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THE EFFECT OF ELECTRIC BREAST PUMP IN INCREASING BREASTMILK PRODUCTION

Sheyla Najwatul Maula^{*}, Melyana Nurul Widyawati

*Postgraduate Applied Science Program in Midwifery,
Poltekkes Kemenkes Semarang, Semarang, Indonesia,*

*Corresponding author's E-mail: sheylanajwa@gmail.com

ABSTRACT

Background: Breastfeeding for 2 years has been recommended by WHO and CDC, so that breastfeeding has become an integral part that determines the quality of human resources in the future as well as solutions for social, environmental and the economic problems faced by every nation around the world. This study was conducted as a preliminary study, the first step in the production of portable electric breast pumping equipment. One of the innovations in modifying electric breast pumping equipment that is more useful effective and efficient in various activities. Breast pumping equipment is a step in the transformational breastfeeding process because it can improve breastfeeding sustainability in the activity performed.

Aims: To observe the effect of electric breast milk pump to the effectiveness and satisfaction in breast milk production in breastfeeding women in Semarang 2017.

Methods: Preliminary study results were tested by statistical analysis test of independent sample T-Test and chi-square. Independent variable in this study is electric breast pump and dependent variables are effectiveness and satisfaction. This study was carried out by testing the electric breast milk Spectra 9+. The data were collected from 10 respondents.

Results: The analysis test results showed the significance value $P > 0.05$ which meant that there was no significant difference between the effectiveness and satisfaction of breast milk production by using the electric breast pump.

Conclusion: The electric breast pumping equipment have no effectiveness and satisfaction in milk production. Modification of electric breast milk pumping equipment should be expected to improve the use by postpartum women to breastfeed in various activities.

Keywords: Electric breast milk pump, breast milk production, effectiveness, satisfaction

INTRODUCTION

Nutrition fulfillment is the main foundation in the successful development of a healthy nation with a strong economy. The nutritional condition of the population will determine the quality of human resources in the future. Lack of nutrition in infancy has an impact not only on the process of physical growth and mental development of a baby, but more broadly on the potential for growth and development of the nation. Breastfeeding is an effective solution to meet the nutritional needs in maximizing a baby's growth and development process. [1-3]

Breastfeeding occurs when the breast milk production starts after the end of labor. In the process, there are two hormones that have an important role to maintain lactation: 1) prolactin, increase milk secretion, and 2) oxytocin, cause ejection of milk. Ejection of milk or milk letdown refers to the expulsion or strong release of breast milk out of alveolar lumen through the ducts. The release of these two hormones is stimulated by

the neuroendocrine reflex triggered by the suction of the baby. The process of breast milk excretion comes out of the alveolar lumen and into the ducts occurs with the help of myoepithelial cells present in each alveolus toward the nipple. [4-8]

Breast suction by the baby stimulates the sensory nerve endings in the nipple, and gives rise to action potential that travels through the spinal cord to the hypothalamus. The hypothalamus, once it is activated, triggers the release of oxytocin from the posterior pituitary. Oxytocin then stimulates the contraction of myoepithelial cells in the breast to move the occurrence of milk ejection.[9, 10] The process of breast milk suction not only affects the release of the oxytocin hormone but also stimulates the production of prolactin hormone. Expulsion of the prolactin hormone secreted by the anterior pituitary is controlled by two hypothalamic secretions i.e. prolactin-inhibiting hormone (PIH) and prolactin-releasing hormone (PRH). PIH is known as dopamine that acts as a neurotransmitter in the brain.[11-13]

Throughout a woman's life, PIH has a dominant influence so that the normal prolactin concentration remains low. During lactation, every time a baby sucks a burst of prolactin secretion occurs. Afferent impulses triggered in the breast nipple by suction are carried by the spinal cord to the hypothalamus. This reflex ultimately leads to the release of prolactin by the anterior pituitary, although it is unclear whether this is due to inhibition of PIH secretion or PRH stimulation, or both. Prolactin then works on the alveolar epithelium to encourage the secretion of milk to replace the excreted breast milk. [11, 12]

Exclusive Breastfeeding is one of the highest impact interventions and is the primary strategy for optimally fulfilling nutritional needs in maximizing the baby's growth and development processes [14, 15] Breastfeeding could prevent 823,000 child deaths in 75 low and middle income countries each year. Other studies showed that the longer the duration of breastfeeding more than 6 months, the higher impact in improving cognitive, immune, motor, behavioral and mental development.[16] Intensive breastfeeding is able to optimize the baby's growth and development processed, as we all know that breastfeeding is a golden standard for infant nutrition that functions to transmit nutrients, affects biochemical systems, enhances immunity and eliminates pathogens [17, 18] In addition to bringing goodness to the baby, breast milk also can provides comprehensive benefits for mothers and the State.

In May 2012, the World Health Assembly took a decision and mandated the World Health Organization (WHO) to implement a comprehensive plan for mother, infant and child nutrition that has six global nutrition targets to be completed by 2025 including Exclusive breastfeeding of 6 months to reach 50% by 2025 and continue breastfeeding until the child is 2 years old or older. [3, 16, 19, 20]

Indonesia has launched several policies strengthened as a legal force in the implementation of exclusive breastfeeding program. In Law No. 36 Year 2009 on Health of Article 128 Paragraph 2 and 3 and Government Regulation of the Republic of Indonesia No. 33 Year 2012 it is specifically discussed Exclusive Breastfeeding which explains that every child is entitled to exclusive breastfeeding and full protection from various parties both government and non-government. [21] However, the facts showed that the rate of breastfeeding was relatively low in globally worldwide, only 38% of infants aged 0-6 months were exclusively breastfed [3, 22]. However, different data showed in 2015 that in Indonesia the exclusive breastfeeding has reached the target coverage by 39%, so in nationally the exclusive breastfeeding of infants less than six months has reached the coverage of 55.7% which means that Indonesia has reached the target. [23, 24]

In various activities, breastfeeding mothers need tools that can be used to maximize breastfeeding and breastfeeding sustainability process. Breast pumping equipment is a step in the transformational breastfeeding process because the process can improve breastfeeding sustainability in various activities, [25, 26] a breast milk pumping device is very effective to increase the production of breast milk.[27, 28] Although hormone is a major driver in the process of breast milk production, but the sustainable process of breastfeeding is determined by how many breast milk excretion effort is conducted. [29] The main thing

that determines the success of exclusive breastfeeding is the intensity of breastfeeding and maximizing the production of milk. [30, 31]. Thus, in this recent study, in the short-term of the existing equipment will be assessed the effectiveness and satisfaction in the use of electric breast pumping equipment with activity and without activity. Having obtained these results, in the long-term goal by modifying the electric breast pumping equipment into a portable electric breast pumping equipment so that it can facilitate breastfeeding mother in providing breast milk in various activities.

METHODS

This preliminary study was conducted in April 2017 on 10 respondents with two interventions of postpartum mothers in Pedalangan sub-district, Semarang. List of population units obtained through complex cadres with used the quota sampling sample design. In determining the samples in this study was conducted by one health cadre in one complex of 10 respondents from data of breastfeeding mother in each housing complex. This study used quasi experimental method with time series design by using a series of observations. Statistical analysis used in this study was by Independent T-test and chi-square analysis. Study stages began by doing informed consent to the respondents in testing the electric pumping device. Postpartum women who were willing to be respondents used an electric breast milk pump by using Spectra 9+, time spent by each respondent was ± 15 minutes in the process of breast milk excretion by going through two interventions i.e. pumping milk with activity and without activity.

In achieving the objectives, this study was conducted by using questionnaires as a material evaluation of the actions. The questionnaire contained a component of information regarding the respondent's self-identity, the amount of milk produced with and without activity, and statements regarding the effectiveness and satisfaction in the use of electric breast milk pumping equipment. Intervention was conducted with activity and without activity since the start of breast milk pumping with electric breast pump. The definition of with activity is to perform various activities and perform movement while doing breast milk pump whereas the definition of without activity is sitting somewhere while doing breast milk pump. This was performed to assess the performance results of electric breast milk pumping equipment when during the production process on how much milk produced by postpartum women under different conditions.

RESULTS

This preliminary study was conducted in April 2017 on 10 respondents of postpartum mothers in Pedalangan sub-district, Semarang. The objective of this study is to observe the effect of electric breast milk pump on the effectiveness and satisfaction in milk production in postpartum women in Semarang. The results of experiment on the use of electric breast milk pumping equipment can be shown as follows:

Table 1. Influence of breastfeeding production by using an electric breast milk pump with interventions of activity and without activity

Intervention	Milk production						Levene's Test of for Equity of Variances		
	Mean	Median	Std. dev.	Kolmogorov Smirnov			F	Sig	Sig. (2 tailed)
				Statistic	df	sig			
Activity	98.70	97.50	25.787	.146	10	.200	.503	.487	.973
No activity	33.50	34.50	4.979	.232	10	.006			

Shown in Table 1, Based on the analysis of data normality test using Kolmogorov Smirnov, the significant test result on activity in milk production showed that the data were normally distributed (P value > 0.05). Based on the output result it was obtained sig (2-tailed) value of $0.973 > 0.05$, then according to the basis of decision-making in the independent sample T-test it can be concluded that there was no significant difference in the production of breast milk through the electric breast pump between the groups of with activity and without activity.

Table 2. Cross tabulation of effectiveness and satisfaction to breast milk production with activity and without activity

	Group2 (effectiveness and satisfaction)				Total
	Less	Moderate	Good	Very Good	
Group 1					
Activity	1 (10%)	2 (20%)	7 (70%)	0 (0%)	10 (100 %)
No activity	0 (0%)	0 (0%)	9 (90%)	1 (10%)	10 (100 %)
Total	1 (5%)	2 (10%)	16 (80%)	1 (5%)	20 (100%)

Table 3. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.250 ^a	3	.236
Likelihood Ratio	5.796	3	.122
Linear by-Linear	3.626	1	.057
N of Valid Cases	20		

Based on the study that has been conducted, there were 10 respondents who received 2 interventions then the results in the table shows the valid value of both data. The effectiveness and satisfaction of breast milk production had good value without activity which was stated by 9 respondents. While there were 1 respondent who stated less effective and satisfied with the activity. In the Pearson chi-square section, the result showed A symp sign value of $0.236 > 0.05$, it can be concluded that H_0 was accepted, meaning there was no significant difference between the effectiveness and the production satisfaction by using the electric breast pump.

DISCUSSION

Based on the results of this study, the level of effectiveness and satisfaction in the 10 respondents who received 2 interventions, breast milk production did not show significant results with the interventions performed by using breast pump. Another study showed, there was no significant difference between the effectiveness and the production satisfaction by using the electric breast pump. However, majority of the respondents gave high value level of the effectiveness and satisfaction by without activity with used electric breast pump. In previous study that has been conducted on the effect of breast milk pumping equipment, the value, benefits and minimal risk felt were the most needed parts during breastfeeding [28]. The study stated that in understanding the action mechanism for the type of pump, the time and support were required to effectively increase the production of breast milk using an electric pumping device, in numerous studies it was evidenced that breast milk pumping devices were very effectively used to multiply breast milk production.[28, 32]. In addition, in another study to explain the faster the frequency of pumping, the volume of milk will increase [33, 34]

In theory about breast milk mechanisms, in the process, there are two hormones that have an important role to maintain lactation: 1) prolactin, increase milk secretion, and 2) oxytocin, cause ejection of milk. Ejection of milk or milk letdown refers to the expulsion or strong release of breast milk out of alveolar lumen through the ducts. The release of these two hormones is stimulated by the neuroendocrine reflex triggered by the suction of the baby. The process of breast milk excretion comes out of the alveolar lumen and into the ducts occurs with the help of myoepithelial cells present in each alveolus toward the nipple. [4-7]. When the nipple and areola are stimulated by suction, it triggers the release of hormones into the mother's bloodstream, sending messages to the brain via the hypothalamus-pituitary-adrenal (HPA) axis to produce milk through mother's stimulation and behavior.

Breast milk expenditure is a very complex interaction between mechanical stimulation, nerves and various hormones. The main concept in the breastfeeding process is that the more infant stimulus is given the more milk production is released. Positive attitudes toward breastfeeding and a calming environment are essential for the success of the breastfeeding process. The stimulation of the mammary gland from an electric breast pumping equipment works as well as a baby's suction. [35]

This is a major factor that is very important in determining the success of the sustainability of breastfeeding production process. Because in the process of milk production, there are several mechanisms of milk production in the body through the prolactin reflex and let down reflex stages. If there is any negligence in the implementation of the use of this electric breast milk pump then the production process will experience a decrease or the cup placement function in the components of the breast milk pump will decrease. [30, 31] The limitation of this study, at the moment the respondents tested the electric breast milk pump using the tools used and directly start to pump breast milk with electric breast pump equipment can not be used optimally with various activities. To overcome the limitation of the study, the electric pump is tied to the back using a scarf. Thus the respondent be able to do various activities.

From these results, the majority of respondent's effectiveness and satisfaction gave the recommendations of this study which indicate that there is a need to modified through the use of innovative portable pumping portable equipment that can be fully utilized, useful, effective and efficient in a variety of activities and better milk production. Policy makers in designing policy recommendations should convince people to breastfeed their babies and their targets can be achieved with a total target in each region.

CONCLUSION

Based on the results of this study that has been conducted it can be concluded that the use of breast milk pumping equipment did not affect the amount of milk production however by using the electric breast pumping equipment, has given the effectiveness and satisfaction during the pump of breastmilk without doing various activities. Policy makers in designing policy recommendations should convince people to breastfeed their babies and their targets can be achieved with a total target in each region.

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