

Original Research

Type Of Breast Pump And The Affect To Pain Scale, Milk Production, And Pumping Time In Breastfeeding Mothers

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ABSTRACT

Background: As we know that breastfeeding saves children under five lives every year, especially during the Covid-19 pandemic. The facts show that only 43% of infants 0-6 months are exclusively breastfed. The limited time for breast milk expression in between the mother's work routine needs to be supported by an efficient and effective pump. This study aimed to assess the type of breast pump not affect to pain scale, milk production, and pumping time in breastfeeding mothers.

Methods: This research is a cross-sectional study with a sample of 36 breastfeeding mothers in Banyumas Regency. They were chosen by distributing survey invitations through the WhatsApp group with a background breastfeeding mothers. Data was collected using the Google form, and analyzed using the Chi Square statistical test with a significance level of 95% (Alpha 0.05).

Results: Chi-Square analysis test shows the Asymp value. Sig. (2-sided) for the relationship between the type of Breast Pump and the Pain Scale, the volume of breast milk expressed, and the duration of pumping are 0.001; 0.905; 0.620, so only pain scale which less than $\alpha > 0,05$, the others are more than $\alpha > 0,05$. This result means any correlation between the type of breast pump with pain scale but no correlation with the amount of milk expressed, and the time spent pumping.

Conclusion: There is no relationship between the type of breast pump, the amount of milk expressed, and the time spent pumping, but any correlation between pain scale. So breastfeeding mothers can choose any breast pump that fits their needs and consider other factors influencing breastfeeding success.

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INTRODUCTION

Optimal breastfeeding is crucial because it can save more than 800,000 lives of children under five every year, especially during the Covid-19 pandemic. However, the

facts show that only 43% of infants 0-6 months are exclusively breastfed. This is common in the working mother community. The limited time for breast milk expression in between the mother's work routine needs to be supported by an efficient and effective pump.

The high interest of working mothers in Indonesia to continue to breastfeed their babies when returning to work is following the results of primary health research by the Health Research and Development Agency, namely the percentage of children aged 0–23 months who have been breastfed between working and non-working mothers, which is 90.8%. Mothers who do not work, 92.3% of mothers who work as employees, 93.2% of self-employed mothers, 93.7% of mothers who are farmers/fishers/labourers, and 90.9% of mothers with other occupations. This needs to be supported by adequate facilities and infrastructure (Kemenkes RI, 2018).

Spending enough time to express breast milk in between busy work is often a dilemma for some working mothers. Many workplaces provide support for their employees to express breast milk during working hours. However, this support is often provided without reducing the workload so that working mothers who breastfeed must be able to manage the time between the busy workloads to express breast milk optimally.

Lack of rest time, inadequate facilities for expressing breast milk, lack of breastfeeding promotion, and lack of support from superiors and coworkers are challenges for mothers who wish to continue breastfeeding in the workplace (Tsai, 2013). Mothers who work with limited time to express breast milk require a long duration of rapid expression to empty the breast, which does not affect milk production or secretion. Breast pump provision has been used as an incentive for breastfeeding, although effectiveness is unclear. Women's use of breast pumps is increasing and a high proportion of mothers express breastmilk (Gardner et al, 2019).

Several methods that can be used to express breast milk include manual by hand, manual pump and electric pump (Gardner et al., 2019). Some of these methods do not affect the pattern of breast milk production. The previous research describe the majority of mothers who express breast milk (65%, 666/843) use an electric pump, and this type of pump is preferred by 59% (454/769) of mothers who express breast milk. This study is different from other previous studies which have never studied the difference in the amount of breast milk from the use of the three types of breast pumps. The selection of the type of pump is adjusted to the needs of the mother and baby.

However, the highest amount of breast milk came from the use of an electric breast pump with a total milk volume of >120 mL. Therefore, it is necessary to know the effectiveness and efficiency of the pump type in terms of volume, duration and frequency. Any breast pump causes mild breastfeeding pain. There is no relationship between the type of breast pump, the amount of milk expressed, or the time spent pumping.

There is no relationship between the type of breast pump, the amount of milk expressed, or the time spent pumping but any correlation between pain scale. So breastfeeding mothers can choose any breast pump that fits their needs and comfort and consider other factors that influence breastfeeding success.

MATERIALS AND METHOD

Population and Sample

The population is all working breastfeeding mothers in the Banyumas district. Sampling in this study used a purposive sampling technique, which is a sampling technique with specific considerations. The sample criteria were taken based on the inclusion criteria of breastfeeding mothers on days 40-60, breastfeeding mothers who worked and breastfed exclusively. The sample used in this study were 36 respondents.

Research Model and Design

The research model used was cross-sectional, with a sample of 36 breastfeeding mothers. The sampling technique used was purposive sampling. Chi-Square statistical test is different from hypothesis testing, and the significance level is 95% (alpha 0.05).

Research Variable

The independent variable of this research is breast pump type, and the dependent variable of this study is pain while breastfeeding, the volume of breast milk once expressed and duration of pumping.

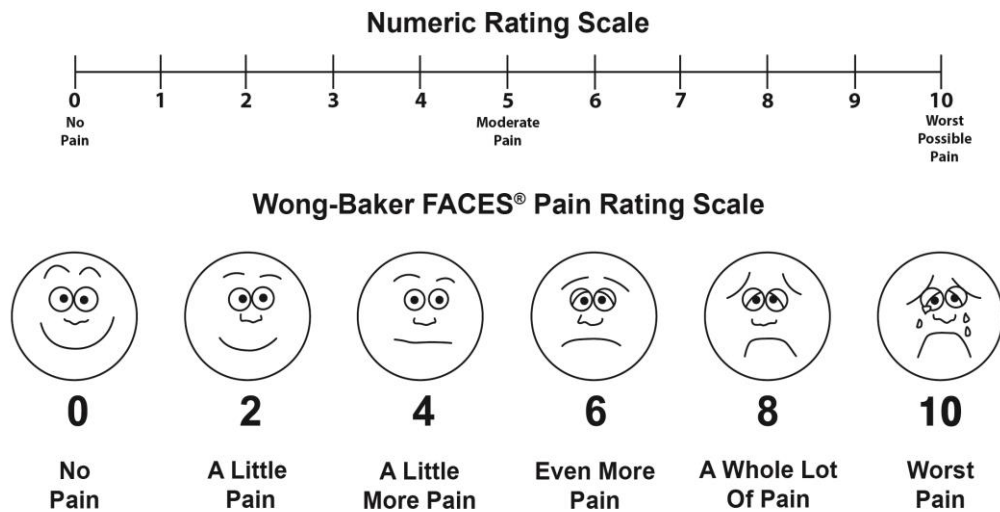
Instuments

Questionnaire using Likert 5 points to measure a response to 19 Questions adapted from the Numerical Assessment Scale (NRS) to determine the scale of pain and latch assessment tools to determine the success of breastfeeding. Validity test and Reliability is done on 30 breastfeeding mothers Outside the research sample. Validity test using The moment of pearson products and reliability tests using Alpha Cronbach with a significance level of 5%. Of the 20 questions, only 1 invalid question so that only 19 questions can be relied upon.

Table 1. The LATCH Breastfeeding Assessment Tool

Assesment	0	1	2	Total scores
L Latch on	Too sleepy or reluctant No sustained latch or suck achieved	Repeated attempts for sustained latch or suck Hold nipple in mouth Stimulate to suck	Grasps breast Tongue down Lips flanged Rhythmical sucking	
A Audible swallowing	None	A few with stimulation	Spontaneous and intermittent/frequent	
T Type of nipple	Inverted	Flat	Averted	
C Comfort	Engorged Cracked, bleed, large blisters ora	Filling Reddene/small blisters or bruises	Soft Not tender	

Assesment	0	1	2	Total scores
	bruises Severe discomfort			
H Hold positioning	Full assist	Minimal assist	No assist	



Picture 1. Numeric Rating Scale (NRS)

Data Collection Technique

We distributed survey invitations via WhatsApp to WhatsApp groups with the background of the breastfeeding mothers, and waited until the response received reached the targeted number of respondents.

Data Analysis

This study's univariate analysis uses a frequency distribution to examine respondent characteristics. The data will be processed with SPSS 16.0. The chi-square statistical test was evaluated using bivariate analysis and a 95% significance level (alpha 0.05).

Ethical considerations

This study was approved and under the supervision of the Faculty of Health of Harapan Bangsa University. The permit to conduct this research was proposed by the Research and Community Service Institute of Harapan Bangsa University. The researchers apply research The principles of anonymity, good and non-mealeficence, autonomy, and justice. Explanation of background and research objectives, as well as information approval contained in the Google form, together -name with instruments.

Participants are reminded of the beginning of the survey that process and complete The survey shows voluntary agreement to participate learning. Anonymity and confidentiality maintained throughout the study.

RESULTS

The study was conducted using a questionnaire via Google Form to breastfeeding mothers, with 36 participants. Collecting data from the questionnaire obtained the following percentage results:

Table 2. Characteristics of Respondents

Category	Total	Percentage
Age		
21-25 years	4	15%
26-30 years	11	28%
31-35 years	15	38%
36-40 years	6	18%
Education		
Senior High School	2	5%
College	34	95%
Work		
Housewife	5	14%
Employee	30	83%
Self-employed	1	3%
Monthly Income		
Rp.100.000-500.000	1	3%
Rp.600.000-1.000.000	2	5%
Rp.1.000.000-3.000.000	15	42%
>Rp.3.000.000	18	50%
Number of Children		
1-2 children	35	97%
3-4 children	1	3%
Baby Birth Weight		
< 2500 gr	1	3%
2500-3500 gr	29	80%
> 3500 gr	6	17%

Based on Table 2, it is known that all respondents are 36 respondents consisting of respondents with an age range of 21-40 years, where the largest age group is respondents aged 31-35 years (38%), with the most educational background being Higher Education (95%) and dominated by working mothers as employees (83%) of the total respondents. It is known that the highest monthly income of mothers is Rp. >3,000,000 with a prevalence (50%).

Table 2 also shows that from 36 respondents, 35 respondents (97%) have 1-2 children. Based on the baby's birth weight, the respondents were dominated by babies with a normal weight of 2500-3500 grams (80%).

Table 3. Types of Breast Pump

Category	Number	Breastpump with Natural Nurshing Technology	Breastpump with Personal Fit (breast protectors)	Plastic funnels with pads
Electric	23 (64%)	20	17	14
Handsfree	2 (6%)	2	2	2
Manual	11 (30%)	6	9	10

Table 3 shows that the majority of breastfeeding mothers use electric breast pumps as many as 23 people (64%). Of the 23 types of electric breast pumps, 20 of them have been equipped with Natural breastfeeding technology and are the type most in demand by respondents, and 18 electric breast pumps have Personal Fit or breast protectors, and 15 of them have used plastic funnels with pads. On the other hand, a hand-free pumping type breast milk pump has been equipped with these three technologies. As for manual breast pumps, most of them are equipped with a plastic funnel with breast pads and personal fit.

Table 4. Amount of Breast Milk Once Expressed

Category	Number	Result < 60 ml	Result 60-120 ml	Result > 120 ml
Electric	23 (64%)	1	9	13
Handsfree	2 (6%)	0	1	1
Manual	11 (30%)	1	5	5

Based on Table 4, it is known that the highest amount of once-expressed mother's milk comes from the use of an electric breast pump with a total milk volume of >120 mL as many as 13 respondents. However, the results of pumping breast milk with a volume of <60 mL appeared in the electric and manual groups with a low prevalence of only one respondent each.

Table 5. Breast Pump Pain Scale

Category	Number	Pain Scale Mild (scale 1-3)	Pain Scale Mild (scale 4-6)	Pain Scale Mild (scale 7-10)
Electric	23 (64%)	14	7	2
Handsfree	2 (6%)	1	1	0
Manual	11 (30%)	7	4	0

Based on Table 5, the pain scale of breastfeeding mothers who use a breast pump when expressing breast milk can be seen. In general, the use of breast pumps causes pain, but the most significant percentage appears on the mild pain scale where all types of breast pumps have values above > 50%. Severe pain only appeared when using an electric breast pump as many as two respondents (9%).

Table 6. Activities when Expressing Breast Milk with a Breastpump

Category	Number	Sitting back	Without leaning
Electric	23 (64%)	18	5
Handsfree	2 (6%)	2	0
Manual	11 (30%)	7	5

Table 6 illustrates the activity when expressing breast milk with a breast pump inbreastfeeding mothers. The activity when expressing breast milk while sitting back was the highest in the three types of breast pumps than the activity of expressing breast milk without leaning.

Table 7. Frequency and Duration of Pumping Using Various Breastpump

Category	Number	pumping frequency per day		pumping duration (minutes)		
		<10x	10-14x	<15	15-30	>30
Electric	23 (64%)	23	0	2	14	7
Handsfree	2 (6%)	2	0	0	1	1
Manual	11 (30%)	11	0	1	9	1

Based on Table 7, it can be seen that the frequency and duration of pumping use various breast pumps. The results occurred with the use of any breast pump, with a pumping frequency of <10x per day as many as 36 people, but the longest pumping duration of 15-30 minutes was mostly in the electric pump group as many as 14 person.

Table 8. Cross Tabulation Between Type of Breast Pump with Pain Scale, Milk Production and Pumping Duration

Category	Pain scale			volume of breast milk			duration of pumping		
	Value	df	Asymp p. Sig. (2-sided)	Value	df	Asymp . Sig. (2-sided)	Value	df	Asymp . Sig. (2-sided)
Pearson Chi-Square	18.593 ^a	4	.001	1.034 ^a	4	.905	2.641 ^a	4	.620
N of Valid Cases	36			36			36		

Statistical analysis with SPSS version 16.0 using Chi-Square Test shows the Asymp value. Sig. (2-sided) for the relationship between the type of Breast Pump and the Pain Scale, the volume of breast milk once expressed, and the duration of pumping, respectively, are 0.001; 0.905; 0.620. This value > 0.05 means no relationship between the type of breast pump with the volume of breast milk once expressed, and duration of pumping but any correlation between pain scale.

DISCUSSION

Care during the postpartum period needs attention because about 60% of maternal mortality occurs. The postpartum period is a period of the mother's activity to breastfeed. Breastfeeding is the process of providing food to babies using breast milk (ASI) directly from the mother's breast (Kemenkes RI, 2018). Several methods that can be used to express breast milk include manual by hand, manual pump and electric pump. Some of these methods do not affect the pattern of breast milk production (Gardner *et al.*, 2019).

The pattern of breast milk production remains consistent in breastfeeding mothers, either breastfeeding directly or by expressing. This research was carried out with the aim of knowing the use of the type of breast pump with a pain scale and the success of breastfeeding for workingbreastfeeding mothers during the COVID-19 pandemic in Banyumas Regency in 2021.

Data on the characteristics of respondents based on Table 2 illustrates that several factors influence the behaviour of respondents in pumping breast milk for their babies, including the first, namely the age factor that affects the perception and mindset of the respondents. The knowledge obtained is getting better from the experience received by the respondent. The second is the education level of the respondent. The higher the level of education, the better knowledge of receiving information (Budiman, 2013).

This affects the mother's behaviour in pumping breast milk. This is reinforced by the status of employees who have jobs with fixed salaries where most have incomes above 3 million per month so that it allows mothers to have the opportunity to buy tertiary necessities such as rice pumps. Breast pumps are seen as financially valuable, acceptable and have the potential to overcome barriers to breastfeeding mothers with several potentials (McInnes *et al.*, 2019).

The results of the questionnaire output based on Table 2 also show quite good results because babies with normal birth weight are dominated by 2500-3500 grams (80%). This is related to the risk when babies are born with low birth weight (LBW) or babies born <2500g, where LBW babies tend to have a slower sucking reflex than children born with normal weight. In the case of LBW, it is infrequent to be exclusively breastfed because of the mother's desire to increase the baby's weight quickly, so they are given additional food other than breast milk (Kumala and Purnomo, 2019).

In Table 3, monitoring of breastfeeding mothers, it is known that 19 respondents (68%) chose an electric breast pump. This is because the use of an electric pump does not require a lot of energy so thatbreastfeeding mothers are more relaxed and comfortable. This result explained the use of an electric breast pump by working mothers could increase milk production. This is in accordance with previous research, namely the volume of breast milk expressed using an electric pump will be more.

The use of a comfortable vacuum on an electric breast pump can increase the flow rate and volume of breast milk. Although electric breast pumps are increasing, evidence of their effectiveness still needs to be scientifically proven (Dewi and Windarti, no date). Research in the Tlogomas Region of Malang City stated that there was an effect of using the Breastfeeding Pump Method (MPA) on exclusive breastfeeding for working mothers. This method also does not interfere with the work process, has flexibility in working time (Anggreni *et al.*, 2018).

The thing that is a concern for women working in breastfeeding is how to maintain milk production during working hours. Previous research stated that there was no significant difference between the effectiveness and satisfaction of breast milk

production using an electric breast pump. The use of a breast pump does not affect the amount of breast milk production. However, an electric breast pump provides effectiveness and satisfaction during breastfeeding (Maula and Widyawati, 2017).

In Table 3, monitoring the type of breast pump, it is known that 23 respondents are users of electric breast pumps. The use of an electric breast pump can support the success of exclusive breastfeeding. Its easy use makes it possible for mothers to express breast milk even when they return to work. In general, there are two types of breast pumps, namely manual breast pumps and electric pumps. The use of an electric pump is recommended for mothers who work more than 8 hours and have problems with pumping time (Khayati, 2019).

Breastpump with Natural nursing technology is the type that is most in demand by 20 respondents because, unlike other products, the breast pump natural nursing technology uses a gentle breastfeeding pumping pattern with productive pumping results to produce more breast milk in a shorter time, is comfortable, and safe for use by breastfeeding mothers. A total of 17 respondents using the breast pump type have Personal Fit, and 14 of them already have a mouthpiece equipped with breast pads.

A personal fit breast pump has an average flange between 24 and 27 millimetres (mm) adjusted to the areola. The downside of this product is that not all nursing mothers will fit this protective size (Becker, Smith and Cooney, 2016). On the other hand, the hands-free pumping type of breast pump has been equipped with these three types. While for the manual breast pump, most of the plastic funnels are equipped with breast pads and personal fit.

Based on Table 4, the highest amount of once-expressed mother's milk came from the use of an electric breast pump with a total milk volume of >120 mL. However, the results of pumping breast milk with a volume of <60 mL appeared in the electric and manual groups with a low prevalence of only one respondent each. While referring to the management of expressed breast milk, the dose of bottled breast milk should be between 60-20ml (according to the habit of many babies drinking, this is so that the bottles used are used up in one drink and there is no residue).

Several studies that support this research include a study conducted in Africa regarding the ratio of the volume of breast milk expressed using three methods of milking, namely with an electric pump, a manual pump and a manual pump with each hand being 578 (135–350), 1051, 463 (85–1315), and 323 (93–812) with the highest volume in electric pumps. Users of hands-free pumping and manual breast pump did not differ significantly between the three types of breast pumps. This is in accordance with previous studies regarding the comparison of the volume of breast milk with three methods, namely, double electric pump 647 mL (SD=310); manual pump 520 mL (SD=298); and manual by hand 434 mL (SD=291) (Slusher *et al.*, 2007).

Based on Table 5, it can be seen that, in general, the use of breast pumps causes pain, but the most significant percentage appears on a mild pain scale where all types of breast pumps have values above >50%. Severe pain only appeared when using an electric breast pump as many as two respondents (9%). These results are supported by other studies, that in general, mothers are delighted with using manual breast pumps, but there is no difference in the convenience of each breast pump. Experiments conducted in parallel groups with 145 respondents who tested maternal satisfaction reported that mothers were very satisfied using manual breast pumps compared to electric breast pumps. Breast pumps can cause nipple damage if the breast pump is not properly attached to the breast, it can cause painful (Amir et al, 2021).

The results of the Chi-Square test analysis show that the Asymp value. Sig. (2-sided) for the relationship between the type of Breast Pump and the Pain Scale, the volume of breast milk once expressed, and the duration of pumping, respectively, are , are 0.001; 0.905; 0.620. This value > 0.05 means no relationship between the type of breast pump with the volume of breast milk once expressed, and duration of pumping but any correlation between pain scale. Other factors influence it, such as lactation management, breastfeeding position, food, stress, let down reflex, social culture and health behaviour (Vony Nurul Khasanah, 2019).

Not only the right method when used breast pump but also right breastfeeding position, are can help the mother relax, reducing pain and increasing the volume of breast milk. Table 6 shows conformity with the theory of the correct breastfeeding position, namely by sitting upright on the backrest, arm resting on the armrest, and sitting with the feet on the ground. This will reduce the build-up of lactic acid that causes pain and fatigue while breastfeeding.

The use of a comfortable breastfeeding chair will help the correct attachment of breastfeeding will stimulate the smooth flow of breast milk, thereby eliminating the feeling of cramps that arise when breastfeeding because the hormone in the let-down reflex is oxytocin (Gumasing, Villapando and Siggaoat, 2019). Meanwhile, Table 7 shows that although the volume of single-expressed breast milk is the most, it appears in the use of an electric breast pump. However, the percentage has evenly distributed results on all types of breast pumps with a pumping frequency of $<10x$ per day, and the most extended pumping duration is 15-30 minutes.

This data is in accordance with the Indonesian Pediatrician Association (IDAI) recommendations, explaining that the schedule for breastfeeding newborns should be around 8-12 times a day (Ambarwati, Susanti and Risdayanti, 2021). Meanwhile, for the period in one feeding, babies usually need approximately 10-15 minutes. The frequency and duration (extended) of breastfeeding, which is replaced by a regular pumping frequency, can stimulate the let-down reflex that triggers the production and release of breast milk (Rini and Dewi, 2017).

However, the level of stress inbreastfeeding mothers in this study was not studied in depth. The current Covid 19 pandemic is likely to affect the psychology ofbreastfeeding mothers. Therefore, further studies are needed on research related tobreastfeeding mothers during the Covid 19 pandemic.

CONCLUSION

This study, for the first time, describes the relationship between the type of breast pump and the scale of pain, volume of breast milk, and duration of pumping in working breastfeeding mothers. Based on the results of this study, it can be concluded that the type of electric breast pump with natural nursing technology is the type that is most in demand by the respondents because, besides being comfortable, this type is able to produce the largest amount of breast milk.

However, in general, the use of any breast pump causes breastfeeding pain with a mild pain scale. There is no relationship between the type of breast pump with the volume of breast milk once expressed and the duration of pumping but any correlation between pain scale. So that breastfeeding mothers can choose all types of breast pumps according to their abilities and comfort but need to pay attention to other factors that affect the success of the breastfeeding process.

The use of an electric pump is recommended especially Breastpump with Natural nursing technology because, unlike other products, the breast pump natural nursing technology uses a gentle breastfeeding pumping pattern with productive pumping results to produce more breast milk in a shorter time, is comfortable, and safe.

It is hoped that further researchers will conduct research with the same variables by adding research samples and studies on stress levels in breastfeeding mothers during the Covid-19 pandemic so that the research results complete this research. Experimental research related to the effectiveness of breastpump on pain scale, volume of breast milk and length of pumping time will be very helpful to strengthen scientific evidence regarding the benefits of breastpump for increasing exclusive breastfeeding coverage for working breastfeeding mothers.

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