

RESEARCH ARTICLE

“ANALGESIC EFFECT OF BREASTFEEDING VS. SKIN TO SKIN CONTACT ON PAIN RELATED TO HEEL PRICK IN NEONATES”

Bala Kaur Gurmeet¹

Rawat H.C.²

Sethi Gurmeet³

Abstract

Introduction: Invasive procedures in pediatric nursing practices require meticulous pain management intervention. Drugs and distraction are investigated by the several investigators; however, there is scanty international and national literature on the analgesic effect of the breastfeeding vs. skin to skin contact among neonates.

Objective: - To compare the analgesic effect of breastfeeding Vs skin-to-skin contact in neonates undergoing heel prick procedure.

Material and Methods: - Quasi-experimental study was conducted on 72 neonates admitted in Pediatric and Obstetrics departments of Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab from Dec 2010 to Jan 2011. 36 neonates for breastfeeding, 36 for skin-to-skin contact group were selected purposively. Socio-demographic data, heart rate renormalization time (pulse oximeter), duration of cry, and Pain (video recording) measured by FLACC Pain scale in response to heel prick was collected (pre-intervention). Post-intervention assessment (breastfeeding/skin to skin contact) was done and study parameters assessed again.

Results: - Findings of the study revealed that the Analgesic effect of both the interventions, breastfeeding and skin-to-skin contact, on level of pain were statistically significant ($p < 0.001$). **Less heart rate variability was seen in post-intervention assessment of both the groups (lesser in skin to skin contact group).** High reduction in heart rate renormalization time and pain in skin-to-skin contact group and less duration of cry in breastfeeding group was found. Statistically non-significant difference was found between the analgesic effect of breastfeeding and skin-to-skin contact group.

CONCLUSION: - Both interventions, Breastfeeding and skin-to-skin contact, are equally effective in reducing the pain related to heel prick in neonates and both can be used safely and effectively in the clinical setting.

Key Words: - breast feeding & skin to skin contact, heart rate, duration of cry, pain, heel prick.

¹Lecturer

M M. College of Nursing
MMU Mullana, Ambala Haryana.

²Professor cum Vice-Principal,
University College of Nursing,
Baba Farid University of
Health Sciences, Faridkot,

³Dr. Gurmeet Sethi, Professor
& Head, GGS Medica college &
Hospital Faridkot Punjab.

Address for Correspondence:
Gurmeet Kaur Bala

Lecturer,

M M. College of Nursing

MMU Mullana, Ambala Haryana.

e-mail: gurmeetbala@yahoo.co.in

Mobile : 98962-79529

Introduction

Advances in neonatal care in recent decades with increased survival of immature and sick neonates have led to an increased number of invasive procedures being performed that may cause pain in these vulnerable neonates. The prevention of pain in neonates is not only an ethical obligation, but it also averts immediate and long-term adverse consequences.

Newborn infants routinely undergo painful invasive procedures, even after uncomplicated birth. Prompt and accurate treatment of pain in young infants is important for their immediate comfort and for their best possible lifelong development (Anand KJS. 2001)¹. Despite the recent interest in pediatric pain assessment, prevention and treatment, many children are still not adequately treated to alleviate pain (Franck LS. 2001)². Neonates have increased sensitivity to pain and to its long term effects. Treating procedural pain has become a crucial part of neonatal care. In infants, one of the common painful procedures is heel prick (Anand KJS.1998)³. Pharmacological treatments are rarely used during painful procedures because of concerns about their effectiveness and potential adverse effects. Therefore, non-pharmacological interventions are valuable alternatives.(Taddio A.1998)⁴. Recent studies have reported that pain can be reduced with simple

interventions such as dextrose solutions, breastfeeding, skin to skin contact of infant with parent, multisensory stimulation.

Sinno H. P. Simons et al (2003)⁵ assessed the frequency of use of analgesics in invasive procedures in neonates and the associated pain burden in this population & concluded that on average, each neonate was subjected to a mean \pm SD of 14 ± 4 procedures per day. Many procedures were estimated to be painful (pain scores >4 on a 10-point scale). Analgesic therapy was provided to fewer than 35% of neonates per study day, while 39.7% of the neonates did not receive any analgesic therapy. Iturriaga GS. et al (Oct 2009)⁶ assessed the analgesic effect of breastfeeding when taking blood by the heel-lance procedure in healthy newborns & showed that breast-feeding is the best analgesic option, with a reduction in the discomfort of 51% and of 98% in the time of crying ($p < 0.001$). Castral TC et al (2007)⁷ tested the efficacy of mother and infant skin-to-skin contact during heel prick in premature infants & showed that Infants who received skin-to-skin contact were more likely to show lower Neonatal Facial Coding System scores throughout the procedure.

Pain management is usually the most neglected area in pediatric population. Health professionals who endorsed the belief that infants experience less pain than adults were more likely to perceive the

administration of analgesia to infants as dangerous. (McLaughlin et al)⁸. Pharmacological methods of pain alleviation are not preferred & a number of non-pharmacological methods are listed by different studies. (Mathai S, 2006)⁹ No study has ever compare the effect of breastfeeding & skin to skin contact on procedural pain. So the researcher thought to compare the two potent known non-pharmacological & physical methods of pain alleviation so as to compare their effectiveness & implement the better one in the clinical practice.

Method

The study was experimental in nature. The pilot study was conducted on a total of 6 neonates. Pilot study was conducted in Pediatrics department (NICU) and Post natal ward of Obstetric department, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab from 1st to 7th December 2010. A sample of 72 neonates was taken for the main study by using purposive sampling technique. Total sample of 72 neonates was divided into two groups, breastfeeding group and skin-to-skin contact group.

Tool consisted of standardized heart rate measuring device (pulse oximeter) and standardized pain scale (FLACC pain scale). Validity and reliability was determined by expert's opinion on the content relevance and tool tryout. Written informed consent was taken from each study subject's guardians and permission taken from authorities of the University College of Nursing, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab and Baba Farid University of Health Sciences, Faridkot, Punjab.

Final data was collected 8th Dec 2010 to 15th Jan 2011 and analyzed by using both descriptive and inferential statistics. Frequency and percentages were calculated for demographic variables of both breastfeeding and skin-to-skin contact group. Paired t-test was used to see the analgesic effect of breastfeeding and skin-to-skin contact on level of pain related to heel prick in neonates. Independent t-test was used to compare the analgesic effect of breastfeeding and skin-to-skin contact on level of pain related to heel prick in neonates.

Inclusion criteria

Neonate undergoing a heel prick (blood sugar monitoring), breastfeeding, who's parents were willing to participate & gave written informed consent were included.

Exclusion criteria

Neonate who were critically ill having Naso-gastric tube, not maintaining oxygen saturation (on ventilator or CPAP), sedated, congenital anomaly grade III or IV, intraventricular hemorrhage, history of surgery, history of drug exposure, and any tissue breakdown or inflammation of either heel, required more than one prick during one heel prick procedure, heel prick procedure or any other painful procedure was repeated in 4hrs were excluded.

Conceptual framework of the current study is based on Ludwig Von Bertalanffy General

System Model & Malzeck and Wall's Gate Control Theory.

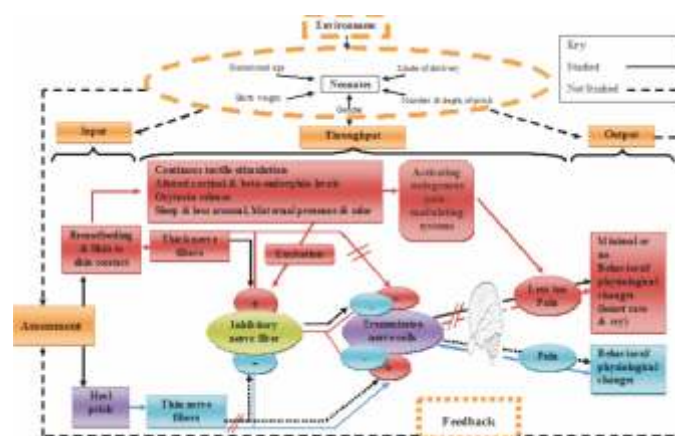


FIGURE 2: CONCEPTUAL FRAMEWORK OF STUDY (SYSTEM MODEL & GATE CONTROL THEORY)

Research Tool

Tool was divided into (i) Section A: - Information on Socio-Demographic Status (ii) Section B: - Data chart on the Cardiac Response & Duration of Cry of the infant to pain stimulus with & without the intervention (iii) Section C: - Information regarding the pain

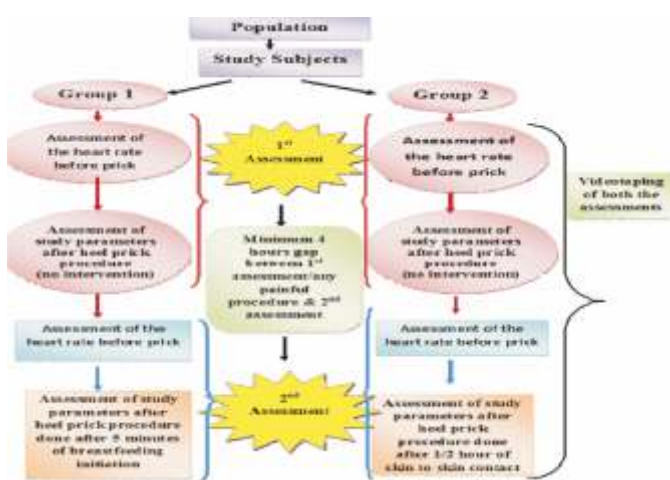


Fig: 1 Plan of data collection

perception of the infant measured by the Face, Leg, Activity, Cry & Consolability (FLACC) pain scale Ethical approval is taken from ethical committee of University College of Nursing and Baba Farid University of Health Sciences, Faridkot, Punjab and written informed consent was taken from the parents of the neonates. Pilot study was conducted from 1.12.2010 to 7.12.2010 and Study was found feasible.

Heel prick was given for blood sugar monitoring using 0.01mm disposable needle attached to lancet (Asensia Microlet, Adjustable Lancing Device) and heart rate monitoring of the neonate was done using the pulse oximeter(PC-900, SN-J0100 FK 00266, Vital Sign Monitor, Manufacturer- Shenzhen Creative Industry Co. Ltd.) rechecked manually by Pediatric Stethoscope (Microtone). Heart rate was seen just before the heel prick (taken as baseline), then just after the heel prick, at 1 min and so on till it normalized to baseline both during pre and post intervention (Breastfeeding or Skin-to-skin Contact). Duration of cry of the neonate in response to heel prick was also noted in seconds both during pre and post intervention (Breastfeeding or Skin-to-skin Contact). Video recording of the procedure was done using Sony Handy Cam (Model no-DCR-SX44E DIGITAL VIDEO CAMERA RECORDER, Carl Zeiss, Vario-Tessar 1,8/1,8-108). Duration of cry of the neonate was noted. Pain level was assessed by using Face Leg Activity Cry and Consolability (FLACC) Pain Scale.

Demographic data was collected by interview schedule as majority of the people visiting this hospital are illiterate or less educated, as observed by the investigator during clinical posting.

The tool (video recording of the procedure and then filling the FLACC Pain Scale Score) was used by two observers independently on the same subject. As the tool used was standardized, no difficulties were faced and inter-rater reliability was computed. The Kappa value for FLACC Pain Scale Score was found to be 0.97.

Statistical analysis was done by SPSS version 15.0. For Descriptive statistics:- mean, standard deviation, frequency, percentages and for Inferential statistics:- Paired t-test and Independent t-test were calculated. CI of 95%, $p < 0.001$ was considered highly significant, $p < 0.01$ and $p < 0.05$ as significant.

Results

Both the groups were comparable. Objective wise results of the study are as follow

1. ASSESSMENT OF THE LEVEL OF PAIN IN NEONATES AFTER HEEL PRICK PROCEDURE: - According to table 1, it was concluded that after heel prick procedure a neonate took 125.205 seconds to renormalize its heart rate back to normal limits and cried for average duration of 17.205 seconds. The heel prick procedure caused moderate level of pain (5.305) as shown by FLACC pain scores.

Table 1: showing combined Mean Heart Rate Renormalization Time, Duration of Cry & FLACC Pain Scale Scores of Breastfeeding & Skin to Skin Contact (control assessment)

N=72

Parameter	Mean
Average Heart Rate Renormalization Time (in seconds)	125.205
Average Duration Of Cry (in seconds)	17.205
Average level of Pain measured by FLACC pain scale	5.305

1. TO ASSESS THE ANALGESIC EFFECT OF BREASTFEEDING ON LEVEL OF PAIN AFTER HEEL PRICK PROCEDURE: - Table 2 reveals that there is significant reduction in the level of pain (heart renormalization time, duration of cry and FLACC scores) in post-intervention (prick during breastfeeding) as compared to pre-intervention. The moderate level pain (5.611) in pre-intervention assessment was perceived and only slight pain during breastfeeding by the same neonates while undergoing heel prick procedure.

TABLE 2
ANALGESIC EFFECT OF
BREASTFEEDING ON HEART RATE
RENORMALIZATION TIME, DURATION
OF CRY AND LEVEL OF PAIN

N=36

S.No	Attribute under study	Mean ± St. Deviation	t Value	df	p Value
1.	Heart rate renormalization time (in sec)				
	• Pre-Intervention • Post-Intervention	130.2500 ± 41.8483 21.6389 ± 23.1049	15.531	35	.000***
2.	Duration of Cry (in sec)				
	• Pre-Intervention • Post-Intervention	21.4722 ± 23.3060 0.8611 ± 1.7913	5.412	35	.000***
3.	Pain measured by FLACC Scale				
	• Pre-Intervention • Post-Intervention	5.6111 ± 2.2587 0.7500 ± 1.2507	12.132	35	.000***

***: Highly significant p value < 0.001

1. ASSESSMENT OF THE ANALGESIC EFFECT OF SKIN-TO-SKIN CONTACT ON PAIN AFTER HEEL PRICK PROCEDURE: -

Table 3 reveals that there is significant reduction in the level of pain (heart renormalization time, duration of cry and FLACC scores) in post-intervention (prick during skin-to-skin contact) as compared to pre-intervention. The moderate level pain (5.000) in pre-intervention assessment was perceived and only slight pain during skin-to-skin contact by the same neonates while undergoing heel prick procedure.

TABLE 3
ANALGESIC EFFECT OF SKIN-TO-SKIN CONTACT ON HEART RATE RENORMALIZATION TIME, DURATION OF CRY AND LEVEL OF PAIN N=36

S.No	Attribute under study	Mean ± St. Deviation	t Value	df	p Value
1.	Heart rate renormalization time (in sec)				
	• Pre-Intervention	120.1667 ± 41.9711	16.527	35	.000***
• Post-Intervention	4.4722 ± 10.8535				
2.	Duration of Cry (in sec)				
	• Pre-Intervention	12.9444 ± 17.1463	4.400	35	.000***
• Post-Intervention	0.5000 ± 1.2984				
3.	Pain measured by FLACC Scale				
	• Pre-Intervention	5.0000 ± 2.2297	10.615	35	.000***
• Post-Intervention	0.5556 ± 1.1574				

***: Highly significant p value

1. COMPARISON OF ANALGESIC EFFECT OF BREASTFEEDING VS SKIN-TO-SKIN CONTACT ON LEVEL OF PAIN AFTER HEEL PRICK PROCEDURE: -

TABLE 4
COMPARISON OF THE ANALGESIC EFFECT OF BREASTFEEDING AND SKIN-TO-SKIN CONTACT ON HEART RATE RENORMALIZATION TIME, DURATION OF CRY AND LEVEL OF PAIN AFTER HEEL PRICK PROCEDURE IN NEONATES N=72

S. No.	Attribute under study	N	Mean ± St. Deviation	t value	df	p value
1.	Heart Rate Renormalization time					
	• Breastfeeding Group	36	108.6111 ± 41.9594	0.716	70	0.476 ^{ns}
• Skin-to-skin Contact Group	36	115.6944 ± 42.0026				
2.	Duration of Cry					
	• Breastfeeding Group	36	20.6111 ± 22.8489	-1.722	70	0.90 ^{ns}
• Skin-to-skin Contact Group	36	12.4444 ± 1.9713				
3.	Pain measured by FLACC Scale					
	• Breastfeeding Group	36	4.8611 ± 2.4042	-0.719	70	0.475 ^{ns}
• Skin-to-skin Contact Group	36	4.4444 ± 2.5122				

NS: Not significant at p<0.05

There is no statistically significant difference between the breastfeeding group and skin-to-skin contact group in relation to reduction in duration of cry of neonate after heel prick procedure

Hence, there is no statistically significant difference between the breastfeeding group and skin-to-skin contact group in relation to reduction in heart rate renormalization time, duration of cry and level of pain of neonate after heel prick procedure.

Breastfeeding and skin-to-skin contact are equally effective in reducing heart rate renormalization time, duration of cry and level of pain during heel prick in neonates.

Discussion

Major findings

The neonates undergoing heel prick procedure were having average heart rate renormalization time of 125.205sec and average duration of cry of 17.205sec

The findings of present study revealed that moderate level of pain was experienced by neonate undergoing heel prick procedure.

There was highly significant reduction in heart rate renormalization time, duration of cry and level of pain when heel prick is given to neonate during breastfeeding in comparison to routine heel prick procedure (pre-intervention) to same neonates.

There was highly significant reduction in heart rate renormalization time, duration of cry and level of pain when heel prick is given to neonate during skin-to-skin contact in comparison to routine heel prick procedure (pre-intervention) to same neonates.

Breastfeeding and skin-to-skin contact is equally effective in reducing heart rate renormalization time, duration of cry and level of pain when heel prick is given to neonate.

The findings of present study revealed that the heel prick procedure causes moderate level of pain expressed by heart rate changes, duration of cry and FLACC pain scale scores. McIntosh N et al (1994)¹⁰ assessed the pain of heel prick and its measurement in infants. Variability of physiological parameters was used as a measure of stress in the neonate. There was a significant increase in variability of the heart rate (P < 0.01) when the heel prick occurred.

The present study depicts that there is less variation of heart rate when heel prick to a neonate is given during breastfeeding as compared to routine heel prick procedure. Gray L in 2002¹¹ studied the analgesic effect of breastfeeding. The study revealed that heart rate variability was substantially reduced by breastfeeding from pre-intervention in infants during the blood collection.

The present study depicts that there is less variation of heart rate when heel prick to a neonate is given during skin-to-skin contact of neonate with care giver as compared to routine heel prick procedure. Ludington-Hoe SM et al (2005)¹² compared a heel stick pain, conducted during Kangaroo Care (skin-to-skin contact) with the mother to a heel stick in a warmer, in reducing premature infant physiologic and behavioral pain responses & they found that heart rate was significantly reduced during Kangaroo Care in comparison to a heel stick in the warmer.

The findings of present study revealed that there was highly significant reduction in heart rate renormalization time, duration of cry and level of pain when heel prick is given to neonate during breastfeeding in comparison to routine heel prick procedure (pre-intervention). These findings are consistent with the results of the study conducted by Iturriaga GS. et al (Oct 2009)⁶ who looked for the analgesic effectiveness of breastfeeding when taking blood by the heel-lance procedure in healthy neonates & showed that breast-feeding is good analgesic option, with a reduction in the discomfort by 51% and duration of cry by 98% (P<0.001).

The findings of present study revealed that there was a highly significant reduction in heart rate renormalization time, duration of cry and level of pain when heel prick is given to neonate during skin-to-skin contact in comparison to routine heel prick procedure (pre-intervention) to same neonate. Similarly Johnston CC et al in Montreal, Canada (2008)¹³ saw the efficacy of kangaroo mother care on pain reduction after heel lance in preterm infants and showed that PIPP scores post lance were significantly lower in the kangaroo mother care group (8.871) versus control group (10.677). Time to pain was significantly shorter by a minute in kangaroo mother care.

The present study depicts that there is no statistically significant difference between the analgesic effect of breastfeeding and skin-to-skin contact on level of pain related to heel prick in neonates. In past no study has ever compared the analgesic effect of breastfeeding and skin-to-skin contact. Hopefully, the current study will act as a source of discussion for future studies.

IMPLICATIONS OF THE STUDY

Current study result has following implications:

1. Pain caused by routine procedures, even simple procedure like heel prick, in NICU or pediatric wards should not be neglected in neonates.
2. If pharmacological methods are not available or preferred then non-pharmacological methods of pain relief should be opted.

3. Whenever painful procedure is planned, mother or caregiver should be called so that breastfeeding or skin-to-skin contact can be initiated for analgesia.

STRENGTHS OF STUDY

1. Addresses the need of hour
2. Economic, preferred, easy method of pain relief with enhancement of breastfeeding and parent infant bonding
3. Good study design chosen
4. Video recording of response of infants confirms authenticity

References

1. Anand KJ. Consensus statement for the prevention and management of pain in the newborn. Arch Pediatr Adolesc Med. 2001 Feb;155(2):173-80.
2. Franck LS. Some pain, some gain: reflections on the past two decades of neonatal pain research and treatment. Neonatal Network. 2002;21(5):37-41.
3. Anand KJ. Clinical importance of pain and stress in preterm neonates. Biol Neonate 1998;73:1-9.
4. Taddio A, Shah V, Ohlsson A. Randomised controlled trial of paracetamol for heel prick pain in neonates. Arch Dis Child Fetal Neonatal Ed. 1998 Nov;79(3):F209-11.
5. Simons SH, van Dijk M, Anand KS, Roofthoofd D, van Lingen RA, Tibboel D. Do we still hurt newborn babies? A prospective study of procedural pain and analgesia in neonates. Arch Pediatr Adolesc Med. 2003 Nov;157(11):1058-64.
6. Iturriaga GS, Unceta-Barrenechea AA, Zárate KS, Olaechea IZ, Núñez AR, Rivero MM. Analgesic effect of breastfeeding when taking blood by heel-prick in newborns. An Pediatr (Barc). 2009 Oct;71(4):310-3.
7. Castral, T.C., Warnock, F., Keite, A.M., Haas, V.J., & Scochi, C.G.S. (in press). The effects of skin-to-skin contact during acute pain in preterm newborns. European Journal of Pain, 2007, doi:10.1016/j.ejpain.2007.07.012.
8. McLaughlin CR, Hull JG, Edwards WH, Cramer CP, Dewey WL. Neonatal pain: a comprehensive survey of attitudes & practices. J Pain Symptom Manage. 1993 Jan;8(1):7-16.
9. Mathai S, Natrajan N, Rajalakshmi NR. A comparative study of nonpharmacological methods to reduce pain in neonates. Indian Pediatr. 2006 Dec;43(12):1070-5.
10. McIntosh N, van Weel L, Brameyer H. Alleviation of the pain of heel prick in preterm infants. Arch Dis Child Fetal Neonatal Ed 1994;70: F177-81.