

## Effect of Breast Milk on Nipple Pain among Early Puerperal Lactating Women

Eman A. Fadel & Nahed Fikry Hassan Khedr

Woman's Health and Midwifery Nursing Department, Faculty of Nursing, Mansoura University, Dakahlia, Egypt

Corresponding Author: Nahed Fikry Hassan Khedr

**Abstract:** Nipple pain is a common problem among breastfeeding women. Aim of the study was to evaluate the effect of breast milk on nipple pain among early puerperal lactating women. A quasi experimental research design was utilized. This study was conducted at Abu El-Saud Center for obstetrics and Gynecology in Aga City at Dakahlia Governorate. A purposive sampling technique was used to select a total number of 92 lactating women. Eligible women were assigned randomly into two equal groups; each group involved 46 lactating women. The control group followed the routine care while the intervention group was asked to express their breast milk and utilize some milk drops to lubricate the nipples and areolas after each feeding and let the nipple to be dried with air, in addition to, receiving the same routine care. Two tools were utilized for data collection, the first tool was a structured interview schedule and the second tool was a numeric rating scale to assess the intensity of nipple pain. **Results:** The findings of this study revealed that the intensity of nipple pain in the intervention group was significantly lower than the routine care group ( $p < 0.001$ ) post intervention. **Conclusion:** Expressed breast milk can be used as a lubricant on nipple to manage nipple pain among early lactating women. **Recommendation:** Raising awareness of obstetricians' doctors and nurses about the utilization of expressed breast milk to alleviate nipple pain among early lactating women.

**Keywords:** Breast milk, Lactation, Nipple, Pain, Puerperal period.

Date of Submission: 14-07-2018

Date of acceptance: 30-07-2018

### I. INTRODUCTION

Nipple pain at the early postpartum period is the most common complain of breastfeeding women<sup>1, 2</sup>. Worldwide, only two-fifths of infants are breastfed exclusively at the first six months after birth and less than one-third of African infants are exclusively breastfed, although, it is recommended by the World Health Organization to make exclusive breastfeeding for the first six months<sup>3,4</sup>. Nipple pain is considering the most relevant cause for either reduction of exclusive breastfeeding or its early cessation and poor outcomes<sup>5</sup>.

The common attributed cause of nipple pain may varied from improper breastfeeding technique, incorrect infant positioning or improper attachment that lead to in effective milk transfer which in turn results in unrelieved suction applied to the nipple surface, and this may elicit subsequent pain<sup>6,7</sup>. Painful stimulus when the infant apply strong vacuum movement with improper positioning or latch on nipple during breastfeeding has an inhibitory effect on oxytocin release. Inhibition of milk release and efficient transfer of milk from the alveoli to the nipple result in either non-nutritive sucking or breast engorgement that are both potential causes of nipple pain<sup>8</sup>.

Evidence indicates that multifaceted breastfeeding interventions strategies are in need to improve the breastfeeding outcomes and rates. The most highly effective evidence based interventions to improve the rate, duration and outcome of breastfeeding is providing early and comprehensive lactation support and managing breastfeeding difficulties as nipple pain<sup>9</sup>. There are various interventions for management of nipple pain such as breastfeeding education, applying compresses, dressings, ointments or tea bags<sup>10</sup>. Recently expressed breast milk (EBM) is recommend as a palliative breastfeeding practice which manage nipple pain to support and foster breastfeeding experience with its numerous benefits to the mother and infant<sup>11</sup>. Breast milk is a unique product. It has the consistent function of providing infant nourishment, protection, and development with short and long-term effects. It contains maternal cells, from leukocytes to epithelial cells of various developmental stages that include myoepithelial cells and lactocytes which have anti-inflammatory effects<sup>12</sup>. In addition, breast milk contains numerous antioxidants such as bilirubin albumins, uric acid, cysteine, coenzyme Q10 glutathione, lactoferrin proteins, carbohydrates, lipids, and molecules with bioactivity, such as vitamins and immunoglobulin which play a role in raising the immunity reaction to the part it applied on<sup>13</sup>.

Evidence suggests that utilization of some drops of expressed breast milk can be a facilitator of moist and healing nipple tissue among breastfeeding women. Expressed breast milk is a treatment for nipple pain as it

works as a barrier that avoids losing the natural moistness of deeper skin layers. Thus, cellular growth is increased and nipple trauma is prevented<sup>14</sup>. Also, it can be used as a non-invasive and plentiful source of cells from the lactating breast to differentiate tissue during lactation by the effect of stem cells which found in the breast milk components and have a great role in regeneration of cells in the case of breast difficulties during lactation<sup>15</sup>.

### **Significant of the Study**

Most breastfeeding women experience a transient period of nipple pain especially during the first early postpartum period that is expected to resolve within the first 10 days<sup>16</sup>. Incidence of nipple pain varied between 11% and 96% of breastfeeding women and up to one-third of mothers' experience these symptoms may change to alternate methods of infant nutrition within the first 6 postnatal weeks, if the pain persists<sup>17</sup>. Nipple pain interferes with the breastfeeding women' general activity, sleep pattern and mood status and reduces duration of breastfeeding or lead to early weaning and cessation of breastfeeding<sup>18</sup>. Nipple pain has also a great implication in the occurrence of postpartum depression and disturbance in the mother-infant relationship and if not manage, it may lead to nipple trauma which consider among the serious challenges facing lactating women as the first symptom of nipple trauma is nipple pain<sup>19,20</sup>.

In Egypt, beyond the clinical experience-based, few interventions exist for the management of nipple pain or for the description of nipple pain experience. All concerns are related to management of nipple trauma or breast problems without any attention to the pain which is the first indicator of all breast problems. So, this study was conducted to evaluate the effect of breast milk on nipple pain among early puerperal lactating women.

### **Aim of the Study**

This study aimed to evaluate the effect of breast milk on nipple pain among early puerperal lactating women.

### **Research hypothesis**

Early puerperal lactating women who lubricate their nipple with breast milk experience less level of nipple pain intensity than those who do not use.

## **III. Subjects and Method**

**Study design:** A quasi experimental design was utilized started from the beginning of July 2017, to the end of December 2017.

**Study setting:** The present study was conducted in Postnatal Clinics at Abu El-Saud Center for Obstetrics and Gynecology in Aga City at Dakahlia Governorate.

**Subjects of the study:** A purposive sample technique followed on ninety two early lactating women in the first postpartum week, complained from nipple pain. The study sample selected according to the following inclusion criteria; healthy lactating women at their first postpartum week; who had normal protruded nipples; free from any signs and symptoms of nipple trauma; presented with nipple pain only; had a healthy full term single baby and accepted to participate in the study with a written consent. The chosen subjects were assigned randomly into control and intervention groups; each group involved 46 women. The Control group received routine care to alleviate nipple pain, which included providence of health instructions about proper positioning and latching on and proper attachment while the intervention group, utilized some drops of expressed breast milk to lubricate nipples and areola after each breast-feeding and let it to dry in air. The intervention started from the first day of enrolment to the fourth and the seventh day after enrolment.

**Sample size:** The sample size was determined by using the following formula at 5% Power = 80%, Type of test = two-sided, then the formula of calculating sample size is  $n = [(Z\alpha/2 + Z\beta)^2 \times \{2(SD)^2\}] / (\mu_1 - \mu_2)^2$ . According to the formula the sample size required is 46 women in each treatment arm. Where; n = sample size required in each group,  $\mu_1$  = mean change in pain score from baseline in inspiratory muscle training group,  $\mu_2$  = mean change in pain score from baseline to week 24 in control group,  $\mu_1 - \mu_2$  = clinically significant difference, SD = standard deviation,  $Z\alpha/2$ : This depends on level of significance, for 5% this is 1.96,  $Z\beta$ : This depends on power, for 80% this is 0.84.

### **Data collection tools:**

*Two tools for data collection were utilized as follows:*

#### **Tool I. A structured interview schedule:**

It was designed by the researchers after reviewing the related literature to collect the baseline data. It consisted of three parts; socio-demographic characteristics such as age, residence, telephone number, education and occupation; past and present reproductive history such as gravidity, parity and mood of delivery; causes of nipple pain among the subjects.

### **Tool II. Pain Intensity Numeric Rating Scale (NRS):**

It was originally adopted from <sup>21</sup> to assess the severity of nipple pain pre-intervention at the first day of enrollment and post intervention on the 4<sup>th</sup> and 7<sup>th</sup> days. It is a fixed scale steps, a linear line with marks spaced (1) cm. The lactating women was asked to rate her pain intensity as a number. It is an 11 points scale ranging from 0 point indicates no pain, one to three points indicates existence of mild pain, four to six points indicates existence of moderate pain, seven to nine points indicates severe pain, finally 10 indicates the worst pain.

### **Validity of the tools**

Content validity of the tool was tested by a panel of three expertises in the field of maternity and gynecology of nursing and obstetrics and gynecology of medicine. According to panel's suggestion, the tool was modified in ordering or sequence of some sentences in the structured interview schedule.

### **Reliability**

Reliability of tool was tested through Cronbach's alpha test. The degree of reliability was 91.7% which mean high reliability of the tool.

### **Pilot study**

Pilot study was conducted on 10% of the present study sample (10 early lactating women) who distributed equally into two groups to be five women for each group. Pilot study sample was excluded from the total study sample .

### **Field work**

Data was collected three days per week started from the beginning of July (2017) to the end of December (2017). The work was conducted through three phases' assessment, implementation and evaluation; Assessment phase: At the baseline assessment, the researchers clarified the purpose of the study to all participants who agreed to participate in the study and were assured about confidentiality and privacy of the collected data. After obtaining their written consent, the data was collected by the researchers through face to face interview to collect the baseline data related to socio-demographic characteristics, past and present reproductive history and causes of nipple pain among the subjects. Also, intensity of nipple pain was rated by each participant using a numeric rating scale (NRS). Each interview lasted from 15 to 30 minutes. Then implementation phase: It started from the first day of enrolment; which was the first postnatal visit for all eligible lactating women came to the previous mentioned setting complaining from nipple pain at their first puerperal week. Eligible women were distributed randomly into two groups. The first group was the control group, who received the routine care for nipple pain, which include providing health instructions about the proper position during breast-feeding and proper latching on. While the second group was the intervention group, in which the researchers asked them to utilize some drops of expressed breast milk to lubricate their nipples and areola after each breast-feeding and let it to dry in the air. The intervention started from the first day of enrolment to the seventh day after enrolment, in addition to the routine care provided. Finally, **evaluation phase:** In which, both groups were evaluated for the intensity of nipple pain at the first day of enrolment and after the fourth and the seventh days after enrolment in the study; each participant rated the level of nipple pain within 10 minutes.

### **Ethical consideration:**

An ethical approval was attained from research ethics committee of the Nursing Faculty, Mansoura University. An ethical permission was taken from the Director of Abu El- Saud Center of Obstetrics and Gynecology in Aga City at Dakahlia Governorate to obtain the official permission to conduct the study after explaining the aim of the study. Formal consent had taken from the participants and had been informed about that, they had the right to be withdrawal from the study at any time.

### **Statistical analysis:**

The collected data were coded, computed and analyzed statistically utilizing SPSS (Statistical Package of Social Sciences) version 21.0 (SPSS Inc., Chicago, IL, USA). All data were categorical data and were expressed in number and percentage. The differences between groups were determined using chi-square test. Statistical significance was set at  $p < 0.05$ .

## **V. Results**

Table (1) indicates that 39.1% and 34.8% of the subjects in the control and intervention groups were in their twenties (21 to 25 years), only 15.2% and 0.9% of them respectively either over 30 years or more. No statistically significant difference was detected between groups' age, residence, and educational level or working status.

**Table 1. Number and percentage Distribution of the study subjects According to their General Characteristics (n=92)**

General Characteristics	Control Group (n=46)		Intervention Group (n=46)		Chi Square Test	
	No.	%	No.	%	X2	P-Value
<b>Age</b>						
< 20 years	15	32.6	11	23.9	4.266	0.234
20 -<25 years	18	39.1	16	34.8		
25 - <30years	6	13.0	14	30.4		
≥30 years	7	15.2	5	10.9		
<b>Mean ±SD</b>	23.9±4.3					
<b>Residence</b>						
Rural	32	69.6	38	82.6	2.151	0.143
Urban	14	30.4	8	17.4		
<b>Educational level</b>						
Basic	5	10.9	6	13.0	0.121	0.941
Secondary	24	52.2	24	52.2		
Higher	17	37.0	16	34.8		
<b>Working status</b>						
Working	6	13.0	7	15.2	0.090	0.765
Housewife	40	87.0	39	84.8		

According to Table (2) no statistical significant difference are present between both groups' reproductive history. However, among the intervention group almost one-half (58.7%) and 41.3% were either primipara or multipara respectively, compared to 67.4% primipara and 32.6% mutipara among the control group. More than three-fourths (82.6%) of the control group and 78.3% of the intervention group had a surgical delivery.

**Table 2. Number and Percentage Distribution of the Study Subjects According to Their Reproductive History (n=92)**

Reproductive History	Control group (n=46)		Intervention group (n=46)		Chi square test	
	No.	%	No.	%	X2	p
<b>Parity</b>						
Primi	31	67.4	27	58.7	0.746	0.388
Multi	15	32.6	19	41.3		
<b>Mode of last delivery</b>						
Vaginal	1	2.2	0	0.0	1.583	0.453
Vaginal with episiotomy	7	15.2	10	21.7		
Caesarean section	38	82.6	36	78.3		
<b>Sex of newborn</b>						
Male	13	28.3	19	41.3	1.725	0.189
Female	33	71.7	27	58.7		

Table (3) represents that (67.4% & 65.2%) of the control and expressed breast milk groups respectively assume baby cradle position during breastfeeding, (58.7% & 63.0%) of them did not maintain latch on during breastfeeding. Majority of routine care group and expressed breast milk group (95.7% & 91.3%) respectively remove nipple with force from baby mouth. In addition, table (3) shows that most of routine care group and slightly more than three quarters of expressed breast milk group (90.3% & 75.9%) were expressed breast milk by breast pump when the breasts were full.

**Table 3. Number and Percentage Distribution of the Study Subjects according to Their Breastfeeding Position and Technique (n=92)**

Items	Control Group (n=46)		Intervention Group (n=46)		Chi square test	
	No.	%	No.	%	X2	p
<b>Lactation position</b>						
Cradle	31	67.4	30	65.2	0.107	0.948
Side lying	10	21.7	10	21.7		
Laid back	5	10.9	6	13.0		
<b>Latch on</b>						
Yes	19	41.3	17	37.0	0.183	0.669
No	27	58.7	29	63.0		
<b>Let the nipple to be withdrawal by the baby without force removal</b>						
Yes	2	4.3	4	8.7	0.713	0.398
No	44	95.7	42	91.3		
<b>Expressed breast when full</b>						
Yes	31	67.4	29	63.0		

No	15	32.6	17	37.0	0.192	0.662
<b>Methods of express milk</b>						
Infant feeding	3	9.7	7	24.1		
Pump	28	90.3	22	75.9	2.256	0.133

**Figure 1. Intensity of Nipple Pain Pre and Post Intervention in the Control Group**

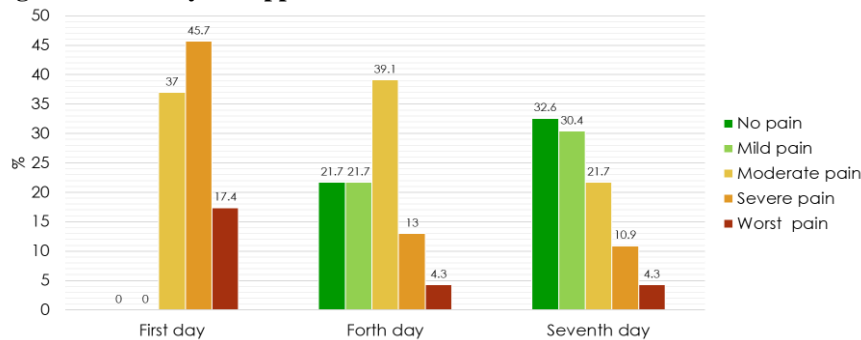


Figure (1) shows that the intensity of nipple pain in the control group on the day of enrolment varied between (37% moderate, 45.7% severe & 14.7% worst pain) while on the seventh day of intervention, the level of nipple pain varied between (30.4% mild, 21.7 moderate & 4.3% worst pain).

**Figure 2. Intensity of Nipple Pain Pre and Post Intervention in the Intervention Group**

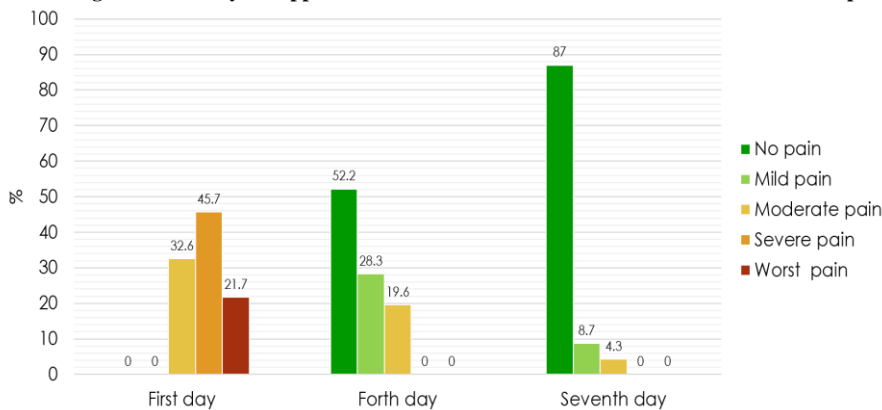


Figure (2) demonstrates that the intensity of nipple pain in the expressed milk group on the day of enrolment varied between (32.4% moderate, 45.7% severe & 21.7% worst pain) while on the seventh day of intervention, most of them (87%) had no nipple pain at all and only (4.3%) had severe pain.

**Table 4. Intensity of Nipple Pain Pre and Post Intervention among the Study Subjects (n=92)**

Level of Pain	Pre- intervention (n=92)				Post-Intervention (n=92)							
	on Base Line				on 4th day				on 7th day			
	Control Group (n=46)		Intervention Group (n=46)		Control Group (n=46)		Intervention Group (n=46)		Control Group (n=46)		Intervention Group (n=46)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No pain	0	0.0	0	0.0	10	21.7	24	52.2	15	32.6	40	87.0
Mild pain	0	0.0	0	0.0	10	21.7	13	28.3	14	30.4	40	8.7
Moderate pain	17	37.0	15	32.6	18	39.1	9	19.6	10	21.7	2	4.3
Sever pain	21	45.7	21	45.7	6	13.0	0	0.0	5	10.9	0	0.0
Worst pain	8	17.3	10	21.7	2	4.3	0	0.0	2	4.3	0	0.0
Chi Square Test. X2	0.347				17.156				29.253			
P-Value	0.841				0.002*				<0.001**			

\*Statistical significant at  $p \leq 0.05$

**\*\*Highly Statistical significant at  $p \leq 0.001$**

## **VI. Discussion**

The present study aimed to evaluate the effect of breast milk on nipple pain among early puerperal lactating women. The hypothesis was achieved through the present study findings, which revealed that lactating women who used expressed breast milk on nipple after each feed experienced less level of nipple pain intensity than the control group with statistical significant difference between the expressed breast milk group and the routine care group.

At the base line assessment, there were no statistical differences in either general characteristics, reproductive history and breastfeeding practices between routine care and expressed breast milk groups. While after the using of expressed breast milk drops on the nipple after each feeding in addition to the provision of the routine care, there were statistical significance differences on the fourth and seventh days of intervention. This study finding is supported by a randomized clinical trial, which was conducted at a maternity ward in an accredited hospital in the middle-western region of Brazil by <sup>22</sup>. The randomized trials involved one hundred women complaining from nipple pain and where randomized into two equal groups. Group one applied anhydrous lanolin daily after each breastfeeding. While group two, applied some drops of expressed breast milk on nipple after each breastfeeding. Both groups where instructed about the proper position and latch on during breastfeeding. Such study findings revealed that both interventions had positive effects on the relive of nipple pain. However, expressed breast milk was more effective than anhydrous lanolin in management of nipple pain during the intervention period.

The findings of the present study is also consistent with <sup>23</sup>, who had performed a clinical inquiry looking for which interventions are best for alleviating nipple pain in nursing mothers. They reported that expressed breast milk is superior over other interventions in management of nipple pain among early breastfeeding women. On the same line, another study by <sup>24</sup>, who had conducted a longitudinal study and indicated that, the use of breast milk for the treatment of nipple pain is very effective.

On the other hand, some other studies' findings contradict to the present study findings <sup>25,26,27</sup> who concluded that anhydrous lanolin was the better intervention than expressed breast milk for the treatment of nipple pain. Also <sup>1</sup>, had conducted a systemic review and reported that, the absence of any solid evidence to the superiority of expressed breast milk over antifungal creams, dressings, lanolin, nipple protection devices or phototherapy on nipple pain management. This contradiction could be attributed to limited <sup>1</sup> sample's size. Furthermore, the present study finding is in the opposite side to a comparative study conducted at Ain Shams University Maternity Hospital in Egypt to evaluate the effect of lanolin, tea bag compress and expressed breast milk on alleviating traumatic nipple among lactating women. They proved that there are no statistically significant differences between 3 methods on pain or trauma for traumatic nipple pre and post intervention<sup>28</sup>. This contradiction could be attributed to the traumatic nipple was accompanied with various degree of injury or trauma, while the present study intervention was performed for women with nipple pain without any signs of inflammation or infection

## **V. CONCLUSION**

It was accepted that early puerperal lactating women who lubricate their nipple with expressed breast milk experience lower level of nipple pain intensity than those who do not do this.

## **VI. Recommendations**

1. Providing third trimester antenatal health education should include a hint about early postpartum nipple pain.
2. Raising awareness of obstetricians' doctors and nurses about the utilization of expressed breast milk for management of nipple pain.
3. Conducting further research to:
  - Investigate the effect of applying expressed breast milk on prevention of nipple pain.
  - Investigate the effect of applying expressed breast milk on prevention and management of nipple trauma.

## **References**

- [1]. Dennis C., Jackson K. & Watson J. Interventions for treating painful nipples among breastfeeding women. Cochrane Database of Systematic Reviews. Cochrane Database of Systematic Review. 2014; 12.
- [2]. Puapompong P., Paritakul P., Suksamarnwong M., Srisuwan S. & Ketsuwan S. Nipple Pain Incidence, the Predisposing Factors, the Recovery Period after Care Management, and the Exclusive Breastfeeding Outcome. *Breastfeeding Medicine*. 2016; 12(3).
- [3]. Indongo N. & Mutorwa K. The Practice of Exclusive Breastfeeding in Namibia. *International Journal of Sciences: Basic and Applied Research (IJSBAR)* · 2017; 36(1):159-169.
- [4]. Xiaodong C., Wardlaw T. & Brown D. Global Trends in Exclusive Breastfeeding. *International Breastfeeding Journal*. 2012; 7(12).
- [5]. Vieira G., Martins C., Vieira T., Oliveira N. & Silva L. Factors predicting early discontinuation of exclusive breastfeeding in the first month of life. *Journal Pediatric*. 2010; 86 (5):441-4.
- [6]. Elad D., Kozlovsky P., Blum O., Laine A., Botzer E., Dollberg S., Zelicovich M. & Ben Sira L. Biomechanics of milk extraction during breast-feeding. *Proc. Natl. Acad. Sci. USA*. 2014, 111, 5230–5235.

- [7]. Kent J., Ashton E., Hardwick K., Rowan M., Chia K., Menon L., Scott C., Mather- McCaw G., Navarro K. & Geddes D. Nipple Pain in Breastfeeding Mothers: Incidence, Causes and Treatments. *Int. J. Environ. Res. Public Health* 2015, 12, 12247-12263.
- [8]. Meedya S., Fahy K. & Kable A. Factors that positively influence breastfeeding duration to six months: A literature review. *Women and Birth*.2010; 23, 135-145.
- [9]. Humphries J. Breastfeeding promotion. *American Journal of Nursing*. 2011; 111(12):1-12.
- [10]. McClellan H., Hepworth A., Garbin C., Rowan M., Deacon J., Hartmann P. & Geddes D. Nipple Pain during Breastfeeding with or without Visible Trauma. *Journal of Human Lactation*. 2012; 28(4):511-21.
- [11]. National Association of Pediatric Nurse Practitioners. NAPNAP position statement on breastfeeding. *Journal of Pediatric Health Care*, 2013; 27, e13-e15.
- [12]. Cacho N. & Lawrence R. Innate Immunity and Breast Milk. *Frontiers in Immunology*. 2017; 8 (584). Available at file:///C:/Users/Dr.%20Eman/Downloads/Innate\_Immunity\_and\_Breast\_Milk.pdf
- [13]. Hassiotou F. & Geddes D. Anatomy of the human mammary gland: current status of knowledge. *Clin Anat*. 2012; 26(1).
- [14]. Hassiotou F., Geddes D. & Hartmann P. Cells in Human Milk: State of the Science. *Journal of Human Lactation*. 2013; (2) 171–182.
- [15]. Meier P., Engstrom J., Patel A., Jegier B. & Bruns N. Improving the use of human milk during and after the NICU stay. *Clin Perinatol*. 2010; 37(1):217-245.
- [16]. McClellan H., Kent J., Hepworth A., Garbin C., Hartmann P. & Geddes D. Persistent Nipple Pain in Breastfeeding Mothers Associated with Abnormal Infant Tongue Movement. *International Journal of Environmental Research and Public Health*. 2015; 12, 10833-10845.
- [17]. Marrazzu A., Sanna M., Dessole F., Capobianco G., Piga M. & Dessole S. Evaluation of the Effectiveness of a Silver-Impregnated, Medical Cap for Topical Treatment of Nipple Fissure of Breastfeeding Mothers. *Clinical Research. Breast feeding Medicine*. 2015; 10, 5.
- [18]. Naimer S. & Silverman W. Seeing Is Believing?: Dermatoscope Facilitated Breast Examination of the Breastfeeding Woman with Nipple Pain. *Breastfeeding Medicine*. 2016; 11(7), 356-60.
- [19]. Buck M., Amir L., Cullinane M., Donath S. & Castle study team. Nipple Pain, Damage, and Vasospasm in the First 8 Weeks Postpartum. *Breastfeeding Medicine*. 2013; 9(2):56-62.
- [20]. Santos K., Santos G., Vieira T., Santos C., Giugliani E. & Vieira G., Prevalence and factors associated with cracked nipples in the first month postpartum. *BMC Pregnancy and Childbirth* (2016) 16:209.
- [21]. McCaffery M. & Pasero C. 0–10 Numeric Pain Rating Scale. *Pain: Clinical manual*. 1999. St. Louis: Mosby Inc.
- [22]. Vieira F., Mota D., Castral T., Guimaraes J., Salge A. & Bachion M. Effects of Anhydrous Lanolin versus Breast Milk Combined with a Breast Shell for the Treatment of Nipple Trauma and Pain during Breastfeeding: A Randomized Clinical Trial. *Journal of Midwifery Women's Health*. 2017; 62:572–579.
- [23]. Lochner J. & Livingston C. Which interventions are best for alleviating nipple pain in nursing mothers? *Oregon Health & Science University, Portland J., Fam Pract*. 2009; 58(11): 612a-612c.
- [24]. Szlagatys-Sidorkiewicz A., Zagierski M., Jankowska A., et al. Longitudinal study of vitamins A, E and lipid oxidative damage in human milk throughout lactation. *Early Hum Dev*. 2012; 88(6):421-424.
- [25]. Abou-Dakn M., Fluhr J., Gensch M., et al. Positive effect of HPA Lanolin versus expressed breast milk on painful and damaged nipple during lactation. *Skin Pharmacol Physiol*. 2011; 24(1): 27-35.
- [26]. Mills S., Ross R. & Hill C., et al. Milk intelligence: Mining milk for bioactive substances associated with human health. *Int. Dairy J*. 2011; 21(6):377-401.
- [27]. Vieira F., Bachion M., Mota DDCF & Munari D. A systematic review of the interventions for nipple trauma in breastfeeding mothers. *Journal of Nurse Scholarship*. 2013; 45(2):116-125.
- [28]. Ahmed E., Mohamed H. & Abu-talibAbu-talib Y. Evidence based guideline using to alleviate traumatic nipple among nursing mothers. *World Journal of Nursing Sciences*.2015; 1 (3): 35-44.