

The effectiveness of DC Motor Vibratory Stimulus (DMV) among Postpartum Women on Giving Breast Milk

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Abstract

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BACKGROUND: The success of a woman in following the exclusive breastfeeding program is determined by the significant effort of a woman in giving breast milk and providing additional food to the baby. This problem can be solved by using the vibration effect on the postpartum mother's breast through DC Motor Vibratory (DMV) system.

AIM: Therefore, the research aims to analyse the effectiveness of DMV among postpartum woman on giving breast milk. This intervention will assist to stimulate the prolactin hormone and to remove the oxytocin hormone of the breast milk.

METHODS: The study is a quasi-experiment, with only post-test design and control group. The sample of the study included 76 postpartum women in University of Sumatera Utara (USU) Hospital and maternity clinic in Medan, Indonesia with accidental sampling technique. The data were collected by using questionnaires, such as demographic questionnaire and observation of breast milk expenditure. The study was analysed by using the Mann-Whitney test.

RESULTS: The Result of the study showed that the DMV could accelerate the process of breastfeeding for a postpartum woman with a significant value of $p < 0.05$.

CONCLUSION: The research concluded that DMV could be applied in the postnatal care process, especially in stimulating breast milk expenditure.

Introduction

The high rate of new-born deaths is commonly based on many factors, including maternal behaviour and the role of health workers. Infection in infants and low birth weight are a major factor in the occurrence of morbidity and mortality [1]. This condition is closely related to the still low health status of mothers and new-borns; low access and quality of maternal and infant health services, especially during pregnancy, childbirth and immediately after birth [2]. Maternal and family behaviour which are preventive and curative is still minimal; community involvement in care, especially the perception of breastfeeding for new-born babies, is still a lot of negatives [3].

Morbidity and mortality rates in infants can be prevented by early breastfeeding, which is immediately after birth and following the exclusive breast milk (ASI) program [4]. Based on data from UNICEF (2006), as many as 30,000 infant deaths in Indonesia and 10 million deaths of infants and toddlers were recorded in the world each year which can be prevented through exclusive breastfeeding for six months, without having to provide additional food and drinks to infants. Breastfeeding is one of the adaptation processes experienced by postpartum mothers. Breast milk (ASI) is a natural nutrient for babies with the most suitable nutritional content for optimal growth [5]. Breastfeeding is revealed to be effective to protect maternal and infant health [6].

The maximum breastfeeding since the baby is

born can meet the nutritional needs accordingly so that the baby will avoid pain and death. The World Health Organization (WHO) recommends that every new-born baby get exclusive breastfeeding for six months, but in some mothers do not give exclusive breastfeeding because the US does not come out or only slightly so that it does not meet the needs of the baby [7]. Postpartum mothers often experience breast swelling after giving birth with nearly 90%, on the second day until the fourth day. This happens due to the lack of breastmilk expenditure and is a strong reason for mothers to stop breastfeeding and provide additional food such as formula milk [8]. The Basic Health Research of Indonesia (RISKESDA) (2010) reported that exclusive breastfeeding for infants aged < 6 months was reported to be less than 40% [3]. Many ways have been used to facilitate postpartum maternal breast milk expenditure such as brash care, oxytocin massage, acupuncture and acupressure [9].

This method is still considered to be less effective as it uses invasive methods, long duration, not practical, must have the skills and techniques in its implementation. Postpartum treatment in optimising breastmilk expenditures uses a lot of non-invasive methods to be considered as alternatives in accelerating breastmilk expulsion, because with effective therapeutic methods with a relatively short time and easy to do by postpartum mothers [10].

Based on that information, a tool needed to be designed as a stimulus therapy to accelerate the release of breast milk postpartum mothers who are simpler, economical, and practical by utilising DC Motor Vibratory which provides a vibration effect for activating prolactin and oxytocin hormones. The DC vibratory motor method is a method of vibration propagation that vibrates the ions in the breast which is directed to the activation of the prolactin and oxytocin hormones which results in the stimulus of the alveoli in flowing milk through the ductulus to the lactiferous duct and into the milk sinus and the nipple hole.

Methods

This research is quantitative research using a quasi-experimental method research design: with the use of Current ASI DMV tools and only post-test design in the intervention and control groups. This study was conducted on postpartum mothers in USU hospital and maternity clinics by observing feeding to infants whether only breastfeeding or providing additional food other than ASI. Data analysis was carried out with frequency distribution and presentation, independent t-test with a significance level of 5% ($\alpha = 0.05$). The tool used is the ASI DMV made by the researcher as displayed in figure 1.



Figure 1: DC Motor Vibratory Stimulant

Results

The characteristics of the postpartum woman are described in Table 1 below.

Table 1: Demographic Data of Respondent Characteristic (n = 38) in Intervention Group

Mother Characteristic	Frequency (n)	Percentage (%)
Age		
Risk (< 20 and 35) Years	13	34
No Risk (20-35)Years	25	66
Obstetric History		
Primi (1)	9	24
2-3	23	61
> 3	6	15
Education		
Low (Elementary – Junior Hight School)	7	18
Middle (Senior High School)	22	58
High (university)	9	24
Work		
Housewife	17	45
Government Employee	8	21
Entrepreneur	13	34
Total	38	100

Based on Table 1, it shows that most postpartum mothers are in the age range of 20-35 years with 25 people or 66% of the total. Most of the mother parity is 2-3 people as many as 61 people. Mother's education level in a senior high school dominated the sample with 22 people as much as 58%, and most mothers are 17% housewife with no occupation.

Table 2: Demographic Data of Respondent Characteristic (n = 38) in Control Group

Mother Characteristic	Frequency (n)	Percentage (%)
Age		
Risk (< 20 and 35) Years	14	35
No Risk (20-35)Years	24	63
Obstetric History		
Primi (1)	9	24
2-3	22	58
> 3	7	18
Education		
Low (Elementary – Junior Hight School)	5	13
Middle (Senior High School)	24	63
High (university)	9	24
Work		
Housewife	18	47
Government Employee	9	24
Entrepreneur	11	29
Total	38	100

Based on Table 2, it indicates that most postpartum mothers are in the age range between 20-35 years with 24 people or 63% of the total. Most of the mother parity is 2-3 people as many as 58% of sample. Mother's education level in a senior high school dominated the sample with 63%, and most mothers are 18% housewife.

Table 3: Distribution of Food Giving to New-borns Intervention Groups and Control Groups

Feeding Infants	Intervention		Control	
	N	%	N	%
Breast Milk	30	78.9	16	42.1
Supplementary Infant Feeding	16	21.1	22	57.9
Total	38	100	38	100

Based on Table 3, postpartum mothers who only gave the breast milk were recorded as 78.9%, and 21.1% of them were giving additional food, while postpartum mothers in the control group who only gave breast milk were 42.1% and 57.9% of postpartum mothers provide additional food.

Table 4: Effectiveness of DC Motor Vibratory Stimulus on Giving Breast Milk in Intervention and Control Group

Variable	Mean	Sum .ranks	Z P.
Intervention	27.50	522.50	-5.187 0.000
Control	11.50	218.50	

Lastly, the effectiveness of DMV on breast milk production is described in table 4. Based on table 4, the result shows a p-value of 0.000, which means that the value of $p < 0.05$ indicates the significant difference in infant feeding in the intervention group and control group.

Discussion

Breast milk (ASI) is a natural nutrient and the most suitable food for babies because the nutritional content in ASI is best suited for optimal growth and development of infants [11]. Breast milk is the only nutrient source that also contributes to the rapid and healthy growth of the baby's brain and nervous system, the maturation of the digestive system and the development of the immune system and immunity [12]. According to the World Health Organisation (WHO), exclusive breastfeeding is only given for 6 (six) months without any additional liquid either formula milk, water, orange juice, or other supplementary foods before reaching the age of six months [13]. The success of exclusive breastfeeding begins with the success of early breastfeeding. In general, the failure of breastfeeding mothers at the beginning of a baby's birth is caused by ASI that has not been released immediately [14].

To speed up the process of removing breast milk requires the process of breast care in postpartum mothers. Some of the treatments that have been done frequently include oxytocin massage, acupressure and acupuncture. But the process of breast care is certainly inseparable from the development of technology in the health sector so that there will be some of the latest innovations in the development of breast care. So every postpartum mother can do breast care independently. But not all postpartum mothers immediately excrete milk because the milk

supply is a very complex interaction between mechanical stimuli [3], nerves and various hormones that affect oxytocin release. The release of the oxytocin hormone besides being influenced by baby suction is also influenced by receptors located in the ductal system when the ducts dilate or become soft; oxytocin is reflexively removed by the pituitary which acts to squeeze milk from the alveoli [2]. Hormones that affect the production of breast milk (ASI) include oxytocin. This hormone causes the contraction of epithelial cells around the alveoli, urging breast milk to enter the lactiferous duct. Stimulation of the nipple causes the release of oxytocin for 3-4 seconds into the bloodstream for every 5-15 minutes [15]. Prolactin is produced by the anterior pituitary which functions to stimulate the ASI gland to produce breast milk, prolactin release occurs in response to a direct stimulus to the nipple or areola which controls autocrine in lactogenesis. Prolactin will come out if there is a space of milk in the breast. Decreasing production and expenditure of breast milk in the first day after giving birth can be caused by a lack of stimulation of the prolactin and oxytocin hormones which greatly contribute to the smooth production and expenditure of breast milk [11].

Breast care should be performed immediately after the baby delivery process (1-2 days), and the mother must do it regularly. By providing stimulation to the muscles of the breast will help to stimulate the hormone prolactin to help to produce milk [5]. Lack of breast milk production is one of the causes of the mother deciding to give formula milk to her baby. UNICEF insists that babies who use formula milk have a chance of dying in the first month of birth, and the possibility of formula-fed infants is 25 times higher than the number of babies whose mother's breastfeeding exclusively [16].

Constraints in breastfeeding have been identified including the factors such as lack of information, apathy on the side of health care providers, inappropriate hospital practices such as providing water and supplements for babies without any medical needs and lack of follow-up care at the beginning of the postpartum period [3], [17]. The low maternal behaviour in breastfeeding is also influenced by various factors, namely socio-cultural community, psychological condition, the physical condition of the mother, lack of information from health workers, incessant promotion of formula or canned milk, the condition of newborns, and lack of knowledge about breastfeeding. Moreover, there is a complaint of breast milk that has not been produced and insufficient for the baby's needs. These reasons and problems cause mothers and families to make decisions from experiences and habits that are contrary to health, such as not breastfeeding and providing additional food to babies.

The results of the study generally show that DC Vibratory Motor (smooth DMV ASI) can accelerate the release of breast milk and affect the behaviour of

mothers in providing food to infants, namely the intervention group can generally provide only breast milk in infants when compared with the control group. Use or Implementation of Dc Vibratory Motor which consists of Arduino Nano components: As the brain of the tool, which is useful in controlling motor speed and setting the use time of the tool? Transistor: To provide more current to the motor so that the motor can be faster. Diodes: As a voltage rectifier. Potential set the motor speed by changing the resistance value. The laser is used to shooting light to the intended point. Led is to provide more lighting on therapy. Vibratory motor: As a vibrator. The tools used in this intervention will help stimulate the hormone prolactin and the hormone oxytocin in the removal of breast milk. Vibration propagation methods that vibrate ions in the breast are directed directly to activation of the prolactin and oxytocin hormones which results in a stimulus to the alveoli and drain the milk through the ductulus to the lactiferous duct and into the sinuses and leave the breast through the nipple.

The presence of vibrations causes the smooth muscles of the breast to contract and accelerate expenditure, due to increased oxytocin secretion. Increased secretion of oxytocin is caused by vibrations that stimulate the surrounding nervous system and continue stimulation to the anterior pituitary in the brain so that prolactin is secreted and continued into the anterior pituitary. Through this intervention, it is expected that postpartum mothers can perform breast care independently with practically and overcome problems in the process of breastfeeding. The use of this tool is expected to provide a solution for mothers who do not breastfeed their babies because ASI does not come out, or breastfeeding is insufficient. The provision of maximum and immediate breastfeeding in newborns can meet the nutritional and nutritional elements so that babies avoid pain and death which in turn can improve the level of infant health in Indonesia.

In conclusion, the DMV tool can increase and accelerate the release of breast milk so that it affects the postpartum mothers in providing food to infants only by using breast milk. This can be seen from the statistical value which shows the value of $p < 0.05$ ($p = 0.000$).

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Ethical Aspects

Authors claim that the research followed the ethical aspect as regulated by University of Sumatera Utara, Indonesia. Also, there is no conflict of interest in this research.

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