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Effect of early rehabilitation on shoulder pain and disability after modified radical mastectomy

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Abstract

Background: Modified radical mastectomy (MRM) is a common surgical procedure used for breast cancer management. MRM often has a negative impact on shoulder function So, early rehabilitation play a critical role in managing shoulder dysfunction.

Aim of the study: Determine the effect of early rehabilitation on pain and disability of the shoulder after modified radical mastectomy.

Patients and method: A quasi-experimental research design was utilized in this study. It was conducted in the general surgery wards, oncology and general surgery out patient clinics at Assiut University Hospital and South Egypt Cancer Institute. A convenient sample of sixty adult female patients scheduled to undergo MRM, their ages ranged from 20 to 65 years. They were divided into 2 equal groups; the first was the control group which comprised 30 patients and exposed to routine hospital care only, the second was the study group and included 30 patients and they received early rehabilitation.

Tool: Knowledge assessment questionnaire, Observation checklist, and Shoulder pain and disability questionnaire.

Results: There was statistical significant difference between study and control group regarding pain and disability in the shoulder after MRM before discharge and after 3 months from application of early rehabilitation.

Conclusion: Teaching and applying early rehabilitation significantly improved the shoulder condition of patients in the study group regarding pain and disability of the shoulder.

Recommendations: Nurses working in the general surgery department must apply early rehabilitation in care and follow-up protocols of patients undergoing MRM and use the validated shoulder pain and disability questionnaire.

Keywords: Disability, early rehabilitation, modified radical mastectomy, shoulder pain

Introduction

Breast cancer is one of the most common malignant tumors in women, and is the second leading cause of cancer-related death among women worldwide (Ghoncheh, 2016) [17]. There are about 1.38 million new cases and 458,000 deaths from breast cancer each year (Katkuri and Gorantla, 2018) [25]. In Egypt, breast cancer is the most common cancer among women, representing 18.9% of total cancer cases (35.1% in women and 2.2% in men) (Hasan *et al*., 2014) [19]. Surgery is considered the primary treatment for breast cancer. Modified radical mastectomy involves removing the entire breast tissue and most of axillary lymph nodes which may be called an axillary lymph node dissection (ALND). About 30% of patients develop shoulder-arm morbidity postoperatively. Axillary seroma is the most common immediate complication. Pain, numbness, impairment of mobility and strength, lymphedema, and frozen shoulder are the major long-term shoulder-arm problems (Xin *et al*., 2017) [43].

ALND is a well-known cause of different kinds of sequeale. Lymphedema, reduced mobility of the shoulder and altered sensation, like numbness, tingling and par- esthesia ALND is a well-known cause of different kinds of sequeale. Lymphedema, reduced mobility of the shoulder and altered sensation, like numbness, tingling and par-es the Shoulder pain is one of the most common musculoskeletal problem in post mastectomy patients. About 17–60% of post mastectomy patients suffer from shoulder pain (McNeely *et al*., 2010) [3]. They are prone to develop shoulder pain due to connective tissue fibrosis of shoulder joint and the residual effects of surgical scarring following mastectomy. The main reason behind connective tissue fbrosis is restricted shoulder joint mobility after mastectomy. Patients with shoulder pain experienced difficulty in dressing, personal hygiene and overhead activities. Decrease range of motion worse the condition and in most cases they are dependent on others for simple activities of daily living (Barnes *et al*., 2016) [6].

Shoulder stiffness and pain can cause considerable physical disability and psychological disturbance. The pathogenesis of these complications is uncertain, but extreme abduction,

arm position, nerve and tissue lesions, seroma formation, and prolonged postoperative immobilization of the shoulder remain the main causes. Presence of shoulder dysfunction in breast cancer patients has been found to be associated with lower physical activity, increased body mass index and poorer health-related quality of life (Skalsky and McDonald, 2012) [38].

Rehabilitation is a "problem-solving" educational process which focuses on managing disability, reducing sequelae and symptoms, and enhancing participation and societal reintegration, to achieve the highest possible independence and the best quality of life (QoL) (Amatya *et al*., 2017) [2]. Rehabilitation interventions should be considered early for maintaining functional capacity and reducing the risk of losing important abilities or independence In rehabilitation intervention, the following components stand out: educational activities, Physical activity, physiotherapy, complementry therapy, psychotherapy, and nutritional support (de Sousa *et al*., 2019) [11].

Nurses play an important role in improving shoulder functions and restoring the full range of motion of shoulder and arm after modified radical mastectomy by giving certain directions and instructions regarding postoperative exercises and protective care measures to prevent shoulder dysfunction. Nurses also assesse the patients' needs, making appropriate nursing diagnosis and initiate plans of care (Bahgat *et al*., 2016) [5].

Significance of the study
Breast cancer is one of the most common malignant tumors in women, and is the second leading cause of death among women (Ghoncheh, 2016) [17].

In Egypt, the highest incidence rates for cancer among females were the breast cancer (32.0%). It has been estimated that by 2050, the incidence of cancer will be 3-fold than in 2013 (Ibrahim *et al*., 2014) [23]. According to Assiut university hospital records from (2017 to 2018), three hundreds breast cancer patients were admitted to the general surgery department, and modified radical mastectomy was the first treatment of decision for them. Pain and disability in the shoulder were recognized as distressing side effects of surgery, and they have impact on patients life. Therefore, the management of these side effects represents a great challenge for nurse. Early rehabilitation includes measures which are inexpensive, available, self-induced by patient, easy to learn and free from side effects. so, this study was conducted to assess the effect of early rehabilitation on shoulder pain and disability after modified radical mastectomy.

Aim of the study
Evaluate the effect of early rehabilitation on pain and disability of the shoulder after modified radical mastectomy.

Research Hypothesis
Shoulder pain and disability among study subjects who will apply early rehabilitation will be lesser than those in the control group.

Patients and Method
Research design
A quasi-experimental research design (study and control group) was utilized in this study.

The setting of the study
The study was conducted in the general surgery wards, and follow up was carried out in the oncology and general surgery outpatient clinic at Assiut University Hospital and South Egypt Cancer Institute.

Study sample
A convenient sample of sixty adult female patients, their ages ranged from 20 to 65 years old scheduled to undergo modified radical mastectomy was included in the study from the time of admission Pre-operatively in the different general surgery wards, and a follow-up period of three months (pre discharge and 3 months postoperatively). Patients were randomly assigned into two equal groups (study and control), 30 patients for each. The study group was received early rehabilitation and routine hospital care while the control group was received the routine hospital care only.

Exclusion criteria
Patients under 20 years or older than 65 years old, those patients with orthopedic or rheumatic conditions of shoulder, patients who are uncooperative or refuse to participate in the study.

Sample size
The sample size was determined statistically by power analysis equation. The calculation was done considering the following: Type I error with significant level (α) = 0.5, Type II error by power test (1-B) = 80% and found the minimum sample size was 26 patients for each group. Although the minimum number of 52 patients was required by the power analysis equation, the researcher had obtained 60 patients in this study because the non-response rate was expected to be lost from the subjects.

Tools of data collection
Based on the recent and scientific researches, data was collected by the following three tools:

Tool I: Knowledge assessment questionnaire: This tool was developed by the researcher based on current national and international literature review to assess socio-demographic data, patient's medical data, patient's knowledge. It consisted of three parts:

Part (1): Patient's demographic characteristics; included age, marital status, occupation, level of education and residence.

Part (2): patient's medical history: It included items to assess present and past health history.

Part (3): Assessment of patient's knowledge. This part was used to elicit knowledge of patients regarding the following; basic information about modified radical mastectomy, postoperative and home exercises, nutrition, ways to minimize postoperative pain, anxiety, stress, wound care and follow up schedule.

It was composed of 30 questions. Two scores was given for each correct answer, one for the incorrect answer and zero for no answer. For each area of knowledge, the scores of the

items were summed up and the total score divided by the number of the items. These scores were converted into a percent score. The total knowledge was considered satisfactory when the percent score was 60% or more, and unsatisfactory if it was less than 60%.

Tool II: Observation checklist: It was developed by the researcher to assess patient's practice for the following; deep breathing exercises, progressive muscle relaxation exercise, and postoperative arm exercises, breast self-examination and wound care. The pactice was classified into correcty, incorrectly and not done. Two marks were given for performing the step correctly, 1 mark for incorrectly step and zero when the patient didn't perform it at all. The points were summed up and converted into a percentage. A total score of 60% or higher was considered adequate practice and it was considered inadequate practice when total score is less than 60%.

Tool V: Shoulder Pain and Disability Index (SPADI)
Shoulder Pain and Disability Index (Roach *et al.*, 1991) [35] is the only reliable and valid region-specific measure for the shoulder. It is a self-administered questionnaire that consists of two dimensions, one for pain and the other for functional activities. The pain dimension consists of five questions regarding the severity of an individual's pain (Worst pain, when lying on the involved side, reaching something on a high shelf, touching the back of the neck, pushing with the involved arm). Each question was given an identified score ranging from 0 to 10 and the final scores were interpreted as the following: 0: no pain, 1-3: mild pain, 4-6: moderate pain, 7-9: severe pain and 10 means the worst pain.). Functional activities are assessed with eight questions designed to measure the degree of difficulty an individual has with various activities of daily living that require upper extremity use (Washing hair, washing back, putting on an undershirt or jumper, putting on a shirt that buttons down the front, putting on pants, placing an object on a high shelf, carrying a heavy object of 10 pounds (4.5 kilograms), removing something from back pocket) Each question was given an identified score ranging from 0 to 10 and the final scores were interpreted as the following: 0: no disability, 1-3: mild disability, 4-6: moderate disability, 7-9: severe disability and 10 means the worst disability).

The early rehabilitation for females after modified radical mastectomy
It was prepared in a simple Arabic language and illustrated photos which given in the form of a booklet included the following four parts; first part was simple explanation on breast cancer, mastectomy operation (definition, indications, types, and complications) & (definition & causes of shoulder pain and disability). The second part was rehabilitation exercises that were classified by time as follows: 1st week; arm lifts, pump elbow up, shoulder shrugs and circles, and Shoulder blade squeeze. After drain removal; wand exercise, elbow winging, shoulder range of motion, Wall hand climbing, rope turning, rod lifting. Before discharge, instructions included teaching patients about weight-bearing exercises. The third part included general recommendations on pain management, sleeping, nutrition, and ways to decrease anxiety as a relaxation

technique, progressive muscle relaxation exercise and how to adapt to body image. The fourth part included discharge instructions on wound care, signs of infection, breast self-examination and follow up visits.

Tools validity and reliability
Data collection tools were submitted to a group of five experts in medical-surgical nursing and general surgery at Assiut University to test the tools content validity. Some modifications were done according to the experts' judgment on the clarity of sentences, appropriateness of content and sequence of items.
The reliability of the tools was statistically tested using Cronbach's coefficient alpha test. The tools proved to be internally reliable, with a Cronbach's coefficient alpha test of 0.968. A pilot study was conducted on 10% (6) patients to evaluate the applicability and clarity of the tools, estimate the time needed for data collection, and test the feasibility of conducting the research. After analyzing the pilot study results, a slight modification was done accordingly. Those patients were excluded from the study subjects.

Ethical considerations
The study was affirmed by the faculty ethics committee. The study followed common ethical principles in clinical research. Oral consent was obtained from every patient to participate in the study. The study maneuvers didn't entail any risk to patients. the participants have the right to withdraw at any time. Confidentiality and anonymity of the subjects were assured. Privacy of patients was considered during data collection.

Methods
- Official endorsement and administration permission were adopted from the head of the general surgery department and outpatient surgery clinic at Assiut University Hospital and South Egypt Cancer Institute.
- Baseline data were collected from females and their current medical records in both control and study groups before operation by using study tools I, II, III. To avoid transmission of the intervention to the control group, data were collected first from the control group over seven months. After reaching 30 patients for the control group, data from the study group started (It took 6 months to complete).
- Early rehabilitation printed in an Arabic educational booklet contained diagrams and colored pictures. It was developed by the researcher based on determined needs, baseline measures, relevant literatures and researches. It is completed and revised within 4 months.
- The researcher met the patients after collecting the baseline data, then schedule the educational sessions (4 sessions) 45 minutes to one hour for each. All session were done preoperatively after filling all tools and then the researcher visited patient of study group daily to encourage and observe him for understanding and applying early rehabilitation.

The first session contained teaching patients about modified radical mastectomy (definition, types, indication, and complications).
The second session contained training on the basic

postoperative exercises (deep breathing, progressive muscle relaxation exercise and exercises performed from the first to seven days postoperatively). The third session included clarification on the exercises which would perform after the drain and suture removal.Fourth session included instructions for wound care, nutrition, sleeping, measures to prevent or control lymphedema, and breast self-examination. The researcher used powerpoint presentation with clear information and the booklet was provided for the patients in study group as guidance.

The study and control groups were evaluated with the study tools (I, II, III). This evaluation was performed 2 times (before discharge, and three months postoperatively). Most of the patients discharged from hospital one week after surgery. The researcher was visiting the outpatient clinics after arrangement with the patients through phone calls for follow up visit.

Statistical analysis

The data were tested for normality using the Anderson-Darling test and for homogeneity variances before further statistical analysis. Categorical variables were described by number and percent (N,%), where continuous variables described by the mean and standard deviation (Mean, SD). Chi-square test and Fisher exact test used to compare categorical variables where compare between continuous variables by t-test and ANOVA test. A two-tailed $p < 0.05$ was considered statistically significant. We are used a person correlation to appear in the association between scores. All analyses were performed with the IBM SPSS 23 software.

Results

Table 1: Comparison between the study and control groups as regard demographic variables (n= 60).

Demographic Variables	Study group n=30		Control group n=30		P. value
	N.	%	N.	%	
Age groups					
- 28 - <38 yrs.	4	13.3	5	16.7	
- 38 - <48 yrs.	6	20.0	9	30.0	
- 48 - <58 yrs.	17	56.7	14	46.7	0.75ns
- 58 - 65yrs.	3	10.0	**2**	.66	
Mean ±SD			48.77±9.1		
Marital status					
- Single	4	13.3	2	6.7	
- Married	16	53.3	16	53.3	
- Divorced	2	6.7	3	10.0	0.8ns
- Widowed	8	26.7	9	30.0	
Educational level					
- Un educated	24	80.0	20	66.7	0.2ns
- Educated	6	20.0	10	33.3	
Occupation					
- Not working	22	73.3	21	70.0	0.6ns
- Working	8	26.7	9	30.0	
Residence					
- Rural	19	63.3	23	76.7	0.2ns
- Urban	11	36.7	7	23.3	

n.s. = Not significant

Table 2: Comparison between the study and control groups regarding medical data (n = 60).

Medical data	Study group (n = 30)		Control Group (n = 30)		P. Value
	N.	%	N.	%	
Medical diagnosis					
- Right breast cancer	14	46.7	12	40.0	0.60 ns
- Left breast cancer	16	53.3	18	60.0	
Current complaint					
- A lump or mass	20	66.7	17	56.7	
- Breast or nipple pain	4	13.3	5	16.7	
- Recent nipple retraction	12	40.0	9	30.0	0.82 ns
- Nipple discharge	3	10.0	4	13.3	
- Skin irritation	6	20.0	2	6.7	
- Thickening of the breast skin	1	3.3	1	3.3	
Duration of illness					
- Less than 1 year	25	83.3	24	80.0	0.73 ns
- 1- 5 years	5	16.7	6	20.0	
Stages of breast cancer					
- Stage I	4	13.33	6	20.0	0.73 ns

- Stage II	21	70.0	19	63.3	
- Stage III	5	16.67	5	16.67	
Types of surgery					
- Modified radical mastectomy	24	80.0	22	73.3	0.77ns
- Conservative breast surgery	6	20.0	8	26.7	
Treatment modalities after surgery					
- Chemotherapy	24	80.0	22	73.3	0.5 ns
- Radiotherapy	6	20.0	8	26.7	
Family history of breast cancer					
A - Yes	15	50.0	17	56.7	
Mother	-11	- 73.33	-14	- 40.0	0.60 ns
Sister	- 4	- 26.67	- 3	- 6.7	
B - No	15	50.0	13	43.3	

n.s. = Not significant

Table 3: knowledge score levels for both study and control groups before rehabilitation, before discharge and 3 months post-operative (n=60).

Knowledge levels	Before rehabilitation				P. value	Before discharge				P. value	3 months Post- operative				P. value
	Study group (n = 30)		Control group (n = 30)			Study group (n = 30)		Control group (n = 30)			Study group (n = 30)		Control group (n = 30)		
	N	%	N	%	0.739 Ns	N	%	N	%	0.001**	N	%	N	%	0.001**
Satisfactory	5	16.7	6	20		27	90	7	23.3		26	86.7	7	23.3	
Unsatisfactory	25	83.3	24	80		3	10	23	76.7		4	13.3	23	76.7	

n.s. = Not significant
* *=statistically significant difference (*p*<0.01)

Table 4: Comparison between the study and control groups in relation to their mean practice score before rehabilitation, before discharge and 3 months post- post- operatively (n = 60).

Practice items	Before rehabilitation			Before discharge			3 months Post- operative		
	Control (n=30)	Study (n=30)	P. value	Control (n=30)	Study (n=30)	P. value	Control (n=30)	Study (n=30)	P. value
	Mean±SD	Mean±SD		Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Deep breathing exercise	2.4±3.08	1.2±2.14	0.085 ns	3.73±3.31	6.03±2.93	0.006**	0.43±0.5	5.93±3.22	<0.001**
Progressive muscle relaxation exercise	2.33±4.46	1.43±2.49	0.338 ns	2.8±4.92	8.8±3.97	<0.001**	0.4±0.5	9.33±4.34	<0.001**
Shoulder exercises: At 1st week	9.63±6.11	6.77±6.01	0.072 ns	10.43±6.81	16.8±6.85	0.001**	0.57±0.5	17.3±6.87	<0.001**
Shoulder exercises: after drain removal	25.2±13.37	22.37±14.4	0.433 ns	24.13±13.38	37.13±15.09	0.001**	2.2±1.27	38.97±15.84	<0.001**
Breast self-examination	5.93±6.18	4.1±4.89	0.208 ns	4.97±5.42	9.87±4.75	<0.001**	5.6±5.85	10.57±4.77	0.001**
wound care	2.23±3.57	0.77±1.83	0.056 ns	3.17±3.7	5.7±3.87	0.012*	3.47±3.89	6.53±4.34	0.006**

*=Statistically significant difference (*p*<0.05) **=statistically significant difference (*p*<0.01) n.s. = Not significant

Table 5: Comprison between the study and control group regarding their practice score levels before rehabilitation, before discharge and 3 months post- operatively (n = 60).

Practice levels	Before rehabilitation				P. value	Before discharge				P. value	3 months Post- operative				P. value
	Study group (n = 30)		Control group (n = 30)			Study group (n = 30)		Control group (n = 30)			Study group (n = 30)		Control group (n = 30)		
	N	%	N	%		N	%	N	%		N	%	N	%	
Adequate	0	0.0	3	10	0.119 ns	21	70	3	10	0.001**	23	77	5	17	0.001**
Inadequate	30	100	27	90		9	30	27	90		7	23	23	83	

n.s= Not significant * *=statistically significant difference (*p*<0.01)

Table 5: Comparison between the study and control groups as regard shoulder pain and disability before discharge and 3 months post-operatively (n = 60).

	Items of Shoulder pain and disability scale	Before discharge				P. Value	3 months post-operative				P. Value
		Study group (n = 30)		Control group (n = 30)			Study group (n = 30)		Control group (n = 30)		
		N.	%	N.	%		N.	%	N.	%	
	Pain										
1.	No pain	1	3.3	0	0.0	0.096 ns	22	73.3	10	33.3	0.009**
2.	Mild pain	20	66.7	18	60.0		6	20.0	10	33.3	
3.	Moderate pain	9	30.0	7	23.3		2	6.7	6	20.0	
4.	Severe pain	0	0.0	11	16.7		0	0.0	4	13.4	
	Disability										
1.	No disability	0	0.0	0	0.0	0.001**	23	10.0	0	0.0	0.001**
2.	Mild disability	8	26.7	3	10.0		3	76.7	4	13.3	

3.	Moderate disability	21	70.0	7	23.3		3	10.0	19	63.3
4.	Severe disability	1	3.3	20	66.7		1	3.3	7	23.3

n.s. = Not significant
* *=statistically significant difference (*p*<0.01)

Table 6: Correlation between patients' demographic data and total of shoulder pain and disability score before discharge and three months post- rehabilitation for the study group (n = 30).

Demographic variables	Total shoulder pain and disability score	
	R	p.value
Before discharge		
Age	0.565	0.001**
Marital status	0.312	0.093
Educational level	-0.438	0.015*
Occupation	-0.126	0.506
Residence	0.016	0.933
3 months post-rehabilitation		
Age	0.885	<0.001**
Marital status	0.055	0.774
Educational level	-0.415	0.023*
Occupation	-0.260	0.165
Residence	-0.009	0.963

*=Statistically significant difference (*p*<0.05)

Table 7: Correlation between total practice scores and total shoulder pain and disability score before discharge and three months post-rehabilitation for the study group (n = 30).

Shoulder pain and disability score	Total practice score	
	r	p. value
Before discharge	- 0.563	0.001**
3 months post-rehabilitation	- 0.667	<0.001**

* *=statistically significant difference (*p*<0.01)

Table (1): showed that; the age of the study and control groups ranged between 48-58 years old. the majority of patients in both groups were married (53%) were uneducated (80.0% and 66.7% respectively). Concerning patients' occupation more than two-thirds of patients were not working (73.3% and 70.0% respectively).

Table (2): showed that; the majority of patients in the study and control groups (53.3%, 60.0% respectively) had left breast cancer. About two-thirds of patients (66.7%) in the study group and more than half (56.7) in the control group were having breast lump or mass as a current complaint. Also, the highest percentage in both groups (83.3%, 80.0% respectively) and (70.0% and 63.3% respectively) their duration of illness were less than one year and had stage II breast cancer. Finally, (73.3%) of the study group and (40.0%) of the control group had a positive family history of breast cancer (mother).

Table (3): reported that; before the application of the early rehabilitation, the highest percentage of patients in the study and control group had an unsatisfactory level of knowledge (83.3% and 80% respectively). Also, A statistically significant difference was found between the study and control groups after application of early rehabilitation (before discharge as well as 3 months post-operative) with p. value =0.001**.

Table (4): It was apparent from this table that the study group had high significant mean practice scores as compared to the control group before discharge and this highly statistically significant difference continued 3 months post-operative.

Table (5): stated that, no significant difference was existed between the study and control groups before discharge regarding pain level. However, significance difference was found 3 months post-operatively between both groups with P. value = (0.009**). Also, a statistically significant difference was found between the study and control group as regard disability level before discharge and 3 months post-operatively with P.value = (0.001**, 0.001** respectively).

Table (6): presented that; there was a positive correlation between patient's age and total score of shoulder pain and disability index before discharge and 3 month post-rehabilitation. This means that younger patient had low pain and disability score than the older one, and vice versa. Also, there was a negative correlation between patients education and total score of shoulder pain and disability index before discharge as well as 3 months post-rehabilitation.

Table (7): showed that; there was a negative correlation between patient's total practise scores and total shoulder pain and disability score before discharge and 3 months post-rehabilitation. This means that increased of practice would be associated with low scores of shoulder pain and disability index.

Discussion
Breast cancer is the most common type of malignancy among women worldwide (Manoochehri, 2018) [29]. Mastectomy is a standard treatment option for breast cancer (Magtanong *et al*., 2018) [27]. Breast cancer and its treatment result in physical and psychological problems. So, it is the responsibility of the nurse to identify the breast cancer patient's needs, make an appropriate nursing diagnosis and initiate plans for care (Taha *et al*., 2013) [40]. In this respect, the main concern of the present study was to evaluate effect of early rehabilitation on shoulder pain and disability after modified radical mastectomy.

From the Demographic characteristics of the studied sample, the present study revealed that the mean age of the study and control groups was 48.77±9.1 years. This result finding was in the same line with (Salehi *et al*., 2017) [36] who mentioned that the mean age at the time of diagnosis

was 48.8 ±12.01. Also, (Nessa *et al.*, 2018) [33] reported that the highest percentage of studied women was above 40 years. This finding may be justified that aging process is one of the most important risk factors of breast cancer because of the longer life expectancy, changes in reproductive patterns in women over 40 years, menopausal hormonal use, rising prevalence of obesity, and genetic damage (mutations) in the body at this age.

As regard educational level: The current study revealed that most of the study and control groups were uneducated. This finding was supported by (Sayed *et al.*, 2017) [37] who pointed out; the highest percentage of the studied groups were illiterates. This can be interpreted by the educated women can get more information sources about their condition through the internet or media than illiterate women. Also, educational level can highly affect patients' perception of the tumor, thus influencing the level of early detection, diagnosis, and treatment. This finding contradicts (Ahmed and Dawood, 2017) [11] who found that two-thirds of the studied sample were secondary educated. Also, it was disagreed with (Beiki *et al.*, 2012) [7] who displayed that women with the highest educational level had a significantly higher incidence of breast cancer compared to those with lower education. In addition, women account for 69% of the total number of illiterate people in Egypt and all samples of the study were women.

Regarding the marital status and occupation: the present study clarified that more than half of patients in both groups were married and housewives, this could be attributed to their exposure to household insecticides and detergents that increase breast cancer risk. This result was similar to (Hoffmann, 2018) [22] who mentioned that, the majority of the women in both groups were married, and most of them were housewives. This finding was in disagreement with the result by (Soliman *et al.*, 2018) [39] who revealed that the majority of the study group was widowed and near half of the study group had administrative work. Also, this finding contradicted (Hayes *et al.*, 2012) [21] who explained that unmarried and nulliparous had an increased risk for developing breast cancer due to estrogen hormones.

Moreover: the current study indicated that the highest percentages of the study and control groups were living in rural areas. This result finding congruent with (Gabr, 2014) [15], who noted that the majority of women with breast cancer came from rural areas. In contrast to this (Wrońska, 2013) [42], who documented that the highest percentage of the included sample were from urban areas and explained by the fact that the women in urban area are prone to use plastic and electrical appliances, cosmetics, high-fat diet, and processed meat, low fruits, vitamins, and vegetables.

The present study showed that a new breast lump and recent nipple retraction were found to predominant complaint among breast cancer patients. This finding was in accordance with (Wachira *et al.*, 2017) [41] who mentioned that the majority of the studied sample more likely to report having felt breast lump.

Concerning the stage of breast cancer: The study's findings showed that more than half of both control and study groups were diagnosed with breast cancer at stage II.

This result was in harmony with (Musarezaie and Zargham-Boroujeni, 2015) [32] who emphasized that a higher percentage of women with breast cancer diagnosed at the second stage. This result could be due to that the majority of the sample were illiterates and were not aware of breast self-examination for early detection of cancer at the first stage. Another contradicting point of view is that most of the sample were married and were not embarrassed to seek medical advice and examination and take support from their husbands, thus the disease was discovered at stage II.

Regarding family history; the current study displayed that most of both study and control groups had a positive family history. This means that specific genetic abnormalities that contribute to the development of breast cancer have been inherited (passed from parent to child). This finding was agreeing with the findings of (Hagrass *et al.*, 2012) [18], who reported that a higher percentage of studied patients had positive family history especially first relative degree related to genetic factors. However, (Hawash, 2018) [20] contradicted this study and discovered that the highest percentage of their patients had a negative family history.

Concerning the patients' knowledge: the present study revealed that, the majority of patients in the study and control groups had an unsatisfactory level of knowledge before the application of the early rehabilitation. From the opinion of the researcher, the level of knowledge was insufficient due to inavailability of training programs, lacking continuous educations and most health care personnels did not routinely counsel women or providing them with written information about mastectomy and self-care practice.

However, after implementing early rehabilitation, the study group patients had a highly significant improvement than those of control with all items of knowledge. This might be due to health instructions given to study patients using different teaching strategies as lectures, discussion, and colored booklet. Also, the researcher emphasized the importance of the patient's knowledge. This study result was in agreement with (Soliman *et al.*, 2018) [39] who showed that there was a statistically significant difference regarding the mean knowledge score at three different intervals pre, post and follow up intervention regarding breast cancer as a disease as well as post-mastectomy exercises.

Likewise (Bahgat *et al.*, 2016) [5] supported the previous finding as they proved that there was a significant difference between the study groups I and II pre & post- protocol of care. Additionally, this finding similarly with the study of (Fu *et al.*, 2010) [13] entitled with "The Effect of Providing Information about Lymphedema on the Cognitive and Symptom Outcomes of Breast Cancer Survivors", who found that patients who received information reported significantly a higher score in the knowledge test.

Regarding the patient's practice: the present study revealed that the majority of the study and control groups had an inadequate level of practice before application of the early rehabilitation. While the study group showed significant compliance at a two-period interval of follow up (before discharge and 3 months post-rehabilitation). (Soliman *et al.*, 2018) [39] supported this result as they

demonstrated that the majority of the patients had adequate self-care practices and arm morbidity minimized during the follow-up period.

In this study the patients were motivated to use and maintain arm and shoulder exercises through teaching the benefits of the exercises, which in turn, motivated them to apply and adhere to regular exercise, learning support by the researcher and effective learning materials (booklet and poster), a family also support while exercising, all contributed on the patients to comply with the exercises program.

In addition, the study findings was consistent with (Qalawa *et al*., 2011) [34] who showed that non-compliance with exercises also significantly declined following the implementation of the instructional scheme. Also, the current results accepted with (Mahdy and Ali, 2012) [28] who observed that the majority of the study patients showed a good maintenance level of self-care practices regarding indoor arm care, outdoor arm care and total self-care practice at one-month post-discharge with a slight decrease at three months post-discharge.

Also, the same finding was in accordance with (Gautam *et al*., 2011) [16] who confirmed that patients' training program post-mastectomy led to good adherence to self-care practices as arm care, arm exercise and improved quality of life scores.

As regard shoulder pain severity: the current study reported that post operatively, majority of women in the study and control groups had mild pain in the first week postoperatively, this may be due to surgical incision and presence of drain. However, there was statistically significant difference between study and control group concerning pain severity at third months from application of early rehabilitation, in which no pain was observed in the study group compared to control group.This may be due to that study women being knowledgeable on topics that can decrease pain as arm elevation and positioning, gradual exercise and arm precautions in daily living.

This result was in line with (Hawash, 2018) [20] who found that during the early weaks after mastectomy, pain and decreased shoulder movements are more common and then decrease gradually after 6 months. In addition, (Chan *et al*., 2010) [9] emphasized that early rehabilitation program post mastectomy seems to accelerate recovery and prevent complication and is effective in lessening shoulder pain. However, this could be contributed to the fact that the importance of pain management is further increased when benefits for the patients are realized earlier mobilization, shortened hospital stay and reduced expenses.

Regarding shoulder disability, the results illustrated that more than two thirds of the study and about one quarter of the control group had moderate shoulder disability in the first week postoperative. This might be due to that modified radical mastectomy with axillary lymph nodes dissection usually decreased muscle strength, increased shoulder stiffness and interfered with ability to practice daily life activity. Shoulder mobility limitation is one of the most important factors that deteriorate the daily functional capacity of the patient after mastectomy, so (Mohammed, 2016) [31] mentioned that the early onset of rehabilitation program is effective in terms of recovery of daily living activities and provide improvement in shoulder movement and prevent disabilities.

Additionally, the current study result revealed that majority of control group had severe shoulder disability in the third month post-operatively compared to non in the study group in the same period. These findings are attributed to adherence of the studied patients to the instructions provided by the researcher to perform self-care activities and incorporating home exercises regularly into their daily living.

This result finding was in agreement with (Fung *et al*., 2011) [14] who concluded that rehabilitation program proved to be secure and effective in improving shoulder function without major complications. This may be related to the adherence of study women to home exercise program and arm precautions, and the patients were instructed to do daily living activities independently such as dressing, bathing, ambulation and preparing meals which is considered part of rehabilitation movement to improve functional ability.

On the other hand, (Cinar *et al*., 2008) [10] found that that recovery of functional capacity of shoulder in the treatment group is better throughout the follow up period (after 6 months). Also the result was in contrast with (Bahgat *et al*., 2016) [5], who concluded that there was no statistical significant differences between the three groups regarding shoulder disability scores in the first week, third, or sixth months after mastectomy.

Rgarding correlation between patients' demographic data and total score of shoulder pain and disability scale (SPADI): The finding of the current study showed that there was a positive correlation between SPADI scores and patient's age before discharge as well as 3 months post-rehabilitation in the study group. This means that older women suffered from shoulder dysfunction more than younger ones. This finding was in respect with (Ahmed *et al*., 2017) [11] who found that the younger patients had more improvement in shoulder function when compared to the group of the older patients. Also, incidence of shoulder dysfunction and restricted shoulder mobility increases with aging due to altered immune response with aging, decreased ability to perform specific activities as combing the hair and using the hand overhead, and decreased ability to do post mastectomy shoulder exercises regularly.

The above finding also was accepted with (Taha *et al*., 2013) [40], who revealed that there was a significant relation between patient's age & shoulder pain and disability Index scores post rehabilitation and after one month of intervention. This means that advanced age was the main factor affecting on physical conditions. In constrat, (Arsh and Ullah, 2019) [4] concluded that age and operated side i. e., right and left mastectomy are insignifcantly associated with shoulder pain and disability in post-mastectomy patients.

The finding of the present study reported that there was a negative correlation between SPADI scores and patient's educational level before discharge as well as 3 months post-rehabilitation in the study group. This result was congruent with (Arsh and Ullah, 2019) [4] who expressed that educational status, marital status, profession and years' passed after surgery were signifcantly associated with shoulder pain and disability.

Rgarding correlation between total practise scores and total score of shoulder pain and disability: The finding of the present study showed that there was a negative correlation between patient's total practice scores and total shoulder pain and disability score before discharge and 3 months post-rehabilitation in the study group. This means that the more exercise performance, the less pain intensity and disability. This finding was accepted with (Jordan *et al.*, 2010) [24] who stated that exercise therapy that consists of individually designed programs, including stretching or strengthening and is delivered with supervision improved pain and function in intervention group. In addition to this finding is encouraging in view of the findings of (Bicego *et al.*, 2006) [8] who reported that exercises also increased arm flexibility and decreased arm pain.

Finally, the present study emphasized that a well-planned early rehabilitation carried out by the researcher could be a successful tool to help in reducing pain and disability of shoulder post mastectomy. Nurses play an important role in planning and applying exercise program. So, nurses should incorporate exercise program into their routine general practice activities. Successful implementation combines education for patients, training for nurses in the context of an organization committed to both the concept and practice of supported rehabilitation program. Trusting relationship between the patient and nurses enables a feeling of working together to achieve the aim of rehabilitation program (Armer *et al.*, 2011) [3].

Conclusion
Teaching and applying early rehabilitation significantly improved the shoulder condition of patients underwent modified radical mastectomy in the study group regarding pain and disability of the shoulder.

Recommendations
From the present study we recommend that; providing copies of the early rehabilitation in the general surgery department and clinic to be readily available for all patients planned to undergo MRM. Nurses working in the general surgery department must include early rehabilitation in care and follow-up protocols of patients undergoing MRM and use the validated shoulder pain and disability questionnaire in monitoring patient's condition.

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