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EFFECTIVENESS OF BREASTFEEDING AND NON-NUTRITIVE SUCKING ON PAIN RELIEF IN INFANT IMMUNIZATION

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ABSTRACT

Background: Immunization in infants is an action that can cause trauma due to injection of the immunization that can cause pain. Breastfeeding and non-nutritive sucking are considered non-pharmacologic strategies of pain management.

Objective: This study aims to investigate the effectiveness of breastfeeding and non-nutritive sucking on pain relief in infant immunization.

Methods: This was a quasi-experimental study with posttest only control group. This study was conducted on 26 October till 30 November 2016 at three Community Health Centers (Puskesmas), namely Puskesmas Cilacap Utara I, Puskesmas Cilacap Tengah, and Puskesmas Cilacap Selatan I. The population was infants aged 2-4 months who got immunization of DPT-HB-Hib 1. Samples were recruited using a consecutive sampling technique. There were 69 samples in this study, which were divided into three groups: 1) The group given a breastfeeding intervention (23 respondents), 2) The second group given a non-nutritive sucking intervention (23 respondents), and 3) The control group (23 respondents). Data were analyzed using ANOVA.

Results: The average of pain response of the three groups was 2.74 in the breastfeeding group, 1.87 in the non-nutritive sucking group, and 3.26 in the control group. There was a significant difference between non-nutritive sucking and control group with p-value = 0.000, and also a significant difference between breastfeeding and non-nutritive sucking with p-value = 0.016. However, there was no difference between breastfeeding and control group with p-value = 0.142.

Conclusion: Breastfeeding and non-nutritive sucking were effective in reducing pain during infant immunization. It is suggested that midwives could administer these interventions to reduce pain in infant immunization, and it could be applied as non-pharmacological strategy in pain management in the community health center in Indonesia.

Keywords: breastfeeding, non-nutritive sucking, pain, immunization

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INTRODUCTION

Childhood is still very vulnerable to diseases,[1] especially infectious diseases due to immune system that has not been formed and functioning optimally. Children who always get sick can affect their growth and development. Thus, it is necessary to expand the effort to the prevention of disease. One of the efforts made by the Government of Indonesia is the mandatory declaration of basic immunization in the first year of life of children.[2]

The programs of immunization in children (0-12 months) in the development program of immunization (PPI) in Indonesia include: Hepatitis B immunization (one time), BCG (one time), DPT-HB-Hib (three times), Polio / IPV (four times), and Measles (one time).[2] Most of the basic immunizations are hepatitis B, BCG, DPT-HB-Hib, and measles are carried out by the method of injecting the vaccine into the body either by way of intracutaneous, subcutaneous, or intra-muscular.[3] It means that in the first year of the children life get approximately 6 injections, which cause pain.[3]

Pain in infants that are not immediately handled will cause adverse effects, such as increased heart rhythm, blood pressure, rapid and shallow respiration, decreased oxygen saturation (SaO2), pale skin and redness, diaphoresis, sweaty palms, increased muscle tone, dilated pupils, decreased vagal nerve tone, and increased pressure of intracranial.[4] This is in line with a previous study that showed an excessive crying in babies, increased heart rate, blood pressure and oxygen saturation during and after heel lance.[5]

Pain management during infant immunization is still a major concern for health professionals. This is due to several things, including the baby's inability to convey pain, reluctance to use analgesics because of side effects, and error interpretation on pain expressions in infants.[6] In response to this, non-pharmacological management of pain is one of the solutions, which is a very important act and can be done independently without waiting for instructions from physician.[7] In addition, non-pharmacological treatment in the handling of the pain is a safety act, non-invasive, and inexpensive. [6]

One technique that can be done is breastfeeding. According to the theory of psychosexual development, the baby in the age of 0-1 years is in the oral phase, which getting satisfaction through stimuli centered on the mouth.[8] Thus, pain reduction strategy by using the technique of breastfeeding before, during and after the immunization is a method that can be applied into practice. Additionally, this technique can increase the relationship between parents and baby.[4]

Alternatively, the other intervention that can be applied to reduce pain during immunization is to use a non-nutritive sucking (NNS). It is to give a baby pacifier into the mouth of neonates to stimulate suction mechanism without giving breast milk or other nutritions.[9] NNS stimulates orotactil and mechanoreceptors to produce an analgesic effect on neonatus.[10]

Based on the preliminary study with three parents in the Health Center (Puskesmas) in Cilacap, Central Java, Indonesia about their responses about immunization indicated that all of them (100%) said that immunization was important for babies because it could maintain the health, while two parents (67%) thought sometimes felt afraid to take their children for immunization because they did not bear to see children crying during injection of immunization, and all of them did not know about anything about pain management during immunization. On the other hand, until

today, there is no yet intervention from the health center regarding pain management during immunization.

Therefore, with this problem and the solutions based on literatures above, this study aimed to investigate the effectiveness of breastfeeding and non-nutritive sucking on pain relief during infant immunization.

METHODS

Design

A quasi-experimental study with posttest only control group. The dependent variable in this study was pain relief in infant immunization, while the independent variables were breastfeeding and non-nutritive sucking.

Setting

This study was conducted on 26 October until 30 November 2016 at three Community Health Centers (Puskesmas), namely Puskesmas Cilacap Utara I, Puskesmas Cilacap Tengah, and Puskesmas Cilacap Selatan I.

Sample

The study population was infants aged 2-4 months who got immunization of DPT-HB-Hib 1. Samples were recruited using a consecutive sampling technique that every patient who met the study criteria included in the sample until a certain time until the required sample size was met. There were 69 samples in this study, which were divided into three groups: 1) the group that was given a breastfeeding intervention (23 respondents), 2) the second group that was given a non-nutritive sucking intervention (23 respondents), and 3) the control group (23 respondents). The inclusion criteria of sample for this study were infants aged 2-4 months who received DPT-Hib-Hb 1, had no contraindications to immunization, came to the health center escorted by their mothers, and were still exclusively breastfed.

Intervention

The first group was given a breastfeeding intervention by the way of mothers breastfed their babies at the time of 2 minutes before, 5 minutes during, and 3 minutes after immunization. Breast-feeding intervention was conducted in Puskesmas Cilacap Selatan 1, while the second group was given a non-nutritive sucking intervention by giving a baby pacifier to the baby's mouth at 2 minutes before, 5 minutes during, and 3 minutes after immunization. This intervention was conducted in Puskesmas Cilacap Utara I; and the third group (a control group) was just getting an intervention of holding the baby at the time of 2 minutes before, 5 minutes during, and 3 minutes after immunization. This control group was in Puskesmas Cilacap Tengah.

Immunization actions were carried out by midwives who had experiences of conducting immunization for at least one year, with the aim that each respondent got the standard immunization procedure in accordance with the needs of the respondents. The measurement of pain response in all three groups was performed directly by the researchers.

Ethical Consideration

Ethical consideration was obtained from the Reseacrh Ethics Committee of the Health Ministry Polytechnic Semarang (Poltekkes Semarang) with No. 038/KEPK/polytechnic-SMG/EC/2017.

Patients who met the study criteria were then given an informed consent, including the explanation of the research objectives and procedures, and asking the willingness of parents or guardians of infants to be involved in the research by signing a written consent form.

Instruments

The FLACC (Face, Leg, Activity, Cry, and Consolability) scale was used to measure pain in this study, adopted from the previous study,[11,12] which had been validated and translated into Indonesian version.[13,14] This scale consists of five ratings with a total score of 0 for no pain and 10 for severe pain. The result of the behavior score is 0 for no pain, 1-3 mild pain / discomfort mild, 4-6 moderate pain, and 7-10 severe pain / discomfort severe. (see Table 1)

Table 1 FLACC (Face, Leg, Activity, Cry, and Consolability) scale

Criteria	Score 0	Score 1	Score 2
Facial expression	No expression of special or smiling	Sometimes grimace or frown, withdrawn	Often frowned constantly, clenched jaw chin quivering
Leg	Normal position or relax	Edgy, nervous, tense	Kicking or pulling the leg
Activity	Lay quietly, normal position, moves easily	Squirming, back and forth moving, tense	Curved, stiff, or kept jerking
Crying	No cry	Whimpering or whining, sometimes complain	Crying constantly, screaming or sobbing
Consolability	Happy, relaxed	Tranquilized with the occasional touch, hug or speak, can be transferred	Difficult to be entertained or difficult to comfortably

Data Analysis

The normality test had been performed and the data were in normal distribution. Data were analyzed using ANOVA to examine the differences of pain responses in three groups in this study.

RESULTS

The characteristics of the respondents were described in terms of age and gender.

Table 2 Age Distribution of the Respondents (N= 69)

Group	N	Mean	Median	SD	Min-Max
Breastfeeding	23	2.48	2.00	0.79	2.00-4.00
NNS	23	2.78	3.00	0.79	2.00-4.00
Control	23	3.09	3.00	0.67	2.00-4.00

Table 3 Gender Distribution of the Respondents

Gender	Group	Total	Percentage
Male	Breastfeeding	9	39.1%
	NNS	11	47.8%
	Control	14	60.9%
Female	Breastfeeding	14	60.9%
	NNS	12	52.2%
	Control	9	39.1%
Total		69	100%

Table 2 shows that the average of age of breastfeeding group was 2.48 months with standard deviation of 0.79, while the average age of NNS group was 2.78 months and the control group's average

age was 3.09 months. There was no much difference age between three groups.

As shown in table 3, in the breastfeeding group, the number of females (60.9%) was higher than the number of males (39.1%), while the ratio between males (47.8%) and females (52.2%) in the NNS group was almost similar, and the male-female ratio in control group showed that the females (39.1%) was higher than males (60.9%).

Table 4 Pain response distribution before, during, and after immunization in the groups of breastfeeding, NNS, and control group

Group variables		N	Mean	SD	*p-value*
Before	Breastfeeding	23	0.04	0.21	0.069
	NNS	23	0.61	1.16	
	Control	23	0.61	1.12	
During	Breastfeeding	23	3.43	1.62	0.000
	NNS	23	3.04	1.40	
	Control	23	5.04	1.33	
After	Breastfeeding	23	0.69	1.40	0.020
	NNS	23	1.37	1.37	
	Control	23	1.04	1.04	

The analysis of pain response in 2 minutes before immunization showed that the average of pain responses in breastfeeding group was 0.04, NNS group was 0.61, and control group was 0.61, with p-value of 0.069, which indicated that there was no difference in pain response between the three groups.

In 5 minutes during immunization, the mean of pain responses in breastfeeding group was 3.43, NNS group was 3.04, and control group was 5.04, with p-value of 0.000, indicated that there were significant differences between the three groups.

In 3 minutes after immunization, the mean of pain responses in breastfeeding group was 0.70, NNS group was 1.17, and control group was 1.78, with p-value was 0.020, which indicated that there were significant differences between the three groups.

Table 5 Pain response distribution during and after immunization in the groups of Breastfeeding, Non-Nutritive Sucking dan Control

Variable	N	Median (min – max)	Mean ± SD	*p-value*
Breastfeeding	23	0.00 – 5.00	2.74 ± 1.29	0.001
NNS	23	0.00 – 4.00	1.87 ± 1.22	
Control	23	1.00 – 5.00	3.26 ± 1.05	

Table 6 Post Hoc test result in the groups of *Breastfeeding*, *Non-Nutritive Sucking* and control

Group	Group	Mean	*p-value*
Breastfeeding	NNS	0.869	0.016
	Control	- 0.521	0.142
NNS	Breastfeeding	- 0.869	0.016
	Control	- 1.391	0.000
Control	Breastfeeding	0.521	0.142
	NNS	1.391	0.000

Table 6 shows that there was a significant difference between non-nutritive sucking and control group with p-value = 0.000, and also the significant difference between breastfeeding and non-nutritive sucking with p-value = 0.016. However, there was no difference between breastfeeding and control group with p value = 0.142.

DISCUSSION

During immunization, especially in the injection part, babies will feel pain. Thus, the role of midwives to deal with pain management is needed. In this study, two interventions had been implemented, namely breastfeeding and non-nutritive sucking. The findings showed that there were significant results on reducing pain during infant immunization. However, the mothers carrying intervention in the control group also had a positive effect on pain relief in infants.

Many benefits are actually obtained during breastfeeding, such as the body contact between the baby and the mother that makes the babies feel comfortable and protected. In addition, breastfeeding also affects the response to pain because of sweet taste that can induce endogenous opioids.[15] The sweet taste in breast milk has an influence on pain response. Additionally, this mechanism occurs because of the sweet solution contained in breast milk. In this case, the lactose can induce the endogenous opioid analgesic pathways that cause no pain transmission to the brain, so the perception and sensation of pain are not felt by the baby during the injection.[15] This is consistent with the previous study indicated that pain during taking blood action can be reduced by breastfeeding before, during, and after the action.[16]

On the other hand, during the intervention of non-nutritive sucking, there is orosensory encouragement that has an effect on pain response in infants.[4] Baby aged 0-12 months is in the oral phase of development, which all the fun is centered in their mouths. So by the time a baby is given a non-nutritive sucking (NNS), pain during immunization will be distracted and focused on oral activity.[4] This is corroborated by the results of a previous study that significantly decrease the occurrence of pain in a group of non-nutritive sucking (B = -11 , 27, p-value <0.001) and group of the sugar solution (sucrose) (B = -11.75, p-value <0.001).[17]

In this study, the control group was given an intervention as just carrying a baby with therapeutic touch. Hugs were given at the time of holding will give skin contact between mother and baby that will stimulate the body to release the hormone oxytocin (a hormone associated with feelings of peace also love), so it will affect the psychological than the baby itself. [18]

On the other hand, environment situation such as bright light and loud noises can also stimuli the baby.[19] Thus, reducing environmental stimuli can calm the baby and indirectly reduce pain. This is supported by a previous study, which indicated that skin-to-skin contact can reduce pain during the time of injection.[19] However, the combination of the use of 25% dextrose per oral and skin-to-skin contact is more effective to reduce pain.[20]

CONCLUSION

Breastfeeding and non-nutritive sucking were effective in reducing pain during infant immunization. There was a significant difference between non-nutritive sucking group and control group, between breastfeeding group with non-nutritive sucking group. However, there was no significant difference between breastfeeding group and control group. It might be because of the position of breastfeeding is similar with the position

of maternal carrying in control group. Therefore, further studies are needed to compare the difference between breastfeeding and maternal carrying, and environmental factors should be further investigated. However, it is suggested that midwives could administer these interventions to reduce pain during infant immunization, and it could be applied as non-pharmacological based pain management in the community health center.

Declaration of Conflict of Interest

None declared.

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Authorship Contribution

The authors contributed equally in this study.

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