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NON-NUTRITIVE SUCKING (NNS) AND PAIN RESPONSE AMONG NEONATAL

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ABSTRACT

Pain is a sensation that is difficult to remember. Pain exposure is a stimulus that can damage the development of the baby's brain and contribute to learning disorders and behavior in childhood. Therefore nursing intervention is needed that can reduce the pain response in infants, especially during hospital treatment. The aim of the study was to determine the effect of non-nutritive sucking (NNS) and ASI (Air Susu Ibu or Breast Milk) on oral responses to acute pain in the neonate when invasive actions were performed. The benefits of research as evidence-based practiced about administering NNS and ASI orally to pain responses in neonates when experiencing pain. The research design uses experimental nonequivalent control group before and after design. The population of all neonates admitted to Dr. Soekardjo Tasikmalaya, with a total sample of 30 respondents consisting of 15 ASI respondents and 15 respondents for the NNS group. Pain assessments instruments CRIES (Crying, Requiring an increase in oxygen, Increased vital sign, Expression, Sleeplessness) was applied. Data analysis used non parametric tests Mann Whitney and Wilcoxon. The results of the study showed no significant differences in pain response before and after the intervention (*p*-value 0.236). It was suggested that nurses can improve health education for parents to be able to provide breastfeeding during treatment, especially when the baby receives invasive action.

Keywords: ASI, Non-Nutritive Sucking (NNS), Normal Newborns, Pain Response

INTRODUCTION

During growth and development, sometimes children as well as neonates, experience a phase of illness or hospitalization. It could be due to certain health reasons or they are not in the same room with the mother so that the neonate needs treatment in the nursery.

As a result of hospitalization, babies often experience impacts such as disruption of trust formation processes, decreased sense of control and pain (Hockenberry & Wilson, 2009). Trust can be formed if the baby gets care with love consistently by the mother or caregiver. Babies always try to control the environment through emotional expression such as crying or smiling. When in the hospital, baby's signals are sometimes misinterpreted so that the treatment given is routine without regarding their individual problem and needs. The pain is accepted as part of the standard hospital care. According to the results of a study in France infants were treated at the NICU with many painful procedures over a period of two-weeks (Badr *et al.*, 2010). Neonates can also experience pain and are very sensitive to it. Pain exposure is a stimulus that can damage the development of the baby's brain and contribute to learning disorders and behavior in childhood (Badr *et al.*, 2010). Therefore, nursing intervention that can reduce the pain response in infants is needed, especially during hospital treatment.

Pain can be described based on three criteria, namely: a stimulus that causes pain, the body's physiological changes to pain and behavioral changes. We can recognize stimuli that have the potential to cause pain when seeing a person's reaction with regard to the intensity of the stimulus given. The physiological changes in the body are related to the release of hormones (cortisol, endorphins, and epinephrine) and changes in physiological parameters such as heart rate, blood pressure and sweating. Behavior changes related to pain can be seen from facial expressions and verbal responses from someone who experiences pain. These

three characteristics generally appear in infants when responding to pain. Babies are psychosocial beings who can also feel anxiety, fear and pain (Buonocore & Bellieni, 2008).

Factors that affect pain in hospitalized infants include gestational age at birth, exposure to pain procedures, neonatal complications, type of needle used, infant status before the procedure, sex and administration of opioids, sedatives, and steroids (Gibbins *et al.*, 2007). All these factors generally correlate with increasing pain scores in infants both from aspects of physiological and behavioral changes (Badr *et al.*, 2010).

Management of pain in infants can be done pharmacologically and non-pharmacologically (Buonocore & Bellieni, 2008). Pharmacological pain management is by administering drugs that function to reduce the pain threshold in the baby or block nerve pain so that pain is not perceived, among others, by giving local anesthesia, regional anesthesia or systemic analgesics. Non-pharmacological management is done by environmental intervention, dissection, non-nutritive sucking, administration of sweet liquid (glucose and sucrose), multisensory stimulation, skin to skin contact (care), breast feeding analgesia and breastfeeding music.

Buonocore & Bellieni, (2008) mentions that there is research evidence that sucrose provides analgesics in neonates and is more effective when used in conjunction with non-nutritive sucking. The study was also supported by Bellieni *et al.*, (2002), Bagnoli, Perone *et al.*, (2002). Pinelli, Symington & Ciliska (2002) who stated that non-nutritive sucking (NNS) was effective in reducing pain in neonates when peripheral blood was withdrawn.

Several studies have been conducted to reduce pain response in infants, including giving 24% sucrose (Johnson *et al.*, 2002), giving non-nutritive sucking (Corbo, 2000; Pinelli, 2002: Schechter, 2007) even breastfeeding in reducing pain when babies are immunized (Razek & El Dein, 2009). According to Pinelli, Symington & Ciliska (2002) there are several studies that reveal that there are no negative effects of short-term NNS administration in both infants less than months or elder than that, but there no evidence of the effect of long-term NNS. Even NNS can increase physiological stabilization in premature infants.

Non-Nutritive Sucking (NNS) is an effort to give suction to the baby when no liquid is swallowed. It usually starts before the let-down reflex appears on the baby and ends when the baby starts sucking fingers, pacifiers or toys. The suction on NNS ranges from a minimum of 2 suction per minute and at most 6-8 suction. Babies given NNS are usually due to the baby's desire to suck and to bring about a calming effect (Pinelli, Symington & Ciliska, 2002). Tools that can be used for NNS actions include (ADA, 2007) thumbs, other fingers, pacifiers or other objects.

Buonocore & Bellieni (2008) reported a decrease in crying intensity with the administration of NNS in neonates during the execution of heel stabbing. In the neonate, NNS was effective for reducing pain during Heelstick Procedures (Buonocore & Bellieni, 2008), as well as Corbo, Mansi & Stagni (2000) who examined the effect of NNS during heel stabbing procedures in infants aged 26-39 weeks with results showing a decrease in crying time, an increase in heart rate during the procedure but did not affect the respiratory frequency.

RESEARCH METHODS

The research design was experimental non-equivalent control group design. This study compared the response of acute pain in the neonate when invasive action was performed in the form of injections before and after non-nutritive sucking (NNS). The research sample was neonates who were treated in the Perinatology Room of Dr. Hospital. Soekardjo Tasikmalaya with inclusion criteria: a) Normal neonates with 37-42 weeks' gestation in the Perinatology Room, b) Not getting sedative treatment, opioids and steroids, c) Intramuscular injection of the external thigh for vitamin K or Hb immunization, d) Babies are in care for a maximum of 3 x 24 hours and are indicated not to get breast milk from the beginning of the birth. The study used a pain assessment instrument for neonatal referred to as CRIES. This is an acronym of 5 physiological and behavioral variables that are shown and related to the presence of neonatal pain, namely C-Crying, R-Requires increased oxygen administration (increased oxygen demand), I-Increased vital sign (increased signs vital), E-Expression (facial expression) and S-Sleeplessness (difficulty sleeping).

This CRIES instrument has been tested for validity and reliability with valid and reliable CRIES results and accepted as an assessment instrument for neonatal

nurses. Concurrent validity between CRIES and POPS=0.73 (p<0.0001; n=1382), Spearman correlation between subjective reports and POPS and CRIES = 0.49 (p<0.0001; n=74). Interpreter reliability coefficient of uses Spearman's correlation r=0.72 (p<0.0001; n=680). Bivariate analysis was carried out with Mann-Whitney and Wilcoxon tests because the data were not normal.

RESULTS AND DISCUSSION

Overview of respondents' characteristics by sex of ASI and NNS groups

Table 1: Distribution of Respondents by Gender

Variables	ASI Group (n = 15)	NNS Groups (n = 15)
	N %	N %
Gender		
1. Male	8 53.3	8 53.3
2. Women	7 46.7	7 46.7
Total	15 100	15 100

Table 1 shows the proportion of respondents in the ASI group and NNS group were mostly men, namely as many as 8 people (53.3%).

Average description of pain response before breastfeeding and NNS in the control group and intervention group.

Table 2: Distribution of respondents based on mean pain response before intervention

Pain response	Mean	Min - Max
ASI group	5.13	3 - 8
NNS group	4.60	3 - 6

Table 2 shows the mean pain score in the ASI group was 5.13 and the minimum - maximum ranged from a score of 3 to 8. In the NNS group, the mean pain score was 4.60 (and the minimum - the maximum ranged scored of 3 to 6.

Average description of pain response after breastfeeding and NNS in the control group and intervention group.

Table 3: Distribution of respondents based on mean pain response after the intervention.

Pain response	Mean	Min - Maks
ASI group	4.73	2 - 6
NNS group	4.26	2 - 6

Table 3 shows the ASI group mean pain score 4.73 with a minimum - maximum range of the score 2 - 6. in the NNS group, the mean pain score 4.26 and the minimum - maximum range with a score of 2 - 6.

Median different of pain response before intervention in the ASI group and NNS group

Table 4: Distribution of respondents based on the median difference in pain response before intervention

Variable	N	Median (min - max)	*P value*
ASI	15	5 (3 - 8)	0.179
NNS	15	5 (3 - 6)	

Based on table 5 above, it can be seen pain response in the ASI group is 5 (minimum score 3 and maximum 8) while pain response in the NNS group is 5 (minimum score 3 and maximum 6). From the results of the statistical test, the results obtained p-value 0.179, which means that there was no significant difference in pain response before intervention in both the ASI group and the NNS group.

Differences in pain response after intervention in the ASI group and NNS group

Table 5: Distribution of respondents based on differences in mean pain response after intervention

After - Before	N	Mean	Sum
Positive Response	4[a]	4.00	16.00
Negative Response	2[b]	2.50	5.00
No change	9[c]		
Total	15		

Test statistics

	After - before
Z	-1.186[b]
Asymp.Sig.(2-tailed)	0.236

Table 5 shows that respondents who experienced a decrease in pain scores after being intervened was 4 people, number of individuals who experienced an increase in pain scores was 2 people while those with scores remained same was 9 people. The results of the statistical test showed that p-value 0.236 means that there was no significant difference in pain response after intervention in both the ASI and NNS groups.

Prevention and reduction of pain response is a necessary for nurses provide care especially in infants. When a baby feels pain, there are some nerve cells that

are damaged (Wong, Perry & Hockenberry, 2002). Pain exposure is a stimulus that can damage the development of the baby's brain and contribute to learning disorders and behavior in childhood (Badr *et al.*, 2010). The physiological response of neonatal pain is a life threat because it is related to physiological changes from normal conditions (Wong, Perry & Hockenberry, 2002). Pain responses can reduce tidal volume, increase the need for the cardiovascular system and increase metabolism and neuroendocrine imbalances (Franck & Gregory, 1993). The hormonal metabolic response of pain in mature infants has greater intensity and shorter duration than adults.

The present study did not examine pain response based on gender, because there were many studies that proved that the response to pain is different in men than in women. Badr *et al.*, (2010) stated that gestational age, type of needle used, disease severity and behavior status correlated with scores on Premature Infant Pain Profile (PIPP) ($F=5.62$ and $p<0.01$) but gender, age postnatal, use of opioids and sedatives do not correlate with PIPP scores. Buonocore & Bellieni (2008) have conducted specific research on gender and pain response when extracting capillary blood for examination of blood sugar levels in infants aged 28 to 42 weeks using the Neonatal Facial Coding Score (NFCS) instrument. The results were analyzed by ANOVA measurements followed by comparisons multiple with Bonferroni and found a significant difference from the mean pain scores between male and female infants when observed at different periods (p value=0.025). The conclusion that can be drawn from this study is that female neonates in any gestational ages will show more facial expressions than male neonates during capillary blood sampling.

In the research that has been done, the pain response in infants is measured using the scale CRIES (Crying (0-2), Requires increased oxygen (0-2), Increased vital sign (0-2), Expression (0-2) and Sleeplessness (0-2) with the results obtained there is no significant difference of pain response experienced by good newborns in both the ASI and NNS groups before and after intervention (*p*-value 0.179 before and 0.236 after intervention). Statistically, it was found that there was no differences in average scale among ASI and NNS groups but the results of this study showed that there were 4 respondents in both the NNS group and the ASI group who experienced a decrease in pain scores after intervention.

This study shows that the administration of NNS is not more effective than breastfeeding in newborns when invasive measures are taken. This study is in line with Phillip, Chantry & Ghallager (2005) who compared the analgesic effects of 96 infants when blood collection procedures from heels. The results showed that breastfeeding is more analgesic than giving pacifiers. Researchers also found that the administration of pacifiers and if the neonates were carried by their mothers, it was more analgesic compared with the administration of pacifiers and not carried by their mothers. These results contradict the research conducted by Shah, Aliwalas & Shah (2006) who concluded that infants given ASI supplements did not show increase in heart rate and facial expression and crying scores than those given the placebo, but there were no significant differences in crying duration and changes in oxygen saturation between the ASI group and the placebo group. Another study was conducted by Blass & Miller (2001) with the results that babies are given colostrum through syringes or bowls, crying or grinning expressions did not reduce when compared with babies given water.

Previous reviews show the debate regarding analgesic effects of breast milk (Buonocore & Belliani, 2008). Shah *et al.*, (2006) stated that breastfed babies significantly have reduced blood pressure compared with the placebo group, but the difference in crying duration and oxygen saturation did not show a significant difference in either the ASI supplement or placebo group.

Potter & Perry (2006) explain that descending nerve grooves have the activity of releasing endogenous opiates, such as endorphin and dynorphin. Breast milk contains a sweet solution, namely lactose which is milk sugar in ASI (Prasetyono, 2010). Sweetness has an influence on the pain response, this is because the sweet solution in breast milk, namely lactose can induce endogenous opioid pathways that can cause pain transmission that is not perceived by the brain so that the sensation of pain will not be felt by the baby when invasive action is performed.

CONCLUSION

Based on the research conducted, there was no statistically significant difference in pain response

before intervention in both the ASI and NNS groups (*p*-value 0.179) and there was no significant difference in pain response after intervention in both the ASI and NNS groups (*p*-value 0.236).

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