

Effect of nursing teaching protocol on mastitis prognosis: quasi-experimental research design

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Background

Mastitis is a problematic issue because it may lead to many complications as early termination of breastfeeding, formation of breast abscess, deformity of breast tissue, and recurrence. Nursing management is conducted to deepen patients' understanding of the diseases, enhancing self-care ability, and establishing healthy living habits.

Aim

The aim of this study is to evaluate the effect of a nursing teaching protocol on mastitis prognosis.

Design

A quasi-experimental research design was utilized.

Setting

The study was conducted in the breast unit in general surgery department at Main Assiut University Hospital.

Sample

A convenient sample of sixty adult female patients diagnosed with mastitis was included.

Tools

Four tools used **I:** An interview questionnaire sheet, **II:** Mastitis self-care practices, **III:** Numeric Pain Rating Scale, and **IV:** Mastitis prognosis sheet.

Results

The mean age of both study and control groups was (37.57±9.01, 38.30±9.24 respectively). (60.0% and 50.0% respectively) of both groups had lactational mastitis. There was statistically significant improvement in study group's level of knowledge and self-care practices at follow up. Moreover, (63.3%, 70.0% respectively) of both groups had severe pain at base line. However, at follow up (66.7%,) of study group didn't have any pain and cured completely. while (40.0%) of control still having severe pain, (33.3%) discontinued breast feeding and (20.0%) converted into breast abscess.

Conclusion

Implementation of a nursing teaching protocol had a positive outcome on mastitis prognosis.

Recommendation

Distribution of a mastitis teaching protocol for patients with mastitis to improve prognosis.

Keywords:

mastitis prognosis, nursing, teaching protocol

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Effect of a Nursing Teaching Protocol on Mastitis Prognosis: Quasi-Experimental Research Design

Introduction

Mastitis is an inflammatory condition of the breast, which may or may not be accompanied by infection. It is usually associated with lactation, so it is called lactational mastitis or occurs spontaneously and called non lactational mastitis. It usually affects fertile women but can be seen at all ages and even in males. The incidence of mastitis in lactating women ranged from 3% to 33% and the frequency of non-

lactational mastitis among biopsies for benign breast diseases is 3% (Boakes *et al.*, 1018).

Inflammation of breast can be broadly categorized as non-infective mastitis which may result from milk stasis, blocked ducts, engorgement or physical injury to the breast, infective mastitis may result from cracked

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or traumatized nipples; interruption in the nipples' integrity provides a route for micro-organisms to enter the breast. It may occur in one or both breasts. Diagnosis of mastitis is usually based on clinical symptoms and signs, such as breast pain, heat, swelling, fever, and chills that lasts from two to three days up to a couple of weeks or more (Crepinsek *et al.*, 2020; Chou *et al.*, 2022).

The most common complications of lactational mastitis are early termination of breastfeeding. Breast abscess is another complication of lactational mastitis which may require surgical treatment. Non-lactational mastitis is associated with recurrence and can lead to scarring and deformity of breast tissue. Mastitis may also contribute in some women to experience negative emotions, including distress, depression and anxiety as well as a feeling of helplessness (Nabil *et al.*, 2019).

Mastitis should be treated immediately, as a delay in treatment or inappropriate management can lead to breast abscess. The initial management of lactational mastitis is symptomatic treatment. Effective management is essential to control the discomfort, reduce the likelihood of discontinuation of breastfeeding, and recurrence of mastitis. Scientific rehabilitation exercise and health education are effective measures to improve the outcomes of mastitis (Wang and Sun, 2022).

Nursing role is conducive to deepening patients' understanding of their own diseases, enhancing their self-care ability, improving treatment compliance, and establishing healthy living habits (Chen *et al.*, 2020). Patients should be encouraged to continue breastfeed, pump milk, non-steroidal anti-inflammatory drugs (NSAIDs) can be used for pain control. Heat applied to the breast just before emptying can help milk letdown and facilitate with emptying. Cold packs applied to the breast after emptying can help reduce edema and pain. If the symptoms of lactational mastitis persist beyond 12 to 24 h, antibiotics should be administered, some patients require hospitalization. Non lactational mastitis is treated empirically with antibiotic therapy (Rose Strickland and Sharma, 2021).

Significance of the study

Worldwide, mastitis occurs approximately in 10 percent of U.S persons. It ranges from a low of 1,000 per 100,000 to a high of 10,000 per 100,000 persons with an average 4,700 per 100,000 persons

(Axelsson and Blomberg, 2019). Many complications may arise if mastitis not treated and managed effectively such as breast abscess, long antibiotic course, recurrence, and in many lactating women may contribute to discontinuation of breast feeding. Furthermore, from the researchers' experiences in the breast unit at general surgery department, in addition to non-lactational mastitis cases; it has been noted that patients with lactational mastitis referred from their obstetrician and came to the breast unit to seek more specialized care. Also, it was found that patients' knowledge and practice about mastitis care are inadequate and need for improvement. Therefore, this study is considered the first one in this geographical location that try to help those patients increasing their knowledge and practice about mastitis care which may improve their prognosis.

Aim

The aim of the study was to evaluate the effect of a nursing teaching protocol on mastitis prognosis.

Outcome measures primary outcomes

- (1) Knowledge level of participants regarding mastitis care and management.
- (2) Practice level of participants regarding mastitis care and management.

Secondary outcomes

- (1) Pain level.
- (2) Number of completely cured participants.
- (3) Number of lactating participants who discontinued breast feeding.
- (4) Number of participants who their condition complicated with breast abscess formation.
- (5) Number of recurrences.

Hypotheses

H1: The total mean scores of both knowledge and practice levels regarding mastitis care and management after implementation of a nursing teaching protocol among study group will be higher than control.

H2: The total mean score of pain level among study group patients after implementation of nursing teaching protocol will be less than those of the control group.

H3: Complications associated with mastitis will be less among the study group than the control group.

Methods

Design

Quasi-experimental designs provide Level III evidence and have a higher risk of bias because randomization is absent. Evidence that the characteristics of the intervention group and control groups are measured and then compared (even if not randomly assigned) and attempt is made to control for the main differences in the analyses (Geri *et al.*, 2019).

Setting

The study was conducted in the breast unit where is affiliated to the general surgery department at Main Assiut University Hospital. It was established in 2021 and staffed by a specialist breast care team. It serves all Upper Egypt population. It is a specialized unit that offers breast cancer screening services. Diagnosis and management of other breast problems, enhances breast care awareness and health for all women, by providing the needed guidance and emotional support.

Sample

A convenience sample of all available women who were seeking for health care about mastitis was chosen (target population). Sixty adult patients were studied. Patients were divided equally into two groups (study and control), 30 patients for each. The study group received intervention (nursing teaching protocol) while the control group received the routine care. Women diagnosed with mastitis (lactational or non-lactational), age ranged from 20 to 65 years were included in the study. Patients who were suffering from mental health problems, visual or hearing problems and patients who were uncooperative or refused to participate in the study were excluded.

Sample size

The sample size was determined statistically by power analysis. The calculation was done considering the following: Target population through the year of 2021 to 2022 was 300 cases. 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 power analysis, the researcher had obtained 60 patients in this study because non-response rate was expected to be lost from the subjects.

Tools

To accomplish the aim of the study; four tools were utilized to collect data for this study.

Tool I: An interview questionnaire sheet: It was developed by researchers after reviewing extensive literatures to assess the following parts:

Part 1: Biodemographic data: This part assessed biodemographic data of studied patients as age, marital status, educational level, pattern of disease, type of mastitis, and risk factors which had been suggested to increase the risk of mastitis.

Part 2: Patients' knowledge about mastitis care: This part consisted of ten questions that was formulated by researchers based on the literature reviews to assess patients' knowledge regarding mastitis care and management.

Scoring

Each answered question scored from 0 to 3 marks as follows; (3) marks for complete correct answer, (2) marks for incomplete correct answer, (1) mark for incorrect answer and zero for not known answer. The range of total score lies between 0-30, the scoring system for patients' knowledge was interpreted in the results into satisfactory and unsatisfactory based on literature review (Crepinsek *et al.*, 2020); satisfactory: if the total knowledge score was $\geq 60\%$ and unsatisfactory if the total knowledge score was $< 60\%$.

Tool II: Mastitis self-care practices

This tool was developed by the researchers based on previous similar studies, articles and library resources to assess self-care practices that should be done by women for mastitis including relaxation techniques, heat and cold application, scraping technique, and breast massage.

Scoring

A total score of 60% or higher was considered as adequate self-care practices and less than 60% was considered as inadequate. Three points scale was used to grade the steps. Two points for doing correctly. One point for doing incorrectly and zero point for not doing at all (Nabil Hussien *et al.*, 2019).

Tool III: Numeric Pain Rating Scale (NPRS)

This scale was developed by (McCaffery and Beebe, 1989). It was adopted in this study for assessing mastitis pain. It was asked from each patient to rate pain level from 0 to 10 with understanding that 0 is equal to no pain and 10 is equal to worst possible pain. The NPRS is a valid, reliable measure that has test-retest reliability (0.79).

Scoring: 0 is equal to no pain, 1-3 is equal to mild pain, 4-6 is equal to moderate pain and 7-10 is equal to severe pain.

Tool IV: Mastitis prognosis sheet

It was developed by the researchers to assess prognosis of mastitis after three weeks from providing nursing teaching protocol which may be either good prognosis (completely cured) or bad prognosis (breast abscess, discontinuation of breast feeding and recurrence).

Nursing teaching protocol

It was developed by the researchers based on previous similar studies, articles and library resources. It was given for study group patients as a handout. It consisted of three parts; the first part under the title of '**Disease overview**' included basic information about the mastitis to acquire the basic knowledge about disease (definition, causes, risk factors, types, clinical manifestation, diagnosis, complications, and management). The second part under the title of '**Non pharmacological measures for mastitis**' to relieve symptoms and prevent further complications; it included (relaxation techniques, gentle massage, application of heat and cold packs to the breast, scraping technique). The third part included '**Other measures**' to complement the intervention provided which included mixed measures as dietary education, rest, medication and follow up.

Procedure

Tools validity

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 clarity of sentences, appropriateness of content and sequence of items.

Reliability

Cronbach's alpha is the most widely used method for evaluating internal consistency of the research tools. It can be interpreted like other reliability coefficients. The normal range of value is between 0.00 and 1.00, and higher values reflect a higher internal consistency. The reliability of the study tools was (0.868). The NPRS test -retest reliability was (0.79).

A Pilot study

It was conducted on 10 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, slight modifications were done accordingly. These patients had been omitted from the study and replaced by another.

Ethics considerations

The study was affirmed by the 'Research Ethics Committee' of Faculty of Nursing, Assiut University (IRB:1120230422), according to the World Medical Association Declaration of Helsinki (1997) Ethical Principles for Medical Research Involving Human Subjects Varghese and Patwa (2020). The trial was registered at Clinical Trial.gov, A service of the US National Institutes of Health) with identifier. NCT NCT05974956 (August 2023) under the brief title 'Effect of a Nursing Teaching Protocol on Mastitis Prognosis: Quasi-Experimental Research Design'. Informed 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. Study subject privacy was considered during data collection.

Administrative approval

Official endorsement and administration permission were adopted from the head of the general surgery department and outpatient surgery clinic at Assiut University Hospital.

The study was carried out on four phases

Planning phase

This phase is concerned with construction and preparation of the different data collection tools and designing nursing teaching protocol after reviewing the related literature, journals, and text books. The researchers translated nursing teaching protocol booklet into Arabic language, which were delivered to all the study group.

Assessment phase

The researchers introduced themselves to the selected participants and clarified the objective, process, and expected outcomes. Participants' approval was obtained. Each patient was interviewed individually by the researchers to collect demographic and medical data using tool I (Parts 1). Initial assessment of the study participants' knowledge was done using tool I (Parts 2) also patient's self-care practices and pain level were assessed by using tool II and III. The structured interview was filled out by the researcher, and the length of meeting was 20–30 min.

Medical treatment protocol

The treatment protocol for the study group patients was similar to the control group, it involved a 10-day

course of antibiotics 2 times a day and pain relievers such as acetaminophen and ibuprofen. However, the study group received nursing teaching protocol in addition to the course of treatment.

Implementation phase

The control group received the routine care in addition to the medical treatment protocol. After filling the study tools; sessions about mastitis care had been started for the study group. One of the family members was existing in the session to **ensure** patient support. The researchers worked with surgeons, nurses regarding anticipated expectations of patients.

Sessions that were given during the implementation phase to the study group were described as the following:

- (1) **The first face to face education session: Aim:** To empower patients with basic knowledge and skills about mastitis care. **Time:** 40 min. **Contents:** Educate patients basic information about lactational and non-lactational mastitis as: definition, causes, clinical features, diagnosis and complications. Demonstrate steps of self-care practice skills and assist patients to select three skills to practice it regularly from the following: (practicing relaxation techniques as deep breathing exercises, walking 30 min two/three times per week for three weeks, applying warm compresses for affected breast for 20 min 3 times a day, and massaging the breast gently for up to 30 to 45 min with small circular motion from inner to outer toward the lymph nodes in the axilla). Help patients to use different strategies to apply the selected three skills. Encourage patients to ask questions and confirm that patients understand what they were told. **Teaching method/media:** Lecture, demonstration and re-demonstration/ illustrated pictures, recorded videos on mobile screen, and printed hand out. **By the end;** a summary was made and time allowed for questions and answers& plan for next session was made.
- (2) **2nd face to face education session: Aim:** To educate patients on the right information and skills about healthy life style habits that are necessary for good mastitis prognosis. **Time:** 40 min. **Contents:** Instruct patients to increase fluid intake and vitamin C. Wearing well fitted supportive bra also, using cold packs when warmth is felt to reduce pain. For lactational mastitis, women were instructed to increase frequency of

breast feeding and avoid sudden cession of breastfeeding with correct latch and positioning of baby during breast feeding. As lactational mastitis usually develops after a period of incomplete drainage and milk stasis, also nipple pain is a common complaint in breastfeeding women and may lead to less frequent nursing. So, it was important to counsel patients on ways to manage and decrease their pain. Furthermore, researchers clarified that breastfeeding with mastitis is safe and it should be continued. If patients do not wish to continue breastfeeding, they had been counseled on the importance of continuing to empty the breasts by using alternative methods such as the use of a breast pump. **Teaching method/media:** Lecture, demonstration and re-demonstration/ illustrated pictures, recorded videos on mobile screen, and printed hand out. **By the end;** a summary was made and time allowed for questions and answers& plan for next session was made.

- (3) **Weekly follow-up phone calls: Objectives:** To provide feedback and suggestions according to patients' **feedback**. **Time:** 30 min. **Contents:** Ask and emphasize the compliance with nursing teaching protocol that should be followed by participants to maintain the achieved results. Conclude what is discussed and encourage patients to contact healthcare providers when they have health problems. **Teaching method/media:** Interactive conversation, active listening/ audio phone media.

Evaluation phase

In this phase, both the study and control group patients returned for follow-up after three weeks from the first assessment to the breast unit in general surgery department at Assiut University Hospital to evaluate their prognosis using tool II, III and IV.

Statistical analysis

Data analysis performed using the Statistical Package for the Social Sciences (SPSS) version 23. Categorical variables described by number and percent (N, %). Continuous variables described by mean and standard deviation (Mean, SD). Chi-square test and Fisher exact test had been used to compare between categorical variables. While *T*-test and Pearson's chi-square used to clear the association between patients' knowledge, practice, and mastitis prognosis before implementation of nursing teaching protocol and three weeks post. *P* values less than 0.05 were statistically significant.

Results

Table 1 Shows that; the mean age of both study and control groups was (37.57±9.01, 38.30±9.24) years respectively. As regard the marital status, the majority of patients in both study and control groups were married (66.7% and 73.3%) respectively. Regarding educational level, majority of patients in both groups (73.3%) were educated. Regarding type of mastitis; (60.0%) of the study group and (50.0%) of the control group had lactational mastitis. Concerning the pattern of disease, mastitis was unilateral in the majority of patients in the study and control groups (80.0% and 86.66%) respectively. in relation to anatomical risk factors, the majority of patients in the study and control groups had nipple cracks (86.7% and 80.0%) respectively. Also, about half of the study group (50.0%) and more than half of the control group (53.3%) were multiparous as mastitis risk factors too.

Table 2 Reflects that; At base line assessment the highest percentage of both the study and control group had unsatisfactory level of knowledge (90.0% and 86% respectively) and inadequate level of self-care practice about mastitis care (90.0% and 83.3% respectively). On the other hand, there were statistically significant improvement in the level of knowledge and self-care practices after three weeks follow up with P value =0.001**.

Table 3 Reveals that both the study and control groups had various degree of breast pain with the highest percentage for sever level (63.3%, 70.0%) respectively at base line assessment. While at follow up, there was a statistically significant difference ($P=0.001^{**}$) between the study and control groups regarding level of pain as about two thirds of the study group (66.7%) had no pain and more than one third of the control group still having severe pain (40.0%).

Table 1 Biodemographic data of studied participants (n=60)

Biodemographic data	Study group (n=30) N (%)	Control group (n=30) N (%)	χ^2	P- value
Age groups				
20> 30	8 (26.7)	6 (20.0)		
30> 40	11 (36.7)	12 (40.0)	0.66	0.882
40<50	10 (33.3)	10 (33.3)		
50≥65	1 (3.3)	2 (6.7)		
Mean±SD	37.57±9.01	38.30±9.24	t=0.31	0.757
Marital status				
Single	2 (6.7)	2 (6.7)		
Married	20 (66.7)	22 (73.3)	0.76	0.859
Divorced	4 (13.3)	4 (13.3)		
Widowed	4 (13.3)	2 (6.7)		
Educational level				
Educated	22 (73.3)	22 (73.3)	0.03	1.000
Non educated	8 (26.7)	8 (26.7)		
Type of mastitis				
Lactational mastitis	18 (60.0)	15 (50.0)	0.26	0.436
Non lactational mastitis	12 (40.0)	15 (50.0)		
Pattern of disease				
Unilateral	24 (80.0)	26 (86.66)	0.12	0.448
Bilateral	6 (20.0)	4 (13.33)		
Mastitis anatomical risk factors				
Nipple cracks	26 (86.7)	24 (80.0)	0.12	0.488
Lactating duct obstruction	15 (50.0)	19 (36.3)	0.65	0.435
Wearing tight-fitting bras	6 (20.0)	3 (10.0)	0.52	0.469
Use of a manual breast pump	6 (20.0)	3 (10.0)	0.52	0.469
Other mastitis risk factors:				
Primiparous	8 (26.7)	9 (30.0)	1.07	0.774
Multiparous	15 (50.0)	16 (53.3)	0.08	0.796
Previous breast biopsy	8 (26.7)	7 (23.3)	0.41	0.766
Increased stress levels	7 (23.3)	5 (16.7)	0.88	0.519
Infections with <i>S. aureus</i>	8 (26.7)	5 (16.7)	0.09	0.347
Don't clean nipple before breastfeeding	6 (20.0)	7 (23.3)	0.08	0.754

Table 2 Knowledge level and self-care practices for study and control groups at base line and three weeks follow up (n=60)

	Base line assessment		χ^2	P. Value	Follow up after three weeks		χ^2	P. Value
	Study (n=30) N (%)	Control (n=30) N (%)			Study (n=30) N (%)	Control (n=30) N (%)		
Knowledge level								
Satisfactory	3 (10.0)	4 (13.3)	0.16	1.00	28 (93.3)	5 (16.7)	21.4	0.001**
Unsatisfactory	27 (90.0)	26 (86.7)			2 (6.7)	25 (83.3)		
Mean SD	12.7±2.48	13.33±3.1	T= 0.73	0.465	3.86±26.57	14.27±2.57	T=14.3	0.001**
Self-care Practices								
Adequate	3 (10.0)	5 (16.7)	0.57	0.706	30 (100.0)	7 (23.3)	37.29	0.001**
Inadequate	27 (90.0)	25 (83.3)			0 (0.0)	23 (76.7)		
Mean SD	7.93±2.86	3.2±8.37	T=0.55	0.583	18.57±2.1	9.73±2.64	T=14.53	0.001**

* =statistically significant ($P<0.01$).**Table 3 Comparisons between the study and control groups regarding pain level at base line and three weeks follow up (n=60)**

Pain level	Base line assessment		χ^2	P. value	Follow up after 3 weeks		χ^2	P- value
	Study (n=30) N (%)	Control (n=30) N (%)			Study (n=30) N (%)	Control (n=30) N (%)		
No Pain	0 (0.0)	0 (0.0)			20 (66.7)	6 (20.0)		
Mild pain	4 (13.3)	2 (6.7)			7 (23.3)	5 (16.7)		
Moderate pain	7 (23.3)	7 (23.3)	0.767	0.682	3 (10.0)	7 (23.3)	21.47	<0.001**
Severe pain	19 (63.3)	21 (70.0)			0 (0.0)	12 (40.0)		
Mean±SD	6.47±2.26	6.87±2.15	t=0.7	0.484	1.07±1.74	4.9±3.46	t= 5.42	<0.001**

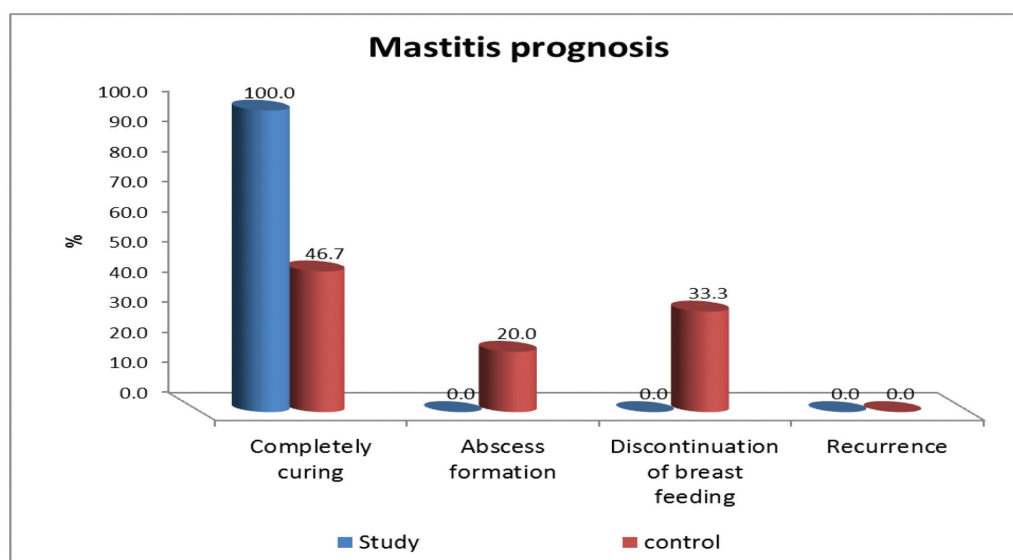
* =statistically significant difference ($P<0.01$).

Figure 1 Illustrates that, there was statistically significant difference ($P=0.001^{**}$) between study group and control groups ($P=0.001^{**}$) regarding prognosis of mastitis whether study group completely cured from mastitis at follow up while one third of control group (33.3%) discontinued breast feeding and (20.0%) had breast abscess.

Table 4 Shows that; there was a negative correlation between patients' knowledge, practice

scores and pain level at three weeks follow up interval. This means that as the patient's knowledge and practice increased, the pain score decreased and vice versa.

Table 5 Reflects that; there was a statistically significant relation between patient's self-care practice and mastitis prognosis among the control group at three weeks follow up interval with P . value = 0.005**.

Figure 1

Mastitis prognosis for both groups (study & control) at 3 weeks follow up (n=60).

Table 4 Correlation between patients' knowledge, practice and pain level before nursing teaching protocol and three weeks post protocol for the study and control groups (n=60)

Variables	Study(n=30)				Control (n=30)			
	Base line assessment		Follow up after three weeks		Base line assessment		Follow up after three weeks	
	knowledge	practices	knowledge	practices	knowledge	practices	knowledge	practices
knowledge	1		1		1		1	
practices	0.087	1	0.799**	1	0.488**	1	0.499**	1
pain intensity scale	-0.506**	-0.214	-0.571**	-0.370*	-0.102	-0.043	-0.127	-0.067

* **=statistically significant difference ($P<0.01$).

Table 5 Relation between mastitis prognosis and practice score level for the control group three weeks post-protocol (n=30)

Mastitis prognosis	Self- care practice score level		χ^2	P-value
	Inadequate N (%)	Adequate N (%)		
Mastitis is completely cured	7 (30.4)	7 (100.0)	10.34	0.005**
Breast abscess is formed	6 (26.1)	0 (0.0)		
Breast feeding is discontinued	10 (43.5)	0 (0.0)		

* **=statistically significant difference ($P<0.01$).

Discussion

Within the framework of the Egyptian state's keenness to preserve the health of the family and society as a whole, the Egyptian President's Women's Health Initiative was launched to enhance the health of Egyptian women. Women in particular were targeted as they were a group in dire need of education and health care. The initiative aims to screen breast cancer at an early stage and follow up with clinical examination. This initiative played a major role in helping early detection of any problems in the breast such as mastitis (State information service, 2022).

The present study revealed that the mean age of the study group was 37.57 ± 9.01 years and the mean age of the control group was 38.30 ± 9.24 years. Nearly to this finding Wang and Sun, (2022) mentioned that the mean age of the studied sample at the time of diagnosis was 44.52 ± 12.64 for experimental group and 44.84 ± 10.87 for control group. Another study by Steuer *et al.* (2020) reported that the highest percentage of their studied women was above 30 years.

Regard educational level; the current study showed that most of the study and control groups had secondary education. In the same line Pardeshi *et al.* (2019) reported that the majority of the studied women had secondary education too. In contrast with Varghese and Patwa, (2020) who reported that the majority of the studied women had primary education. This difference may be due to different study settings. Regarding the marital status; the present study clarified that more

than two thirds of patients in both groups were married. This result was similar to Alikhassi *et al.* (2020) who mentioned that, the majority of women in both groups were married. In contrast to these findings Viduedo *et al.* (2015) who revealed that the majority of the study group were widows or had no partner.

Regard clinical data; the current study displayed that more than half of patients in the study and control group had lactational mastitis. From the researchers' point of view, these results could be accepted because of the culture of our society puts pressure on wife to quickly have children immediately after marriage without preparing that result in reproductive health literacy, including lack of awareness regarding breast care, breast feeding and also lack of support from family. This result was supported by Wilson *et al.* (2020) who conducted a study entitled 'Incidence and risk factors for lactational mastitis: a systematic review' reported that mastitis can affect patients at any time but it represents significance burden to lactating women. This could be attributed to the increased activity of the breast tissue in response to female hormones'.

On the other hand, non-lactational mastitis represents a considerable percentage (forty percent in study group and half of patients in control group) and this percentage should not be neglected. From the researchers' point of view, although this condition is rare but it can be easily diagnosed because of our skilled surgeons and advanced technology that help in early and an accurate diagnosis (Zhang *et al.*, 2018) reported

that 'Non-lactational mastitis is a breast inflammatory condition in young women. In accordance Costa Morais Oliveira *et al.* (2021) in their systemic review reported that non-lactational mastitis is a complex public health problem with diagnostic and treatment challenges.

Concerning the disease pattern; the study's findings showed that most of the study and control groups were diagnosed with localized, unilateral breast pain, tenderness and erythema. From the researchers' point of view, patients complain from localized breast pain because of engorgement and inflammation of the breast. This result was in harmony with Baeza (2016) who reported that a higher percentage of women typically present with unilateral breast tenderness.

In relation to risk factors; the present study showed that nipple damage or nipple crack was the most frequently investigated risk factor for mastitis followed by blocked milk duct. This finding was in accordance with Nabil Hussien *et al.* (2019) who carried out a cross sectional study to assess the prevalence and risk factors of mastitis in lactating women and found that the most frequent diagnosis among women was lactational mastitis and 75% suffered from nipple cracks. Another risk factor was more than half of women in both groups was multiparous. This result finding was consistent with Ding *et al.* (2021) who stated that the incidence of mastitis is prominent in multipara and seriously affect quality of life and breast feeding after delivery. In contrast Yin *et al.* (2020) reported that primiparous women were found significantly more frequent in the mastitis group than in the control group and rationalized that; as primipara is without previous experience of childbirth, lacks healthcare knowledge and preventive measures for postpartum care.

Concerning the patients' knowledge; the present study revealed that, the majority of patients in both study and control groups had unsatisfactory level of knowledge before application of nursing teaching protocol. From the opinion of the researcher, level of knowledge was insufficient due to most physicians and nurses did not routinely counsel women or providing written information about mastitis and self-care practice. However, after implementing of nursing teaching protocol, the study group patients had a highly statistically significant improvement than those of control in relation to all items of knowledge. This might be due to health education and instructions given to study patients using different teaching strategies as lecture, discussion, and colored booklet.

Also, the researcher emphasized up on the importance of reinforcement of patient's knowledge. This result was in agreement with Wang and Sun, (2022) who showed that there was statistically significant difference regarding the mean knowledge score at two different interval pre, post intervention regarding mastitis as a disease as well as mastitis management. Also, they concluded that health education was carried out to enhance the awareness of patients with mastitis, which eliminated their fear and tension to a large extent and boosted their confidence in treatment.

Regarding patient's self-care practices, the present study revealed that the majority of the study and control groups had inadequate level of practice before application of nursing teaching protocol. While the study group showed significant improvement at period interval of follow up 3 weeks post-intervention. From the researchers' point of view these results could be because of lack of patient's knowledge about the disease that reflects on their practice level of self-care. Gresh *et al.* (2019) were disagreeing with our study results and found that majority of the patients had adequate self-care practices during the follow-up period and explained this by mastitis may be clinically described as 'self-limiting' as it usually resolves without medical intervention through self-management, for example massaging the affected breast, feeding or expressing frequently enough to empty the affected breast, and using cold compresses to soothe the inflammation.

In addition, the study findings were consistent with Ren *et al.* (2022) who showed that the implementation of effective clinical interventions can largely reduce the clinical symptoms of mastitis in patients and enhance the quality of life of patients with the administration of conventional western medicine.

As regard pain severity, the current study revealed that the majority of women in the study and control groups had severe pain before application of nursing teaching protocol, this may be due to the presence of inflammation of the breast tissue. However, there was statistically significant difference between the study and control groups concerning pain severity after application of intervention, in which about two third of the study group had no pain and more than one third in the control group had severe pain. This may be due to that women in the study group become knowledgeable and performed self-care practices such as warm compress, gentle massage and relaxation techniques as it handled in teaching protocol.

In this regard Abd Elhakam and Abd Elmoniem (2016) stated that there was a highly significant difference between study and control groups after intervention as the most of study group recovered from pain and reported significant reduction of pain scores. Also, the current results agreed with Karaçam and Sağlık (2018) who observed that effective managements such as education, counseling and monitoring are essential to control the pain and discomfort of mastitis.

Regarding prognosis of mastitis; the present study found that the study group completely cured after application of nursing teaching protocol while about one quarter of the control group developed breast abscess after mastitis. From the researchers' point of view, these results are a good proof for the importance of health education and training of females about breast care during lactation period or even at non- lactation time. This finding was consistent with Cooney and Petty-Saphon (2019) who mentioned that about 3–11% of acute mastitis are still prone to develop breast abscess in the case of rapid progression and improper treatment. In addition, add that if left under- or un-treated, mastitis can lead to breast abscess or septicemia, which may necessitate hospitalization and may be surgery.

Unfortunately, about one third of patients discontinued breast feeding, and to avoid this big problem we enforce the importance of education and continuing breast feeding. Pevzner and Dahan, (2020) requested from the women with mastitis to overcome difficulties with mastitis as pain, fear, or false conception 'antibiotics may pass through the milk', and to continue breastfeeding. Also, the choice of a proper treatment and the provision of therapeutic instructions to the patient are crucial for a cure, for a successful duration of breastfeeding, and for preventing complications for mother and baby. Furthermore; Wilson *et al.* (2020) reported that lactational mastitis is a painful condition that can lead to discontinuation of breastfeeding and recommended that mothers should be reminded of the many benefits of breastfeeding and encourage persevering.

Conclusion

Nursing teaching protocol for patients with mastitis led to better prognosis that was apparent in fewer complications rate, decreased pain level, improved knowledge and practice among study group who received and applied the nursing teaching protocol. Also, there was a negative correlation between patients' knowledge, practice scores and pain level at three weeks

follow up interval. Moreover, there was a statistically significant relation between patient's self- care practice and mastitis prognosis among the control group at three weeks follow up interval.

Recommendation

A hand out copy of mastitis care teaching protocol should be available for all patients diagnosed with mastitis to prevent complications and achieve better outcome. Replication of the current study on a larger probability sample is recommended to attain generalizability and wider utilization of the nursing teaching protocol.

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