The effect of bath on feeding, pain and physiological parameters of newborns

Banyonun yenidoğan bebeklerde beslenme, ağrı ve fizyolojik parametreler üzerine etkisi

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ABSTRACT

Aim: This study was conducted to examine the effect of bath on the nutrition, pain and physiological parameters of newborns.
Methods: This study was carried out with 100 randomly selected newborn with pain score 3 and above. The physiological parameters of the newborns, which were included in our study before the bath, 15 minutes (mins) after the bath, 30 mins and 60 mins, were examined the levels of nutrition and pain. Physiological measurements of newborns are recorded with the Newborn Follow-up Form and Neonatal Infant Pain Scale. In the analysis of the data, descriptive statistics analysis of variance and Bonferroni analysis were used.
Results: It was found that newborns' pain scores before and after the bath were gradually decreased within the first hour, according to repeated measurements of nutrition, the amount of nutrition of the newborn increased and the increase was at 30-60 mins after the bath. In addition, it was found that body temperature and saturations increased in the 30th and 60th mins of newborns after the bath and their pulse decreased in all measurements compared to the before bath (p<0.05).
Conclusion: It was determined that the bathroom reduces the pain of newborns and increases the amount of nutrition in newborn intensive care units. In repeated measurements, it was found that the bathroom had positive effects on the physiological parameters of newborns. Nurses play an active role in reducing the pain of newborn babies and increasing their nutrition. Therefore, nurses should establish evidence-based methods, guidelines and protocols for bathing newborns.

Keywords: bath; nutrition; pain; newborn; nursing

ÖZET

Amaç: Bu çalışma, banyonun yenidoğanların beslenme, ağrı ve fizyolojik parametrelerine etkisini incelemek amacıyla yapılmıştır.
Yöntem: Bu çalışma, ağrı skoru 3 ve üzerinde olan rastgele seçilmiş 100 yenidoğan ile gerçekleştirilmiştir. Çalışmamıza dahil edilen yenidoğanların banyo öncesi, banyo sonrası 15. dakika (dk), 30. dk ve 60. dk fizyolojik parametreleri ile beslenme ve ağrı düzeyleri incelenmiştir. Yenidoğanların fizyolojik ölçümleri beslenme ve ağrı düzeyleri Yenidoğan İzlem Formu ve Yenidoğan Bebek Ağrı Skalası ile kaydedilmiştir. Verilerin analizinde tanımlayıcı istatistikler varyans analizi, Bonferroni analizi kullanılarak yapılmıştır.
Bulgular: Yenidoğanların banyo sonrası ağrı skorlarının ilk bir saat içerisinde kademeli olarak azaldığı, beslenme ile ilgili tekrarlanan ölçümlere göre yenidoğanın beslenme miktarının arttığı ve artışın banyodan sonra 30-60 dk'da olduğu görülmüştür. Ayrıca banyo sonrası yenidoğanların 30. ve 60. dk'larda vücut sıcaklığı ve saturasyonlarının arttığı, banyo öncesine göre tüm ölçümlerde nabızlarının düştüğü bulunmuştur (p<0.05).
Sonuçlar: Yenidoğan yoğun bakım ünitelerinde banyonun yenidoğanların ağrılarını azalttığı ve beslenme miktarlarını arttırdığı belirlenmiştir. Tekrarlanan ölçümlerde banyonun yenidoğanların fizyolojik parametreleri üzerinde olumlu etkilerinin olduğu saptanmıştır. Yenidoğan bebeklerin ağrılarının azaltılmasında ve beslenmelerinin arttırılmasında hemşireler etkin rol oynamaktadır. Bu nedenle hemşireler yenidoğanlarda banyo ile ilgili kanıta dayalı yöntemler, kılavuzlar ve protokoller oluşturmalıdır.

Anahtar kelimeler: banyo; beslenme; ağrı; yenidoğan; hemşirelik

Introduction

Stress-causing conditions such as pain in infants have been shown to have potentially long-term effects on brain activity and endocrine stress responses. Epigenetic effects of stress in infants have been reported (Montirosso et al., 2016; Vinall & Grunau, 2014) Therefore, pharmacological and non-pharmacological methods are recommended to prevent and control all factors that cause stress in infants, especially pain (Gao et al., 2018).

Clinically, newborns and especially preterm babies may sometimes show signs and symptoms for unclear clinical reasons. Since newborns are physiologically different from adults, stressors that do not affect adults can have a significant impact on newborns by altering their long-term development. In addition to the environmental stressors that are inherently characteristic of the neonatal intensive care unit

(NICU) (i.e. noise, temperature, etc.), babies experience excessive stress due to their current illness and various invasive medical procedures (Šapina et al., 2018). Exposure to pain can have neurodevelopmental consequences beyond other factors. Preterm babies admitted to the NICU are exposed to significant environmental, procedural and physiological stress factors, including medical procedures, nursing care, medical comorbidities, and pain (Nist et al., 2019).

Pain is one of the most important sources of stress in the NICU. Current guidelines for pain management suggest a multidimensional approach that includes environmental, pharmacological and non-pharmacological measures (Howard et al., 2020). One of the non-pharmacological methods recommended for providing comfort in newborns is bathing. In addition to having hygienic, aesthetic, cultural and

individual benefits, newborn bath is an important practice that positively affects newborns (Bryanton et al., 2004; Lund, 2016). It can be relaxing because the bath repeats the free movements of the baby in water in intrauterine life (Afsar, 2010; Yagi & Yonei, 2018).

Bathing is both a pleasant experience for the baby and a means of establishing a positive bond between the baby and the caregiver (Bryanton et al., 2004). It has been stated that bathing relaxes the breathing of newborns, reduces stress and pain, and also supports the development of babies, prolongs sleep and increases maternal satisfaction (Ceylan & Bolışık, 2018; Darmstadt & Dinulos, 2000; Edraki et al., 2014; da Fonseca Filho et al., 2017; Günay & Coşkun, 2018; Kuller, 2014; Medves & O'Brien, 2004). In addition, thermal, cardiac and respiratory positive reactions have been observed in neonatal bath (da Fonseca Filho et al., 2017).

Although bathing has a great effect on protecting the health of baby, there are different opinions about baby bathing. The most common bathing methods for babies are wiping and bathtub bathing. Studies have shown that bathing positively affects the physiological findings without harming the baby (Ar & Gözen, 2018; Edraki et al., 2014; Günay & Coşkun, 2018). In the literature reviews, it is seen that the method and duration of the bath are also important factors.

There are studies that examine babies' first baths; however, studies examining subsequent baths, bathing routines and their effects are limited. Studies examining the effects of bathing on comfort have shown that it increases the comfort level of babies and reduces their pain (Taşdemir & Efe, 2019). However, the effect of bathing on baby's nutrition and pain has not been studied. This study has been carried out in order to examine the effect of bathing on current pain, nutrition and physiological parameters of babies that have pain.

Methods
Study design, setting and population

The population of the study consists of newborns who were hospitalized in a training and research hospital at the time of the study. According to the power analysis of the sample of the study, the effect size was 0.5, level of significance was 0.05, population representation power was 0.95 and the sample size was 100 newborns.

In the study, (a) term infants hospitalized in neonatal intensive care (b) newborns with a pain score of 3 and above (c) newborns with no problem in oral feeding (d) newborns without skin problems (e) and newborns without a health problem such as breathing or heart problems that prevents them from bathing were included. In the study, (a) pain score below 3, (b)having health problems that prevent bathing, such as neural tube defect, (c) babies receiving ventilation support formed the exclusion criteria. Accordingly, 10 newborns were excluded in our study.

Measures

The researchers prepared a procedure for recording the research data. The research procedure consists of 4 stages. In the first stage, the introductory characteristics (gestational week, postpartum age, body weight, type and amount of nutrition, pain level) of the newborns meeting the inclusion criteria were recorded. In the second stage of the study, all bathing equipment (bathtub, bucket, water temperature thermometer, bath water at appropriate temperature, towel,

cover, clothing, beanie, diaper) were prepared and recorded. In the third stage, environmental variables were controlled (since the temperature and humidity of the building are adjusted by a central system, the system record information was taken), a note was put on the door to avoid entering the bathing room during the procedure. In the last stage of the study, vital signs (body temperature, oxygen saturation, pulse, blood pressure) of the newborns before and after bathing, as well as pain and nutritional status were recorded. The study was conducted in the neonatal intensive care unit of a state hospital. The hospital has intensive care units at 3 levels. Neonatal nurses work in each intensive care unit, and 4-5 nurses work in each ward. There is a bathroom in the intensive care unit where newborns can be bathed.

Procedure

The families of the newborns meeting the inclusion criteria were informed about the study and "Informed Consent" was obtained. Before starting the procedure, the bathroom was cleaned and the room temperature was set to be 26-28 ºC. Hands were washed, materials were prepared. The water temperature was set to be 37-38 ºC. Starting from the neck of the newborn, the neck, chest, arms, back and legs were washed with shampoo respectively, and genital area was washed with soap, then the head was washed and the body was rinsed with soft movements with the other hand. Meanwhile, a second person helped to rinse by pouring water and the newborn was laid on a clean towel. Quickly, the whole body was dried with soft movements. While drying, care was taken to dry the knuckles, armpits, groin, fingers and genital area thoroughly. Moisturizer (newborn oil) or rash cream was applied and a clean diaper was fastened. Belly care was done and the newborn was dressed quickly. Immediately afterwards, the newborn was monitored and vital signs were recorded from the first moment. Physiological parameters, nutrition and pain levels of the selected newborns before bathing and within 15 minutes, 30 minutes and 60 minutes after bathing were recorded. Research data were collected by the researchers using a newborn follow-up form.

Instruments
Newborn follow-up form

The form, which was prepared with seven questions examining the characteristics of the newborn gender, age, weight, medical diagnosis, physiological parameters, feeding and pain score, was applied by the researchers.

Neonatal Infant Pain Scale (NIPS)

NIPS was developed by Lawrence et al. (1993) and adapted to Turkish by Akdovan (1999). It is a scale that evaluates behavioral responses to pain in penetrating procedures in preterm and term infants. It is a scale developed for premature and neonatal infants and each item is scored between 0 and 2 points and it is seen that the pain increases as the total score increases. Total score 0 to 7 scores higher than 3 indicate the presence of pain. Cronbach's alpha coefficient was 0.76 before the bath and 0.80 after the bath (Akdovan, 1999).

Statistical analysis

In the assessment of data obtained as a result of the study, computer program was used and the data were interpreted by the researcher. Percentage and average were used for descriptive statistics. The Kolmogrow-Smirnov test

was applied in order to determine whether the sample data were normally distributed. Since it showed normal distribution, repeated analysis, variance analysis and Bonferroni analysis were used. Significance level was accepted as $p < 0.05$.

Ethical principles

Ethical permission İnönü Univesity Health Sciences Scientific Research and Publication Ethics Committee (Decision no: 2017/8-9, Date: 04.04.2017) was obtained to conduct the study. The parents of the newborns who met the inclusion criteria were informed about the research and an informed consent form was filled out by the researchers.

Results

It was determined that 50% of the newborns included in our study were female, 44.6% were hospitalized with the diagnosis of respiratory distress, and their mean weight was 2487.70±761.34 gr.

It was determined that there was a statistically significant difference between the measurements in repeated measurements of the physiological parameters of the newborns before and after the bath. When the effect sizes of the physiological parameters were examined, a low-level effect was found.

When the repeated temperature measurements of the newborns were examined, it was determined that the difference between the measurements was between the groups before and after the bath. However, although this difference seemed statistically significant, when evaluated clinically, the fever of the newborn continued as 36 ºC. A significant difference was found in the respiratory rate of newborns between 30 minutes (54.56 ± 2.74) and 60 minutes (52.53±5.53). While there was no significant difference between the SpO₂ values before bath (54.49±7.49) and the SpO₂ values at 15 minutes after the bath (56.10±3.24), it was determined that there was a significant difference in the SpO₂ values at 30 and 60 minutes (54.56±2.74; 52.53±5.53).

It was found that pain score of newborns before bath was (5.08±2.33). The pain score was (4.56±2.61) within 15 minutes, (0.83±1.80) within 30 minutes (0.15±0.71) within 60 minutes after bath. It was found that the pain scores of the newborns decreased gradually and there was a significant difference between the groups. It was observed that the effect level ($\eta^2 = 0.673$) of the reduction in pain scores after bathing was high (Table 1).

Since the free feeding model was applied to the newborns, intermediary feedings were given. Oral feeding was given at the 15 minutes, 30 minutes and 60 minutes according to the wakefulness of the newborns according to their nutritional requirements (Table 2). There was an increase observed in the nutrition of newborns. Oral intake was observed in 1 infant within the first 15 minutes after the bath, in 3 newborns within 30 minutes and in 48 newborns after 60 minutes. It was observed that the average of feeding before the bath and the mean increase in 1 hour after the bath were similar.

Table 2. Increase in oral feeding of newborn babies before and after bathing

Nutrition	Mean ± SD	Min-max
Before bath	30.52±17.76	0-80
15 min. after bath (1 baby)	12	-
30 min. after bath (3 babies)	17.00±12.52	5-30
1 hour after bath (48 babies)	30.68±17.36	1-70

Discussion

In this study, it was observed that differences occurred in physiological parameters, pain and nutrition of newborns before and after bathing. Although physiological parameters appear to be significant, it can be said that they are not clinically significant. It can be said that the vital signs of newborns are not affected by bathing. When the studies examining the effect of bathing on the vital signs of the newborn are examined, there are conflicting information. Günay and Coşkun (2018) found that body temperatures did not change in his study, in which he examined the effects of two bath methods on pain and physiological parameters. In their study comparing swaddling and traditional bathing methods, Çaka and Gözen (2018) found a decrease in body temperature in both methods. Similar results were seen in different studies (Ar & Gözen, 2018; Edraki et al., 2014; Medves & O'Brien, 2004; Taşdemir & Efe, 2019). While there was no difference between the SpO₂ values of the babies at 15 minutes before and after the bath, it was found that there was a significant difference between the SpO₂ values at 30 and 60 minutes. In their study examining the effects of bathtubs and underwater baths on the vital signs of newborns, Ar and Gözen (2018), found that the oxygen saturation values of babies increased in both bath forms. Similarly, in their study examining the effect of sponge and

Table 1. Values of physiological parameters and pain before and after bath

Parameters	Before bath	15 Minutes after bath	30 minutes after bath	60 minutes after bath	Test value	p value	Partial Eta Squared (η^2)
Body temperature (ºC)	36.62±0.24	36.21±0.50	36.36±0.26	36.36±0.24	91.433	.000	0.164
Pulse (per minute)	152.83±25.83	151.28±25.42	146.09±20.37	142.55±13.69	7.043	.000	0.105
Respiration (per minute)	54.49±7.49	56.10±3.24	54.56±2.74	52.53±5.53	17.488	.000	0.157
SpO₂ (%)	95.66±2.13	95.26±2.05	96.39±1.53	97.71±1.61	35.429	.000	0.204
Pain	5.08±2.33	4.56±2.61	0.83±1.80	0.15±0.71	189.997	.000	0.673

bathtub baths on physiological parameters of newborns, Taşdemir and Efe (2019) revealed that although no difference was found between the two groups with respect to oxygen saturation, the measurements of babies who had sponge baths increased within 30 minutes after the bath. In different studies, it has been recommended that sponge bathing does not significantly change the oxygen saturation of babies, but the bath should be completed very quickly (Lee, 2002; So et al., 2014; Tapia-Rombo et al., 2003).

Different results in the literature may have resulted from the difference in bath methods applied and factors affecting the method. Therefore, it is important to evaluate the analysis results in terms of clinical benefit. This research draws attention to an important point in this sense.

Newborns with pain scores above 3 were included in this study. The environment of neonatal intensive care units is stressful for babies. At the same time, it is an environment where they are exposed to painful procedures during examination and treatment. The effect of bath, which reduces stress and pain, is known (Mooventhan & Nivethitha, 2014). In our study, it was observed that the pain levels of babies gradually decreased after bathing. In their study, Ceylan and Bolışık (2018) examined the effects of sponge and swaddling baths on the vital signs, pain and stress levels of preterm babies (n=35), and recorded videos to evaluate the babies' bathing, pain and stress behaviours. The pain and stress behaviours of the babies were evaluated by independent observers. They found that swaddling baths had a positive effect on babies' stress and pain level (Ceylan & Bolışık, 2018). In a study examining the effect of tub bath on the pain of premature babies, it was found that bath was effective in alleviating mild/moderate pain (Günay & Coşkun, 2018). In the literature, it is seen that the swaddle bath method is recommended because it reduces crying in babies (Ceylan & Bolışık, 2018; Edraki et al., 2014). Aguiar Da Silva et al. (2017) reported that hydrotherapy had a positive effect on body weight in the study examining the physiological effects of hydrotherapy in premature babies.

Taşdemir and Efe (2019) reported that tub bath significantly increased the comfort scores of preterm babies. Çaka and Gözen (2018) found that swaddling baths significantly reduced the pain scores of newborns. Bryanton et al. (2004) conducted a randomized controlled study to compare how traditional wiping and tub baths in a hospital's obstetrics unit in Canada affect body temperature, navel healing/infection, infant behaviour, mothers' satisfaction and post-discharge adjustment in healthy term babies. As a result, it was observed that tub bath increased baby's satisfaction and pleasure and it was less stressful. In their study examining the effects of swaddling and traditional bathing methods on body temperature and crying time in premature babies, Edraki et al. (2014) reported that swaddling baths had a positive effect on maintaining body temperature and reducing stress. Moreover in their study examining the effects of swaddling and traditional bathing methods on behaviours of babies, found that swaddling and traditional bathing methods decreased neonatal stress of premature babies (Edraki et al., 2014). It is seen that bathing through different methods are effective in the pain, stress and comfort of the newborn. The use of newborn bath in the control of pain can be considered to be used in relieving the pain of the newborn. This situation

may suggest that it is important to make use of baby bath in different areas.

In our study, it was observed that the amount of feeding in babies, who were applied free feeding, gradually increased after bathing and reached the highest level in 1 hour. Considering that bathing is effective on stress and pain, the nutritional need of a relieved newborn can be considered as a natural result. Although there is no research examining the factors affecting nutrition, the relief of a baby whose pain is relieved is a finding that cannot be overlooked. This research shows that providing the comfort of the newborn can help us achieve good results in different areas for the baby (Gebuza et al., 2022). Studies generally examined the effect of the first bath on breastfeeding. However, they showed that early bathing did not affect the newborn's breastfeeding and that breastfeeding continued actively (Suchy et al., 2018). Practices that provide relaxation for the newborn may have an effect on nutrition. Therefore, studies evaluating nursing care and newborn development are needed. Relieving neonatal pain positively affects the development of neurodevelopment (Nist et al., 2019). However, the lack of studies examining the effect of bathing on nutrition leaves the question "In which situations can feeding be managed more effectively in the baby?" unanswered. This change in nutrition may be due to the decrease in the baby's pain and thus the increase in comfort, or the desire to be fed may have increased with the relaxing effect of the bath.

Limitations

The research has some limitations, the first of which is that more participants could not be reached due to the inclusion criteria. Babies' weight, birth week, etc. are similar. Therefore, this result cannot be generalized to premature and other newborns.

Conclusion

A decrease was seen in pain scores of the babies, who had pain, in the measurements made within 15, 30 and 60 minutes after bathing. Free feeding was applied to newborns after bathing and oral feeding amount of babies increased after bathing.

Positive results were obtained after bathing in babies with pain. For this reason, bathing babies with pain can be recommended as a nursing approach. Nurses play an active role in reducing the pain and stress of babies. Research should be done for evidence-based methods, guidelines and baby baths. In addition, there are multiple variables depending on the nature of the pain. Studies examining the causality of the bath at this point may contribute. Nutrition of the newborn is one of the most important practices after birth. There is a need for methods that can increase nutrition. This study creates speculative information on this subject. This information should be evaluated and it should be examined whether there is a relationship between bathing and nutrition.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Ethics Committee Approval

Ethics committee approval was received for this study by İnönü Univesity Health Sciences Scientific Research and Publication Ethics Committee and was approved by the scientific committee (Decision no: 2017/8-9, Date: 04.04.2017).

Informed Consent

Written consent was obtained from the participant(s).

Peer-Review

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Author Contributions

E.H.Y.: Plan, Design, Data Analysis and Comments, Writing and Corrections

Y.S.D.: Plan, Design, Writing and Corrections

K.A.: Material, Methods and Data Collection, Data Analysis and Comments

S.S.M.: Material, Methods and Data Collection

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