

Effectiveness of Cabbage Leaves plus Breast Milk Expression on the Relief of Breast Engorgement among Women with Cesarean Section

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Abstract: Breast engorgement is one of the most common minor discomforts confronting nursing women after delivery especially primipara. **Purpose:** The purpose of the current study was to investigate the effect of cabbage leaves plus breast expression on the relief of breast engorgement among women with cesarean section. **Setting:** The study was conducted in the postnatal ward at Menoufia University Hospital and Shebin El-kom Teaching Hospital. **Design:** A quasi-experimental study design was used. **Sample:** A convenient sample included 60 primiparous women were selected after fulfilling the including criteria of the sample. They were divided into two groups, study group was applied cold cabbage compresses between breastfeeding and breast expression after breastfeeding, and control group was used routine hospital care. **Instruments:** There were three instruments of data collection compromised I: A structured interviewing questionnaire, II: Breast engorgement assessment checklist, III: Follow-up checklist to assess the effectiveness of the cabbage leaves compared to routine hospital care. **Results:** There was a highly statistically significant effect after using cabbage leaves with breast expression on the reduction of breast engorgement more than those who use routine care. **Conclusion:** Application of the cold cabbage plus breast expression was more effective than routine hospital care on the reduction of breast engorgement. **Recommendation:** Encouraging the use of non-pharmacological measures as cabbage leaves with breast expression as it was safe and less expensive those who have breast engorgement.

Keywords: Breast engorgement, Cabbage leaves, Breast milk expression, Postnatal mothers.

I. INTRODUCTION

Lawrence and Lawrence (2016) stated that Breast engorgement has defined as the swelling and distension of the breasts, usually in the early days of initiation of lactation, caused by vascular dilatation as well as arrival of the early milk. It characterized by the painful swelling of the breasts associated with the sudden increase in milk volume, vascular congestion, and edema during the first two weeks after birth. It may lead to a decreased milk supply, mastitis, and inflammation of the breast. It is caused by the buildup of breast milk during breastfeeding (Ministry of Health-Manatū Hauora, 2015).

Generally, the woman with breast engorgement may find that her breasts become larger and heavy, warmer and uncomfortable when milk 'comes in', usually from two to six days after the baby is born (Australian Breastfeeding Association, 2014). The first signs of the condition are the swollen, firm and painful breasts. In more severe cases, the affected breast becomes very swollen, hard, shiny, and slightly lumpy when touched. In cases when the breast is greatly

engorged, the nipple is likely to retract into the areola. Ordinarily, women experience loss of appetite, fatigue, weakness, and chills. A fever may occur in fifteen percent of the mothers, but is typically less than 39°C and lasts for less than one day (Sharma, 2014).

Based on the scientific evidence, cabbage leaves can reduce the pain of engorgement without side effects. Also, cabbage leaves increases breastfeeding duration, and its use is recommended for engorgement (Lawrence et al., 2016). Cabbage is known to contain sinigrin rapine, mustard oil, magnesium, oxylate and sulphur heterosides. Cabbage also has both antibiotic and anti-irritant properties (Lawrence and Lawrence, 2016).

Sharma (2014) pointed out that the nurses contribute to the health and well-being of women, children, and family, promoting skilled and specialized care in the clinical management of breastfeeding in their professional practice. In addition, they should guide and demonstrate maneuvers to express milk to mothers so they can be performed when feeding their babies, and prevent the occurrence of breast engorgement.

Significance of the study:

Breast engorgement is one of the significant problems confronting nursing women, especially primiparous in the first week of motherhood (World Health Organization, 2014). It is evidenced that the incidence of breast engorgement in the world is 1:8000 and in India is 1: 6500 (Malini, 2017). Rate of breast engorgement between 25% and 85% has been reported in Egypt (Sangar, 2015). Breast engorgement may affect the area around the nipple and areola only, or the entire breast, and may affect one breast only, or both. Once engorgement occurs, swelling around the nipple may make it even more difficult for the newborn to latch-on and feed successfully, and make the engorgement worse. Breast pain and swelling discourage the women from continuing breastfeeding. However, women may also receive limited advice and support from the health professionals; a lack of knowledge in managing this condition could be the reason for limited or inappropriate advice (Disha et al., 2015). Managing breast engorgement has always been a challenge for the nurses who are working with postnatal mothers. It was important for the nurses to know how to manage breast engorgement to provide evidence based practice for introducing this intervention in the clinical practice field. Based on what is mentioned before, this study is undertaken to investigate the effect of cabbage leaves on relief of breast engorgement among a group of breastfeeding women after caesarean section.

Purpose of the Study:

The study purposed to investigate the effect of cabbage leaves on the relief of breast engorgement among women with cesarean section.

Research Hypotheses:

1- Cabbage leaves plus breast expression reduce breast engorgement in terms of pain intensity, pyrexia, edema and redness among women with cesarean section more than those who use routine care.

II. METHODS

Research design:

A quasi-experimental design (case-control group) was used.

Setting:

The present study was conducted in the postnatal ward at Menoufia University Hospital and Shebin El-Kom Teaching Hospital. These settings were selected because of the highly flow rate of C.S, high level of services were provided, and provision of postnatal services for women with various socioeconomic backgrounds. They have high turnover of puerperal women. Also, these settings were governmental hospitals. Mothers remain in hospital for at least 24hrs after C.S in University Hospital and from 2-4 days in Shebin El-Kom Teaching Hospital. The flow rate of women delivered C.S (primiparas and multiparas) ranged from 8-10 cases/day in University Hospital and from 4-6 cases/day in Shebin El-Kom Teaching Hospital. The flow rate of primipara ranges from 2-3 cases attending per day (emergency day).

Sampling:

A purposive sample of 60 postpartum women (45 women from from Menoufia University Hospital and 15 women from Shebin El-Kom Teaching Hospita) were selected. They included primi postnatal mothers who had undergone cesarean section, free from medical disease which interferes with breastfeeding, delivery of viable healthy baby and has breast engorgement. The selected women were then randomly assigned into two groups (study and control). Each of the 60 was asked to pick a piece of paper containing a number (1 and 2). Those who selected number 1 was assigned to study group, those who selected number 2 was assigned to control group. This technique was used to avoid sample contamination and bias.

Sample size: The sample size was calculated by using the following formula

$$N = \frac{2(z_{1-\alpha} + z_{1-\beta})^2 \sigma^2 \{1 + (m-1)p\}}{md^2}$$

The sample size was calculated for each group according to the following equation and the results of the pilot study. The researcher considering a type I error of 0.05, a test power of 0.8, $m = n_1$ =size of sample from population 1, and $d = 2$ as the least significant difference (Diggle, Heagerty, Liang & Zeger, 2013). Based on the sample size measured, a total of 60 women (30 for each group) participated in the study.

Instruments:

Instrument I: A structured interview questionnaire: It was developed based on the review of currently related literature. It consisted of three parts: the first part contained questions related to the socio-demographic characteristics, the second part contained data related Antenatal assessment, the third part contained data related to knowledge about breast engorgement.

Instrument II: A breast engorgement checklist: This instrument was especially designed to provide the baseline data of the participants regarding their signs and symptoms of breast engorgement. It was implemented by using an observational checklist which illustrated the breast current condition (redness, edema and pain as well as pyrexia. In addition, follow-up checklist was used to assess the effectiveness of the nursing interventions compared to routine hospital practices used to relieve the breast engorgement among the three groups. The severity of breast engorgement was assessed using the total score obtained for the symptoms of engorgement (Severity= Breast pain+ breast edema+ pyrexia+ erythema, with score ranging from 0 to 19). The degree of breast engorgement was estimated according to the Storr breast engorgement checklist scores (Storr, 2013).

Instrument III: A breast engorgement follow-up checklist: for observation and evaluation of breast engorgement after nursing intervention compared to routine hospital care.

Validity and reliability

For validity purposes, the researchers conducted an extensive literature review and developed the questionnaire from the previously used instruments and reviewing pertinent studies. Instrument 1 was designed by the researchers and validated by three experts (two Professors in Maternal and Newborn Health Nursing and one expert has doctorate degree in Obstetric Medicine) for content accuracy and internal validity, while instruments II and III were adopted from the previous studies. The interview questionnaire underwent some modifications according to the panel of judgment regarding the clarity of sentences and appropriateness of content. Test-retest reliability was used to estimate reliability.

Administrative Approvals:

An official letter was taken from Dean, Faculty of nursing, Menoufia University and directed to Directors of the study settings. An official permission was obtained to carry out the study from the directors of the above mentioned settings. Also, the approval of the Ethical Committee of the Faculty of Nursing, Monoufia University was obtained.

Ethical Consideration:

An approval of the committee of the research committee in the faculty of nursing, Menoufia University was obtained on 2/6/2015. Approaches to ensuring ethics were considered in the study regarding confidentiality and informed consent.

Confidentiality was achieved by the use of closed sheets with the names of the participants replaced by numbers. All participants were informed that the information they provided during the study would be kept confidential and used only for statistical purpose and after finishing the study, the findings would be presented as a group data with no personal participant's information remained.

Pilot study

A pilot study conducted to test the feasibility, applicability and understandability of the tools. It was conducted on 10% of the total sample (6 women) according to the selection criteria. All women participated in the pilot study excluded from the study sample because the researcher made some modifications of the instruments.

Study field work:

The current study was carried out on four phases:

1) Preparatory phase:

An extensive review related to the study area was done including electronic dissertations, available books, articles and periodicals. A review of literature to formulate knowledge base relevant to the study area was also done. A written permission from the institutional authority of the two hospitals was obtained before conducting the study. The researcher was constructed and prepared of the different data collection tools, measuring tape, in addition to seeking managerial arrangement to carry out the study.

2) Interviewing phase:

The researcher collected the data from the women of the two groups through an interview and assessment.

3) Implementation phase (for study group):

Started immediately after assessment (pre-intervention) in the 4th day postpartum; each woman in the group was received two sessions, one for knowledge about breast engorgement and one for applying nursing intervention to relieve breast engorgement.

In the first session, the researcher explained with each women definition of breast engorgement, causes of breast engorgement, signs and symptoms associated with breast engorgement, and its complications if breast engorgement not treated. This session took about 20-30 minutes.

In the second session, the researcher explained how to perform breast expression of milk manually (or pump) after breastfeeding. Express one breast for at least 3 to 5 minutes until the flow slows, then expresses the other side and then repeats both sides for 20 minutes. The researcher instructed the women to do this technique 3 times/day or every 8 hours for 3 continuous days or until completely relieved. The researcher also explained with each woman to wait for half an hour after breast expression then apply cold cabbage to the breast. The researcher instructed the women how to apply cold cabbage leaves compresses directly to the engorged breast, Cold cabbage leaves were placed inside the women bra for 15-20 minutes. Remove wilted leaves and reapplies fresh leaves. The leaves should be applied between breastfeeding sessions. The researcher instructed women to repeat this technique 3 times/day for 3 consecutive days. The researcher instructed each woman to stop intervention if breast engorgement was completely relieved before three days. After removing cabbage compresses, the woman was instructed to wait for 40-30 minutes then breastfeed her baby. The instructions were through visual pictures of both techniques, demonstration by the researcher which took 20 minutes and re-demonstration by the women which took about 20 minutes. This session took about 60 minutes.

At the end of the sessions, the researcher advised the mothers to nurse their infant from both breasts every 2 to 3 hours and for 10 to 15 minutes and wearing supportive bra. Each woman was given booklet, measuring tape and thermometer and trained how to assess breast condition after intervention. The researcher scheduled with each women for the next visit in the 7th day during postnatal follow-up at outpatient clinics for follow-up assessment using instrument 3.

For control group, The women who were assigned to the control group were interviewed also in the first 12 hours following C.S, examined her breast condition in the 4th day postpartum during the initial home visit for assessing degree of breast engorgement, did not receive management from the researcher, and they received the routine postnatal care

included simple analgesia if required, instructions on correct latching and positioning of baby to breast, hand expression of breast milk or massage techniques prior to breastfeeding as well as the provision of a support nursing bra. At the end of the first visit, the researcher advised the mothers to nurse their infant from both breasts every 2 to 3 hours and for 10 to 15 minutes and wearing supportive bra. Each woman was given measuring tape and thermometer and trained how to assess breast condition after intervention. The researcher scheduled with each women for the next visit in the 7th day during postnatal follow-up at outpatient clinics for follow-up assessment using instrument three.

4) Evaluation phase:

In this phase, all postnatal women recruited in the study were evaluated for the levels of breast engorgement, signs and symptoms (redness, edema, pain as well as women pyrexia) by the researcher using the follow up form (instruments 3) in the 7th day postpartum during routine follow-up of postpartum women at outpatient clinic in the hospital to assess effectiveness of the intervention and also breast engorgement assessed in the 10th day postpartum by the studied women themselves, as the researchers had limitations on visiting them again in their home and performing the assessment for them. The researcher was received the data by a telephone contact to assess the effectiveness of the intervention. This post assessment consumed about 15-20 min for each woman and the telephone call took about 15 minutes. A comparison was then done between the 1st and successive measurements which were done in the 4th day and in the 7th and 10th day after delivery.

III. STATISTICAL ANALYSIS:

Data analysis

The collected data were scored, tabulated and analyzed using (SPSS) version 22. Descriptive as well as nonparametric statistics were utilized to analyze the data pertinent to the study. The level of significance was set at $p < 0.05$. Chi square test, Independent sample t-test, Fischer exact test (FE), Mean and Mann-Whitney test (nonparametric test) were used to analyze the data.

IV. RESULTS

Table (1): Socio-demographic characteristics of the study Groups (N =60)

Variables	G 1		G 2		Total		Test of Significant	P value	
	No	%	No	%	No	%			
Age groups:	<25 -years	11	36.7	7	23.3	18	30	X2= 1.3	P=0.47 NS
	25-29	13	43.3	16	53.4	29	48.3		
	30-34	6	20	7	23.3	13	21.7		
	Mean±SD	28±2.5	Y	26.4±5.1	Y	27.4±3.6	Y	F=1.4	P=0.64
Education	Illiterate	7	23.3	5	16.7	12	20	LR =9.2	P=0.10 NS
	R&W	15	50	14	46.7	29	48.3		
	Diploma.	3	10	4	13.3	7	11.7		
Occupation:	University	5	16.7	7	23.3	12	20	X2 =1.4	P=0.48 NS
	Working	12	40	12	40	24	40		
	Housewife	18	60	18	60	36	60		
Employment type (N =		12		12		24			
	Employee	4	33.3	4	33.3	8	33.3	LR= 1.9	P=0.92 NS
	Vocational	2	16.7	3	25	5	20.9		
	Business	2	16.7	1	8.4	3	12.5		
	Farming	4	33.3	4	33.3	8	33.3		
Residence	Rural	18	60	21	70	39	65	X2= 2.5	P=0.28 NS
	Urban	12	40	9	30	21	35		
Family income:	Enough	28	3.3	24	80	52	86.7	LR= 9.3	P=0.01 Sig.
	Not enough	2	6.7	6	20	8	13.3		
Total		30	100	30	100	60	100		

Table (1) shows the socio-demographic characteristics of the study groups. The mean age of the participants was (27.4±3.6 Y). The majority of the participants (48.3%) were able to read & write & the minority of them (11.7%) had diploma. More than fifty percent of the participants were housewives (60%). More than half of them (65%) were from rural areas. Regarding the income, the majority (86.7 %) had enough income, which had statistically significant difference ($p = 0.01$).

Table (2): Ante-natal Care & Follow-up during Pregnancy of the Study Groups. (N =60):

Variables	G 1		G 2		Total		Test of Significant	P value
	N0	%	N0	%	N0.	%		
Follow-up pregnancy								
- Yes	20	66.7	16	53.3	36	60	$X^2=2.7$	$P=0.21$ NS
- No	10	33.3	14	46.7	24	40		
If No, Causes* : (N)=	10		14		24			
- Lack of awareness about antenatal care services	8	80	12	85.7	20	83.3	$LR=1.2$	$P=0.14$ NS
- Far distance	5	50	3	21.4	8	33.3		
- Expensive	4	40	8	57.2	12	50		
- Care only for dangerous cases	0	0	4	28.6	4	52.1		
- Waste time	1	10	0	0	1	4.1		
- More than one cause	7	70	11	78.5	18	75		
If Yes: Number of antenatal visits:								
- ≤ 4 times	11	36.7	8	26.7	19	52.8	$X^2=16.6$	$P=0.002$ Sig.
- > 4 times	9	30	8	26.7	17	47.2		
Receiving knowledge about breast care.								
- Yes	11	36.7	8	26.7	19	31.7	$X^2=0.47$	$P=0.49$ NS
- No	19	63.3	22	73.3	41	68.3		
Breast preparation during pregnancy								
- Yes	9	30	5	16.7	14	23.3	$X^2= 0.20$	$P=0.65$ NS
- No	21	70	25	83.3	46	76.7		
Total	30	100	30	100	30	100	60	100

*Percentages may add to more than 100% because one woman may mention more than one cause of not having antenatal care.

Table (2) shows ante-natal care and follow-up during pregnancy of the study groups. There was statistically significant difference regarding the number of antenatal visits ($p= 0.002$). Also, the majority of the study groups (68.3%) did not receive any information about breast feeding & breast care & problems associated with breastfeeding.

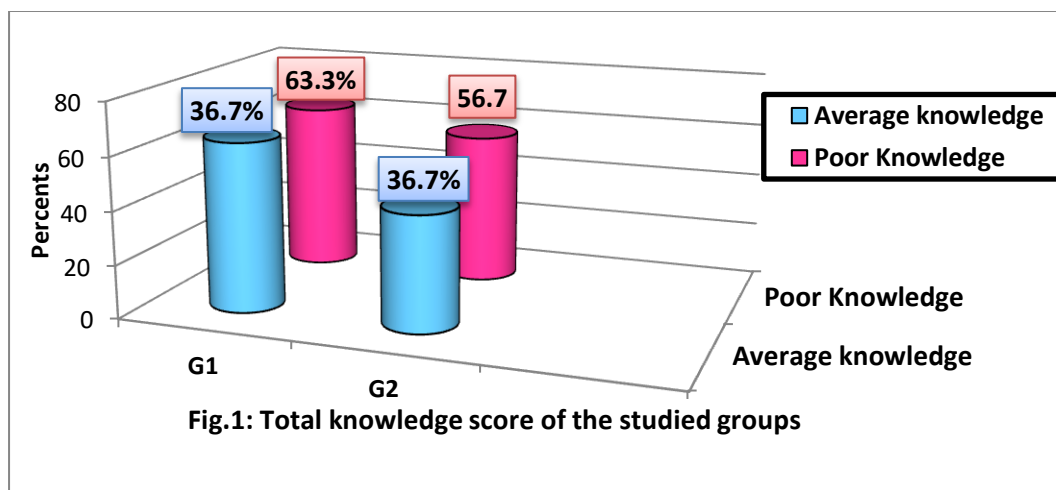


Figure (1): Knowledge of the Study Groups about Breast Engorgement (N =60):

Figure (1) shows knowledge of the study groups about breast engorgement. More than half of the study groups had poor knowledge about breast engorgement (63.3% and 56.7%) in Group1 and group 2, respectively.

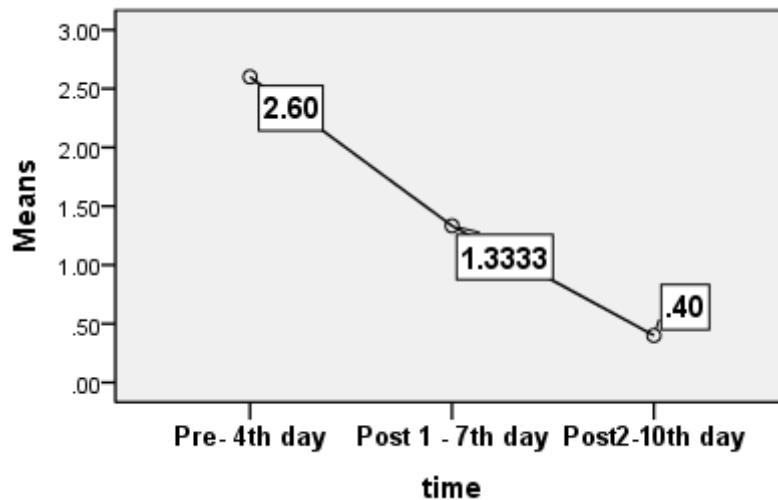


Figure (2): Mean Level of Breast Pain on the 4th, 7th, and 10th Days of Delivery Pre and Post- Nursing Interventions among Group1 (N=30).

Figure (2) shows the evaluation of breast pain on the 4th, 7th, and 10th days of delivery among group 1. It shows that there was highly statistically reduction in the means of breast pain from pre-intervention to 7th and 10th day post-intervention (from 2.60 to 1.3333 to .40, respectively).

Table (3): Breast Engorgement on the 4th, 7th, and 10th Days of Delivery Pre and Post- Nursing Intervention (N=60).

Study groups	Scoring of Breast engorgement	4 th day of delivery pre-intervention		7 th day of delivery post intervention		10 th day of delivery post intervention		*P value	Post hoc tests		
		No	%	No	%	No	%		P1	P2	P3
		Group 1 N=30	Non	0	0	22	73.3		30	100	$X^2=32.4,$ $P=0.000$ HS
Mild	2	6.7	2	6.7	0	0					
Moderate	16	53.3	6	20	0	0					
Severe	12	40	0	0	0	0					
Group 2 N=30	Non	0	0	0	0	5	16.7	$X^2=8.3,$ $P=0.03$ Sig.	$LR=3.2,$ $P=0.07$ NS.	$LR=10.3,$ $P=0.01$ Sig.	$LR=1.2,$ $P=0.26$ NS
Mild	0	0	8	26.7	3	10					
Moderate	13	43.3	8	26.7	13	43.3					
Severe	17	56.7	14	46.6	9	30					
Total		30	100	30	100	30	100				

Table (3) shows breast engorgement on the 4th, 7th, and 10th days after delivery. Among group (1), there was highly statistically significant reduction of breast engorgement between 4th day (pre-intervention) and post intervention 7th day and 10th day ($p=0.000, p=0.000$, respectively). Among group (2), there was no statistically significant reduction of breast engorgement between 4th day and 7th day ($p=0.07$). Also, there was no reduction of breast engorgement between 7th day and 10th day ($p=0.26$) of using routine hospital care.

V. DISCUSSION

The findings of the current study revealed that the research hypothesis was supported. The findings are discussed in the following sequence: 1- findings related to “socio-demographic characteristics” 2-findings related to antenatal follow-up during pregnancy 3- findings related to knowledge about breast engorgement. 4- Findings related to cold cabbage leaves. 5- Findings related to breast expression.

The present study found that the mean age of all the mothers in the study groups was 27.4 ± 3.6 years old. This may reflect that mothers in the study groups in this age were more likely to develop breast engorgement than older ones. This may be rationalized as the majority of girls were married at this age which considered as a middle reproductive age and also because older mothers have more experience in breastfeeding and less likely to develop breast engorgement.

This comes in agreement with **Eapen and Fernandes, (2013)** who investigated the effectiveness of an information booklet on the measures of managing breast engorgement in Mangalore, Kannada. They reported that the highest percentage of mothers were in the age group of 24-29 years old who had breast engorgement. Also, this finding was in harmony with **Disha and Singh, (2015)** who investigated the effect of chilled cabbage versus hot compresses on breast engorgement among postnatal mothers in Chandigarh. Their findings revealed that breast engorgement is more common in the age group 25-28 years old.

These findings are in disagreement with **Wong et al, (2017)** who investigated the effectiveness of chilled cabbage leaves and gel packs on breast engorgement in Singapore. Their findings revealed that the mean age of all mothers was 32.9 years: 62.6% having the first baby, 30.4% having their second child and 7% having their third child.

As regards education, the majority of the study groups who developed breast engorgement was low educated while the minority of them was highly educated. This may be rationalized as low educated women have limited knowledge about breastfeeding and less likely to breastfeed exclusively and develop breast engorgement. This was supported by **Najem, (2012)** in California who found that mothers with a college education are thirty eight times more likely to breastfeed exclusively than those with secondary school or diploma; this can prevent the former from developing breast engorgement.

It was also supported by **Chiu et al (2010)** in Taiwan and **Dennis et al, (2016)** in New England who confirmed that less educated mothers tend to have lower rates of exclusive breastfeeding and higher risk for premature weaning and this predisposes them to breast engorgement. This result was also in accordance with **Sharma, (2013)** in North Adelaide, Australia who revealed that, the breast engorgement was more likely to occur in highly educated and middle social class women.

Regarding occupation, the present study revealed that the majority of housewives in the studied groups were more likely to suffer from breast engorgement than working ones. This is attributed to the fact that less educated housewives are more than working ones. So, the educated working mothers may have more access to different sources of accurate information about breastfeeding.

The present finding was supported by the study of **William, (2014)** in California who investigated the duration of breast milk expression among working mothers enrolled in an employer-sponsored lactation program. It was reported that although maternal employment has been one of the greatest barriers to breastfeeding, working mothers are increasingly solving this problem by expressing milk at work and taking it home to their infants. That is why they are less likely to develop breast engorgement. Also they were supported by a study conducted by **Dennis et al, (2016)** in New England who concluded that employed mothers tend to favor exclusive breastfeeding, and this can prevent them from developing breast engorgement.

Regarding pregnancy follow-up, there was no statistically significant difference between the study groups. More than half of them had follow-up and sought antenatal care during pregnancy. Also, there was statistically significant difference regarding number of antenatal visits in which the study groups had follow-up their pregnancy more than four times. This may be rationalized as all the study groups were primipara who needed antenatal care guidelines. This indicates that the number of visits is influenced by the increased needs that arise during pregnancy.

All literature emphasizes the importance of antenatal education for pregnant women to avoid any complications during pregnancy, labor and postpartum period. This current finding was confirmed by studies conducted by **Hildingsson et al, (2016)** in Sweden and **Petrou et al, (2013)** in UK, whose findings revealed that a higher number of antenatal visits, the women were in primiparae and with medical risks during pregnancy.

The present findings were supported by a study in Geneva done by **Walker, (2013)** investigating evidence based prenatal care visits. Walker revealed that the number of prenatal care visits for pregnant women was approximately nine visits for

nulliparous women and seven for parous women. Also, these findings were not in congruence with a study conducted in Malaysia by **Ahmed et al, (2012)** who reported that most of women ignored the importance of antenatal follow-up and thus had lack of antenatal follow-up visits.

Moreover, the present finding revealed that the majority of the study groups did not receive knowledge about breastfeeding, breast care and problems associated with breastfeeding. So, the majority of the study groups did not perform preparation to breast during pregnancy. This may reflect the deficiencies in health institutions regarding their role toward health education. In addition, this is probably because the interest of antenatal clinic focuses mainly on serious cases and neglects health teaching about such subjects for pregnant women, especially primipara.

This is in agreement with a study conducted in Banha, Qalyubia Governorate by **Mandor, (2011)** who found that the majority of the study groups had no idea either about breast preparation or breast care during pregnancy as most of the subjects never visited antenatal clinics or follow up their pregnancy.

On investigating knowledge about breast engorgement in the present study, it was noted that the study groups had poor knowledge regarding breast engorgement. This is not surprising since they were less educated and housewives. This finding may be attributed to the fact that all of the study groups were primiparous who usually lack knowledge and experience in motherhood crafts, which in turn makes them at high risk of breast engorgement. They may also have incorrect knowledge or unaware of their own health as well as insensitive to minor symptoms of engorgement, incapable of overcoming embarrassment to report them or seek medical help. In addition, homemakers may have lack of autonomy, empowerment, and decision-making abilities to follow correct breastfeeding techniques.

For example, the study of **McClellan et al, (2012)** in US revealed that although most women are aware of the fact that breastfeeding is the best source of nutrition for infants, they often lack knowledge regarding the reduction in health risks that occur through breastfeeding such as breast engorgement.

The present study also illustrated that all the study groups do not know any information about the complications of breast engorgement. This is probably because many of them were from rural areas in which they do not have good access to care and information. This supported by **Moon and humenick, (2016)** who conducted a study in Belgaum, revealed that nipple trauma and engorged breast occur frequently when women receive inappropriate advice and care.

Unfortunately, when women were asked about preventive and curative measures undertaken to relieve breast engorgement, the majority of the study groups responded incorrectly. Again, this is probably attributed to the fact that all of the study groups were primiparous with limited education background. A study was conducted in this context by **National Center for Chronic Disease Preventive and Promotion of Health for Women before, during, and after Pregnancy, (2015)**. It revealed that pain during breastfeeding is preventable when a woman receives appropriate advice about starting and continue to breastfeed after delivery.

In addition, the study of **Stamp et al., (2016)** on breastfeeding among rural women in South Australia also demonstrated that lack of knowledge and support results in problems about establishment of breastfeeding such as breast engorgement, which usually occurs due to poor breastfeeding technique. Therefore, they suggested that ongoing information and support are crucial to ensure successful breastfeeding free from any problems.

This comes in agreement with the study of **Hummerick, Hill & Anderson (2014)** in USA, that revealed that health professionals' lack of knowledge in managing breast engorgement could be the reason for limited or inappropriate advice and support for puerperal women. Therefore, **Hill (2017)** reported in their Cochrane database systemic review in USA that antenatal breastfeeding education increase breastfeeding duration. It is also reported that such education showed a significant reduction of symptoms associated with breast engorgement.

In contrast, a randomized controlled trial was conducted by **De Oliveira et al, (2012)** in Brazil. Their findings revealed no significant difference between women who were counseled once in hospitals and those who were not counseled on breastfeeding in relation of developing breast engorgement. Therefore, the mother should be educated immediately after delivery about the dangerous breast symptom she may develop and that necessitate the immediate demand for medical care. A health education message given to the mother should include the importance of periodic suckling and complete emptying of the breasts.

The findings of the present study showed that there was a highly statistically significant difference after using cabbage leaves with breast expression on the reduction of breast engorgement in terms of pain, edema and redness more than those who use routine care. It is not entirely clear why cabbage leaves would reduce breast engorgement, but the green cabbage plant contains a high concentration of sulphur, which is known to reduce swelling and inflammation in all tissues (**Arora et al, 2015**). Cabbage is known to contain sinigrin (allylisothiocyanate) rapine, mustard oil, magnesium, oxalates and sulfur hetroisides. Herbalists believe that cabbage has antibiotic anti-irritant properties. It is theorized that this natural mixture of ingredients from Mother Nature's Kitchen, helps decrease tissue congestion by dilating local capillaries, which improves the blood flow in and out of the area, allowing the body to reabsorb the fluid trapped in the breasts (**Lawrence et al, 2016**).

Many studies have been conducted to investigate the effects of cabbage leaves in various ways, in an attempt to work out why exactly they are believed to relieve engorgement. One solution is that they have a cooling effect. By contrast, study conducted in Darwin, NT Australia by **Robert et al, (2015)**, who compared the effectiveness of room temperature and chilled cabbage leaves in reducing the discomfort of breast engorgement in postnatal mothers. Their findings revealed that chilling has no difference, even room temperature cabbage leaves were just as good as chilled in both cases.

These results were similar to a study conducted in Singapore on 277 mothers with breast engorgement by **Wong et al, (2017)** and another one conducted in Darwin, NT Australia by **Roberts, (2012)** who investigated the effectiveness of chilled cabbage leaves and cold gel packs on breast engorgement. Their findings revealed that similar significant reduction in pain and breast engorgement with both methods with two thirds of mothers preferring the cabbage leaves due to a stronger and more immediate effect.

A quasi experimental study was conducted by **Ruba, (2011)** in Tamil Nadu to investigate the effectiveness of cabbage leaves application on breast engorgement among postnatal mothers. The study had twenty four mothers selected by using the purposive sampling method. Pretreatment level of breast engorgement is compared with post treatment level and found that application of cabbage leaves to relieve breast engorgement is very effective.

This study is supported by the findings of **Snowden et al, (2014)** who reviewed research studies to investigate the effect of several interventions to relieve the symptoms of breast engorgement among breastfeeding women in UK. Their findings revealed that cabbage leaves were effective in the treatment of this painful condition. Cabbage leaves were preferred by mothers. The advantage of using cabbage leaves is its low cost and convenience as compared to other medical regimens.

Roberts et al, (2015) also compared the efficacy of cabbage leaf extract with that of a placebo in the treatment of breast engorgement in lactating women in Darwin, NT Australia. Their findings revealed that both the groups received equal relief from the discomfort and the hardness in breast tissue which decreased substantially.

The findings of the present study showed that there was a highly statistically significant difference after using cabbage leaves with breast expression on the reduction of breast engorgement in terms of pain more than those who use routine care. The effectiveness of cabbage leaves in relieving pain from breast engorgement concurred with results from several studies;

Arora et al, (2015) performed a quasi-experimental study in India on cabbage leaves application for breast engorgement. The authors enrolled 60 postnatal mothers with breast engorgement. Pre and post treatment test scores were measured the pain of the breast in breast engorgement. It is concluded that both cabbage leaf and hot and cold compresses were effective in decreasing the pain.

El Razeq et al, (2016) performed a quasi-experimental study to investigate the effectiveness of both cabbage leaves and cold therapy in relieving breast engorgement in the postnatal wards of two hospitals; Sue Canal University Hospital and Ismailia General Hospital in Egypt. It was found that the pain scores between the two groups in the pre and post-test intervention were found to be significant.

Emmanuel, (2011) carried out an experimental investigation on the effectiveness of cold therapy and cabbage therapy in the treatment of breast engorgement in Pune. It was found that both therapies were effective in reducing pain for breast engorgement treatment. However the study group who received the cabbage leaf treatment expressed that it was more effective.

Robson, (2016) conducted a study involving 152 women with caesarean sections in Canada. Eighty eight developed breast engorgement and were randomly assigned to the intervention group, who received cold cabbage or the control group, who received routine care. The findings revealed that there was a decrease in pain intensity after cold cabbage treatment. In contrast, the control group increased from pre-test level of pain to post-test level.

The present study findings also concurred with **Roberts, (2012)** in Darwin, NT Australia, who found a greater percentage reduction in pain for the participants who used the cabbage leaves compared to the gel packs. The cooling properties of the cabbage leaves could have resulted in the reduction of hardness and swelling, thereby reducing pain.

The present study findings revealed that there was a highly statistically significant difference after using cabbage leaves with breast expression on the reduction of breast engorgement in terms of breast edema more than those who use routine care. This was supported by a study conducted in AIIMS, New Delhi by **Arora et al, (2015)** and a study conducted in Africa by **Nikodom et al, (2014)** who revealed that cabbage leaves could help reduce breast edema. These findings are consistent with **Wong et al, (2017)** in Singapore who reported that the overall results indicated that cabbage leaves and gel packs were effective in relieving breast hardness and swelling.

The present study revealed that there was a highly statistically significant difference after using cabbage leaves with breast expression on the reduction of breast engorgement in terms of breast pyrexia more than those who use routine care. However, the results were not significantly different among all the study groups. Nevertheless, during the interview some participants verbalized that their fever went away after using the cabbage leaves.

This result was supported by **Rosier, (2014)** in USA who investigated the effect of cold cabbage leaves in temperature on mothers with breast engorgement. The findings revealed that mothers with breast engorgement experienced fever subsided without any antibiotics.

The present study revealed that using breast expression helps in reducing breast engorgement. This may be rationalized as expressing milk decreases the mechanical stress on the alveoli, prevents the cell death process, prevents blood circulation damage, alleviates the impendence to lymph and fluid drainage; decreases the risk of mastitis and compromised milk production. Also, breast expression helps in reducing breast edema, allowing the baby to latch on properly and giving relief to the mother.

This is in agreement with a study conducted in Umeå, Sweden by **Aarts, (2012)** who reported that when breasts are severely engorged, the baby often cannot latch on properly. Pumping or manually expressing some breast milk can help to reduce engorgement, allowing the baby to suckle, thereby helping to alleviate the swelling and prevent future episodes.

In addition, these findings were similar to a study conducted in Africa by **Nikodom et al, (2014)** who reported that many women are afraid to pump or express milk while they are engorged because they think it will cause them to make even more milk. However, engorgement is really a problem of poor milk flow, rather too much milk. If the breasts are so full that it's hard for the baby to latch on correctly, it may want to pump or hand express some milk before the feeding. She should express enough to soften the nipple and areola, so the baby can better grasp the breast. If the breast is still uncomfortably full after feeding, she should pump for a few minutes until the breasts are softer, the milk flows better, and the firmness is reduced enough to relieve discomfort and decrease obvious softening.

Moreover, these findings were supported by **Fraser, (2013)** who conducted a study in Daejeon, Korea who reported that the occurrence of engorgement would require artificial removal of milk and breast expression was effective in reducing breast engorgement. Also, **WHO, (2015)** stressed the importance of teaching all mothers how to express their milk in the first or second day after delivery. Breast pumping for a new mother should commence 6-24 hours after birth (**John et al, 2013**).

Milk removal starts by the third postpartum day to promote the likelihood of successful lactation (**Odom et al, 2015**). The present finding was supported by a study in Geneva done by **Walker, (2013)** who reported that hand expression and electronic pump may be most helpful, as this drain the milk ducts better (**Riordan et al, 2014**).

Along with the application of intervention, mothers' health education regarding proper breastfeeding, proper compliance with the treatment to increase the success rate of intervention is necessary. Also, frequent breast expression with each intervention seems to support its value in reducing breast engorgement (**Watkins et al, 2011**).

VI. CONCLUSION

According to the findings of the present study, it can be concluded that there was a highly statistically significant difference after using cold cabbage leaves with breast expression on the reduction of breast engorgement in terms of pain intensity, edema, pyrexia and redness more than those who use routine care. This supported the study hypothesis. Based on the present findings; the study hypothesis was accepted.

VII. RECOMMENDATIONS

In light of the study findings, the following recommendations are proposed:

Incorporating preventive measures and taking care of breast engorgement within antenatal counseling to avoid breast engorgement after delivery. Encouraging the use of non-pharmacological measures as cabbage leaves with breast expression as it was safe and less expensive for those who have breast engorgement.

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