

## Effect of foot reflexology on physiologic index of neonates

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### ABSTRACT

**Introduction:** The traditional view that neonates are not capable of perceiving pain has been refuted and there is now no doubt those neonates feel pain. Although babies cannot express their pain as older children, but capable to show in response the pain a set of measures as observable behavioral responses. The aim of this study was to determine Effect of foot reflexology on physiologic index of neonates.

**Methods:** This investigation was a quasi-experimental study on 30 neonates admitted to NICU. The questionnaires were composed of socio-demographic status and NIPS scale test. Measurements of HR and SaO<sub>2</sub> were taken twice, before and then again after completion of the intervention, and foot reflexology was codified to measure and evaluate them.  $P < 0.05$  is acceptable for all of tests.

**Results:** The study showed that there was significant difference between before and after the intervention on physiologic index (O<sub>2</sub> saturation, heart rate) in neonates ( $P = 0.003$ ). Nonetheless, we suggest doing more studies in related subjects.

**Conclusion:** Our investigation shows that foot reflexology can improve the physiologic index and decrease O<sub>2</sub> saturation, heart rate (toward normal range), and can inspired relaxation in neonates. Nonetheless, we suggest to doing more studies to this subjects.

**Key words:** Reflexology; Physiological Index; neonates.

### Introduction

Pain management is especially important for neonates who are not able to verbally express their pain. The traditional view that neonates are not capable of perceiving pain has been refuted and now there is no doubt that neonates feel pain (1). Although infants do not verbalize; they reveal their vulnerability to pain through specific pain behaviors and physiologic changes. The physiological indicators of pain include autonomic changes in the heart and respiratory rate, blood pressure, and oxygen saturation. There are also hormonal responses to pain, but these need a laboratory evaluation to make an informed judgment. Behavioral responses consist of Changes in sleeping/waking patterns, crying, body and limb movement, and facial expressions (2). Pain can be managed by pharmacological and non-pharmacological interventions. Using analgesics to relieve short-term procedural pain in newborns is questionable because of these agents' poor effectiveness and potential side effects (3). To

avoid adverse effects of pharmacologic analgesic agents, non-pharmacologic strategies to minimize neonatal procedural pain, such as skin-to-skin contact with a caregiver, non-nutritive sucking (NNS), oral administration of sweeteners, and massage have been proposed (4).

Systematic application of touch is called massage. Neonatal massage has been a traditional practice in India, Bangladesh, Nepal and other neighboring countries (5). Massage therapy is most popularly used with pain syndromes (6). Gentle massage may inhibit the transmission of pain along the ascending fibres by closing the gate or by activating the descending endogenous opioid and non-opioid pathways to decrease nociceptive transmission and reduce pain (7). Pain stimuli in neonates generate short- and long-term effects. Short-term effects include physiologic responses (increase in heart and breath rate, decrease in oxygen saturation, and increase in intracranial pressure) and behavioral responses (brow bulge, eye squeeze, nasolabial furrow, and cry). Although

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long-term effects are less easy to prove, some studies on circumcised boys showed that newborn early pain experience can alter pain response in later infancy(8). Furthermore, Neonatal intensive care unit is considered a stressful environment with loud noise of equipment, alarms and bright lights. Neonatal massage may help these neonates reduce the stress levels and pain and has been suggested to improve the growth and development of preterm and low birth weight infants (9).

### Study Aim

The aim of this study was to determine the effect of foot massage on pain relief in neonates in NICU. We hypothesize that neonates who receive massage therapy will have better physiologic and behavioral responses and show less pain.

## Material and Method

This investigation was a quasi-experimental study on 30 neonates admitted to NICU in Ardabil. The neonates were recruited by a researcher who was a nurse. She obtained written informed consent from all the parents. Then, the subjects with pain disorders were randomly selected to intervention and received leg massage. Investigator slowly massaged the sole of feet from toes to mid-thigh by using a firm but gentle pressure by fingers and thumbs. The Field's massage therapy consists of; both tactile and kinesthetic stimulation. Massage is given in 15 minute sessions starting with 5 minutes of tactile stimulation followed by 5 minutes of kinesthetic stimulation and ending again with 5 minutes of tactile stimulation. Three massage sessions need to be performed per day (10). The massage pressure was adjusted to keep the baby comfortable. Measurements of HR and SaO<sub>2</sub> were taken twice: once before providing intervention (i.e. pre-test) and then again after completion of the intervention (i.e. post-test). Pain response was measured by the NIPS. The Neonatal Infant Pain Scale (NIPS) developed by Lawrence (11). Integrates one physiologic parameter (breathing patterns) and different behavioral components: facial expression, limb activity, cry and state of arousal. Inter-rater reliability and internal consistency reported by Lawrence ranged from 0.92 to 0.97 and 0.87 to 0.95, respectively. Infants are scored on a 1-10 point scale, in coordination with clinical nursing judgment. Score ranges from (0-3) mild, (4-6) Moderate, and (7-10) severe pain (12). I need to mention that study was conducted according to the principles of the Helsinki declaration.

### Statistical analysis

The data were analyzed using SPSS/PC software (version 16). Descriptive analysis, Wilcoxon and pair t test were used for comparing before and after intervention in neonates. The results of statistical tests were considered significant when  $p < 0.05$ .

## Results

The characteristics of 30 subjects are described in Table 1. Overall, neonates weighed between 3.0 and 3.5 kg, and their age was 3-4 days (See table 1). The HR of subjects significantly decreased after the intervention compared to the time before it. Also, the SaO<sub>2</sub> levels of all neonates increased after feet massage compared to before intervention. Meanwhile, the pain scores (NIPS) of the neonates were shown to have significant difference after intervention.

**Table 1 :** Characteristics of neonates(n=30)

Characteristics	N	%	
<b>Age</b>	3-4	26	86.7
	5-6	4	13.3
	>6	0	0
<b>Sex</b>	Male	19	63.3
	Female	11	36.7
<b>Weight</b>	2000-2500	2	6.7
	2501-3000	9	30
	3001-3500	11	36.7
	>3500	8	26.7
<b>Delivery</b>	NVD	8	26.7
	C/S	22	73.3

There was a significant difference in the change of SaO<sub>2</sub> and HR levels between pre-test and post-test in subjects (See Table 2).

**Table 2:** Comparison of heart rate and oxygen saturation (N=30)

Group	Pretest	Post test	P value
	M(SD)	M(SD)	
HR	127.9(12.4)	123.2(18.6)	
Sao <sub>2</sub>	97.2(0.65)	98.3(0.7)	P=0.03
NIPS	6.4(11.79)	3.9(7.18)	

## Discussion and Conclusion

Measuring pain in newborns is a complex problem (13). A number of non-pharmacologic therapies have been shown to be beneficial to the management of mild to moderate pain in the neonate (14). Moreover, neonatal intensive care unit is considered a stressful environment with loud noise of equipment, alarms and bright lights.

Neonatal massage can help these neonates reduce the stress levels and pain of preterm and low birth weight infants (9). Indeed, gentle massage may inhibit the transmission of pain along the ascending fibers by closing the gate or by activating the descending endogenous opioid and non-opioid pathways to decrease nociceptive transmission and reduce pain(7). It may also be that massage which contributes to a soothing environment similar to studies of multisensory stimulation potentiating the analgesic effects of oral sugar in newborns (15).

In this study NIPS test, especially level of SaO<sub>2</sub> and Heart rate, shows that neonates before intervention had increased level of HR, SaO<sub>2</sub> and NIPS mark rather than after intervention that it's according to above studies, and descending this measurements was due to feet massage can relieve the pain in this subjects. Our findings in the present study are consistent with Kulkarni A & Jain S & Catelin C's (5, 16, 17) finding and confirm our hypothesis.

There was a limitation in this study which should be considered in further studies. It is that Infant facial responses to pain as well as physiological responses might have been influenced by multiple confounding factors, such as infant hunger or discomfort, temperament, sleep/wake state, and prior painful experiences. Although some of these variables were controlled in our analyses, future studies should consider these factors in selecting newborns and in data analysis. Despite these limitations, this study introduced an intervention that may be an effective pain management intervention in infants. Therefore, this study could provide health professionals with a research-based intervention.

## Conclusion

Our investigation shows that foot massage can relieve the pain and can inspired relaxation in neonates. Nonetheless

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