N	%	N	%	N	%	N	%	N	%
No signs of phlebitis		27	90	21	70	29	96.7	25	83.3	6	20.0	3	10.0
Possibly first signs of phlebitis		3	10	9	30	1	3.3	5	16.7	14	46.7	5	16.7
Early stage of phlebitis		0	0	0	0	0	0.0	0	0.0	6	20.0	8	26.7
Medium stage of phlebitis		0	0	0	0	0	0	0	0.0	4	13.3	10	33.3
Start of thrombophlebitis		0	0	0	0	0	0	0	0.0	0	0.0	4	13.3
Advanced stage of thrombophlebitis		0	0	0	0	0	0	0	0.0	0	0.0	0	0.0
Chi-square	X2			3.795		7.680				21.640		4.565	
	P-value			**0.048***		**0.006****				**<0.001****		**0.335**	

*** Significant at P < 0.05**

****high significant at p<0.001**

Table (9): Distribution of the studied patients according to extravasations of chemotherapeutic agent scale (ECA scale) throughout all intervention periods of the study

ECA items	The studied patients (n=60)												
	Study group (n=30)						χ2 P	Control group (n=30)					χ2 P
	Pre the protocol of care		At 2nd month of the care		Post the completion of care			Pre the protocol of care		At 2nd month of the care		Post the completion of care	
	N	%	N	%	N	%		N	%	N	%	%	
1. Color													
▪ **Nor mal**	30	100	28	93.33	30	100	4.09	30	100	16	53.33	16.67	36.52
▪ **Pink**	0	0.00	2	6.67	0	0.00	0.129	0	0.00	7	23.33	26.67	0.00*
▪ **Red**	0	0.00	0	0.00	0	0.00		0	0.00	6	20.00	16.67	
▪ **Blanched red**	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	33.33	
▪ **Blackened**	0	0.00	0	0.00	0	0.00		0	0.00	1	3.33	6.67	
2. Integrity													
▪ **Unbroken**	30	100	30	100	30	100	-	30	100	29	96.67	90.00	3.663
▪ **Blistered**	0	0.00	0	0.00	0	0.00		0	0.00	1	3.33	10.00	0.160
3. Edema													
▪ **Absent**	26	86.67	22	73.33	28	93.33	10.63	28	93.33	14	46.67	26.67	37.79
▪ **Non pitting**	4	13.33	9	30.00	2	6.67	0.005*	2	6.66	16	53.33	63.33	0.00*
▪ **Pitting**	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	10.00	
4. Skin temperature													
▪ **Normal**	30	100.00	30	100.00	30	100.00	-	30	100.00	14	46.67	36.67	29.27
▪ **Warm**	0	0.00	0	0.00	0	0.00		0	0.00	16	53.33	63.33	0.00*
5. Mobility													
▪ **Full**	30	100.00	29	96.67	29	96.67	1.02	30	100.00	29	96.67	80.00	9.604
▪ **Slightly limited**	0	0.00	1	3.33	1	3.33	0.60	0	0.00	1	3.33	20.00	0.008*
6. Pain													
▪ **(0)**	24	80.00	20	66.66	28	93.33	8.14	30	100.00	15	50.00	20.00	41.78
▪ **(1-3)**	6	20.00	10	33.34	2	6.67	0.017*	0	0.00	15	50.00	73.33	0.00*
▪ **(4-6)**	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	6.67	
7. Fever													
▪ **Normal**	30	100.00	30	100.00	30	100.00	-	30	100.00	30	100.00	96.67	2.022
▪ **Elevated**	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	3.33	0.364

*** Significant at P < 0.05**

Table (10): Correlation between socio-demographic characteristics of the studied patients and their total knowledge score pre and post protocol of care.

Characteristics	Total knowledge score of the studied patients							
	Study group (n=30)				Control group (n=30)			
	Pre protocol of care		Post protocol of care		Pre routine care		Post routine care	
	r	P	r	P	r	P	r	P
Age (in years)	**-0.291**	**0.119**	**-0.574**	**0.042***	**-0.249**	**0.185**	**0.040**	**0.835**
Sex								
▪ Male	0.249	0.184	0.358	0.169	0.327	0.078	0.288	0.123
▪ Female	-0.249		-0.358		-0.327		-0.288	
Marital status								
▪ Single	0.132	0.487	0.147	0.437	-0.057	0.766	-0.074	0.699
▪ Married	-0.061	0.748	0.109	0.565	0.170	0.369	0.196	0.299
▪ Widow	-0.160	0.400	-0.203	0.281	-0.165	0.385	-0.181	0.337
Educational level	0.128	0.500	0.396	0.030*	0.365	0.047*	-0.153	0.419
Occupation								
▪ Not work	-0.119	0.530	-0.130	0.494	-0.257	0.171	-0.353	0.055
▪ Employee	0.247	0.188	0.392	0.032*	0.381	0.038*	0.258	0.169
▪ Manual work	-0.178	0.346	0.078	0.683	0.151	0.427	0.311	0.094
▪ House wife	-0.137	0.472	-0.141	0.458	-0.188	0.319	-0.033	0.864

*** Significant at P < 0.05**

Discussion:

The patients undergoing administration of intravenous chemotherapy are susceptible for the occurrence of many types of peripheral venous access complications as phlebitis, extravasation, skin hypersensitivity and infection. These complications arise mainly if the nurse does not adhere firstly to the basic guidelines of cannulation and vein selection. So, the oncology nurse should maintain high standard of knowledge and protocol of care related to the prevention of these complications **(48,49).** So this study aimed to evaluate the effect of implementing a protocol of nursing care on peripheral venous access complications for patients undergoing chemotherapy.

Concerning to sociodemographic data of the patients, the current study results revealed that nearly two thirds of the studied patients were in the age group between (50-60 years) and (40- 50 years) and nearly three quarters in the study group and more than half of the control group were females. Also approximately three quarters of the studied patients of both groups were married and nearly half of them were secondary education. Concerning to occupation and place of residence, more than half and one third of the study and control patients were house wives. These results were in line with **Kurian et al, (2018) (50)** who reported in their study about chemotherapy that the majority of age group (85%) among breast cancer patients' was ≥50 years old.

Also these results were supported by **Chan , Ismail (2014) (51)** who reported that the majority of cancer patients in Malaysian general hospital (73.3%) were in the age range of 45-64 years. Moreover these results were supported by **Chagani et al, (2017) (52)** who mentioned that (66%) of the adult cancer patients undergoing chemotherapy treatment in the Pakistan were females. Moreover, the educational level result was supported by **Chan , Ismail (2014) (51)** who reported that (40%) of the studied cancer patients were secondary education. Also it was supported by **Üstündağ , Demir (2015) (53)** who reported that nearly half of the cancer patients undergoing chemotherapy in his study were house wives. Moreover, the place of residence result was in line with **Choenyi et al, (2016**) **(54)** who stated that most of the cancer patients (58%) belonged to rural area, while (42%) were from urban area.

Concerning to clinical data, the study results revealed that one third of the patients of both groups were diagnosed with breast cancer and all patients of both groups were treated with antimetabolites chemotherapy and nearly half of the them

had duration of disease more than six month, moreover duration of chemotherapy ranged from three to five months and number of cycles ranged from five to ten cycles for both groups. This findings were in the same line with **Pearce et al, (2017)** [(55)] who reported that more than half of the studied chemotherapeutic patients were diagnosed with breast cancer. Moreover, **Kim et al, (2006)**[(56)] reported that more than two thirds (68.5%) of the studied patients were undergone chemotherapy treatment pre surgical treatment. Also **Wakiuchi et al, (2015)** [(57)] reported that more than half of the studied patients (55.3%) had duration of disease more than six months. And **Singh et al, (2014)** [(58)] who reported that half of the patients (50%) had duration of chemotherapy less than six months

Regarding to levels of knowledge throughout all intervention periods of the study, the study results revealed that there was a high significant improvement in the **study patients'** levels of knowledge concerning to chemotherapy, peripheral venous access complications, hypersensitivity and infection from pre implementation until post the completion of the protocol of care. This may be attributed to insufficient information related to chemotherapy and peripheral venous complications and lack of continuous education and in-service training programs among patients, **comparing to the control group** there was no significant improvement in their total levels of knowledge from pre implementation until post the completion of the protocol of care.

These findings were supported by **Barakat (2016)**[(59)] who reported that 90% of chemotherapeutic patients had poor level of knowledge about chemotherapy, complications, prevention of infection in pretest, while (100%, 96%) of the patients had good level of knowledge post 1 month posttest respectively. Also these results were in the same line with **Abd-Allah et al, (2000)** [(60)] who reported that the in-service training program has a beneficial effect in the improving knowledge for the patients regarding caring of peripheral venous access complications and infections control measures. Also, they were supported by **Traeger et al, 2012**[(61)] who mentioned that "It is crucial that patients must be educated about chemotherapy and management of complications prior and during subsequent cycles of treatment.

These findings also are in the agreement with **Bouvier et al. (2013)** [(62)] who mentioned that in their study, it is necessary to optimize specific guidelines and translating this knowledge into

practical recommendations which allow for the patients to identify chemotherapy complication. Also **Shinde , Babu, 2014 (63)** showed that (15%) of cancer patients undergoing chemotherapy during pre-test were having poor knowledge about chemotherapy and its complications, (82.5%) of patients were having average knowledge while the majority of patients during post-test were having good knowledge post educational guidelines.

In relation to Vein Quality Assessment, the study results revealed that there was a statistically significant improvement regarding vein quality assessment among the **study group** patients throughout all periods of intervention **comparing to the control group**, where there was no statistically significant improvement in their vein quality throughout all periods of intervention. The improvement in the study group can be attributed to the effectiveness of the designed protocol of care that helped to improve the quality of the veins for its visibility and palpability which are leading to facilitation of peripheral vein cannulation.

This finding was in the same line with **Kaur et.al (2011)(64)** ,who reported that after implementation of the protocol of care about (73%) of chemotherapeutic patients had developed good vein quality, while (26%) of these patients had developed fair vein quality**.** Also, the results were supported by **Simarpreet et al, (2018)(65)** who mentioned that after intervention for chemotherapeutic patients such as (moist heat therapy application and hand exercises), there was (78%) of the patients had good vein quality that enhances the visibility and palpability of the veins facilitating peripheral cannulation and reducing the number of pricks, while (84%) of the control group patients had developed fair vein quality after the routine care.

Concerning to Visual Infusion Phlebitis, the study results revealed that there was a high significant improvement regarding visual infusion phlebitis among **study group** patients after the completion of the protocol of care comparing to **control group,** where the study results revealed that there was a high significant difference in the control group representing deterioration in the VIP scale at the 2nd month of the care. The improvement in the study group can be due to the effectiveness of the designed protocol of care to prevent the occurrence of phlebitis and to effectively manage the presented conditions hence reducing its incidence among the studied chemotherapy patients as a peripheral venous access complication related to the infused chemotherapy.

This finding was in the same line with **Uslusoy , Mete** (**2008)** [66] who reported that phlebitis has been linked with inappropriate catheter insertion sites and inappropriate catheter usage during chemotherapy administration. Also, **Martinho , Rodrigues** (**2008)** [67] had reported that mechanical phlebitis often occurs when the size of the cannula is too big for the selected vein. Moreover, **Macklin (2003)** [68] suggested that the placement of a cannula near a joint or venous valve will increase the risk of mechanical phlebitis due to irritation of the vessel wall by the tip of the cannula .In addition, a poor standard of infection control has a part to play and infection control and hygiene standards are essential in the treatment and prevention of the condition.

Regarding to extravasation of chemotherapeutic agent, the study results revealed that the incidence of extravasation signs and symptoms among **study group** patients was (2.3%) post the completion of the protocol of care comparing to **control group** where the incidence rate of extravasation was higher than 40%. This finding may be attributed to the effectiveness of the planned protocol of care provided to the study group patients by the researcher to avoid the occurrence and limit the incidence of extravasation due to the infused chemotherapeutic agent among the participants.

This study finding was in the same line with **Rose et al, (2008)** [69]**,** who reported that the incidence rate of extravasation ranged between (0.1 and 5%) for chemotherapeutic agents. Also, the current study finding was in harmony with **Pikó et al, (2011)** [70] and **Pluschnig et al, (2015)** [71] who listed that insufficient training of the staff, poor technique in cannula insertion, and administration of chemotherapy as the common risk factors related to nurses performance. Iatrogenic causes of extravasation such as poor puncture technique or inappropriate placement of indwelling cannula particularly by inexperienced staff may also increase the risk of extravasation.

In relation to correlation between socio demographic data of **studied patients** and their total knowledge score pre and post the protocol of care. The study results revealed that, there was a significant positive correlation between total knowledge of the study patients and their educational level and being employees post protocol of care. In addition, there was a significant negative correlation between the total knowledge of the study group patients and their age in years. Comparing to **control group**, where there was a significant positive correlation

between the total knowledge of patients and educational level and being employees pre the routine care.

This study result was in the same line with **Mohammed et al, (2016)[72]** who reported that there was significant association between overall Knowledge of the breast cancer patients regarding complications of chemotherapy, occupational status of the patient, and also the educational level. Also, this finding was supported with **Samir et al, (2014)[73]** who reported that there was statistical significant correlation between breast cancer patient knowledge and socio demographic data as age, education and occupation.

Conclusion

In the light of the current study, it can be concluded that: implementation of protocol of nursing care had significant effect on improving level of chemotherapeutic patients' level of knowledge about chemotherapy, peripheral venous access complications, infection and hypersensitivity. Also it had an obvious effect on maintaining vein quality and reducing peripheral venous access complications as phlebitis and extravasation.

Recommendations

Based on the results of the present study recommendation are suggested that;

1- Oncology patients should be encouraged to attend training teaching program about chemotherapy and its PVAC complications

2- Oncology patients should be informed about the importance of follow up and periodical check-up for early detection of any deterioration of vein condition.

3- Cooperating with other institutions to improve nursing staff behavior and identify the barrier against application of protocol of care for patients undergoing chemotherapy sessions.

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Effect of Implementing Training Module on Competence of Internship Nursing Students Performance regarding Needle Stick and Sharp Injuries Safety Issues

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Abstract: Background: Needle stick and Sharp injuries pose a high risk to internship nursing students. They represent a major risk factor for transmitting blood borne pathogens as hepatitis B , C virus. Interns being vulnerable section are more prone for these injuries, so they need training module program to improve their skills. **Aim:** This study was conducted to evaluate the effect of implementing training module on competence of internship nursing students performance regarding needle stick and sharp injuries safety issues. **Design:** A quasi experimental research design was utilized. **Setting:** Data were collected from the Faculty of Nursing, Tanta University and Tanta Main University Hospital. **Subjects:** Random sample of (75) internship nursing students who were spent the internship period at Tanta Main University Hospital. **Tools**: Three tools were used to collect data: Tool (I); Structure Questionnaire Sheet regarding safety measures about NSI; Tool (II); Observation checklist for students' practice regarding safety measures about NSI. Tool (III): Challenges that affect follow up safety measures. **Results:** revealed that there were significant improvements in internship nursing students' knowledge and practice regarding safety measures of needle stick and sharp injuries post implementation of training module at $P < 0.05$. Also, the study revealed that the highest percentages of challenges those affect their follow up safety measures were; night shifts and lack of training**. Conclusion:** The study findings revealed that the implementation of training module were successful for improving nursing students' knowledge and practice regarding needle stick and sharp injuries. **Recommendations**: it is recommended to students instructions should be continually reinforced, and clinical supervision should be managed to ensure compliance in all clinical experiences regarding NSIs.

Key words: Needle stick and sharp injuries, Training module, Safety issues, Competence.

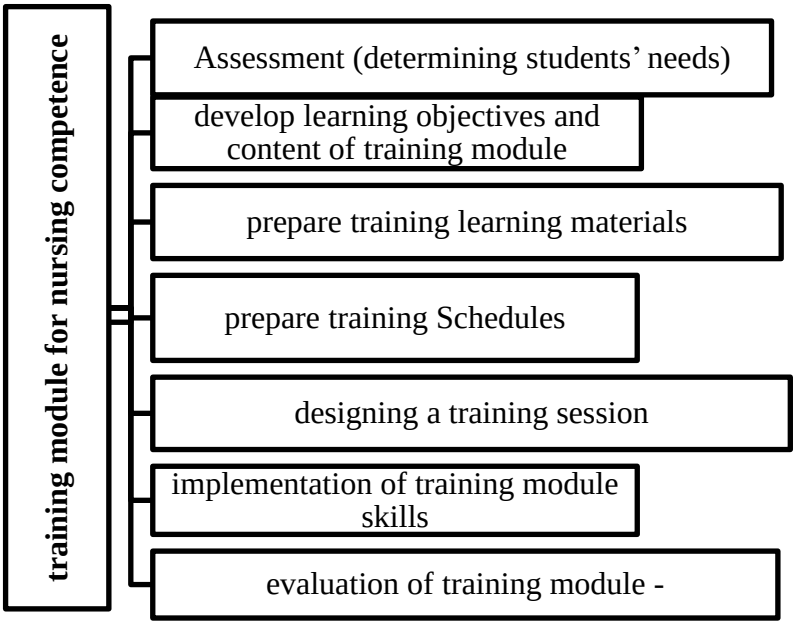
Introduction

Needle stick and sharp injuriy is one of the serious are international issues in every healthcare environment. It is defined as wounds caused by hazardous material such as needles and sharp instruments that accidently harm the skin during routine performance of their duties [1,2]. Each day thousands of health worker around the world, suffer from accidental occupational exposures to bloodborne pathogens resulting in infections such as HIV, hepatitis B , C virus during the course of their role of caring for patients. [3]. Needle stick and sharp injuries usually cause other many different risks among health care workers such as; bleeding, minor surface scratches and minor visible skin injuries, although the main risk is transmission of viral infections but scalpel-caused wounds need more attention in comparison with needle stick injuries [4].

World Health Organization reported that an annual rate of needle stick and sharp injuries per health care workers were 35 million, 2 million of them experience percutaneous exposure to infectious diseases each year and approximately 37.6% of hepatitis B, 39% of hepatitis C, and 4.4% of HIV/acquired immunodeficiency syndrome in healthcare workers around the world are due to NSIs [5,6]. and due to major underreporting (often less than 50%), the occurrence of NSIs significantly higher than the existing approximation [7]. According to many studies 11 to 50% of nursing students had history of exposure to infection related to sharp injuries during their undergraduate training period [8]. Late reviews suggest that the causes of needle stick and sharp injury happen either by recapping and overuse of the needle (18%), trailed by exchange of sharps (16%) and fifteen percent wounds while trading a body fluid (blood) to an example bottle, passing instruments from hand to hand, lack of awareness of hazard and lack of training[9].

Nursing is a practice profession, so nursing education must include both classroom and clinical practice education [10]. Internship nursing students are young professional health care workers who are probably for the first time in their professional real life come in contact with patients and during their training period face stressful clinical situations which may lead to the increased incidence of needle stick and sharp injuries during performace of various types of procedures which are involving sharps and subcutaneous needles [11]. However, internship nursing students must have special skills during handling needles and sharps safely [10]. The risk of injuries by needles and sharps were usually faced with various fronts including dissemination of safety protocols, educational program and training module of safer technologies that contribute to significant reduction of such incidents [12].

Training module is an instructional guide primarily used for teaching and learning step-by-step procedures. It is also can be used to present more factual information for the purpose of practical experience [13]. Training module was designed to enhance students' clinical competence standards. It consists of determining needs, develop learning objectives , content of training module, prepare training learning materials, prepare training schedules, designing a training session, implementation of training module skills and monitoring , evaluation of training module. In order to address these educational concerns, the institution of nursing education should have a training module about applying of safety measures regarding NSI in nursing program that motivates learning process [14-17, 4]. Occupational safety measures is defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers [18].



The implementation of training module program about safety devices measures is one of the main starting points for avoidance of accidental needle-stick and sharp injuries and keep health care workers away from infectious disease which is transmitted through unsafe practice. Uses of such safety devices should be accompanied with the necessary clinical training as part of a comprehensive sharps injury prevention and control program [19,20], which includes taining about some important aspects such as; uses of engineering controls (i.e, needles or syringes with safety devices), drawn blood with a vacutainer or protective cap that protects from the needle after it is removed, using instruments (not fingers) to grasp needles, load scalpels, and avoiding hand-to-hand passing of sharp instruments also preparing of medications especially removing cap, utilizing sterile procedure by an all-around prepared individual and disposes of it appropriately [21,22].

Education for preventing needle stick injuries is the most effective way to protect the nursing students from the infectious diseases caused by it. It is necessary to conduct an educational intervention for such students before their internship rotations before graduation [23]. Nurse internship require to be trained and supervised by expert nurses through different area in the hospital to work competently due to limited clinical experience and insufficient attention to personal safety. So nurse internship should spend an internship year in teaching hospitals because it is crucial for them to possess adequate competences regarding the procedures that require them to handle

sharp devices.[8,24]. From this view this study aimed to evaluate the effect of implementing training module on competence of internship nursing students performance regarding needle stick and sharp injuries safety issues.

Significance of the study:-

In Egypt, a study about safe injection practice among health care workers in Gharbiya Governorate, reported that 66.2% of health care workers had experienced needle stick and sharp injuries at least once and only 11.3% had received full course of hepatitis B vaccine [25]. Moreover many studies have shown internship nursing students having high rates of occupational exposures and high incidence of needle stick and sharp injury because of their inexperience, long working hours, high volume of inpatient procedure [26,27]. Internship nursing students safety measures is an important issue to be considered in the organization to provides a safe environment. Therefore, designed a training module prevention programme for student to minimize the risk of occupational regarding needle stick and sharp injuries was recommended.

Aim of the study:

Evaluate the effect of implementing training module on competence of internship nursing students performance regarding needle stick and sharp injuries safety issues.

Research hypothesis:

To fulfill the aim of the study, the following research hypotheses were formulated:

1- Post implementation of the training module, the internship nursing students exhibited improve in knowledge regarding needle stick and sharp injuries

2- Post implementation of the training module, the internship nursing students exhibited improve in practice regarding needle stick and sharp injuries

Operational definition:-

- Internship nursing students performance; It's defined as the knowledge and practice of the internship nursing students related to safety measures about needlestick and sharp injury.
- Safety issues; It refers to the control of recognized hazards in order to achieve an acceptable level of hazardous risk.

Subjects and methods:

Research design:

A quasi-experimental research design was utilized to conduct the study.

Setting:

The study was carried out at the Faculty of Nursing, Tanta University and Tanta Main University Hospital.

Subjects:

Proportion stratified random sample of (75) internship nursing students who were spent the internship period at Tanta Main University Hospital, they were divided as following; (13) students from medical department, (12) students from surgical department, (10) nursing students from intensive care units, (10) nursing students from outpatients, (10) students from dialysis unit, (10) students from neuorological departments and (10) students from operating theatre who are trained in Tanta Main University Hospital during internship clinical rotation. The sample size was estimated using Epi Info 7 Statistical Program, using the following parameters; Total target population size= 200 students, confidence level= 99.9%, expected frequency= 50%, accepted error= 5% and confidence co efficient =95%. The accepted sample size was 75 students.

Tools of data collections:

Three tools were used for data collection. These tools were aimed to evaluate the effect of implementing training module on competence of internship nursing students performance regarding needle stick and sharp injuries safety issues.

Tool (I): Structure Questionnaire Sheet regarding safety measures about NSI: It was developed by the researchers after reviewing of the related literatures **(28-34).** It was comprised of two parts:-

Part (A): Socio- demographic characteristics of the students:

which includes; code, age, gender, clinical training areas, previous training about infection control, previous experience about needle stick injury, previous needle stick accident.

(B): Internship nursing students' Knowledge Assessment Sheet: It was included the following:-

Students' knowledge about about training module as definition, steps, task, story and how to applied during clinical practice which consisted of 8 questions.

Students' knowledge about needle stick and sharp injuries which includes; causes and injury type (as insufficient training, recapping of used needle, handling sharp instruments from hand-to-hand, cleaning of sharp objects, unexpected patient reactions, lack of safety devices ect…), characteristics of safer needle device and sharps disposal objects (as device must be needleless, device preferably works passively, device must have a rigid cover to protect hands from needle ect…) and sharps disposal objects which consisted of 28 questions,

Students' knowledge about safety measures regarding NSIs (precautions to avoid NSI accidents, first aid after needle

or sharp injury, size of sharps boxes ect….), and immediate and late response after NSI (don't scrub the wound or suck on the wound post NSI, After a needle stick injury the affected area should be washed, milk out more blood is not recommended post injured and immediately seek medical treatment post NSI) which consisted of 22 questions.

Scoring system of knowledge was as the following:

-Correct answer scored (1)

-Don't' know or incorrect answer scored (0)

The total scoring systems of students' knowledge were (58) and classified as the following:

-Good → > 60% of the total score

-Fair → ≥ 50% - 60% of the total score

- Poor → < 50% of the total score

Tool (II): Observation checklist regarding safety measures about NSI:

This tool was developed by the researchers based on relevant literatures [28-34] to evaluate students' practice before and after implementation of training module regarding needle stick and sharp injuries. it was included the following steps; needle stick injury safety measures before the procedure (12) steps, needle stick injury safety measures during procedure (14) steps and needle stick injury safety measures post-procedure (12) steps.

Scoring system for performance was as the following:

-Correctly done take (1).

-Incorrectly done or not done take (0).

The total scoring systems of nurses' practices score were (38) and classified as:-

-satisfactory → ≥ 60% of the total score

-Unsatisfactory → < 60% of the total score

Tool (III): Challenges that affect follow up safety measures:-

The questionnaire was developed by the researchers to elicit internship nursing students' views about challenges that affect follow up of safety measures from students in the clinical settings during procedure. **Scoring system**, respondents were asked to indicate their level of agreement using three points Likert type scale with fix values ranging from 1 to 3, possible responses per item: (1) disagree, (2) natural and (3) agree.

Ethical and Legal Consideration:

- Official letters from the Faculty of Nursing Dean were delivered to the appropriate authorities in the selected area to conduct the study.

- A written/ oral consent was obtained from every internship nursing student to

participate in the study. The researchers explained to the students that participation in the study is voluntary and they can withdraw from the study at any time without penalty.

- Confidentiality of the data and patient privacy were respected. A code number was used instead of name.

Methods of data collection:

1- All tools of the study were developed by the researchers after reviewing relevant literature and used to collect data of the study.

2-All tools were reviewed for content validity by a panel of (5) expertise professors in the field of Medical Surgical Nursing, Their opinions were elicited regarding tools format and consistency, it was calculated and found to be = (96%).

3- All tools were tested for reliability using Cronbuch`s alpha test; it was 0.937 for tool (1) part B and 0.970 for tool (II) and 0.910 for tool (III).

4- A pilot study was performed to test the practicality and applicability of the tools and to determine any obstacles that may be encountered during the period of data collection. It was conducted on (10%) from students accordingly, needed modification was done. Pilot study from nurses and patients was excluded from the study sample.

5- This study was conducted at the beginning of September 2019 to the December 2019.

6- Training Module was conducted for internship nursing students through many phases which include; assessment (determining students' needs), develop learning objectives and content of training module, prepare training learning materials, prepare training Schedules, designing a training session, implementation of training module skills and monitoring , evaluation of training module -

a- Assessment of the internship nursing student's needs;

- Assessment of internship nursing students' baseline data was carried out using tool I part (A) to assess socio-demographic characteristics, and part (B) to assess knowledge regarding NS/SI, and tool (II) that were used to assess students' practice regarding NS/SI pre application of training module to determine the needs of the students and number of the sessions. The knowledge questionnaire sheet was filled by the students within 20 minutes and observational checklist was filled by the researchers within 20 minutes.

b-Develop learning objectives and content of training module;

-It's important to come up with measurable learning objectives of the

study that were prepared based on the needs of the students to give training modules a sense of direction and make the trainees feel like they are working toward a concrete goal before actually get down to designing training modules.

-Once the learning objectives prepared, the researcher start to prepare the content toward achieving those objectives which includes needle stick and sharp injuries safety measures. **Training module content** were prepared by the researchers based on the related literature **(14-17, 35-39)**. An illustrative structured booklet was prepared and supported by pictures as a guide for the students.

c- Prepare the training learning materials;

-The researcher prepared all of the listed resource materials that included; session task, skills and overview which contains purpose, story and learning objectives, classrooms, role-playing, case studies, focus groups, training-on-the safety measures, lectures, discussions, demonstration and redemonstration. Then prepare a list of all topics mentioned, typed out, copied and a booklet was given to each student during sessions to refresh their knowledge and practice. Choose methods for students learning as; computer-based training or instructor-led training, self-guided or self-based learning, learn better from reading.

d- Prepare training Schedules:

-The researchers determine day time / hours of the training, time dedicated to each of the sessions inputs, exercises, breaks and time dedicated to unforeseen events in any training workshop there will be unforeseen events.

E-Designing a training session:

-Training module were conducted for each group according to specific time of each department as following; (4) sessions within two weeks for each group, about two days per week, each session contained knowledge, skills, situation, learning objectives and learning activities according to session (knowledge or practice) and summary. The time of each session was about (1) hour. Researchers maintained integration between theoretical knowledge and practice during learning activities.

f- Implementation of training module:

-Training module was implemented by the researchers through schedule which were divided into four educational sessions that are provided for each group as the following: ***The First session:*** was included pretest for all internship nursing students, Then knowledge about training module as definition, steps, task and how to applied and knowledge about causes of needle

stick and sharp injuries, injury type, characteristics of safer needle device and sharps disposal objects and sharps disposal objects are given to the students, duration was 60 minutes. ***The second session:*** was included; knowledge about safety measures regarding NSIs, immediate and late response after needle stick and sharp injuries, duration was 60 minutes. ***The third session:*** was included demonstration and re-demonstration regarding needle stick injury safety measures before procedure and needle stick injury safety measures during procedure, duration was 60 minutes. ***The fourth session:*** was included demonstration and re-demonstration regarding needle stick injury safety measures post-procedure, duration was 60 minutes.

g- Monitoring and Evaluation of training module:

Evaluation was done by using tool (I) part (B) to evaluate internship nursing students' knowledge regarding training module and needle stick and sharp injuries. Tool (II) used to evaluate internship students' practice regarding safety measures about needle stick and sharp injuries, once pre implementing, and post completion of training module and Tool (III) used to assess challenges that affect follow up of internship nursing students safety measures after implementation of training module regarding needle stick and sharp injuries.

Methods of data analysis:

The statistical data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. For categorical data the number and percent were calculated and the differences between subcategories were tested by chi square χ^2 . For numerical data the range, mean and standard deviation were calculated. Normality of data was tested using Kolmogorov-Smirnov test. Both descriptive and inferential statistics involving t - test and spearman test were used to present results. For each test, a p-value of <0.05 was considered statistically significant.

Results:

Table (1): showed the distribution of the studied internship nursing students according to their socio-demographic characteristics. As regard to age, the table showed that nearly three quarter of the students (69.3%) were in the age group (19-22) years/old. More than half (57.3%) of them were female. Regarding to clinical training areas it was observed that the distribution of students as following; (13) students from medical D, (12) students from surgical D, (10) nursing students

from ICU, (10) nursing students from outpatients, (10) students from dialysis unit, (10) students from neuorological D. and (10) students from operating theatre. Moreover Majority of students (69.3 and 77.3%) had no training about infection control or experience about needle stick injury respectively. In addition to (77.3%) of students Have not NSI previously.

Figure (1): Showed the distribution of the internship nursing students according to their knowledge about characteristics of the safer needle device pre and post training module. The figure revealed that there were statistical significant improvement in students' knowledge regarding characteristics of safer needle device from pre to post training module at $p < 0.05$.

Figure (1): Showed distribution of the internship nursing students according to their knowledge about immediate and late response after NSI pre and post training module. The figure revealed that there were statistical significant improvement in students' knowledge regarding immediate and late response after NSI from pre to post training module at $p < 0.05$.

Table (2): showed the mean score of the studied internship nursing students' knowledge regarding training module and safety measures about needle stick and sharp injury pre and post training module. Highly statistically significant difference in the mean score of knowledge regarding different items of safety measures about needle stick and sharp injury were observed from pre to post implementation of the training module with p-value < 0.05.

Table (3): Showed the total levels of students' knowledge about safety measures during NSIs practice pre and post intervention. The table showed that there were improvement among students' knowledge regarding safety measures during needle stick practice. Where the majority of the studied nurses (93.3%) had poor level of knowledge pre training module, whereas they scored good level of knowledge later after module for about (76%). So there was highly statistically significant difference between levels of students' knowledge throughout all intervention periods at $P< 0.05$.

Figure (3): Showed distribution of the internship nursing students according to their practice about needle stick injury safety measures post the procedure pre and post training module. The figure revealed that there were statistical significant improvement in students' practice regarding needle stick injury safety measures post the procedure at $p < 0.05$.

Table (4): Showed the mean score of the studied internship nursing students according to their practices about safety measures of needle stick pre and post

training module. Highly statistically significant difference in the mean score of practice regarding different procedures of needle stick injury safety measures were observed from pre to post implementation of the training module with p-value < 0.05.

Table (5): Showed the total level of students' practices about safety measures regarding needle stick pre and post training module. The table showed that there were statistically significant differences among total levels of students' practice. Where the majority of the studied students (98.7%) had unsatisfactory level of practice pre training module, whereas(97.3%) of them had satisfactory level of practice after module.

Table (6): showed the distribution of the studied students according to the challenges that affect follow up safety measures. The table showed that the highest percentages of challenges those face students and affect their follow up safety measures were; worked night shifts, lack of training, replacing needle caps most of the time, increase number of patients daily and sudden movement of a patient during injection for about (68.0, 73.3, 73.3, 45.3 and 66.7%) respectively.

Table (7): Showed the correlation between total score of knowledge pre and post training module and total score of practices pre and post training module. The table showed that there were statistical significant positive correlations among students' knowledge and practice from pre to post training module with p value 0.01

Table (1): Distribution of the studied internship nursing students according to their socio-demographic characteristics

Variables	The studied subjects (N=75)	
	N	%
Age in years		
▪ 19-22 year	52	69.3
▪ > 22 year	23	30.7
Sex		
▪ Male	32	42.7
▪ Female	43	57.3
Clinical training areas:		
▪ Medical area	13	17.3
▪ Surgical area	12	16.0
▪ Intensive Care Units	10	13.3
▪ Outpatient	10	13.3
▪ Dialysis	10	13.3
▪ Neurological area	10	13.3
▪ Operating theatre	10	13.3
Training about infection control		
▪ Yes	23	30.7
▪ No	52	69.3
Experience about needle stick injury		
▪ Yes	22	29.3
▪ No	53	70.7
Have needle stick accident		
▪ Yes	17	22.7
▪ No	58	77.3

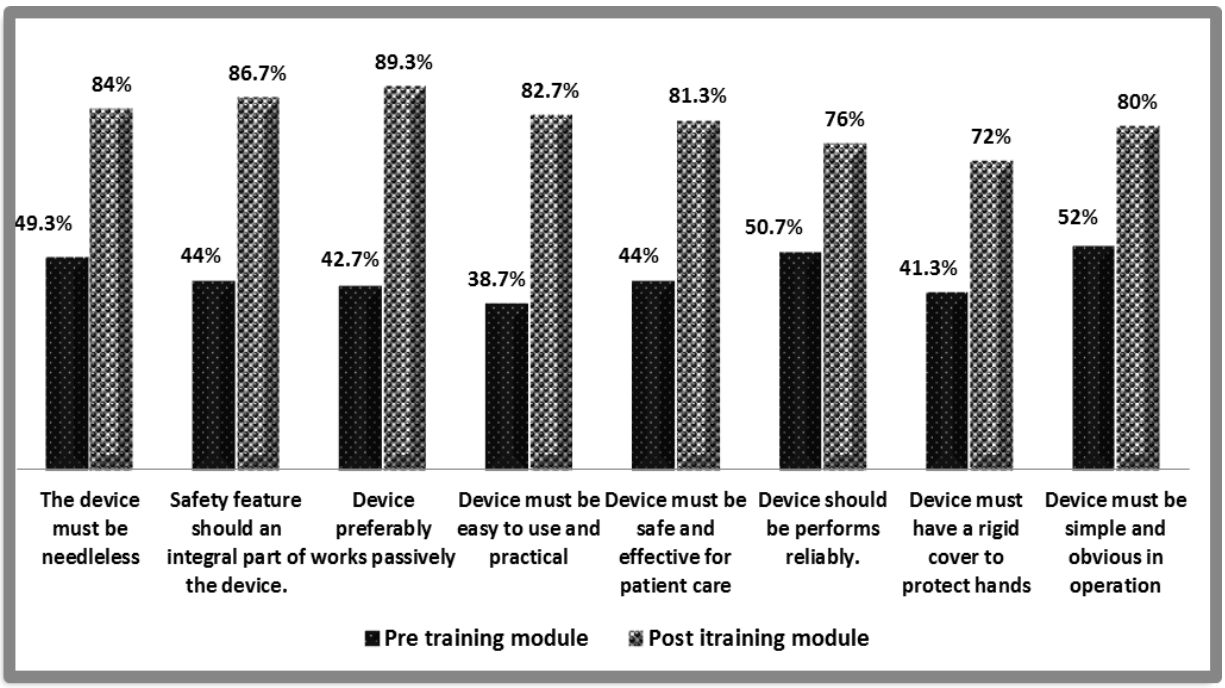


Figure (1): Distribution of the internship nursing students according to their knowledge about characteristics of safer needle device pre and post training module.

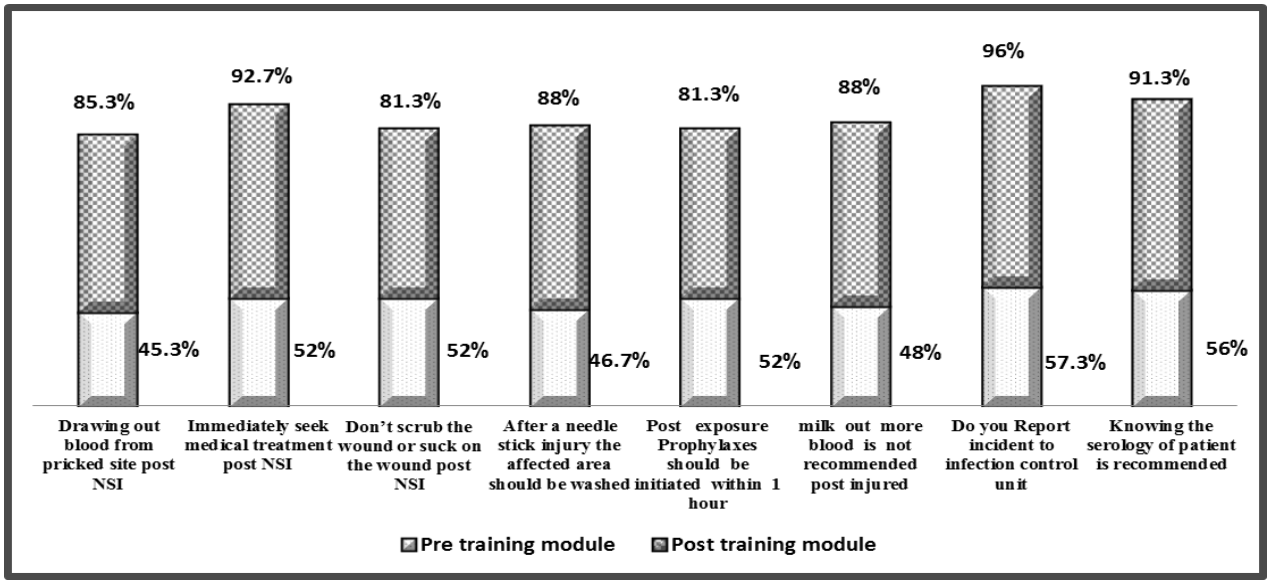


Figure (٢): Distribution of the internship nursing students according to their knowledge about Immediate and late response after NSI pre and post training

Table (2): Mean score of the studied internship nursing students' knowledge regarding training module and safety measures about needle stick and sharp injury pre and post training module

Variables	The studied subjects (N=75)		
	Pre training module	Post training module	t p
Knowledge about training module	4.12±1.298	7.22±1.108	15.717 0.000**
Knowledge about causes and injury type	4.49±1.298	7.09±1.198	12.717 0.000**
Knowledge about characteristics of safer needle device	4.13±1.154	7.25±1.053	16.439 0.000**
Knowledge about sharps disposal objects	4.60±1.497	8.24±1.113	18.067 0.000**
Knowledge about safety measures regarding NSIs	5.89±1.438	10.64±1.311	20.209 0.000**
Knowledge about Immediate and late response after NSI	5.32±1.128	7.50±1.082	19.275 0.000**
Total score of knowledge	**24.44±3.429**	**40.22±3.211**	**28.705** **0.000****

***Significant at (p < 0.05)**

Table (3): Total levels of students' knowledge about safety measures during needle stick practice pre and post training module

Variables	The studied subjects (N=75)					
	Pre training module		χ^2 p	Post training module		χ^2 p
	N	%		N	%	
Good	**3**	**4**		**57**	**76.0**	
Fair	**2**	**2.7**	**67.213** **0.000****	**16**	**21.3**	**20.280**
Poor	**70**	**93.3**		**2**	**2.7**	**0.000****

****Significant at (p < 0.05)**

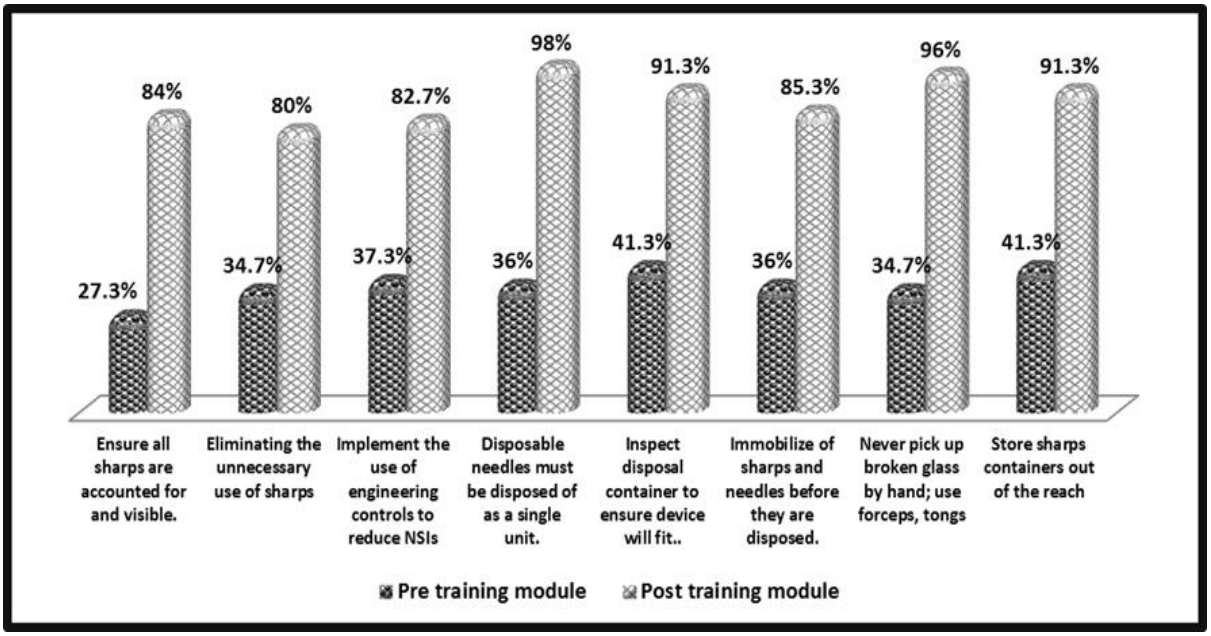


Figure (3): Distribution of the studied students according to their practice about Needle stick injury safety measures post the procedure pre and post training module

Table (4): Mean score of the studied internship nursing students according to their practices about safety measures of needle stick pre and post intervention

Variables	The studied subjects (N=75)		
	Pre training module	Post training module	t p
Needle stick injury safety measures before procedure	6.25±2.218	10.13±1.328	13.627 0.000**
Needle stick injury safety measures during procedure	6.25±2.218	12.08±1.548	20.630 0.000**
Needle stick injury safety measures post procedure	4.52±1.031	10.25±1.424	29.856 0.000**
Total score of practices	**17.02±4.644**	**32.46±3.180**	**25.502 0.000****

****Significant at (p < 0.05)**

Table (5): Total level of students' practices about safety measures regarding needle stick pre and post training module

Variables	The studied subjects (N=75)					
	Pre training module		χ^2 p	Post training module		χ^2 p
	n	%	71.053 0.000**	n	%	67.213 0.000**
Satisfactory	1	1.3		73	97.3	
Unsatisfactory	74	98.7		2	2.7	

*** Significant at P <0.05.**

Table (6): Distribution of the studied students according to the challenges that affect follow up safety measures

Challenges that affect follow up safety measures	The studied subjects (N=75)					
	Agree		Natural		Disagree	
	N	%	N	%	N	%
Working night shifts	51	68.0	8	10.7	16	21.3
Lack of training	55	73.3	16	21.3	4	5.3
Replacing needle caps most of the time	55	73.3	8	10.7	12	16.0
Not wearing gloves when working with needles.	16	21.3	27	36.0	32	42.7
Worked mixed shifts	28	37.3	15	20.0	32	42.7
Increase number of patients daily	34	45.3	32	42.7	9	12.0
Not participate in educational sessions	33	44.0	30	40.0	12	16.0
Work experience	33	44.0	31	41.3	11	14.7
Working in surgical wards.	20	26.7	11	14.7	44	58.7
Sudden movement of a patient during injection	50	66.7	18	24.0	7	9.3
Mean±SD	22.5867±2.72175					

Table (7): Correlation between total score of knowledge pre and post intervention and total score of practices pre and post training module

Variables	Total score of practices pre training module	Total score of knowledge post training module	Total score of practices post training module
	r p	r p	r p
Total score of knowledge pre-training module	٠,٣١٩ **٠,٠٠٥	٠,٠٧٥ ٠,٥٢٠	٠,٠١٩ ٠,٨٦٩
Total score of practices pre-training module	-	٠,٠٢٢ ٠,٨٤٩	٠,١٤٢ ٠,٢٢٥
Total score of knowledge post training module		-	٠,٦٤٥ **٠,٠٠٠

**** Correlation is significant at the 0.01 level (2-tailed).**

***** Correlation is significant at the 0.05 level (2-tailed).**

Discussion

The susceptibility of internship nursing students to the risk of needle stick and sharp injury are increased due to lack of clinical experience, inadequate knowledge related to handling of sharp instruments and lack of instructional training [(40)]. Thus, training program for nursing students should focus on reducing risks and increasing awareness of preventive measures of needle sticks and sharp objects injuries among health care personnel [(41)]. So this study was aimed to evaluate the effect of implementing training module on competence of internship nursing students performance regarding needle stick and sharp injuries safety issues.

Concerning to socio-demographic data of the internship nursing students, the study results revealed that the majority of students were in the age group (19-22) years and more than half of them were female. Regarding to clinical training areas, the study results revealed that the students were from different areas as; medical, surgical, ICU, outpatients, dialysis, neuorological and operating theatre. Moreover the majority of the students had no training about infection control or experience about needle stick injury. These findings were in the same line with **Madhavan et al, (2019)** [(42)] who reported that in their study about needle-stick injury that the mean age of internship nursing students were 24.38 ± 1.21 and (95.5%) from them were males.

Also **Seng et al, (2013)** [(43)] reported that the majority of internship students were female (90.36%) and age group ranged between 20-25 years. Also 57.57% of them got exposed to NSI in their of clinical posting. Moreover **Anupriya , Manivelan (2014)** [(44)] illustrated that two thirds of the internship nursing student experienced needle stick and sharp injuries and this number increased during clinical training. Also These results were in the same line with **Al-Momani et al, (2013)** [(45)] who clarified that there were still insufficient attention paid toward the infection control measures and prevention of needle stick and sharp injuries among nursing students during their clinical training in the hospitals. In addition to **Norsayani , Hassim (2003)** [(46)] reported that the mean age of the nursing students were 23.9 and most of them were female.

The present study revealed that there were highly statistically significant difference in the mean score of knowledge regarding training module, causes of needle stick and sharp injuries, injury type, characteristics of safer needle device , sharps disposal objects , safety measures regarding NSIs, immediate and late response after NSI

were observed from pre to post implementation of the training module. Inadequate knowledge about safety measures of NSI may be attributed to lack of experience about risky habit like separating or disassembling used needles prior to disposal, factor identified to be associated with occurrence of NSIs, standard practice of needle use. Also may be due to that, these students need more pay attention preventive measures, safety devices, how to deal with the contaminated needle, and adhering to the practice of universal precautions.

These findings were in the same line with **Lukianskyte et al, (2012)** [47] who reported, it is essential that the internship nursing students should be trained to develop their knowledge and hand skills before starting clinical practice. Moreover **Swe et al, (2016)** [38] **and Zhang et al, (2008)** [48] reported that in their study on health science students in northern china, the nursing students displayed a general lack of knowledge of occupational exposure standards, also the transmission risk of HIV was rated correctly by only 9% of students. On the other hand **Talas (2009)** [49] reported that about two thirds of the nursing students included into their study were determined to have lack of knowledge and training regarding NSSIs, and the rate of the training given rises with the increasing number of years.

Also **Acharya et al, (2014)** [50] reported that nearly all (98%) medical interns had good knowledge about diseases that are transmitted by unsafe injections, namely HIV, hepatitis B, and hepatitis C. In addition to **Shariati (2007)** [51] reported that internship is a period where knowledge is important through using training module and opportunity is given to acquire clinical skills. At the same time, there is need to safeguard interns against avoidable occupational hazards including universal precautions, injection safety. Moreover **Yang et al, (2007)** [52] reported that about 40% of the nursing students were familiar with the rules of NSIs notification, registration, observation and prevention, however, 92.0% of all NSIs among them were unreported, because they did not think that it was important. **Also Joardar et al, (2008)** [53] reported that high awareness was reported among students nurses in both study hospitals as regards measures to be taken after NSI (96% and 92.8%) and blood-borne diseases transmitted by unsafe injection practice

The present study revealed that there were highly statistically significant difference in the mean score of practice regarding different items about needle stick injury

safety measures before, during , after procedure were observed from pre to post implementation of the training module. Lack of internship nursing students practice regarding needle stick and sharp injuries before training module might be due to inadequate curriculum training in the faculty of nursing and training department and improvement of practice post module may be due to training module was highly effective in enhancing practice of students regarding prevention of needle stick injury, which in turn, help the students to improve the quality of life by controlling the spread of various blood borne pathogens and thus prevents various fatal infectious diseases transmission when the students promote the safety practice.

These findings were in the same line with **Hambridge (2011)** [(54)] who reported that safety training to prevent NSIs is essential for improving clinical skills during nursing students' training, it should focus on high-risk procedures such as various types of injections, needle disposal, removing needle caps, and opening ampoules and vials. Moreover **Al-Rawajfah , Tubaishat (2015)** [(55)] reported that enhanced practice on occupational safety among nursing students is expected to reduce the risk of NSIs. This may be done through many systems model that serves as the theoretical framework to improve practice.

Also **Kulkarni et al, (2013)** [(56)] reported that the students have practice regarding universal precaution measures, but regarding needle recapping; only 50.3% gave correct answer. It could be concluded that the availability of disposal bin near the procedure encouraged the students to recap the needle back.

From this view **Saji (2017)** [(57)] revealed that 70% of nursing students sustained needle stick injuries and there was lack of practice among students nurses regarding prevention and management of needle stick injury. Moreover **Kataria (2008)** [(58)] reported that there were many needle stick injuries among nursing student, this is because of inadequate practice regarding handling and disposal of needles so these students needs training module and program to decrease NSI incidence. This also was supported by **Kebede et al, (2012)** [(59)] who recommended that effective training, ongoing awareness on the risk of hazards, preventive measures such as engineering control are essential to reduce the risk of such injuries between health care workers.

The present study revealed that the most challenges those face students and affect their follow up safety measures during clinical training were; night shifts, lack of training, replacing needle caps most of the time, increase number of patients daily and

sudden movement of a patient during injection these results may be explained by lack of sleep and pressure during work that are resulting in inattention and less ability to concentrate when these students are providing treatments. These findings were in the same line with **Qin et al, (2015)** [(60)] who found that the risk of NSIs during nursing procedures was significantly associated with many factors such as student gender, age, night-shift frequency, injection frequency lack of safety training, knowledge of safety management policies, and lack of personal protective equipment use.

Also **Lihan et al, (2013)** [(61)] reported that long working hours increase the risk of sharp and needle stick injury, age which less than twenty-four years, less than four years of nursing work experience, working in the surgical intensive care unit are considered from major risk factors. Moreover **Ayas et al, (2006)** [(62)] reported that interns reported that injuries more frequently occur during the night shift than in the day. In addition to **Hambridge (2011)** [(63)] reported that repeated night-shift frequency, as a risk factor for NSIs among nursing students. This study suggested nursing students who reported three or more night shifts per week were nearly six times more likely to experience NSIs than those who did not work night shifts.

The study result showed that there were statistical significant positive correlations among internship nursing students' knowledge and practice from pre to post training module. These findings were in the same line with **Reda et al, (2010)** [(64)] who mentioned that there were positive relation between nursing students' knowledge regarding improving clinical training of preventive and precautions to prevent blood-borne infection diseases and needle-stick and sharp injuries. Also **Al tawil (2013)** [(65)] revealed that knowledge is positively related to compliance and negatively related to environment, but these relations are not statistically significant. There is statistically significant negative correlation between knowledge and clinical practice for these students.

Conclusions:-

In the light of the current study, it can be concluded that:

There were statistical significant improvements of internship nursing students' knowledge and practice regarding needle stick and sharp injuries safety measures from pre to post implementation of training module. Also the study results revealed that the most challenges those affect their follow up safety measures were; night shifts, lack of training,

replacing needle caps, increase number of patients daily and sudden movement of a patient during injection. Moreover there were statistical significant positive correlations among students' knowledge and practice from pre to post training module with p value 0.01.

Recommendation

Based on the results of the present study recommendation are suggested that;

1- A general workshop followed by practical training sessions on universal standard precautions should be conducted during the preparation period for internship nursing students by the Faculties of Nursing.

2-Continuous education for student and staff nurses about importance of application of standard infection control precautions and ensure that HCW are properly trained regard the safe use and disposal of needles.

3- Internship nursing students should be provided with appropriate information regarding correct occupational health habits, HIV prevention, and risk behaviors as a part of their requisite preclinical preparation.

4- Internship nursing students instructions should be continually reinforced, and clinical supervision should be managed to ensure compliance in all clinical experiences regarding NSIs.

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Effect of the New Corona Virus Disease2019 on Pregnancy Outcomeat El-GharbiaGovernorate

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Abstract

Background: Pregnancy is a state of partial immune suppression, which makes pregnant women more vulnerable to infection which have serious consequences onpregnancy outcome. **The aim of this study:**To assess the effect of thenew corona virus disease 2019 (COVID 19) on pregnancy outcome. **Study design: Descriptive correlationa**l was used. **Setting**: It carried out at four isolation hospitals represented El- Gharbia Governorate.Tanta University hospital, El-Menshawy Hospital andEl Mehalla El-Kobra Hospital and Kafr El- Zayate General Hospital.**Subjects**:A convenientsample of 30 pregnant women who infected with COVID-19 and isolated at the previouslymentioned settings. **Four tools were used**; **Tool I,** it included two parts. Part 1: Socio- demographic characteristics. Part 2: Reproductive history. **Tool II:**Women's knowledge regarding COVID 19. **Tool III:** Women's practices regarding COVID 19. **Tool IV:** Assessment the effect of COVID 19 on pregnancy outcome. **Results:**It was found that almost one third of the studied women had unsatisfactory level of knowledge as well as almost two fifths had unsatisfactory level of practices regarding COVID 19.The result also revealed that COVID 19has negative effect on pregnancy outcome.**Conclusion and recommendations:** Based on the studyfindings ,it can be concluded that the studied pregnant women had satisfactory level of knowledge as well as unsatisfactory practices regarding COVID 19. It seems that there is a great need for further studies to assess the effect of COVID 19 on pregnancy outcome.

Keyword: Effect, COVID 19, pregnancy and pregnancy outcome.

Introduction

Coronavirus disease 2019 (COVID -19) is a universal health threat that creating a pandemic situation around the world. It is a respiratory disease caused by new strain of corona virus.Wuhan city in China is the origin of COVID-19, where the first case was reported in December 2019.It has spread very quickly, and by 1 September 2020, morethan 25,662,091 cases have been reported in almost 216 countries resulting in more than 855,352 deaths[(1)].In response to this serious situation, the COVID-19 was declared as a public health emergency of international concern by the World Health Organization (WHO) on 30 January and called for the importance of collaborative efforts of all countries to prevent the rapid spread of COVID-19[(2,3)].

While, in Egypt the first confirmed case was reported at Cairo International Airport on 14 February2020. However, the infection stayed at low level until the end of March 2020,by 1 September it reached 98,939 cases with 5,421 deaths.(3-4). COVID-19 has overcome geographical barriers achieving a remarkable proliferation which can affect any person especially that are immune compromised including old people more than 65 years, patients with chronic medical diseases health care providers in addition to pregnant women[(5)].

Pregnancy is a state of partial immune suppression which makes pregnant women more vulnerable to viral infections. Therefore, the COVID- 19 epidemic may have serious consequences for pregnant women [(6)].Pregnancy increases the risk of adverse obstetric and neonatal outcomes as a result of respiratory viral infections. The physiologic and immunologic changes that occur as a normal component of pregnancy can be affected by COVID-19 and increase the risk of complications which may increase the rate of maternal and neonatal death such as; changes in the maternal cardiovascular and respiratory systems functions, including increased heart rate, increase oxygen consumption, and decreased lung capacity, as well as the development of immunologic adaptations that allow a mother to tolerate the growing fetus, increase the risk for pregnant women to develop severe respiratory failure.

Most of pregnant women infected with corona virus will have mild to moderate flu-like symptoms such as cough, sore throat, and fever. Few of them have difficulty in breathing or shortness of breath. Pregnant women, especially those with medical diseases may complain from pneumonia and marked hypoxia. Also other symptoms may be appear such as fatigue, malaise, body ache and/or

gastrointestinal symptoms like nausea, vomiting and diarrhea.[7,8] .

Now there are many trails for drug to treat or vaccine to prevent COVID- 19 but not proven its success yet.So appropriate measures should be used to prevent its spread among pregnant women. Therefore, some precautions should be consideredincluding keeping social distancing at least one meter, stay away from public places, maintaining personal hygiene, daily life style modifications and maintain good psychological condition. The most important thing is to wash their hands regularly and effectively by using soap and water for at least 20 seconds or use hand sanitizer (with 70 % alcohol concentration) frequently and wearing mask and gloves[10]. All the previous measures should be followed by the health care providers who deal with pregnant women. Also enhancing women's immunity by eating well balanced diet and follow the protocol of corona virus management.[9]

A quarantine and isolation instructions as for general population is applicable to pregnant women also [11,12]. SO, pregnant women suspected with COVID-19 should be isolated and investigated properly. While, confirmed cases should be promptly admitted to a negative pressure isolation ward with adequate facilities and multi-disciplinary expertise to manage critically ill obstetric patients [13].The recommended strategy for routine antenatal care is to reschedule routine visits. Telephonic consultation can be done for minor complaints and for any question. Only essential milestone visits such as the 12 and 19 week scans are needed. The next visit can be at 32 weeks pregnancy [14].

Time of delivery should not be altered on the basis of COVID-19 ,becausethe presence of infection is not an indication to induce labor or deliver the woman,but there is exception for the critically ill pregnant woman where delivery may be indicated to relieve the extra metabolic and pulmonary load and in case of maternal or fetal distress guided by the degree of clinical stability and the gestational age. The most suitable method of delivery is cesarean section [15, 16].

Neonates born from mothers with COVID-19 infection are tested within 14 days of delivery or up to 28 days after birth [17]. If baby’s initial sample is negative, another sample should be repeated after 48 hours. Postnatal care of the mother infected with COVID-19 should include continued medical evaluation for respiratory status and routine postnatal care. The mother who is recovering from an acute illness and/or is isolated from the infant may be at risk for developing anxiety, postpartum

blues and other psychological health problems. At this time the woman should be offered counseling and psychological support [18,19].

COVID 19 s is a new strain of corona virus, little is known today about its effect on the pregnancy outcome [20]. Regarding the effect of corona virus infection on maternal condition, there is no evidence that pregnant women with COVID-19 are more prone to experience severe respiratory problems than non-pregnant. Moreover, there is no evidence of higher risks of abortion or preterm labor among pregnant women with COVID-19 as well as there were no traces of the virus in the mother's amniotic fluid, umbilical cord blood or breast milk. Concerning effect of corona virus infection on fetus condition, there is no evidence that COVID 19 undergoes intrauterine or trans-placental transmission from infected pregnant women to their fetuses. [20-21]

Further researches should be done for better understanding the effect of this new virus and its health hazards on both the mother and fetuses so this study was conducted to assess the effect of new COVID-19 on pregnancy outcome at El-GharbiaGovernorate.

Aim of the study

The aim of this study was to assess the effect of thenew corona virus disease 2019 on pregnancy outcome at El- Gharbia Governorate.

Research Questions:

1- What are the knowledge and practices of pregnant women regarding COVID-19?
2- What is the effect of COVID-19 on pregnancy outcome?

Subjects and Methods: -

Study design:A descriptiveCorrelational study design was used to conduct this study.

Study setting: The study was conducted at the isolation hospitals at El-Gharbia Governorate including:Tanta University hospital,El-Menshawy Hospital affiliated to the Ministry of Health and Population .El Mehalla El Kobra General Hospital affiliated to ministry of healthand Kafer El-Zayate General Hospital.

Study subjects: Aconvenient sample of 30 pregnant women who had infected with COVID-19 and isolated at the previously mentioned settings according the following criteria.

- Free from medical or obstetrical complications.
- Willing to participate in this study.

Tools of data collection: -

To achieve the aim of this study thefollowingtoolswereused for datacollectionasfollows:

Tool I: A structured interview schedule: Itwasdevelopedby theresearcherafterreviewing therecentrelated literature. It was consisting of 2 parts:

Part 1: Socio-demographiccharacter-isticsof pregnant women: This part was used to collect data such as: name, age, level of education, occupation, family income and residence.

Part 2: Reproductive history including: last menstrual period, gestational weeks, antenatal follow up visits, number and place of antenatal visits, number of gravida, number of abortion,number of parity and mode of last delivery**Tool II:Women knowledge regarding COVID-19**:such ascausative agent of COVID-19, the main transmission route, incubation period,who are susceptible to COVID-19, general clinical manifestation, discover the time of infection with COVID-19, specific complain appear on the infected pregnant woman with COVID-19, measures to protect others from infection, effect of COVID-19 on the fetus and mother, signs of fetal distress, the presence of effective cure and methods of COVID-19 prevention. ,….. Correct and complete answers will be scored as (2),correct and incomplete answers will be scored as (1), and incorrect and didn't know will be scored as (0). Result of test was interpreted as follows; A scoring of ≥ 75% was considered "satisfactory knowledge" A scoring of 50% - <75% was considered "unsatisfactory knowledge"**.**The higher participant score means greater knowledge about COVID 19.

Tool III: Assessment of women's practices regarding COVID-19: It consisted of (10) items each item of these had two categories, one category in the form of (done) and another category in the form of (not done) including the following items frequent hand washing, using antiseptic solution(alcohol) on the hand frequently, wearing face mask frequently, having adequate amount of rest, assessing the number of fetal movement daily, drinking warm fluid frequently, eating planned hospital diet, practice daily exercise, taking breathing exercise and having compliance with the recommended medication. A scoring of <50% of the total score indicated "unsatisfactorypractice".While a score of ≥ 50% of the total score indicated "satisfactory practice"

Tool IV: Assess the effect of COVID-19 on pregnancy outcome: It included two parts.

Part (1): Assess the effect of COVID-19 on pregnant woman included: Abortion, bleeding in late pregnancy, maternal

distress, pre -term labor, vaginal infection and maternal death.

Part (2): Assess the effect of COVID-19 on the fetus included:

Intra-uterine growth restriction, hypoxia, asphyxia, polyhydromnise, oilghydrominse, congenital anomalies, fetal distress, premature infant and intra-uterine fetal death.

Methods:

1. **Before conducting the study** an officialpermission to carry out the study Afterclarifyingthepurpose of thestudywasobtainedfrom the dean of the Faculty ofNursing Tanta Universityand was submittedtotheresponsible authoritiesoftheselectedsettingforpermissionfor data collection.
2. **2-Ethical consideration ,women oral consent was obtained**including the right to withdraw at any time**,rights and confidentiality and privacy of the respondents were respected** and was taken into consideration regarding data collection **through the all phases of the study and all the women informed about the aim and benefits from the study.** The researcher was ensuring that the nature of the study do not cause any harm or pain for the women or their fetuses.
3. **3-Developingthetools**: Study tools were developed by the researcher based on the literature review.
4. **4-Validity test:** Tools of data collection were distributed to a jury of 5 academic professors in Maternity and Gynecological Nursing Department to test its face and content validity. Accordingly, corrections and modifications were done. The validity of the expertise judgments of the questions of the Arabic translated version of pregnant women knowledge and practices regarding COVID 19 was 0.98 and 0.96 respectively.
5. **The reliability** of the translated Arabic tools was done by using Cronbach's Alpha which was0.87 and 0.88 respectively
6. **6-The pilot study:** After development of the tools, a pilot study was carried out on 10 % of the pregnant woman (3 women), from previously mentioned setting to test the clarity and applicability of the tools to detect any obstacles that might be encountered during data collection, as well as to determine the length of time needed to collect the data from each woman. The

necessary modifications were done according to the pilot study. Those women were excluded from the study sample.

7. **Data collection: -**
   - The researcher collected the data within four months startedfrom the beginning of April to the end of July 2020.
   - Data of this study was collected by the cooperation of the registered nurses working in the isolation hospitals at El-Gharbia Governorate and responsible about the care of the infectedpregnant women.
   - At first the researcher wear the suitable personal protective equipment and met the registered nurse who working in the isolation hospitals at El-Gharbia Governorateto explain the purpose of the study discussed the tool of data collection completely with the nurse to ensure that she understood it perfectly.
   - The researcher explain to the nurses the importance to report anycase of infected pregnant woman with COVID 19 admitted to the hospital immediately
   - When pregnant women infected with COVID 19 were admitted to the isolation hospital, the registered nurses notified the researcher after taking permission from the woman that the researcher will call her by telephone if the health status of woman allow.
   - If the health status of the woman not allows the researcher collect the necessary study data though the nurse and the women admission sheet till the health status of the woman improved.
   - Then theresearcher contacted by the registered nurses through the telephone twice daily at the morning and afternoon to monitor the status of pregnant women infected with COVID-19 regarding the maternal or fetal health condition .
   - Daily calling the pregnant women by telephone if their health status allow.
   - At the time of the study 12 out of 30 pregnant women were at the first or second trimester while the other 18 pregnant women were atthe third trimester.
   - All the women who recovered and discharged from the hospital,

the researcher followed up those women and their relatives such as ,mothers or husbands to ensure from the women and fetuses health status during the time of data collection

– At the time of delivery, the researcher assessed the maternal, fetal and neonatal condition and recorded the delivery outcomes as normal or exposed to any complications from their hospital files and relatives.

- The researcher used **Tool I**: part 1, 2 to collect data about the socio-demographic characteristics, reproductive history of pregnant women infected with COVID 19**, tool II** was used by the researcher to assess women's knowledge regarding COVID-19,t**ool III** was used to assess women's practice regarding COVID-19, which observed by the registered nurses and then reported to the researcher by the telephone and **tool IV**: part (1) and part (2) was used to assess the effect of COVID-19 virus on pregnancy outcome which evaluated by the researcher.

8- The data were coded,entered and analyzed using SPSS (version 20).Statistical significant was set at P value <0.05%. Spearman correlation was used to examine the relation between COVID 19 andknowledge , practice of women and pregnancyout come.

Results:

Table (1): Shows the distribution of the studied women according to their socio-demographic characteristics. It was observed that the mean age of the studied women was 31.57±4.63years. It was also, noticed that slightly less than three fifths (56.7%) of them were housewives. Concerning the residence, it was found that three fifths (60.0%) of the studied women were from urban residence. The table also reveals that, almost half (53.5%) of the studied women had finished university or post graduate education. Furthermore, the majority (93.3%) of studied women had enough income and almost three quarters (76.7%) of them were from nuclear families.

Table (2): Demonstrates the distribution of the studied women according to their reproductive history. It was obvious that about two third (66.7% and 70.0%) of the studied women were multigravida and multipara respectively. As regard number of abortion, it was observed that almost three quarters (76.6%) of them had not abortion. In addition, it was demonstrated that three fifths (60%) of them were in the third trimester when found their infection with corona virus. Also it is found that the

entire sample (100%) had the initial antenatal visit at the first trimester and majority (96.7%) of them received the antenatal follow up at private clinics. Regarding number of follow up visits, it was evident that nearly three quarters (73.3%) of pregnant women had more than seven visits. The table also reveals that almost half (55%) of the studied women had Cs in the last delivery.

Table (3) illustrates the distribution of the studied women according to their knowledge regarding COVID-19. It was observed that the majority of the studied women (83.3%, 100%, 96.7, 100%, 100%, 90%, 100%, 100% respectively) had correct answer regarding the type of COVID 19 infection, route of transmission, effective way to reduce its spread, wearing protective mask , avoid going to the crowded places, isolation after contact with infected personnel as well as the place of isolation. The table also reveals that (100%, 100%, 93.3%, 80%, 76.7%, 76.7%) respectively had incorrect answer regarding maternal and fetal effect of corona virus infection, transmission of infection when the person is asymptomatic, persons who susceptible to COVID 19 in addition to the presence of effective treatment to COVID 19 and if contacting wild animals can cause corona virus infection. Concerning the psychological reaction after corona virus infection, it was observed that almost half (56.6%) of the studied women were excited and almost two fifths (43.3%) of them had episodes of severe crying.

Figure (1): shows the distribution of the studied women according to their overall total score level of knowledge regarding COVID-19. It was found that slightly less than two thirds had satisfactory level of knowledge compared to almost one third who had unsatisfactory level of knowledge

Table (4) demonstrates the distribution of the studied women according to their practice regarding COVID-19. It was evident that (100%, 100, 93.3%, 86.7% respectively) had correct practice regarding frequent hand washing, compliance with the recommended medication, eating planned hospital diet as well as taking adequate amount of rest compared to (100%, 100%, 80% and 70% respectively) who had incorrect practices regarding practicing daily and breathing exercise, wearing face mask frequently and drinking warm fluid frequently.

Figure (2): reveals the distribution of the studied women according to their overall total score level of practice regarding COVID-19. It was found that almost half of the studied women had satisfactory practice while almost two fifths had

unsatisfactory practice regarding corona virus infection.

Table (5) shows the distribution of the studied women according to the maternal and fetal effect of COVID-19. It was demonstrated that two fifths (40%) of the pregnant women continue normal course of pregnancy at the time of the study as well as the entire sample (100%) of them delivered by cesarean section while almost one fifth (23.3%) had pre term labor also the minority (10%, 10% and 6.6% respectively) had maternal death, maternal distress and connected with mechanical ventilator due to decreased O2 saturation. As regard the fetal effect of COVID 19, it was found that almost two-fifths (40%) had no complicationat the time of the study compared to (23.3%, 10%, 10% and 6.6%) who delivered prematurely, exposed to fetal distress, intrauterine fetal death and oligohydramnios.

Table (6) demonstrates the correlation between pregnant women total score level of knowledge and their total score level of practice regarding COVID 19. It was found that a highly statistically significant correlation between pregnant women total score level of knowledge and their total score level of practice regarding COVID 19 as p-value was <0.001**

Table (7): Clarifies the relation between Socio-demographic characteristics of the pregnant women infected with COVID-19 Virus and their total score level of knowledge. It was evident that a statistically significant deference between pregnant women total score level of knowledge and their occupation, residence and educational level as p-value was <0.05*. The table also reveals that there is no statistically significant relation between pregnant women total score level of knowledge and their income and family type.

Table (8): Demonstrates the relation between Socio-demographic characteristics of the pregnant women infected with COVID-19 Virus and their total score level of practice. It was evident that a statistically significant deference between pregnant women total score level of practice and their occupation as p-value was <0.05*. The table also reveals that there is no statistically significant relation between pregnant women total score level of practice and between their age, residence, educational level, income and family type.

Table (9): Illustrates the relation between the studied pregnant women total score level of knowledge and the effect of COVID-19 virus on pregnancy outcome. Concerning the effect of COVID-19 on pregnant women, it was evident that (100%, 100%, 100%, 71.4% and 61.1%)

respectively of women who attained unsatisfactory level of knowledge exposed to maternal distress, maternal death, mechanical ventilator, pre-term labor and cesarean section delivery. While regarding the effect of COVID-19 virus on the fetus, it was observed that (100%, 100%, 100%, 100%, 85.7%, and 66.7%) respectively of pregnant women who attained unsatisfactory level of knowledge their fetuses exposed to fetal distress, intrauterine fetal death, neonatal death and still birth.

Table (10): Shows the relation between the studied pregnant women total score level of practice and the effect of COVID-19 virus on pregnancy outcome. Concerning the effect of COVID-19 on pregnant women, it was evident that (100%, 100%, 100%, 77.8% and 85.7%) respectively of women who attained unsatisfactory level of practice exposed to maternal distress, maternal death, mechanical ventilator, pre-term labor and cesarean section delivery. While regarding the effect of COVID-19 virus on the fetus, it was observed that (100%, 100%, 100%, and 66.7%) respectively of pregnant women who attained unsatisfactory level of practice their fetuses exposed to fetal distress, intrauterine fetal death, neonatal death and still birth.

Table (1): Distribution of the studied women according to their socio-demographic characteristics.

Socio-demographic characteristics	N=30	%
Age (years)		
<25	10	33.3
25-35	14	46.7
35 or more	6	20.0
Mean±SD	**31.57±4.63**	
Job		
House wife	17	56.7
Employee	13	43.3
Residence		
Rural	12	40.0
Urban	18	60.0
Educational level		
Secondary or diplome	14	46.7
University or postgraduate	16	53.3
Income		
Not enough	2	6.7
Enough	28	93.3
Enough and more	0	0
Family type		
Nuclear family	23	76.7
Extended family	7	23.3

Table (2): Distribution of the studied women according to their reproductive history

Reproductive history	**N=30**	**%**
Primigravida	10	33.3
Multigravida	20	66.7
Parity		
Primipara	6	30
Multi-para	14	70
Number of abortion		
None	23	76.7
One	7	23.3
Gestational age		
First trimester	5	16.7
Second trimester	7	23.3
Third trimester	18	60.0
Time of initial antenatal visits		
First trimester	30	100.0
Place of receiving the antenatal follow up		
Governmental hospital	1	3.3
Private clinic	29	96.7
Number of follow up visits:		
More than three visits	3	10
More than four visits	5	16.7
More than six visits	4	13.3
More than seven visits	18	60
Mode of last delivery		
Cesarean section	11	55
Normal vaginal delivery	9	45
When did you find out your infection with corona virus		
First trimester	5	16.7
Second trimester	7	23.3
Third trimester	18	60.0

Table (3): Distribution of the studied women according to their knowledge regarding COVID-19.

Knowledge about Clinical characteristics of COVID-19	Correct		Incorrect	
	N=30	%	N=30	%
Causative agent of COVID-19	25	83.3	5	16.7
The route of COVID-19 transmission	30	100.0	0	0.0
Incubation period f COVID-19	16	53.3	14	46.7
Risk group of COVID-19	6	20.0	24	80.0
clinical manifestation of COVID-19	10	33.3	20	66.7
Isolation is effective method to prevent spread of infection	29	96.7	1	3.3
Presence of effective cure for COVID-19	7	23.3	23	76.7
Methods of transmission	2	6.7	28	93.3
Methods of prevention	30	100.0	0	0.0
Effect of COVID-19 virus on pregnant women	0	0.0	30	100.0
Effect of COVID-19 virus on fetus	0	0.0	30	100.0
Warning signs of pregnancy	12	40.0	18	60.0
Signs of fetal distress	11	36.7	19	63.3
Available places of isolation	30	100.0	0	0.0
Methods to assess fetal wellbeing by pregnant women	13	43.3	17	56.7
What about your psychological reaction when you knew that you infected with corona virus##				
Excited	17		56.6	
Severe crying	13		43.3	
Depressed	10		33.3	
Very anxious	10		33.3	
Total	19	63.3	11	36.7
Mean±SD	11.5±1.91			

indicate more than one answer.

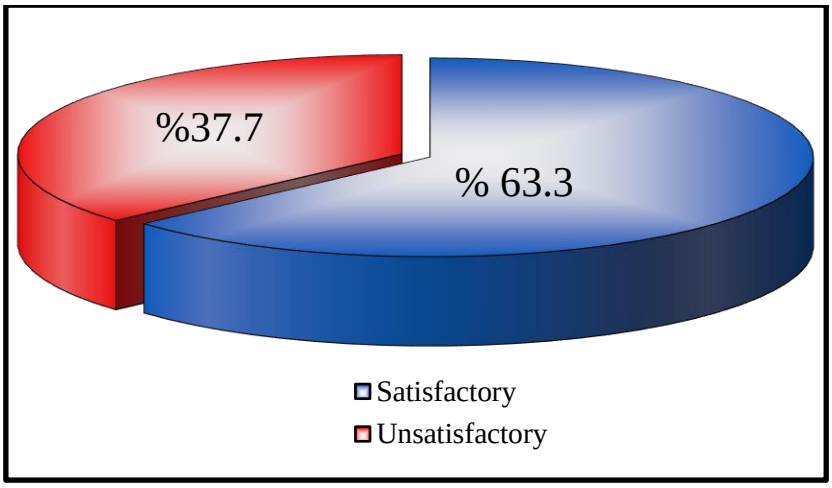

Figure (1): Distribution of the studied women according to their overall total score level of knowledge regarding COVID-19.

Table (4): Distribution of the studied women according to their practice regarding COVID-19.

Women's practice regarding COVID-19 virus	Done		Not done	
	N=30	%	N=30	%
Frequent hand washing	30	100.0	0	0.0
Using antiseptic solution (alcohol) on the hand frequently	16	53.3	14	46.7
Wearing face mask frequently	6	20.0	24	80.0
Have adequate amount of rest	26	86.7	4	13.3
Do you assess the number of fetal movement daily	15	50.0	15	50.0
Drinking warm fluid frequently	9	30.0	21	70.0
Eating the planned hospital diet	28	93.3	2	6.7
Practice daily exercise	0	0.0	30	100.0
Practice breathing exercise	0	0.0	30	100.0
Compliance with the recommended medication	30	100.0	0	0.0
Total	16	53.3	14	46.7
Mean±SD	**5.33±1.06**			

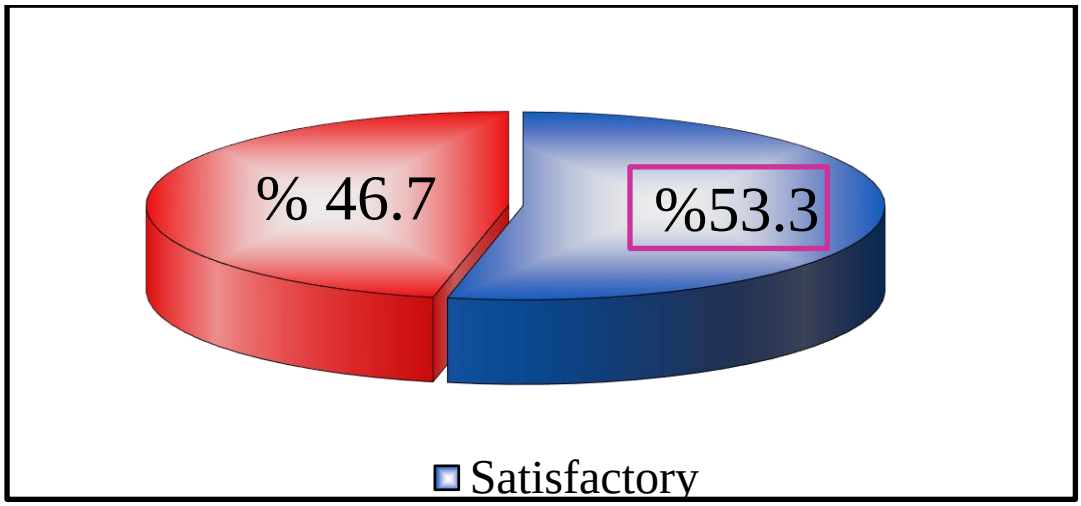

Figure (2): Distribution of the studied women according to their overall total score level of practice regarding COVID-19.

Table (5): Distribution of the studied women according to the effect of COVID-19 on pregnant women and fetal condition.

Effect of COVID-19 virus on the pregnant woman ##	**N=30**	**%**
Normal course of pregnancy	12	40.0
Maternal distress	3	10
Pre-term labor	7	23.3
Cesarean section delivery (n=18)	18	100
Maternal death	3	10
Mechanical ventilator due to decreased o_2 saturation	2	6.6
Effect of COVID-19 virus on the fetus ##		
Congenital anomalies	1	3.3
Oilgo-hydrominse	2	6.6
Fetal distress	3	10.0
Premature baby	7	23.3
Intrauterine fetal death	3	10
Still birth	3	10
Neonatal death	1	3.3
None of the above	12	40.0

indicate more than one answer.

Table (6):Correlation between pregnant women total score level of knowledge and their total score level of practice regarding COVID 19.

Items	Total knowledge	
	R	P-value
Total practice	0.813	<0.001**

Table (7): The relation between Socio-demographic characteristics of the pregnant women infected with COVID-19 Virus and their total score level of knowledge

Socio-demographic characteristics	Total knowledge					
	Satisfactory		Unsatisfactory		Chi-square	
	N	%	N	%	X^2	P-value
Age (years)						
<25	5	26.3	5	45.5	1.805	0.406
25-35	9	47.4	5	45.5		
35 or more	5	26.3	1	9.1		
Job						
House wife	8	42.1	9	81.8	4.474	0.034*
Employee	11	57.9	2	18.2		
Residence						
Rural	5	26.3	7	63.6	4.043	0.044*
Urban	14	73.7	4	36.4		
Educational level						
Secondary	6	31.6	8	72.7	4.739	0.029*
University or postgraduate	13	68.4	3	27.3		
Income						
Not enough	1	5.3	1	9.1	0.164	0.685
Enough	18	94.7	10	90.9		
Family type						
Nuclear family	16	84.2	7	63.6	1.648	0.199
Extended family	**3**	**15.8**	**4**	**36.4**		

Table (8):The relation between Socio-demographic characteristics of pregnant women infected with COVID-19 Virus and their total score level of practice.

Socio-demographic characteristics	Total practice					
	Satisfactory		Unsatisfactory		Chi-square	
	N	%	N	%	X^2	P-value
Age (years)						
<25	3	18.8	7	50.0	3.291	0.193
25-35	9	56.3	5	35.7		
35 or more	4	25.0	2	14.3		
Job						
House wife	6	37.5	11	78.6	5.129	0.024*
Employee	10	62.5	3	21.4		
Residence						
Rural	4	25.0	8	57.1	3.214	0.073
Urban	12	75.0	6	42.9		
Educational level						
Secondary	5	31.3	9	64.3	3.274	0.070
University or postgraduate	11	68.8	5	35.7		
Income						
Not enough	0	0.0	2	14.3	2.449	0.118
Enough	16	100.0	12	85.7		
Family type						
Nuclear family	14	87.5	9	64.3	2.249	0.134
Extended family	2	12.5	5	35.7		

Table (9): The relation between the studied pregnant women total score level of knowledge and the effect of COVID-19 virus on pregnancy outcome.

Effectof COVID-19 virus on pregnancy outcome	Total knowledge						
	Satisfactory		Unsatisfactory		Total	Chi-square	
	N	%	N	%		X2	P-value
Effect of COVID-19 virus on the pregnant woman							
Maternal distress	0	0.0	3	100.0	3	5.758	0.016*
Pre-term labor	2	28.6	5	71.4	7	4.751	0.029*
Cesarean section delivery	7	38.9	11	61.1	18	11.579	<0.001**
Maternal death	0	0.0	3	100.0	3	5.758	0.016*
Mechanical ventilator	0	0.0	2	100.0	2	3.701	0.054
Effect of COVID-19 virus on the fetus							
Fetal distress	0	0.0	3	100.0	3	5.758	0.016*
Intrauterine fetal death	0	0.0	3	100.0	3	5.758	0.016*
Still birth	1	33.3	2	66.7	3	1.292	0.256
Neonatal death	0	0.0	1	100.0	1	1.787	0.181

Table (10): The relation between the studied pregnant women total score level of practice and the effect of COVID-19 virus on pregnancy outcome.

Effect of COVID-19 virus on pregnancy outcome	Total practice						
	Done		Not done		Total	Chi-square	
	N	%	N	%		X2	P-value
Effect of COVID-19 virus on the pregnant woman							
Maternal distress	0	0.0	3	100.0	3	3.810	0.051
Pre-term labor	1	14.3	6	85.7	7	5.593	0.018*
Cesarean section delivery	4	22.2	14	77.8	18	17.500	<0.001**
Maternal death	0	0.0	3	100.0	3	3.810	0.051
Mechanical ventilator	0	0.0	2	100.0	2	2.449	0.118
Effect of COVID-19 virus on the fetus							
Fetal distress	0	0.0	3	100.0	3	3.810	0.051
Intrauterine fetal death	0	0.0	3	100.0	3	3.810	0.051
Still birth	1	33.3	2	66.7	3	0.536	0.464
Neonatal death	0	0.0	1	100.0	1	1.182	0.277

Discussion

COVID-19 pandemic is a huge problem, threatening all the population groups especially pregnant women due to many physiological and immunological changes occurring during pregnancy that render pregnant women more vulnerable to respiratory pathogens and serious respiratory problems than others. Their chance to catch COVID19 infection increases, especially, if they are suffering from other morbidities. Up till now, there are a few published studies regarding COVID-19 during pregnancy. The aim of the current study is to highlight the effect of new corona virus disease 2019 (COVID19) on pregnancy outcome. [20-22]

The findings of the present study illustrated that the mean age of the studied pregnant women were31.57±4.63years old. This finding goes in lines with **David A, , Schwartz (2020)** [23]who study **(**An analysis of 38 Pregnant Women With COVID-19, Their Newborn Infants, and Maternal-Fetal Transmission of SARS-CoV-2: Maternal Corona virus Infections and Pregnancy Outcomes) the researcher demonstrated that the study age range from 30-34 years old. In the same line, **El shaffeey F et al, (2020)** [22] who study (A systematic scoping review of COVID 19 during pregnancy and childbirth), the researcher reported that mean age of the studied pregnant women were ranging from 21-42 years old. This agreement between the two studies related to the studied samples was taken during their reproductive age.

The findings of the current study also illustrated that slightly less than three fifths of the pregnant women were house-wives and three fifths of them were from urban residence. The table also reveals that, almost half of the studied women had finished university or post -graduate education. The findings of this study disagreed with **Nwafor J et al, (2020)** [24] who study the **(**Knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting**),** the researcher concluded that the majority of the study sample were farmers, were living in rural areas and had no formal education. This disagreement between the two studies from the researcher point of view may be related to the different setting of the sample.

The results of the present study also reported that none of the studied women had enough income and more. The results of the present disagreed with **Alahdal H et al, (2020)** [25] who study (An analytical study on the awareness, attitude and practice during the COVID-19 pandemic in Riyadh, Saudi Arabia) who find out that

the majority of the study sample had high income. This disagreement between the studies related to different setting of the studied samples.

The results of the current study demonstrated that two third of the studied women were multigravida and multipara, Also all of the study sample had their initial antenatal visit at the first trimester and majority of them received the antenatal follow up at private clinics and nearly three quarters of pregnant women had more than seven visits. In addition, almost half of them had Cs delivery. The findings of the present study relatively matching with **Wu Y et al, (2020)** [(26)]who investigate **(**Corona virus disease 2019 among pregnant Chinese women: case series data on the safety of vaginal birth and breastfeeding)

Concerning the infection of the pregnant women with COVID-19, the findings of the present study illustrated that three fifths of the study sample were infected with COVID-19at the third trimester. These results were consistent with **De sousa A et al, (2020)**[(27)]who study the (Effects of COVID19 during pregnancy and neonatal prognosis). The researchers reported that the majority of the pregnant women had infected with corona virus during the third trimester.

Concerning women's knowledge regarding COVID-19, the findings of the current study showed that the majority of the studied women had correct answer regarding the type of COVID 19 infection, route of transmission and the protective measures. The findings of the current study in a path with **Anikwe C et al, (2020)** [(28)]who study (corona virus disease 2019: knowledge, attitude, and practice of pregnant women in a tertiary hospital in Abakaliki Southeast Nigeria) and **Reuben R, et al, (2020)** [(29)]who study the **(**Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria) the researchers reported that the majority of the study subjects had correct answer regarding knowledge about corona virus infection. From the researcher point of view this high level of knowledge is expected due to the social impact of the COVID-19 pandemic on the studied areas.

Regarding, the most reported symptoms of COVID19 the findings of the current study demonstrated that the fever followed by muscle aches, cough and headache were the most common symptoms reported by pregnant women. The findings of the present study agreed with **Nwafor J et al, (2020)** [(24)] who reported that fever followed by cough and headache were the most common symptoms associated

withCOVID19. Also, this study goes hand to hand with **Pereira A et al, (2020)**[30]who investigate the (Clinical course of corona virus disease2019 in pregnancy), the researcher illustrated that fever, cough and dyspnea are the common symptoms associated with corona virus infection.

Regarding the women's knowledge about the effect of COVID-19 infection on pregnancy outcome. The results of the study reported that all the women had incorrect answer regarding the effect of corona virus infection on pregnancy. This finding disagreed with **Bhagavathula A et al, (2020)** [31] who study(novel Corona virus (COVID-19) Knowledge and Perceptions: A Survey on Healthcare workers) the researchers reported that health care workers had correct answer regarding the effect of corona virus infection on pregnancy outcome. This incongruity between the current study and the previous study related to different level of education of the two study samples, where the study sample in that study are doctors.

Concerning the woman psychological reaction toward corona virus infection, it was observed that almost half of the studied women were excited and had episodes of severe crying. The results of the current study relatively matching with **Mappa I et al, (2020)** [32] who study the (Effects of coronavirus 19 pandemic on maternal anxiety during pregnancy) the researchers illustrated that the pregnant women who infected with corona virus had very high level of anxiety and becoming very stressed. This matching was accepted because it might be related to the fear of women from the effect of corona infection on the pregnancy.

Considering the total score level of knowledge regarding COVID-19. It was found that slightly less than two thirds of the pregnant women had satisfactory level of knowledge. The findings of the current study matchwith **Azlan A et al, (2020)**[33]who study **(**Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia) they illustrated that most of the study subject had reported satisfactory level of knowledge this agreement related to that most of the studied subject in both samples were educated.

As regard the women's practice toward COVID-19, the findings of the present study illustrated that all of the women had correct practice regarding frequent hand washing and compliance of the recommended medication and most of them hadeaten the planned hospital diet as well as taking adequate amount of rest. The findings of the present study goes in line with **Zhong B et al, (2020)** [34]who

study the **(**Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey). The researchers demonstrated that the majority of women had correct practice regarding hand washing, compliance of the recommended medication and taking adequate amount of rest.

Concerning, women's practice of frequent wearing face mask and drinking warm fluid. The findings of this study showed thatthe majority of women had incorrect practice. The results of these study disagreed with **Zhong B et al, (2020)** [(34)]they illustrated that the majority of the study subject had correct practice regarding frequent wearing face mask and drinking warm fluid.This disagreement may be attributed to the economic status of the two studies, in the other study the subjects had high income which enable them to buy and change the face mask frequently while in our study none of the subjects had enough income and more

As regard the effect COVID-19 on maternal condition. The findings of the current study illustrated that almost one fifth (23.3%) of pregnant women had pre-term labor and three fifths (60%) of them delivered by cesarean section.This finding relativelyagreed with **Khan M (2020)** [(35)]who study **(**COVID-19 during pregnancy: A systematic review to summaries possible symptoms, treatments and pregnancy outcome) they showed that (30.4%) had premature delivery and (83.9%) delivered by cesarean section.

Furthermore, the findings of the current study reported that (10%) of women had maternal distress and maternal death.This finding ofthe current study disagreed with **NayakAet al, (2020)** [(36)]study who investigated the **(**Impact of the Coronavirus Infection in Pregnancy: A Preliminary Study of 141 Patients) the researchers demonstrated thatthe maternal death rate was (2.12%) and (19.5%) had maternal distress. The findings of this study also reported that (6.6%) of women connected with mechanical ventilator, the findings of the current study disagreed with **Sentilhes L et al, (2020)** [(37)]who study(Coronavirus disease 2019 in pregnancy was associatedwith maternal morbidity and preterm)the researchers find out that the percent of pregnant women who connected to themechanical ventilator were (23.1%). This disagreement might be attributed to that the sample size in our study was greater than the sample size in the other studies.

Regardingthe effect of COVID 19 on fetal outcome it was found that almost two

fifths (40%) had no complication compared to (23.3%, 10% and10%) who delivered prematurely, exposed to fetal distress and intrauterine fetal death.The findings of the current study agreed with **Schwartz D, ,Graham A (2020)** [38] who study the (Potential Maternal and Infant Outcomes from (Wuhan) Coronavirus 2019 Infecting Pregnant Women: Lessons from SARS, MERS, and Other Human Corona virus Infections,) they find out that nearly one third of the fetus were born prematurely.Furthermore, the finding of the present study relatively doesn't go in the line with **Nayak A et al, (2020)** [36]they reported that the percent of intrauterine fetal death was (2.23%), and the percent of fetal distress was (24%).

In relation to the correlation between pregnant women total score level of knowledge and their total score level of practice regarding COVID 19. The findings of the present study found that a highly statistically significant correlation between pregnant women total score level of knowledge and their total score level of practice regarding COVID 19.The findings of the current study agreed with **Schwartz D, ,Graham A (2020)** [38]who found that a positive correlation between pregnant women knowledge and practices regarding COVID 19 and also demonstrated that good knowledge will result in best practices regarding COVID 19.

Considering the relation between the socio-demographic characteristics of the pregnant women infected with COVID-19 and their total score level of knowledge. The findings of this study reported that there was a statistically significant deference between pregnant women total score level of knowledge and their occupation, residence and educational level. This result goes in line with **Abdelhafiz A. et al, (2020)** [39] (Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID19). The researchers reported that there was significant relation between the subject total score level of knowledge and their occupation, residence and educational level.

As regard the relation between socio-demographic characteristics of the pregnant women infected with COVID-19 and their total score level of practice. The finding of the current study demonstrated that there is astatistically significant deference between pregnant women total score level of practice and their occupation. The findings of the present study agreed with **Azlan A et al, (2020)** [33] who proved that there significant

relation between the subject total score level of practice and their occupation.

Regarding the relation between the studied pregnant women total score level of knowledge and the effect of COVID-19 on pregnancy outcome. The findings of this study reported that the majority of pregnant women who had unsatisfactory level of knowledge exposed to maternal distress, maternal death, mechanical ventilator, pre-term labor and cesarean section delivery as well as their fetuses exposed to fetal distress, intrauterine fetal death, neonatal death and still birth more than those who had satisfactory level of knowledge. This study was in line with **Alfaraj SH et al, (2019)[40]**whoobserved that the most perinatal complications among pregnant women with poor knowledgeregarding COVID-19 was preterm delivery, intrauterine growth restriction, spontaneous abortion, infants with small for gestational age, and neonates admitted to intensive care unit.

Concerning the relation between the studied pregnant women total score level of practice and the effect of COVID-19 on pregnancy outcome. The findings of this study showed that majority of pregnant women who attained unsatisfactory practice exposed to maternal distress, maternal death, mechanical ventilator, pre-term labor and cesarean section delivery as well as their fetuses exposed to fetal distress, intrauterine fetal death, neonatal death and still birth more than those who attained satisfactory practice. This study agreed with **Lu R et al,(2020)[41]**who declared that the effect of COVID-19 among women with unsatisfactory performance was fetal distress, premature rupture of the fetal membrane and maternal admission to intensive care unit as well as septic shock.

Conclusion

Based on the findings of the present study, it can be concluded that the studied pregnant women had satisfactory knowledge as well as unsatisfactory practices regarding COVID 19. Moreover, it was found that the effect of COVID 19 on pregnant women was included cesarean section, preterm labor, maternal death, and maternal distress as well as connection to mechanical ventilator while regarding the effect of COVID-19 on fetus; it was included premature baby, fetal distress, intrauterine fetal death and oligohydramnios and neonatal death.

Recommendations

Based on the findings of the current study, it seems that there is a great need for improving knowledge and practices of pregnant women about COVID 19 and further studies needed to assess the effect of COVID 19 on pregnancy outcome.

Thus the following recommendations are derived and suggested including refreshing online courses especially for newly appointed nurses can be successful in improving nurse's level of knowledge and practices regarding COVID 19 prevention.

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Effect of Resilience Intervention on Nurses' resilience and Psychological Problems during The COVID-19 Pandemic

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Abstract

Background: Nurses are vital resources for every country. Their mental health and psychological wellbeing are crucial not only for continuous and safe patients care, but also for control of any outbreak. Resilience can be described as the ability to get better after difficult life experiences or overcome change or disasters. So, it is important to help nurses for building their resilience. **Objective:** the study aimed to evaluate the effect of resilience intervention on nurses' psychological problems, and their resilience during time of coronavirus pandemic. **Setting:** the present study was conducted at two settings in Tanta city, Egypt: Psychiatry, Neurology,&, Neurosurgery center that is affiliated to Tanta University, and Al-Minshawy General Hospital that is affiliated to Ministry of Health and Population. **Subjects:** 70 nurses who are caring for patients with corona virus. They were selected by using convenience sampling design. **Tools**: three tools were used to collect the necessary data: Socio-Demographic Questionnaire developed by researchers, Four Dimensional System Questionnaire (4DSQ) was developed ***by Terluin .B (2012),*** and Connor - Davidson Resilience Scale (CD-RISC) was developed by ***Connor &Davidson (2003) .***The participants divided into small groups and attended eight sessions of resilience intervention through zoom cloud meetings**. Results**: there was a statistically significant improvement in nurses' resilience & psychological problems after the intervention, Also, a statistical significant negative correlation was found between resilience and all psychological problems. **Conclusion:** resilience intervention is proved to be effective in improving nurses' resilience and psychological health. **Recommendations:** Continuous training intervention that targeting and enhancing resilience are important to be planned and implemented to improve psychological wellbeing among frontline nurses who are caring with patients infected with corona virus.

Keywords: Resilience, Corona virus, and psychological problems

Introduction

The novel corona virus disease (COVID - 19) outbreak emerged in Wuhan in December 2019, and on 30 January was declared a public health emergency of international concern by the world health organization [(1)]. News about COVID-19 pandemic is frightening, with an overwhelming number of new cases and death rate every day. Undoubtedly, this is a stressful time, especially the stressor is new, the absence of warning for preparation and pre-adaptation, no antidotes or vaccinations are currently available [(2)]. This is producing a huge burden on health care workers.

Health care workers are vital resources for every country. They are working on the frontlines of the Corona virus outbreak [(3)]. They are often under daily pressure due to several reasons such as; nurses are putting in risk conditions where they are fighting a lethal virus with inadequate equipment and non-evidence-based treatment (no specific life-saving treatment) and fear of being infected. This stress extends outside of the realm of health care facilities, and includes worrying about infecting their families and contaminating their homes which leads to continued infected vehicle [(4)]. They may be choose to self- isolate or force the guilt of potentially infecting a family members. Social isolation and subjective feeling of solitude are known risk factors of suicide. Moreover, every day there is the significant existential stress associated with witnessing other dying, loss of many patients, colleagues or loved one [(5)].

The possible stress reaction to threatening situations such as dealing with patients have coronavirus may include decreased of concentration, irritability, anxiety, insomnia, fear, reduced productivity, and interpersonal conflicts [(2)].In addition to prolonged exposure to these stressors may have a long term negatives psychological consequences on health care workers and job performance, leading to a poor quality of patients care [(3,6)]. Therefore, nurse' health and safety are crucial not only for continuous and safe patient care, but also for control of any outbreaks in the future[(7)].

A recent study in Wham China demonstrated that women nurses are particularly vulnerable to experiencing depression, insomnia, and distress in these work condition [(8)].The ***World socialist website, (2020***) have reported suicide case among nurses working in the intensive care units in Europe that could potentially be related to the COVID-19 emergency [(9)]. It suggested that a strong need to mental health protection of nurses, and provide psychological support. Based on the evidence for risk of psychological

problems among nurses who are working in the frontline against CVID-19, Primary concern is protecting the psychological well- being by fostering nurses' mental resilience to cope with difficult situations and to enable them to continue to perform their duties [5,10]

Resilience is a process of adjusting well in the time of trauma, tragedy, threat, adversity, or even significant sources of stress[11]. It is also described as an individual's ability to cope with various adverse conditions while maintaining a sense of purpose, balance, and positive mental and physical well- being [12]. Many empirical studies supported that resilience is negatively correlated with depression and anxiety, and positively corrected with life satisfaction, subjective well-being, and positive emotions [13-18] .

The concept of resilience in nursing has received much attention and some programs have been developed to teach resilience to the nurse [19, 20]. ***Mealer et al (2017*** indicated that nurses with higher levels of resilience are significantly less likely than those with low levels to experience post-traumatic stress disorder (PTSD), anxiety, depression, and burnout syndrome [21]. The loss of resilience in nurses not only compromises their health but also leads to burnout or leaving intentions, which are major concerns in nursing management[22]. Data from China have shown that social and psychological intervention could be significantly enhance nurses' resilience and well - being during the COVID -19 outbreak [23] .

The important components of personal resilience are involved optimism and adaptive coping (cognitions), emotional competence, adaptive health practices, and social support. ***Optimism*** involves an individual's belief that good things will happen to them in the future [24]. From a resilience perspective, optimism has been linked with psychological well-being in the face of adversity, better physical health, and adaptive coping mechanisms [25]. ***Adaptive coping*** refers to the ability of an individual to manage a situation and a general cognitive ability to actively deal with global adversity [26, 27] . ***Emotional competence***, is the another component of resilience, that means the ability to perceive emotions, utilize, and regulate emotions [28]. Another component of personal resilience was ***adaptive health practices***. It includes physical exercise, rest, relaxation, good nutrition, and smoking abstinence. ***Terte et al (2014)*** explored the strong link between adaptive health practices and physical and mental health [29]. The last component of resilience is ***Social support*** which is very important to develop resilience; it is a key

environmental influence. Social support has also been shown to promote psychological wellness, protect cognitive decline and contribute to physical health [30]. These components of resilience were expected to work together to provide higher levels of resilience among nurses who exposed to higher stressful situations[29] .

Significance of the study:

Nurses are under huge pressure at work, due to increased exposure to patients with the corona virus. They have greater risks for psychological problems, such as distress, anxiety, depression, insomnia and other somatic symptoms. A literature review concluded that resilience in nurses is an important factor for promoting their mental health, helping them remain caring, focused on their patients' needs , and provide qualified nursing care.

Aim of the study:

The study aimed to evaluate effect of resilience intervention on nurses' resilience &psychological problems during the COVID-19 pandemic.

Research hypothesis:

The resilience intervention expected to improve nurse' resilience and psychological problems

Operational definition: the psychological problems that investigated in the present study includes: distress, anxiety, depression, and somatization that may be experienced by nurses who were caring for patients infected with corona virus.

Research design: a quasi-experimental design was utilized.

Setting: the present study conducted at two settings; Psychiatry, Neurology & Neurosurgery center that is affiliated to Tanta university, and Al-Minshawy General Hospital that is affiliated to Ministry of Health and Population, Tanta city, Egypt. These two setting are recently be a quarantine hospital to give healthcare services for patients who infected with coronal virus. These settings are working 7 days\a week , 24 hours \day.

Subjects: the participants of this study selected by using conveniences sampling design from nurses who caring for patients with corona virus in the previous settings. The sample size estimated using EPi-Info created by World Health Organization and Center for Disease Control and Prevention, Atlanta, Georgia, USA version 2002 ; 95% confidence limit, 80% power of the study, Expected level of psychological distress 80% before intervention that will be declined to 60% after intervention. Based on these criteria the sample size was N>66. The sample size was increased to 70 nurses to increase validity of the study results

Tools of the study: the present study used the following tools

Tool (1) Socio-demographic questionnaire: it was developed by researchers to elicit information about nurses' age, sex, residence, social status, level of education, their role in health care system, and their years of experience in field of nursing care

Tool (2) : Four Dimensional system Questionnaire (4DSQ):

It is a self-report questionnaire that developed by ***Terluin (2012)*** [31]**.** It consisted of 50 items disturbed over four subscales namely: The distress subscale measure individual basic response to life stressors (16 items), anxiety (12 items) and depression (6 items) subscales measure a specific symptoms of anxiety and depressive disorders and somatization subscale (16 items) measure somatic symptoms associated with distress. The responses are categorized in five points likert scale: no (0) , sometime (1) , regularly (2) , often (3), and constantly (4) . The score of all items are summated and ranged from (**0-200**) .The total score of all items and each subscale is divided according to validated cut- off points in to three parts as follow; Nurses with a score less than 50% denote mild level of psychological problem, 50–75% indicate moderate level of psychological problem , and more than 75 denote severe level of psychological problem .

Tool (3) :Connor - Davidson Resilience Scale (CD-RISC): This scale developed by Connor & Davidson(2003) [32]. It is a 25 items that measure the ability of individual to cope with distress and diversity. All items were rated on five points likert scale are ranging from not true at all (0) to true all the time(4). The total score is summated and high score indicated high resilience. The score of this scale is divided according to validated cut-off points in three parts as follow: low resilience (less than 50%) moderate resilience (50 to 75%), and high resilience (higher than75%).

Method:

An official permission was addressed from the dean of the faculty of nursing Tanta University to the manager of psychiatry, Neurology &Neurosurgery center, and El-Minshaw General hospital to gain cooperation for data collection.

Ethical consideration*:*

- The present study was revised and approved by the ethical committee of Faculty of Nursing, Tanta University .
- Informed consent was obtained from all participant after explaining the purpose of the study, methods of data collection and intervention.

- The participants were assured about the confidentiality of their information, and respecting their rights to withdraw at any time during period of data collection.

Actual study: the actual study consisted of four phases:

Preparation

Tool two and three translated to Arabic languages and tested for content validity by jury composed of five experts in the psychiatric nursing field; and modification was done accordingly. Then tested for reliability by using Cronbach's alpha test, and found that have excellent internal consistently (α= 0.948 and 0.922 respectively) . By using Google drive the tool created as an electronic tool by the researcher.

The researcher visited the study settings that mention previously and invited nurses to participate in the study, an informed consent and their phone numbers were obtained**.** A what's app groups were created by the researcher (from 6 to 10 nurses in each group), after that the study tools' link was sent to what's App groups and the researchers explained how to fill the study tool through click on this link. https://docs.google.com/forms/d/1qnf6XpBWCKxXiut3xmVhoPuRmtqrOPXZmd2J5_JT_k/edit

A pilot study was carried out on 10% of the study sample, they were selected randomly from the list of the nurses' phone numbers by simple random method (picking up their phone numbers from a pool), and these nurses were excluded later from the actual study, the pilot study was conducted to ensure the clarity and applicability of the study tools as well as find out any problems or obstacles during data collection.

Planning:

Based on the results of the study tools the needs of participants were determined and the content of the resilience intervention were prepared by the researchers after reviewing the recent related literature **(33-36)**

The participants were divided into small groups (6-10 for each group),each sub-group attended eight training sessions, three sessions per week with duration 60 to 90 min.

Through zoom cloud meetings the researchers arranged meetings schedules with the participants and send the user ID and password 10 minutes before the meeting time to implement the intervention.

Implementation:

The intervention sessions were conducted as a follow:

First session (introductory session) it includes getting familiar with the groups' members, recognized rules, frameworks of training sessions, Knowledge about stress, anxiety, its' manifestation, and its' impact on mental health, and discussed the stressors that faced nurses who caring patients with corona virus.

Second session: during this session the researchers explained meaning of resilience, characteristics resilience people, and role of resilience in maintain and promote mental health during adversity, followed by discussion within group. The researchers get the participant's feedback about the previous session and this process will be repeated in each session. .

Third session: through this session the researchers presented A-B-C model of resilience in adversity for psychologist Albert Ellis (1913-2007), that explained how negative thoughts effect on emotions and behaviors which leads to reduction in the individual's ability to cope with adversity or life stressors. The researchers discussed within the groups the best methods to overcome negative thoughts that associated with COVID- 19 pandemic, this discussion followed by a training exercise about the common life stressors that already experienced by group members in their life, through discussion, reaction, and interaction between members, they reached to a suitable rational interpretation of those stimulated life stressors didn't seeing stressors as insurmountable problems .

Fourth session focused in improve nurses' self-confidence especially when facing stressful situations or adversity. This was done thorough given opportunities for nurses' self-awareness and discover their strengths or abilities and used it in accomplishment of their life roles, as consequences they acquired a positive view of self. The participants answered questions and applied exercises to discovered more about themselves, and perform homework as training to improve their self-awareness and build self-confidence. Whereby, strengths and vulnerabilities are the basic for understanding one's capabilities that using in dealing with adversity.

In Fifth session, the researcher explored the importance of social support at time of adversity or major life stressor**.** They discussed a characteristics of effective helper and its' impact on his/her mental health, and discussed within the group why some people found difficulties to ask help when needed, followed by discussion, application some exercises to learn them asking help from suitable people to receive adequate support especially at time of emergency.

Sixth session explored for the participants that a sense of purpose and meaning of life act as bedrock for coping, healing, and renewal after adversity**.** The participants encouraged to answered the questions related to criteria of effective life goals, and why some people put goals and can't reached, through discussion and gave examples from life situations each members of the group determined his/her main life goals that motivated them and simulated power to continuing facing life challenges or obstacles.

In the seventh session the nurses learnt problems solving skills and appropriate decision making. These skills involved be open minded, flexible and broad perspective of thinking, optimistic based on realistic positive attitude, learning from past experiences such as having overcome previous adversities or major life stressors, and develop creativity in solving problems and dealing with unpredictable situations. These skills acquired through training exercises, answerable questions that improve self- exploring, and disclosure within the group to discover strength and weakness points in dealing with life problems and stressful situations.

Last session centralized on the best stress management techniques that nurses used to relieve pressure or stress, such as "deep breathing exercises, physical meditation, taking care of self are including diet, sleep exercises, self-smoothing activities, give sense of humor. Through discussion the researcher and group members exchanged information, and recognized the more suitable ways that may be utilized. Moreover, the researchers focused on spirituality and its' impact on mental health especially during the outbreak and adversity. At the end of this session the researchers summarized the main content of the previous training session and receive feedback from participants.

***Evaluation* :** the participants invited to fulfill the study tools two times; immediately post and after three months of resilience intervention by sending the previous study tools link to the participants.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS version 19 (Statistical Package for Social Studies) created by IBM, Illinois, Chicago, USA. For numerical values the range mean and standard deviations were calculated. The differences between mean values before and after intervention were used using student's paired (t). correlation between variables was calculated by Spearman's rank correlation. The level of significant was adopted at $p<0.05$.

Results

Table (1) presents the characteristics of studied nurses according to their socio-demographic data. In relation to age, the total subjects mean age was 29.50±5.65 years with 72.8 % being in the age group ranging from 20 to less than 30 years. As for sex, the majority of studied subjects (81.4%) were females. Concerning residence and marital status, around two thirds (64.3%, 65.7) living in rural areas and were married respectively. As regards the educational status, nearly half of the studied subjects (44.3 %) had Bachelor degree of nursing education. In relation to workplace, more than two thirds of them (68.6 %) worked at Psychiatry, Neurology &Neurosurgery center in Tanta university hospitals with a mean score 7.97±6.03 for years of experience in which 40% had years of experience ranged from five to less than ten years.

Table (2) displays the distribution of studied nurses according to their psychological problems before, immediately post, and after three months of the intervention. Regarding to distress subscale it can be observed that, the majority of studied subjects (87.1%) had severe distress before implementing the intervention and this percent reduced to 60.0% immediately after and **s**lightly increased to be 66.1% after three months. Concerning to depression, those who had severe depression before implementing of intervention constituted the vast majority of the subjects (91.4 %) but this percent decreased to (68.6 %) immediately after the intervention while, increased slightly to (79.0 %) after three months. Speaking of anxiety level, 80.0 % of subjects had severe anxiety before the intervention and reduced to 54.3 % immediately post and raised slightly to 58.1 % after three months. As such somatization subscale, about two thirds of subjects (65.8 %) suffered from severe somatization before the intervention however; this level was decreased to 28.6 % and 27.4 % immediately post and after three months respectively. Regarding the total score of psychological problems, it can be observed that, more than one half of the studied subjects (57.2 %) had severe level of psychological problems before implementing the intervention and this percent decreased to 0.0 % immediately post the intervention and also **9.7 %** after three months.

Table (3) presents the distribution of studied nurses according to their levels of resilience in before, immediately after and after three months of the intervention. The table illustrates that, 42.9 % of the studied subjects had low resilience before implementing the intervention, but immediately after the intervention those

who had high level of resilience amounted to 35.7 % of subjects. However, this level of high resilience slightly decreased to 22.6 % after three months of the intervention

Table (4) illustrates the comparison between psychological problems among the studied nurses in before, immediately post, and after three months of intervention. The table shows that, the mean score of total psychological problems decreased significantly after implementing the intervention. In this respect, the mean score was 47.40±15.90 before conducting training intervention, and decreased to 31.86±11.82 immediately after the intervention (P1= 0.001*). However, it increased to 34.99±12.60 after three months but still has statistical significant difference than level before intervention (P2= 0.001*).In relation to types of psychological problems , the first one of them was distress was 54.40±16.93 before the intervention and reduced to 35.16±14.28 immediately after the intervention with a statistical significant difference (P1= 0.001*) while, the mean score became 39.92±14.31 after three months but also still has statistical significant difference (P2= 0.001*). As for depression, the mean score was 50.12±22.01 and decreased to 31.78±16.32 immediately after the intervention with a statistical significant difference (P1= 0.001*) but the mean score became 37.77±18.32 after three months with statistical significant difference (P2= 0.001*). Concerning to anxiety, it was 45.12±19.35 before and reduced to 30.48±15.36 immediately post with statistically significant difference (P1= 0.001*) nevertheless, the mean score slightly raised to 32.59±17.05 after three months but still has statistical significant difference (P2= 0.001*). The last one was somatization, it was noted that the mean score changed significantly (P= 0.001*) from before, immediately post and after three months (39.95±18.16, 30.02±12.07, and 29.66±11.32 respectively).

Table (5) shows the comparison between studied nurses' resilience mean score before, immediate and after three months of the intervention. It was noted that, the mean score of nurses' resilience was increased significantly immediately after the intervention 73.29±12.36 than the level before intervention 53.09±13.68 (P1= 0.001*)while after three months, the resilience mean score decreased **slightly** to 70.74±12.48 but still highly statistical significant difference than level before intervention.

Table (6) presents the correlation between resilience and psychological problems post intervention. From this table it can be observed that, there are statistical significant negative correlations between resilience and total score of psychological problems as well as all its subscales namely distress, depression, anxiety, and somatization. (r= -0.316, -0.285, -0.275, -0.328, -0.325 respectively).

Table (1): Characteristics of studied nurses according to their socio-demographic data

Socio-demographic data	Number (n=70)	%
Age in years:		
20-	51	72.8
30-	13	18.6
40-	6	8.6
Range	22-47	
Mean ± SD	29.50±5.65	
Sex:		
Males	13	18.6
Females	57	81.4
Residence:		
Rural	45	64.3
Urban	25	35.7
Marital status:		
Single	20	28.6
Married	46	65.7
Divorced	4	5.7
Education:		
Nursing school	3	4.3
Technical institute of nursing	21	30.0
Bachelor	31	44.3
Post graduate	15	21.4
Workplace:		
Al- Menshawy hospital	22	31.4
Psychiatry, Neurology &Neurosurgery center	48	68.6
Years of experience:		
<5	23	32.9
5-	28	40.0
≥10	19	27.1
Range	2-25	
Mean ±SD	7.97±6.03	

Table (2) : Distribution of studied nurses regarding to their psychological problems before, immediate, and after three months of intervention

Psychological problems	Mild		Moderate		Severe	
	No.	%	No.	%	No.	%
Distress						
Before (n=70)	0	0.0	9	12.9	61	87.1
Immediately after (n=70)	4	5.7	24	34.3	42	60.0
After three months (n=62)	4	6.5	17	27.4	41	66.1
Depression						
Before (n=70)	4	5.7	2	2.9	64	91.4
Immediately after (n=70)	11	15.7	11	15.7	48	68.6
After three months (n=62)	9	14.5	4	6.5	49	79.0
Anxiety						
Before (n=70)	3	4.3	11	15.7	56	80.0
Immediately after (n=70)	15	21.4	17	24.3	38	54.3
After three months (n=62)	12	19.4	14	22.6	36	58.1
Somatization						
Before (n=70)	5	7.1	19	27.1	46	65.8
Immediately after (n=70)	6	8.6	44	92.9	20	28.6
After three months (n=62)	5	8.1	40	64.5	17	27.4
Total score of psychological problems						
Before (n=70)	25	35.7	5	7.1	40	57.2
Immediately after (n=70)	63	90.0	0	0.0	7	10.0
After three months (n=62)	56	90.3	0	0.0	6	9.7

Table (3): Distribution of studied nurses regarding to their levels of resilience before immediate and after three months of the intervention

Resilience	Low		Moderate		High	
	No.	%	No	%	No.	%
Before (n=70)	30	42.9	32	45.7	8	11.4
Immediately after (n=70)	4	5.7	41	58.6	25	35.7
After three months (n=62)	4	6.5	44	71.0	14	22.6

Table (4): Comparison between psychological problems among the studied nurses before, immediately post , and after three months of intervention

Psychological problems	Range	Mean ± SD	t	p
distress				
Before (n=70)	20-92	54.40±16.93		
Immediately after (n=70)	6-67	35.16±14.28	21.415	P^1= 0.001*
After three months (n=62)	12-75	39.92±14.31	18.549	P^2= 0.001*
Depression				
Before (n=70)	8-100	50.12±22.01		
Immediately after (n=70)	0-67	31.78±16.32	13.273	P^1= 0.001*
After three months (n=62)	4-79	37.77±18.32	9.071	P^2= 0.001*
Anxiety				
Before (n=70)	12-90	45.12±19.35		
Immediately after (n=70)	8-71	30.48±15.36	11.960	P^1= 0.001*
After three months (n=62)	6-77	32.59±17.05	11.945	P^2= 0.001*
Somatization				
Before (n=70)	9-89	39.95±18.16		
Immediately after (n=70)	9-89	30.02±12.07	10.041	P^1= 0.001*
After three months (n=62)	12-64	29.66±11.32	9.885	P^2= 0.001*
Total score psychological problems				
Before (n=70)	18-79	47.40±15.90		
Immediately after (n=70)	11-58	31.86±11.82	19.352	P^1= 0.001*
After three months (n=62)	13-63	34.99±12.60	17.815	P^2= 0.001*

(t) Student's paired test.

(p^1) Comparison between before and immediate post intervention.

(p^2) Comparison between before and after three months of intervention.

***** Statistically significant at ≥0.05.

Table (5): Comparison between studied nurses' resilience before, immediate and after three months throughout the phases of intervention

Resilience	Range	Mean ±SD	t	p
Before (n=70)	33-85	53.09±13.68		
immediate(n=70)	35-93	73.29±12.36	t=15.613	P^1-= 0.001*
After three months (n=62)	36-94	70.74±12.48	t=14.471	P^2= 0.001*

(t) Student's paired test.

(p^1) Comparison between before and immediate post intervention.

(p^2) Comparison between before and after three months of intervention.

*Statistically significant at ≥0.05.

Table (6) Correlation between resilience and psychological problems post intervention

Psychological problems	Resilience	
	rho	p
Distress	-0.285	0.017*
Depression	-0.275	0.043*
Anxiety	0.328	0.006*
Somatization	-0.325	0.010*
Total score of psychological problems	-0.316	0.012*

*Statistically significant at ≥0.05

Discussion

Supporting the psychological wellbeing and resilience of frontline healthcare workers is imperative to ensure global recovery from the COVID-19 pandemic. Mental health resources and education should be provided to health care providers who are experiencing traumatizing work conditions and unparalleled stress levels. While action to maintain the psychological and emotional health of them needs to start now, these health care providers will need long-term intervention to fully recover from this experience [(5)] .Resilience may reduce the probability of psychological disorders, such as anxiety, depression, and post-traumatic stress disorder (PTSD) . Therefore, the aim of this study was to evaluate effect of resilience intervention on nurses' resilience &psychological problems during the COVID-19 pandemic.

The present study revealed that more than half of the studied nurses have severe level of psychological problems. The depression come the most common problem experienced by majority of the participants, followed distress feeling, and anxiety. Whereby, the somatization symptoms comes the last in its frequency and the nearly half of nurses have lowered level of resilience in facing coronavirus pandemic.. This result may be due to high rate spread of infection of corona virus, a lot of fears and concerns about the possibilities of being infected or infecting their family members, have inadequate information, feelings of loneliness, stigmatization, understaffing, lack of adequate resources either human or financial, and uncertainty about current situation. Along the same line, studies by ***Desclaux et al., (2017)*** and ***Jeong et al., (2016)*** found that health care workers had fears about their own health or fears of being infected and become particularly worried if they experienced any physical symptoms potentially related to the infection [(37,38)].

Recently ***Brooks et al., 2020***, indicated that the possible stress-related reactions among nursing staff in response to the corona virus pandemic may include difficulties in concentration, reduced productivity, irritability, anxiety, somatization, depression ,sleep disorders, and interpersonal problems [(39)]. This consisted with ***Liu et al., (2020)*** [(٧)] stated that the frontline healthcare providers who are caring for patients with COVID-19 have a greatest risks of mental health problems, such as anxiety, depression, insomnia, and stress, and agreement with the previous study by ***Bai et al., (2004)*** stated that nursing staff were particularly more liable to exhaustion, detachment from others, anxiety when dealing with

patients, irritability, insomnia, poor concentration, and deteriorating work performance [40].

All the above mentioned along with the seriousness of the situation make the nurses feel the critical need for support and assistance from others during this period of pandemic state. So, this difficult situation calls the present study to implemented resilience intervention in order to decrease nurses' psychological distress, and improved their resilience during time of corona pandemic, and coping effectively with this stressful situation. Completing the picture of nurses' imperative need for training intervention, it appears also through the nurses' reaction during the implementation of the intervention in our study. They were interested, motivated, enjoyed with the intervention content, and make reflective statements about the importance of sessions' topics and their vital needs for it during this specific time of pandemic. Their interest also appears through providing positive feedback and positive feelings toward different sessions of the intervention. Needless to say that all of these may be part of the negative effects of corona virus pandemic on psychological status of nurses reflecting their insistent needs for similar program to help them in better coping and living their life effectively.

The results of the present study also demonstrated a positive impact of the intervention in building and increasing resilience as well as relieving or alleviating total psychological distress with all its four subscales (namely distress, depression, anxiety and somatization) among nurses who participated in our study. This was observed in the results, there was a statistical significant negative correlation between resilience and psychological distress subscales and total score after the intervention. By other words, the research hypothesis was confirmed. Similarly ***Ziaian et al (2012)*** [41] indicated that higher levels of resilience are associated with lesser depressive symptomatology . This result also is consistent with ***Miller and Chandler, 2002*** [42] ***; Nrugham et al., 2010; Wells et al., 2012; Poole et al., 2017;*** and ***Shapero et al., 2019*** [14-17]**.** The findings of the present study is explained by content of resilience intervention that have been provided to nurses encompassed variety of necessary skills that help in effective coping with stressors like; how to overcome negative thoughts, how to improve self-confidence and how to seek social support from others. Other skills that are taught during

intervention are the importance of setting goals in life, how to cope with challenges and difficulties, stress management techniques, and the effect of smiling on individual's mental health.

Furthermore, during intervention of the present study there are many different examples from real life were given to the studied nurses and reflective questions were provided to help nurses to be self-aware about their own reactions, way of thinking and coping strategies they are using at a time of stress. This method of self- introspection help nurses to know their defects and weak points and try to overcome it and learn how to deal with crisis situations with different adaptive manner. In this context, a study by ***Jackson et al., (2007)*** mentioned that resilience construction strategies such as seeking supportive relationships, achieving life balance, enhancing spirituality, positive emotions and putting realistic goals were proved to have protective factors that can help individuals to improve their mental health [(43)].

Another possible explanation for the improvement resilience in general and improving anxiety, depression , distress, and somatization in specific in our participants in the study could be the effect of some cognitive behavioral techniques that applied during sessions of the training program. In this respect, the participants were helped to evaluate their own view about stressful situations and examine factors that lead to their anxiety and depression and learn how to deal with these barriers. This process increases nurses' self-esteem and confidence in facing these situations without anxiety. This is consistent with the cognitive-evaluative model which views the source of anxiety as being in the individuals' cognitive appraisal of their performance and in the expectation of aversive consequences, not in their performance itself. This faulty in appraisal can be the result of unrealistic misperceptions regarding performance, negative self-evaluation or insufficient self-reinforcement [(44)]. On the same line, ***Charney DS (2004)*** stated that cognitive restructuring is one important psychological characteristics of resilience that can be learned [(45)].

It is important to mention that, the researchers in the present study divided participants into small groups to facilitate group discussion and expression of feelings, exchange of experiences, enrich session with valuable and interesting atmosphere, and provide enough time for participants to benefit from learned skills. Moreover, using group strategies and group activities during sessions serve as a

stimulus for interaction between participants for conversation and reducing their anxiety. This may be another factor for explanation of study results. Along the same line, the results of previous studies by ***Rohan et al., (2009)*** and ***Zander et al., (2010)*** [46,47] they suggested that team support can enhance coping skills in times of stress and can help relieving emotional burden in a stressful environment. Furthermore, Findings by ***Edward (2005)*** also suggest that a supportive team improve individual resilience [48].

The results of the present study go in accordance with the results reported by ***Chesak et al (2015)*** **they** analyze the effect of a resilience education program carried **on** nurses' stress, awareness, anxiety and their resilience. They found that, stress and anxiety scores reduced, and awareness resilience scores increased in the experimental group [35]. Similarly a study by ***Jafarizadeh et al (2019)*** [33] titled " Effect of resilience-based intervention on occupational stress among nurses". **They** found that there is a significant difference in the amount of occupational stress and resilience in the two periods before and after the resilience training within the group. Moreover, the study with ***Warelow et al (2007***) under title'' Caring as a resilient practice in mental health nursing'' stated that nurses in the 21st Century should enhance their resilience skills in order to cope with their professional problems and improve their mental health, the resilient behaviors potentially help people to overcome negative experiences and turn it into positive experiences [34]. This comes in agreement with the results of ***Kutluturkan et al 2016*** [49]***, McAllister et al 2009*** [50] and ***Shakernia et al 2009*** [51], and contrasted with, the result of ***Mealer et al (2014)*** who reported that the resilience program that implemented in their study was feasible and acceptable, but their subjects had insufficient power to improve resilience and alleviated their psychological problems [36].

Finally, although there are improvements in resilience level and lowering in psychological stress total and subscales immediately after the intervention, this improvement was decreased after three months from intervention but still there is a significant difference than level before. This result was anticipated because of continuity of pandemic state with all its negative consequences and depletion of staff nurses' resources to deal effectively and maintain their level of psychological equilibrium. This in turn may necessitate the continuity of providing support and assistance as well as conducting a lot of training program directed to nurses who

occupy this stressful career and work under this intolerable situation.

Limitation of the study:

The study sample wasn't selected randomly because the participants should have a commitment to work with researchers for certain periods of time which wasn't possible for all nurses and our resilience intervention implemented through Zoom Meetings and this technology didn't available for some nurses. Therefor the study sample selected by convenience method.

Acknowledgment: Thankful to all nurses who participated in the study.

Conflict of interest: No

Conclusion

Based on the results of the present study, it can be concluded that resilience intervention that implemented on nurses who are caring for patients infected with coronavirus improved their resilience and reducing their levels of psychological problems.

Recommendations: The following recommendations were suggested:

- Continuous training intervention that targeting and enhancing resilience should be planned and implemented to alleviate psychological distress and improve psychological wellbeing among frontline nurses who are caring with patients infected with corona virus.
- Nurses deserve special attention. So, their mental health should be continuously monitored, and professional psychological counseling and crisis interventions should be provided.
- Emotional support should be made in a variety of ways such as; using telemedicine, video chats, or online forums through volunteers' psychologists and psychiatrists to provide mental health services for nurses.
- Emphasis should be placed on developing individualized health care plans for nurses who suffer from psychological breakdown (as anxiety, distress and depression) to assist them to overcome these problems early and return to their wellbeing.
- Resilience training need to be incorporated into nursing education and within health care policies to help create healthier workplace climate, reduce ineffective coping with stressors due to poor mental health and well-being.

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