

Comparison of the Effect of Two Methods of Breastfeeding and Oral Glucose 10% on the Severity of Venipuncture-Induced Pain and Physiological Indicators in Hospitalized Infants: A Randomized Clinical Trial Study

Mozhgan Saeid nejad

Kerman University of Medical Sciences

monirsadat Nematollahi (✉ m.nematollahi@kmu.ac.ir)

Kerman University of Medical Sciences <https://orcid.org/0000-0002-0905-8802>

Farokh Abazari

Kerman University of Medical Sciences

Abdoali Mortazavi

Seyed Al-Shohada Hospital

Research article

Keywords: infant, pain, physiological indicators, glucose, breast milk, venipuncture

Posted Date: June 9th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-25615/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background: The incidence of pain in ill infants hospitalized in the neonatal ward is unavoidable. The aim of the present study was to compare the effects of two methods of breastfeeding and oral glucose 10% on the severity of venipuncture-induced pain and physiological indicators in infants hospitalized in the neonatal ward of Seyyed Al-Shohada Hospital in Kerman in 2019.

Methods: The present study is a clinical trial study with three groups and with a pre-test and a post-test. It was conducted on 120 neonates who met the inclusion criteria. Infants were selected by a convenient sampling method, and they were randomly divided into three groups. The study instruments included a neonatal demographic questionnaire, and neonatal infant pain scale and a checklist for recording physiological indicators. Then, the data were analyzed using SPSS25 software.

Results: The results of the study showed that the mean score of pain severity before the intervention was the same and zero in the three groups ($P > 0.05$), but during venipuncture and after that, a statistically significant difference was observed among three groups ($P < 0.05$). The highest mean pain during venipuncture was observed in the control group (86.95) and the lowest mean pain was observed in the breastfeeding intervention group (35.91). After venipuncture, the lowest mean pain was observed in the breastfeeding intervention group (40.40). Also, there was no significant difference between the mean physiological indicators (temperature and heart rate) in different stages of the venipuncture (before, during, and after) in three groups ($P > 0.05$).

Conclusion: Based on the results of the study, breastfeeding is more effective than oral glucose 10% in reducing the severity of infant pain during venipuncture. Breastfeeding is an easy and inexpensive and available method that can be easily implemented with proper training for the mother and it can be used as a method of reducing infant pain by nurses in neonatal intensive care units to ensure the normal growth and development of the infant and prevent the physical effects and discomfort of infants.

Background

Pregnancy, childbirth, and the first days of life are always associated with high emotional load for families and are a new experience for family life. Also, infants require great care in the field of neonatal care due to their specific biological and physiological conditions. (1) By providing proper and standard care in the neonatal period, the opportunity for optimal growth and development of the infant is provided. Also, the neonatal period is a vulnerable period because the infant is in the stage of physiological adaptation to ectopic life(2). Infants weighting less than 2,500 account for 10% of all infants in the world. In 2012, more than one in 10 infants were born prematurely, and more than one million infants die after birth. Also, according to the World Health Organization (2011), the death of premature infants has been an important cause of death in children under five years of age in Iran(3). Infants are able to perceive, experience, and remember pain(4). Also, they are more sensitive to pain than adults because they do not have a declining control system that is effective in moderating pain (3), and even non-painful stimuli might cause a pain response in them(5).

Hospitalized infants usually tolerate pain of venipuncture, suctioning, intubation, and vaccination(6). Pain has short-term and long-term side effects for infants. Short-term side effects include instability in the physiological state, changes in the quality of sleep and wakefulness of the infants (6) and long-term and recurrent pain can cause relatively permanent changes in the development of the nervous system, disruption in level of attention, learning ability, and behavioral problems in childhood(7). Infants are unable to express pain and in response to painful stimuli, they show a range of behavioral and physiological responses such as facial expressions, crying, increased heart rate, and decreased oxygen saturation of arterial arteries(8). One of the most painful procedures in the neonatal ward is venipuncture. Due to the multiplicity of painful procedures, the use of appropriate methods to reduce infants' pain during painful interventions seems necessary(8). According to one study, each infant undergoes 372 painful interventions on average during his or her hospitalization, the most common of which is venipuncture, followed by endotracheal suctioning (9).

Many studies have emphasized the implementation of non-pharmacological methods of pain relief in the care of these infants (10) Nurses play a major role in providing this type of care and relieving pain is one of the duties of nurses. They should have required knowledge on the diagnosis of pain level, complementary treatments, and non-pharmacological methods (11) Sweet oral solutions reduce pain and increase tolerance to painful stimuli by increasing the effect of internal endorphins. Due to the cheapness of glucose solutions, if they are effective in reducing pain and controlling pain responses, these solutions can be used when performing painful procedures (12)

The study conducted by Dylan in 2010 showed that there was no significant difference in the effects of oral glucose 30% and spray of glucose 30% before neonatal venipuncture on pain relief (13), but there was a significant difference between giving placebo and oral glucose 30% or spray of glucose 30% before venipuncture. It was also reported that the use of a single dose of oral glucose before

subcutaneous injection was effective for premature infants (11, 13) The results of a study conducted by Sahoo et al. showed that breast milk and glucose 25% were effective in reducing pain in infants, but when their effects were compared, it was found that glucose 25% was more effective in reducing pain (11) The study conducted by Bilgen on 130 infants showed that sucrose, compared to breastfeeding, was more effective in reducing pain and breastfeeding did not reduce infant pain (14)

The results of a study conducted by Ayoma et al. (2010) showed that breastfeeding significantly increased the oxygenation of the cerebral blood flow in the orbital and frontal areas, indicating the effect of breast milk on improving the oxygenation (15). The results of the study of Korbandi et al. in 2015 showed that the rate of physiological changes in the breastfeeding group was lower than that of the control group. Breastfeeding during venipuncture caused more stability in the infant (16) Also, the results of the study conducted by Hu (2013) showed that the HR index in the breastfed group reached baseline within 2 minutes. In the glucose group, it reached baseline within 3 minutes, while in the control group, this index reached baseline within 5 to 7 minutes (17). Based on the existing studies, non-pharmacological measures to reduce neonatal pain are inevitable, and nurses in neonatal wards should pay attention to this issue. However, the researcher's experience in the neonatal intensive care unit showed that nurses in the neonatal wards of Iranian hospitals still do not pay enough attention to this issue. The results of various studies on the effect of non-pharmacological pain control methods in infants also differ. Based on the researcher's results, no comparative study was found to investigate the effect of glucose and breast milk solutions in Iran, so the present study was conducted to examine the effect of nutrition (breast milk and glucose 10%) on the severity of venipuncture-induced pain and physiological criteria in hospitalized infants.

Methods

After obtaining the necessary permission from Kerman School of Nursing and Seyyed Al-Shohada Hospital, the researcher referred to the neonatal intensive care unit of Seyyed Al-Shohada Hospital in Kerman. After providing a complete explanation of the research objectives to nurses and mothers of infants hospitalized in the neonatal ward, he obtained a complete list of hospitalized infants. Based on the inclusion criteria, 120 infants were randomly selected and then randomly assigned to three groups using a table of random numbers by researcher. The sample size was determined by the formula.

Inclusion criteria included: no barrier for oral feeding and no sedatives and painkillers for at least 3 hours before venipuncture (18)), the infant should be awake before venipuncture, the mother has not received any drugs, the infant should not have any cleft lip and palate abnormalities, mother should not be diabetic, and infant should be breastfed. The research exclusion criteria also included all infants who have congenital anomalies such as congenital heart disease, gastrointestinal abnormalities, hypoxic lesions, respiratory failure, current or past history of NEC, suspected or confirmed sepsis, recent abdominal surgery, diagnosis of sepsis (positive blood culture) during the study, infant undergoing NPO at least two consecutive times, and discharging before the intervention completion.

In the first group, the infant's mother was asked to be present in the ward during venipuncture and hug her infant. The duration of hugging by mother was five minutes before the intervention. Then, the mother was asked to breastfeed her infant. During breastfeeding, venipuncture was done from the veins behind the infant's hand. During venipuncture, the neonatal infant pain scale (NIPS) and the infant's physiologic checklist were completed by the researcher. In the second group (glucose 10% feeding), the infant's mother was asked to be present during the venipuncture. Two minutes before the venipuncture via syringe, two ccs of oral glucose 10% was given to the infant, and two minutes later, venipuncture was done while the mother has hugged her infant. The pain questionnaire and physiological criteria checklist were completed by the researcher before and five minutes after venipuncture. In the third group (control), venipuncture was done without any other intervention. The instrument of determining the severity of pain and the checklist of physiological criteria were completed five minutes before, during venipuncture, and five minutes after venipuncture.

All infants were fed half to one hour before the test. To do venipuncture from the veins on back of the hand, the desired area was first cleaned with an alcohol-soaked swab, and the venipuncture was done using a needle No. 22 in all infants by a nurse. If venipuncture failed in the first time of entering the needle inside the skin, that infant would be excluded. Behavioral changes and physiological criteria were recorded by the researcher.

It should be noted that during the pilot study, the crying and restlessness of infants lasted two minutes on average, so the researcher allocated a 2-minute time for observing before, during, and after the intervention.

Study instruments: The instruments used in this study include 3 questionnaires. The first instrument was demographic information questionnaire that included maternal characteristics (age, number of children, number of deliveries, type of delivery, history of underlying disease and neonatal characteristics (sex, gestational age, birth age, birth rank, weight, height, head circumference, first-minute and fifth-

minute Apgar). Also, this part of the questionnaire included the sex of infant, birth age, the weight of infant's birth, the history of multiple pregnancies, the first-minute and fifth-minute Apgar, and birth rank. The second instrument included neonatal infant pain scale. This instrument can be used in infants up to 6 weeks after birth. The validity and reliability of this scale have been investigated in studies (18) Calculation of validity and reliability: Reliability and validity of NIPS have been confirmed by Mollahadi and Moradi (95% ($r = 95\%$) (14) and other studies (19) The validity of Puritan Nellcor 295-NB Bennett pulse oximetry and chronometer devices was confirmed based on the manufacturer company and performing calibration. To evaluate the reliability of the instrument during the research, single pulse oximetry was used, and it was done in a similar situation (on supine position and connecting probe to the right leg of the infant). The infants' physiological data checklist in this questionnaire included physiological information of infants, including respiration rate, heart rate, arterial blood oxygen levels, and temperature. Its content validity was examined and its reliability was obtained at 0.87 using Cronbach's alpha.

Data analysis

Descriptive and analytical statistics were used to analyze the data. According to the results of the Kolmogorov-Smirnov test, the study data did not have a normal distribution, so non-parametric tests were used. Central and distribution indices (frequency, percentage, mean, and standard deviation) were used to report demographic characteristics, Kruskal-Wallis test was used to compare means of pain severity and physiological indicators, and Mann-Whitney U test was used to compare variables before and after intervention in each group.

Results:

According to the results of the study, 120 infants studied in all three groups of control, oral glucose 10%, and breastfeeding was not significantly different in terms of demographic characteristics. In other words, the three groups were homogeneous ($p\text{-value} > 0.05$). (Tables 1). The results of Table 2 showed that severity of pain at the beginning of the study was the same in all three groups ($P > 0.05$), but during venipuncture and after it, significant differences were observed among the three groups ($P < 0.05$), so that the highest mean of pain during venipuncture was observed in the control group (86.95) and the lowest mean pain was observed in breastfeeding group (35.91). Also, after venipuncture, the lowest mean pain severity was observed in the breastfeeding group (40.40). The mean infant pain score at the time of receiving breast milk and glucose 10% during and after venipuncture was significantly different ($P\text{-Value} = 0.0001$) (Table2). Also, the results of the study showed that physiological indicators (temperature and heart rate) in different stages of the venipuncture (before, during, and after intervention) were the same in three groups ($P > 0.05$). In other words, there was no significant difference between the mean physiological indicators (temperature and heart rate) in infants received breastfeeding, glucose 10%, and routine care before, during, and after venipuncture. However, a significant difference was observed between means of bonded oxygen in infants received breastfeeding, glucose 10%, and routine care before, during, and after venipuncture ($P \geq 0.05$) (Table3).

Table 1
Comparison the demographic characteristics of infants between three groups

Variables	Breastfeeding		Glucose nutrition		Control		Test
	Mean \pm SD	N	Mean \pm SD	N	Mean \pm SD	N	
Birth weight	3075.42 \pm 2.5	40	2973.5 \pm 3.4	40	2925 \pm 0.4	40	df = 2 p = 0/610
Head of circumference	34.1 \pm 6.1	40	34.1 \pm 0.7	40	33.1 \pm 0.83	40	Statistics of Crocus Wallis = 6/676 df = 2 p = 0/036
Birth Height	48.2 \pm 63.3	40	48.2 \pm 2.56	40	48.1 \pm 3.69	40	Statistics of Crocus Wallis = 1/202 df = 2 p = 0/548
Number of hospitalized days	2.0 \pm 78.9	40	2 \pm 75.89	40	2.0 \pm 85.9	40	Statistics of Crocus Wallis = 0/284 df = 2 p = 0/868

Table 2

Comparison the mean rank of pain intensity between three groups before, during, and after the intervention

The severity of the pain		Number	Mean rank	Test statistics
Before The intervention	Glucose	40	60.5	0001/0 = Statistics of Crocus Wallis 2 = df 1 = P
	Breast milk	40	60.5	
	Routine care	40	60.5	
During the intervention	Glucose	40	58.64	Statistics of Crocus = 344/45 Wallis df = 2 0001/0 = P
	Breast milk	40	35.91	
	Routine care	40	86.95	
After the intervention	Glucose	40	57.61	205/35 = Statistics of Crocus Wallis 2 = df 0001/0 = P
	Breast milk	40	40.04	
	Routine care	40	83.75	

Table 3

Comparison mean \pm SD of physiological criteria between three groups

		glucose10% group			Breast milk group			Control group		
		M(\pm sd)	MR	Test(P)	M(\pm sd)	MR	Test(P)	M(\pm sd)	MR	Test(P)
Temperature	Before	36.99(\pm .085)	1.95	$\chi^2 =$ 3.556 (0.169)	36.99(\pm .046)	1.89	$\chi^2 =$ 49.56 (0.0001)	36.99(\pm .074)	1.95	$\chi^2 =$ 4.68 (0.097)
	During	37.005(\pm .085)	2.10		36.98(\pm .042)	2		36.98(\pm .058)	2.06	
	after	36.99(\pm .078)	1.95		37.01(\pm .035)	2.11		36.99(\pm .073)	1.99	
HR	before	135.57(\pm 10.9)	1.58	$\chi^2 =$ 33.307 (0.0001)	130.08(\pm 21.2)	1.49	$\chi^2 =$ 36.27 (0.0001)	130.2(\pm 10.6)	1.36	$\chi^2 =$ 50.9 (0.0001)
	During	145.58(\pm 14.8)	2.73		137.38(\pm 10.6)	2.71		147.4(\pm 16.1)	2.89	
	after	136.52(\pm 12.03)	1.70		133.6(\pm 9.05)	1.80		133.2(\pm 10.1)	1.75	
O ₂ saturation	before	95.78(\pm 1.9)	2.21	$\chi^2 =$ 5.620 (0.060)	95.15(\pm 1.18)	2.16	$\chi^2 =$ 2.52 (0.283)	94.3(\pm 2.6)	1.96	$\chi^2 =$ 1.033 (0.597)
	During	94.5(\pm 3.1)	1.73		94.6(\pm 2.4)	1.84		92.7(\pm 4.9)	1.91	
	after	95.18(\pm 2.4)	2.06		94.93(\pm 1.6)	2		94.3(\pm 2.4)	2.13	

Discussion

The present study was conducted with the aim of determining and comparing the mean scores of pain and physiological indicators in infants who received oral glucose 10%, breast milk before, during, and after intervention in neonatal intensive care unit of Seyyed Al-Shohada Hospital in Kerman. The results showed that the mean pain severity before venipuncture in the three groups of breastfeeding, glucose 10%, and control was zero and the highest mean pain during venipuncture was observed in infants received routine care (20) and the lowest mean pain was observed in breastfeeding intervention group (35.91). Also, after the venipuncture intervention, the lowest mean pain was observed in the breastfeeding intervention group (40.40). The mean scores of pain in infants at the time of receiving breast milk and glucose10% during and after venipuncture were significantly different (P-Value = 0.0001).

In fact, breastfeeding has been shown to be effective in reducing neonatal pain during venipuncture. Breastfeeding is probably the most pleasurable stimulant that an infant experiences and having an opportunity to suck enables the infant to control each source of stimulation with his or her activity. Also, being in the mother's embrace is one of the interventions that stabilizes the infant's condition (9). In 2012, Sahoo in India compared the effects of breast milk with glucose 25% on infants' pain severity in painful procedures in infants and showed that the mean score of pain severity was lower in breastfeeding. Its results are consistent with those of the present study (8).

However, in the present study, breastfeeding was done in the mother embrace and from her breast. The results of studies conducted by Sahebi Hagh, Shahali and Razek were in line with the results of the present study, as they showed that breastfeeding reduces pain significantly in breastfeeding infants compared to control group infants.

Dilen in 2010 showed that out of 4 solutions of distilled water, glucose 10%, glucose 20%, and glucose 30%, the solution with the highest concentration was more effective in reducing pain, and these results are consistent with those of present study. The use of sweet solutions as pain relievers can be considered as a non-pharmacological method to relieve the pain of infants hospitalized in the neonatal intensive care unit (8) With administration of oral glucose to infant, taste system and endorphins secretion in the brain are stimulated and causes pain relief in painful procedures. If glucose is given to the infant in the form of gavage and with the gastric catheter, it will not show such an effect due to lack of stimulation of the sense of taste. However, in the study conducted by Ors et al., the use of sucrose in infants caused more pain relief compared to breast milk (14)

Also, in the study conducted by Sahoo, the pain score was significantly lower in infants in both groups that received glucose and breast milk compared to the control group, but glucose was more effective than breast milk (14) It is inconsistent with results of the present study. One of the reasons for differences with the present study was the implementation of breastfeeding intervention in the mother's breast, which mother embraced the infant about five minutes before the procedure. It seems that implementing embrace care along with breastfeeding to be very effective in controlling the infant's pain because being in contact with the skin of the mother calm down the infant, and it is effective in reducing anxiety and stress of mother. In this study, it reduced the pain caused by venipuncture.

The results of the present study showed that there was no statistically significant difference between the means of physiological indicators (temperature, heart rate, and bonded oxygen) in infants receiving oral glucose 10%, breast milk, and routine care before, during and after venipuncture ($p > 0.05$). Hu showed that the HR index in the breast milk group reached baseline within 2 minutes and within 3 minutes in the glucose group, while in the control group, it reached baseline within 5 to 7 minutes (14). The results of the study conducted by Azari showed that the mean changes in HR and mean changes in SPO₂ reduction were significantly different between the two groups of breast milk and oral glucose ($p < 0.001$) (14).

Conclusion

The results of this study showed that breastfeeding was compared to glucose 10% was more effective e in reducing the severity of pain during and after venipuncture in infants. Therefore, nurses should implement non-pharmacological interventions to reduce the pain of infants hospitalized in neonatal wards so that infants receive the best quality of care. It seems that conducting clinical trial studies to clarify the effect of different concentrations of glucose on pains of infants. Nursing managers should also use non-pharmacological interventions in neonatal wards with proper planning and provide high-quality care for infants by involving parents in the care process.

Limitations

Inappropriate mental and physical conditions of the mothers during the procedure was one of the limitations of the research, which researcher obtained their consent to cooperate in the study providing a full explanation of the objectives of the study and the possible benefits of embracing the child during venipuncture procedure.

Declarations

Ethics approval and consent to participate

This article was derived from a master thesis in neonatal intensive care nurses. It was approved by the Research Deputy of Kerman University of Medical Sciences with Codes of Ethics of IR.KMU.REC.1397.343 and registered in a clinical trial under the code of IRCT20190105042245N1. As a part of the requirements for observing the ethical considerations, the objectives of the study were explained to the participants, and written informed consent was obtained from them by emphasizing the confidentiality of their information. Moreover, the implementation of the study had no physical or psychological harm to the participants.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests.

Funding

This study was financially supported by Kerman University of Medical Sciences, Iran. Number of grant was 97000317. The funding was applied in the design of the study and collection, analysis, and interpretation of data.

Author contribution

This manuscript is the consequence of the collaboration of all the authors. Author MS designed the study, wrote the study proposal, conducted data collection, and analyzed the data. The author MN analyzed the data, and the Authors FA and AM wrote the final draft of the manuscript, prepared tables, and submitted the document to the journal.

Acknowledgment

The authors of this article thereby appreciate the Research Deputy of Kerman University of Medical Sciences for their sincere cooperation in the study, honorable professors of the School of Nursing and Midwifery, and all infants' parents participating in the research, and honorable authorities of Seyyed Al-Shohada Hospital in Kerman for their sincere cooperation in this study.

References

1. Fetus Co, Newborn A, So, Medicine P. Prevention and management of procedural pain in the neonate: an update. *Pediatrics*. 2016;137(2):e20154271.
2. Francis K, Gephart S. What is best practice for providing pain relief during retinopathy of prematurity eye examinations? *Advances in Neonatal Care*. 2016;16(3):220–8.
3. Jang EK, Lee H, Jo KS, Lee SM, Seo HJ, Huh EJ. Comparison of the Pain-relieving Effects of Human Milk, Sucrose, and Distilled Water during Examinations for Retinopathy of Prematurity: A Randomized Controlled Trial. 2019.
4. Aftyka A, Rybojad B, Rozalska-Walaszek I, Rzońca P, Humeniuk E. Post-traumatic stress disorder in parents of children hospitalized in the neonatal intensive care unit (NICU): medical and demographic risk factors. *Psychiatria Danubina*. 2014;26(4):0–352.
5. Enterprises D. *Pharmacy Management Software for Pharmacy Technicians: A Worktext-E-Book*: Elsevier Health Sciences; 2017.
6. Aein F, Alhani F, Mohammadi I, Kazemnezhad A. Needs of mothers of hospitalized children: demanded rights of mothers from nursing services. *J Ethic Med Hist*. 2009;3(3):70–81.
7. Gray PH, Edwards DM, O'Callaghan MJ, Cuskelly M. Parenting stress in mothers of preterm infants during early infancy. *Early Hum Dev*. 2012;88(1):45–9.
8. Dodrill P, McMahon S, Donovan T, Cleghorn G. Current management of transitional feeding issues in preterm neonates born in Queensland, Australia. *Early Hum Dev*. 2008;84(10):637–43.
9. Barfield WD, Papile LA, Baley JE, Benitz W, Cummings J, Carlo WA, et al. Levels of neonatal care. *Pediatrics*. 2012;130(3):587–97.
10. Bagheri MM, Burd L, Martsolf JT, Klug MG. Fetal alcohol syndrome: maternal and neonatal characteristics. *Journal of Perinatal Medicine-Official Journal of the WAPM*. 1998;26(4):263–9.
11. Olang B. *Aspects of feeding patterns in the first two years of life in Iranian infants: Inst för biovetenskaper och näringslära/Dept of Biosciences and Nutrition*; 2011.
12. Carlo WA, Wright LL, Chomba E, McClure EM, Carlo ME, Bann CM, et al. Educational impact of the neonatal resuscitation program in low-risk delivery centers in a developing country. *J Pediatr*. 2009;154(4):504–8. e5.
13. Dilen B, Elseviers M. Oral glucose solution as pain relief in newborns: results of a clinical trial. *Birth*. 2010;37(2):98–105.

14. Gradin M, Finnström O, Schollin J. Feeding and oral glucose—additive effects on pain reduction in newborns. *Early Hum Dev.* 2004;77(1–2):57–65.
15. Bilgen H, Özek E, Cebeci D, Örs R. Comparison of sucrose, expressed breast milk, and breast-feeding on the neonatal response to heel prick. *The Journal of Pain.* 2001;2(5):301–5.
16. Nishitani S, Miyamura T, Tagawa M, Sumi M, Takase R, Doi H, et al. The calming effect of a maternal breast milk odor on the human newborn infant. *Neurosci Res.* 2009;63(1):66–71.
17. Örs R, Özek E, Baysoy G, Cebeci D, Bilgen H, Türküner M, et al. Comparison of sucrose and human milk on pain response in newborns. *Eur J Pediatrics.* 1999;158(1):63–6.
18. Azari M, Dargahi R, Mardi A. The effect of breastfeeding and skin to skin contact of mothers and infants on first injection pain of newborn infants. 2012.
19. Aoyama S, Toshima T, Saito Y, Konishi N, Motoshige K, Ishikawa N, et al. Maternal breast milk odour induces frontal lobe activation in neonates: A NIRS study. *Early Hum Dev.* 2010;86(9):541–5.
20. Örs R, Özek E, Baysoy G, Cebeci D, Bilgen H, Türküner M, et al. COMPARISON OF SUCROSE AND HUMAN MILK ON NEWBORNS' PAIN RESPONSE. *Pediatr Res.* 1998;44(3):446-.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [codeethics.docx](#)
- [CONSORT2010Checklist.doc](#)