Artigo Original

Breastfeeding and skin-to-skin contact for pain relief of newborns during hepatitis B vaccination

Amamentação e contato pele-a-pele no alívio da dor em recém-nascidos na vacina contra Hepatite B

Adriana Moraes Leite[1], Ariadna de Cássia Tardim Oliveira da Silva[2], Thaíla Corrêa Castral[3], Lucila Castanheira Nascimento[4], Mirna Isicawa de Sousa[5], Carmen Gracinda Silvan Scochi[6]

[1] Nurse, PhD in Public Health Nursing. Professor, Escola de Enfermagem de Ribeirão Preto (EERP), Universidade de São Paulo (USP). Ribeirão Preto, SP, Brazil. E-mail: drileite@eerp.usp.br.
[2] Nurse, Master in Public Health Nursing. Nurse at the Hospital Estadual de Ribeirão Preto. Ribeirão Preto, SP, Brazil. E-mail: silva.ariadna@yahoo.com.br
[3] Nurse, PhD in Public Health Nursing. Adjunct Professor, Faculdade de Enfermagem da Universidade Federal de Goiás. Goiânia, GO, Brazil. E-mail: thaccastral@gmail.com.
[4] Nurse, PhD in Public Health Nursing. Associate Professor, EERP, USP. Ribeirão Preto, SP, Brazil. E-mail: lucila@eerp.usp.br.
[5] Nurse. Student of the Postgraduate Program in Nursing, PhD level, EERP, USP. Nurse at the Hospital das Clínicas of the Faculdade de Medicina de Ribeirão Preto, USP. Ribeirão Preto, SP, Brazil. E-mail: miisicawa@gmail.com.
[6] Nurse, PhD in Nursing. Professor, Escola de EERP, USP. Ribeirão Preto, SP, Brazil. E-mail: cscochi@eerp.usp.br.

ABSTRACT

The objective was to compare the combination of skin-to-skin contact with breastfeeding, to skin-to-skin contact during hepatitis B vaccination in newborns. Randomized clinical trial with a sample of 55 full-term newborns divided between two groups, namely; skin-to-skin contact (GP, n = 38), and breastfeeding combined with skin-to-skin contact (GPA, n = 27). The pain of newborns was assessed by facial movements. The heart rate (HR) of all newborns was measured, as well as the suckling frequency of newborns in the GPA. There was a statistically significant difference in the periods of compression and recovery between the groups for the NFCS scores. The average values of HR were significantly higher in the GP during antisepsis/injection. The suckling in the GPA ranged between 10-28 suckles per minute. The breastfeeding combined with maternal skin-to-skin contact can enhance the analgesic effect of maternal skin-to-skin contact, contributing to a better recovery of newborns after the procedure.

Descriptors: Infant, Newborn; Acute Pain; Breast Feeding; Vaccines; Neonatal Nursing.

RESUMO

Tem-se como objetivo comparar a combinação entre o contato pele a pele com a amamentação, ao contato pele-a-pele durante a vacina contra a Hepatite B em recém-nascidos. Ensaio clínico randomizado cuja amostra constituiu-se de 55 RN a termo divididos entre os grupos contato pele-a-pele GP, n=38), amamentação combinada ao contato pele-a-pele (GPA, n=27). A dor do RN foi avaliada por meio da mímica facial. Mensurou-se tambéma frequência cardíaca de todos os RN e frequência de sucção dos RN no GPA. Houve diferença estatisticamente significativa nos períodos de compressão e recuperação entre os grupos para os escores do NFCS. Os valores médios das FC foram significativamente mais elevados no GP na antissepsia/injeção. As sucções no GPA variaram de 10 a 28 sucções por minuto. A amamentação combinada ao contato materno pele-a-pele pode potencializar o efeito analgésico do contato materno pele-a-pele, contribuindo para uma melhor recuperação do RN após o procedimento.

Descritores: Recém-nascido; Dor Aguda; Aleitamento Materno; Vacinas; Enfermagem Neonatal.

INTRODUCTION

Newborns (NBs) undergo various physiological changes during their first hours of life to adapt to an air environment[1]. Furthermore, they are faced with a bright and noisy environment, with different odors and loss of intrauterine physical limits[2]. The post-birth routines are added to these factors, when in a short period of time, the NBs undergo stressful and often painful procedures, among which the hepatitis B vaccine[3].

Vaccination is an effective strategy for preventing infectious diseases and reducing child mortality, but pain is an expected adverse effect[4], and if left untreated, can lead to negative consequences for the child in future procedures, such as anticipated fear, hypersensitivity to pain[5], reduced effectiveness of painkillers[6] and fear of needles[7].

Several measures are recommended to relieve pain during vaccination in NBs, such as breastfeeding, sweetened solutions, topical anesthetics and distraction[8]. There is also evidence of the additive analgesic effect of skin-to-skin contact combined with glucose 25% in pain score reduction during hepatitis B vaccination in full-term NBs[9]. However, except the latter study, no other has investigated measures to reduce injection pain in NBs during hepatitis B vaccination.

Considering the frequent exposure of NBs to that procedure and the need for a more humanized care in the birth process, it is necessary to conduct studies investigating the effectiveness of nonpharmacological measures for pain relief during hepatitis B vaccination.

Some studies show evidence of the effectiveness of breastfeeding as a nonpharmacological measure to relieve pain during intramuscular administration in children from two months old and during administration of DPT vaccine (diphtheria, pertussis and tetanus)[10-11].

A study found that breastfeeding was more effective than local analgesic spray for babies up to six months during the administration of hepatitis B and DPT vaccines[12].

Regarding nonpharmacological measures with mother's participation for the relief of acute neonatal pain, a study with NBs of up to 24 hours of life compared those who were breastfed two minutes before and after the first dose with NBs who were kept in their mother's lap only. It concluded that breastfed NBs had lower pain scores during the procedure[13].

Another study compared three groups: NBs with skin-to-skin contact + breastfeeding, NBs with skin-to-skin contact, and NBs kept in the crib without intervention. No statistical difference of pain scores was found between the first and second group. However, the assessed procedure was pain of the heel puncture[14].

To our knowledge, no studies have compared the effectiveness of skin-to-skin contact + breastfeeding with skin-to-skin contact during the first dose of hepatitis B vaccination. Thus, in this study we made an attempt to compare the combination between skin to skin contact + breastfeeding with skin-to-skin contact during this procedure.

The hypothesis of the study is that breastfeeding combined with skin-to-skin contact is more effective than skin-to-skin contact for reducing behavioral and physiological manifestations of pain during the administration of intramuscular injection of hepatitis B vaccine.

This study is part of the proposals of atraumatic, developmental and humanized care to the NB, and seeks scientific evidence on maternal interventions for the management of acute pain resulting from hepatitis B vaccination. Therefore, the aim of this study was to evaluate the effect of breastfeeding combined with skin-to-skin contact in pain relief of NBs undergoing intramuscular hepatitis B vaccination.

METHODS

This is a randomized clinical trial conducted in a maternity ward in the countryside of the state of São Paulo. The inclusion criteria involved full-term newborns of up to 12 hours of life admitted to collective rooms,

Apgar ≥ 7 at the 5th minute of life; in exclusive breastfeeding on demand, who suckled the breast at least once after birth, and whose mothers had physical conditions to breastfeed. We excluded the NBs who were breastfed up to one hour before the procedure.

From similar studies[2-15], the sample consisted of 55 full-term newborns who were randomly assigned to two groups by a computer randomization program: skin-to-skin contact group (GP, n = 38 NBs), in which NBs were maintained for five minutes in a common crib (baseline period), and soon after, positioned in maternal skin-to-skin contact for 15 minutes (treatment period), followed by the period of antisepsis/injection and compression with cotton soaked in 70% alcohol, and in skin-to-skin contact until five minutes after the procedure (recovery period). In the breastfeeding + skin-to-skin contact group (GPA, n = 27), the NBs were kept in a common crib for five minutes (baseline period), and then put in skin-to-skin contact for five minutes, then combined with breastfeeding for ten more minutes, and kept in this condition during periods of antisepsis/injection, compression and recovery (five minutes after the end of compression).

The pain of newborns was assessed by facial movements and heart rate (HR) measured in the periods of treatment, procedure (antisepsis/injection), compression and recovery.

The facial expression was measured by the Neonatal Facial Coding System (NFCS)[16-17] validated in Brazil[18]. We codified only the facial actions of brow bulge, eyelid closure, and nasolabial furrow, because the view of some lower hemiface actions was blocked due to breastfeeding[2].

The faces of the NBs were shot with a SONY camera, model DCR-DVD 650 and recorded on a DVD by the research assistant. The recorded images were later codified and observed using a 29-inch Samsung TV.

The three NFCS facial actions were coded every two seconds during the final 20 seconds of each data collection period. To obtain the NFCS score, the following calculation was done for all periods of data collection: NFCS of the analyzed period (20 seconds) = number of activities observed in 10 intervals of two seconds / maximum number of possible activities or 30 (10 intervals X 3 actions) X 10[2].

For the heart rate (HR) measurement, was installed a POLAR heart monitor (RS 200 model) in all babies. It comprises a wrist receiver that records and stores the data, and a coded transmitter connected to two frequency pickup electrodes located in the thoracic region of the NBs.

Data stored by the wrist receiver were transmitted to the Polar Weblink software, responsible for presenting the average frequencies during the analyzed time. We also analyzed the number of risk situations (HR<110 and >160 beats/min)[2].

The NBs suckling frequency was also measured in the GPA, from the time they started to be breastfed in the treatment period (five minutes before the vaccine administration), until the end of the recovery period. It was quantified during different periods, initially every 30 seconds, until obtaining the number of suckles per minute.

The intramuscular injection of hepatitis B vaccine was performed solely by the same trained nursing technician using a BD® syringe connected to a Nipro® needle 20 gauge x 5.5 in the vastus lateralis muscle of the right thigh.

The data relating to maternal parity, birth (hours of life of NBs, gender, birth weight, Apgar at 1 and 5 minutes), time elapsed since the last breastfeeding at the time of newborns immunization, and number and type of painful procedures received by NBs until the time of the procedure were obtained by checking the medical records.

The study was approved by the Research Ethics Committee of the Escola de Enfermagem de Ribeirão Preto (protocol number 002/2008) and data collection started after the consent of the participating mothers.

We performed the Intraclass Correlation Coefficient test (ICC) to assess the reliability of the NFCS, from the

independent observation of the recordings of newborns' faces made by the researcher and a research assistant. To this end, was used a random sample of 11 newborns, six of the GPA and five of the GP. For each of the facial actions (brow bulge, eyelid closure, and nasolabial furrow), were obtained 20 ICC values. The average ICC obtained was 0.8801 (± 0.1434), showing excellent agreement between observers.

The Mann Whitney test was used to verify the differences between the NFCS scores between groups and periods (intragroup), and to verify the differences between the HR scores between groups and periods (intragroup) was used the ANOVA with repeated measures, with significance level of 0.05 (α =0.05).

RESULTS

Table 1 shows the NBs birth data of both groups. There was no significant difference between groups with respect to birth weight, Apgar score at 1 and 5 minutes, time of the last breastfeeding and hours of life.

Table 1: Mean values and standard deviation of the newborns birth data. Ribeirão Preto, SP, Brazil, 2010.

Variables	GP		GPA		*p*
	$\bar{x}$	*SD*	$\bar{x}$	*SD*	
Birth weight (g)	3170.71	351.912	3113.33	425.445	0.5871 [1]*
Apgar 1 minute	9.18	0.723	8.78	0.751	0.62 [2]*
Apgar 5 minutes	9.82	0.476	9.89	0.476	0.6942 [2]*
Time of the last breastfeeding (h)	2.14	0.932	1.85	0.718	0.2011 [1]*
Hours of life	6.93	0.766	6.93	0.730	0.801 [2]*

[1] Student's t-test

[2] Mann Whitney test

* There was no statistically significant difference between the groups means.

In the GP, there were 15 female NBs (53.6%) and 13 male NBs (46.4%); the GPA had 15 female NBs (55.5%) and 12 male NBs (44.5%). The chi-square test showed no difference between groups regarding gender of the newborns (p = 1.00).

Of the 28 babies in the GP, nine received more than a painful procedure, while of the 27 NBs in the GPA, five were exposed to more than a painful procedure in the period before the injection of hepatitis B vaccine. The types of painful procedures were: arterial blood sampling for tests of complete blood count, C-reactive protein (CRP) and blood culture, and capillary blood collection for blood glucose test. On average, the newborns of the GP were exposed to 1.32 (± 0.48) painful procedures, and NBs in the GPA were exposed to 1.19 (± 0.40) painful procedures. However, there was no statistically significant difference in the number of painful procedures between groups (p = 0.251).

All the newborns were exposed to at least a painful procedure after birth, which was the intramuscular administration of vitamin K.

Table 2 shows the duration of each period of the procedure, and there was no difference between groups.

Table 2: Values of mean, median and standard deviation of the time spent (in seconds) in the periods of antisepsis, injection and compression during administration of hepatitis B vaccine in the groups. Ribeirão Preto, SP, Brazil, 2010.

Variables	GP			GPA			*p*
	X	*Md*	*SD*	*X*	*Md*	*SD*	
Period of antisepsis	8.42	9.01	1.97	9.95	9.59	5.26	0.200 [1]*
Period of vaccine injection	7.32	7.59	2.07	9.26	8.0	5.56	0.090 [1]*
Period of compression	19.78	19.59	3.80	21.25	20.0	3.69	0.051 [1]*

[1] Student's t-test

* There was no statistically significant difference between groups.

The NFCS score values were lower in the GPA in all periods of the procedure, highlighting the statistically significant differences in periods of compression and recovery (Table 3).

Table 3: Comparison of NFCS scores between newborns of the GP and GPA groups. Ribeirão Preto, SP, Brazil, 2010.

Periods \ NFCS score	GP		GPA		*p*
	X	*SD*	*X*	*SD*	
Treatment	1.21	2.36	1.15	2.07	0.965[2*]
Antisepsis/Injection	19.36	3.95	18.44	3.75	0.461[2*]
Compression	11.86	5.45	6.44	4.05	0 [2**]
Recovery	9.43	3.14	6.37	1.964	0 [2**]

[2] Mann Whitney test
* No statistically significant difference between groups.
** There was a statistically significant difference.

In relation to HR, the mean values were significantly higher in the GP, compared to GPA in the period of antisepsis/injection (Table 4). Note that the intragroup analysis showed a statistically significant difference between the periods of treatment and antisepsis/injection, antisepsis/injection and compression, and between antisepsis/injection and recovery in both groups separately.

Table 4: Mean values and the respective standard deviation of HR (bpm) of newborns in the GP and GPA in each period of the procedure. Ribeirão Preto, SP, Brazil, 2010.

Periods	GP		GPA		*p*
	X	*SD*	*X*	*SD*	
Baseline	136.7	0.9	138.3	0.9	0.2173*
Treatment	137.3	0.6	137.7	0.6	0.5943*
Antisepsis/injection	161.7	0.9	157.9	0.9	0.0043**
Compression	156.9	1.0	158.9	1.0	0.1583*
Recovery	144.2	0.6	144.3	0.7	0.8683*

[3] ANOVA with repeated measures.
* No statistically significant difference between groups.
** There was a statistically significant difference.

Considering the relation of heart rate and the groups, the ANOVA with repeated measures showed a statistically significant difference in the interaction between the two groups during the period of antisepsis/injection (p = 0.004), i.e., the GP showed higher HR values during antisepsis/injection than the GPA.

In the GP, the mean values of heart rate in the period of antisepsis/injection were above 160 bpm, considered as risk.

In the GPA, the number of suckling ranged from 10 to 28 suckles per minute in the period of treatment, from zero to seven suckles per minute in the period of antisepsis/injection, zero to 10 suckles per minute in the period of compression, and nine to 21 suckles per minute in the recovery period (Table 5).

Table 5: Mean values and the respective standard deviation of newborns' suckling for the GPA according to the periods. Ribeirão Preto, SP, Brazil, 2010.

Periods	GPA	
	X	*SD*
Treatment	18.79	4.9
Antisepsis/injection	3.22	2.3
Compression	5.11	3.4
Recovery	14.58	3.76

DISCUSSION

When comparing the analgesic effect of skin-to-skin contact + breastfeeding with maternal skin-to-skin contact to relieve pain resulting from injection of hepatitis B vaccine, we found that NBs treated with skin-to- skin contact + breastfeeding had lower NFCS scores during compression and recovery periods than those kept only in maternal skin-to-skin contact. Thus, the present study results show that breastfeeding combined with maternal skin-to-skin contact can enhance the analgesic effect of maternal skin-to-skin contact, contributing to a better recovery of NBs after the procedure of hepatitis B vaccination.

A previous study examined the combined effect of maternal skin-to-skin contact with other nonpharmacological interventions in full-term NBs during heel puncture[19]. In line with our findings, maternal skin-to-skin contact combined with breastfeeding or sucrose resulted in shorter duration of crying compared to maternal skin-to-skin contact alone. However, pain scores were lower in the group who received sucrose compared to the other groups.

The analgesic mechanisms of maternal skin-to-skin contact are not known with certainty. This nonpharmacological measure brings together various stimuli such as the smell, voice, warmth, skin texture, sound of the heartbeat, movement of the chest during maternal breathing, restraint and prone positioning[20]. Studies with animals suggest that opioid systems and other neuropeptides such as cholecystokinin are involved in the learning of maternal discriminative aspects and in the establishment of the mother-child bond, indispensable factors for the formation of the NBs self-regulation[21].

By combining maternal skin-to-skin contact with breastfeeding, the oral-tactile analgesic properties of suckling and taste sensation and gastric effect of breast milk were added to the aforementioned factors[22]. It is important to highlight that not all mothers had lactating breasts because the presence of colostrum was not evaluated.

The suckling frequency in different periods was similar to another study[2], i.e., the babies kept an effective suckling during the pain treatment period, decreasing in the antisepsis/injection, increasing slightly in the compression period and suckling a little more in the recovery. However, note that in the moment of acute pain, the suckling frequency was greatly reduced, and after this time, the NBs start suckling again looking for recovery. Importantly, the suckling frequency was a variable that stood out in this study, compared to others who used breastfeeding in situations of hepatitis B vaccine administration, since it was not evaluated in these studies[12-13].

As for the treatment time offered to the group of breastfed NBs in the two other studies found in the literature, they were breastfed two minutes before the procedure[13] and immediately before starting the procedure[12], and in both the NBs continued to be breastfed until the end. As in a prior study, the present one has the differential[2] that the NBs started to be breastfed five minutes before the vaccine, and they kept suckling during the procedure and five minutes in recovery.

Another study implemented maternal skin-to-skin contact just two minutes before the injection of hepatitis B vaccine and found favorable analgesic effects[9].

Both breastfeeding as maternal skin-to-skin contact constitute strategies already advocated by the Ministry of Health[23], and the relief of acute pain in NBs is an extra benefit that justifies promoting the use of these measures during vaccination. The participation of mothers as the only agents of this care is a special feature to be considered in both interventions. Thus, the benefit for NBs extends to the mothers, who also have their stress reduced[24-25].

FINAL CONSIDERATIONS

The results of this study allow us to recommend the use of maternal skin-to-skin contact and breastfeeding for reducing pain due to hepatitis B vaccination in full-term newborns. The combination of these interventions has greater analgesic effect in reducing pain scores during injection and increased physiological stability after injection than the interventions alone.

The inclusion of the evaluation of the state of sleep and wakefulness and the crying duration of newborns in both groups could also collaborate with the study findings, once these are considered complementary variables in the evaluation of neonatal pain.

Considering that it was not controlled if all mothers had lactating breasts, we recommend the evaluation of such variable for future studies, enabling the analysis of factors related to the presence of milk as an antinociceptive measure in similar situations.

Another aspect that deserves to be better evaluated in future studies is the maternal behavior during breastfeeding and maternal skin-to-skin contact, as these strategies enable the active participation of mothers and may modify the response of newborns to the painful event.

The treatment of neonatal pain comprises one of the great relevant actions of the health team for the babies' well-being, as pain interferes in restoring their health and may have long-term repercussions for children's integration in their family, cognitive development and learning, reflecting also in increased morbidity and mortality.

For the effective implementation of the measures recommended here, it is necessary that health professionals are aware of the newborns' right to have their pain prevented and treated.

We expect the results of the present study bring subsidies for transformations in care practice in neonatology, contributing with improvements in the quality of care and life for children and their families.

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