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Research Article

Examination of Graduate Nursing Theses Made on Different Methods Applied in the Blood Collection Process in Newborns in Turkey

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Abstract

Objective: This study was conducted to examine postgraduate nursing theses in Turkey that focus on different methods used during the blood collection process in newborns.

Method: Theses published between 2011 and 2024 were analyzed based on their type, year, purpose, method, and results, following a search in the Council of Higher Education National Thesis Center using the keywords "newborn, blood collection, heel prick."

Results: Based on the analysis of the search results from the Council of Higher Education National Thesis Center, 41 theses related to the topic were identified. Examination of the data revealed that 32 of these postgraduate theses were at the master' s level, while 9 were at the doctoral level. When analyzed according to research type, it was found that most of the theses were experimental studies conducted as randomized controlled trials. The theses aimed to eliminate effects such as pain, stress, crying duration, and discomfort during blood collection procedures in newborns by applying different methods.

Conclusion: In the theses conducted, it was determined that the different methods applied in newborns revealed the effect of reducing the pain and stress felt during heel blood and bloodletting. It is thought that the number of theses on the different methods applied during blood collection in newborns is insufficient; increasing the number of academic studies on the subject will shed light on other research.

Keywords: Blood collection, Heel blood, Newborn

INTRODUCTION

Newborns are exposed to various medical interventions from the very first minutes of their lives, and among these, blood sampling ranks among the most common. Blood sampling is considered one of the most painful procedures for newborns. It is accepted that, due to their ability to remember early and repeated stimuli, babies may overreact when exposed to the same stimuli later on (Akyürek & Conk, 2006). This makes it important to reduce the pain, stress, and discomfort experienced during blood sampling. In addition, factors such as procedure duration, crying time, comfort level, and physiological parameters like heart rate and oxygen saturation are critical indicators for newborn health. Therefore, tolerating pain during blood sampling is of great importance for the newborn. In addition to pain, parameters such as crying duration, procedure time, comfort, and stress level are critical during interventions. To prevent the adverse effects of pain, appropriate and effective pain management tailored to the infant should be applied (Loeffen et al., 2020; Akdeniz Kudubes et al., 2021). Currently, a review of the literature on neonatal pain reveals that most experimental studies focus on comparing the efficacy of different pain control methods (Chen et al., 2021; Cirik & Efe, 2020; Küçük Alemdar & Güdücü Tüfekçi, 2018).

Newborns are exposed to various medical interventions from the very first minutes of their lives, among which blood sampling ranks prominently. Blood sampling is considered one of the most painful procedures for newborns. Due to their ability to recall early and repeated stimuli, infants are believed to exhibit exaggerated responses when subsequently exposed to the same stimuli (Akyürek & Conk, 2006). This highlights the importance of reducing pain, stress, and discomfort during blood sampling. Additionally, physiological parameters such as procedure duration, crying time, comfort level, heart rate, and oxygen saturation are critical indicators of neonatal health.

The literature describes numerous non-pharmacological methods employed to mitigate these adverse effects. These include mother, infant, and nurse holding (Avçin, 2017; Karga, 2021), fetal positioning (Akbarı, 2023; Ayar, 2018; Çağlayan, 2011; Önner, 2024), exposure to maternal breast milk odor (Akbarı, 2023; Ezen, 2018; Otlu, 2023), breastfeeding (Avçin, 2017; Kale, 2019; Memiş, 2023), kangaroo care (Avçin, 2017; Yücel, 2018), amniotic fluid odor (Akcan, 2014; Atal, 2019), lavender scent (Akcan, 2014; Orcan, 2024), white noise (Alırkılıçarslan, 2022; Ayar, 2018; Döral, 2020; Kanbur, 2021; Otlu, 2023), vibration (Antepli, 2019; Çatal, 2023), shotblocker (Çatal, 2023; Dinç, 2023), leg massage (Çetinkaya, 2017), foot reflexology (Deniz, 2019; Memiş, 2023; Şafak, 2021), acupressure (Deniz, 2019; Oğul, 2018), lullabies (Döral, 2020), use of different lancets (Dur, 2014; Merter, 2015), swaddling (Erzurumoğlu, 2014), prone positioning (Özdemir, 2020), oral glucose administration (Şafak, 2021; Üğücü, 2023), heat application (Uğur, 2017), parental voices (Kurnaz, 2019; Ünal, 2022), foot massage (Yavaş, 2020), regional massage (Küçüktepe, 2022), maternal gentle touch and wrapping (Hacısalihoğlu, 2024), among others.

Numerous studies have demonstrated that these methods effectively manage pain during blood sampling in newborns, reduce stress levels, enhance comfort, and induce positive changes in physiological parameters (Chen et al., 2021; Cirik & Efe, 2020; Küçük Alemdar & Güdücü Tüfekçi, 2018). Therefore, implementing diverse approaches during neonatal blood sampling improves the quality of nursing care and minimizes adverse experiences for infants.

This study aims to examine the quantity and content of master's and doctoral theses conducted in Turkey within the field of nursing, focusing on various methods used during blood sampling in newborns, and to identify trends in this area. By doing so, it will create a data pool for researchers who plan to work in this field. Additionally, by identifying the areas where studies have been conducted, this research will provide valuable insights for determining unexplored topics, variables, and practices. This study was conducted to examine postgraduate nursing theses in Turkey that focus on different methods used during blood sampling in newborns, in terms of their publication year, type, purpose, methodology, and findings.

Research Questions

1. In which years were postgraduate nursing theses conducted on different methods used during blood sampling in newborns published in Turkey?
2. What are the types of postgraduate nursing theses conducted on different methods used during blood sampling in newborns in Turkey?
3. For what purposes have postgraduate nursing theses on different methods used during blood sampling in newborns been conducted in Turkey?
4. What are the findings of postgraduate nursing theses on different methods used during blood sampling in newborns in Turkey?

METHOD

The data for this retrospective descriptive study were collected between March 3 and March 13, 2025, by searching the Higher Education Council National Thesis Database (https://tez.yok.gov.tr/UlusalTezMerkezi/) online. The database was searched using the keywords “newborn,” “blood sampling,” and “heel blood.” The titles and abstracts of the theses accessed through the database were reviewed. As a result of this review, it was determined that master’s and doctoral theses existed between the years 2011 and 2024. After applying inclusion and exclusion criteria, a total of 41 theses were selected for detailed examination.

Data Analysis

The theses obtained through the search were examined by the researcher using a “Thesis Review Form” developed specifically for this study. The form was designed to review various aspects of the theses, including publication year, type, department, university, author’s name, thesis title, purpose, sample size, study type, and the results obtained from the thesis. The collected data were organized to allow for comparison in two separate tables.

RESULTS

It was determined that 78.05% of the theses were master's theses, while 21.95% were doctoral dissertations. In terms of distribution by year, 14.6% were completed in 2023; 12.1% in 2019 and 2018; 9.75% in 2024 and 2022; 7.3% each in 2021, 2020, 2017, 2015, and 2014; and 2.4% in 2011. Regarding the institutions, 90.25% of the studies were conducted at state universities, and 9.75% at private universities. Among state universities, Istanbul University had the highest share with 17.05%. The majority of the studies 70.7% were randomized controlled trials, followed by 19.5% experimental, 7.3% quasi-experimental, and 2.4% cross-sectional-analytical experimental designs. In terms of departments, 64.4% of the theses were conducted within the Nursing Department, 21.95% within the Department of Pediatric Health and Diseases, and 14.6% involved both departments (Table 1).

Between 2011 and 2024, theses examining the effects of different techniques used during blood sampling in newborns in our country have focused on various areas, with 56.16% of studies investigating pain, 8.22% physiological parameters and comfort, 6.85% crying duration and stress levels, 5.48% vital signs, 4.11% procedure duration, 2.74% oxygen saturation, and 1.37% heart rate (Table 2).

As a result of the examination of the theses included in the study, the effects of all investigated methods on pain were evaluated, and it was determined that all methods reduced pain during blood sampling (Table 2).

Table 1. The distribution of theses by year of publication, academic department, type and university

Subject	Content	n	%	Content	n	%
Thesis Type	MsD	32	78.05	PhD	9	21.95
Year of Publication	2011	1	2.4	2018	5	12.1
	2012	-	-	2019	5	12.1
	2013	-	-	2020	4	9.75
	2014	3	7.3	2021	3	7.3
	2015	3	7.3	2022	4	9.75
	2016	-	-	2023	6	14.6
	2017	3	7.3	2024	4	9.75
Affiliated University	Ankara University	1	2.4	Istanbul Medeniyet University	1	2.4
	Atatürk University	1	2.4			
	Avrasya University	2	4.9			
	Aydın Adnan Menderes University	1	2.4	Istanbul University	7	17.05
	Çanakkale Onsekiz Mart University	1	2.4	Izmir Kâtip Çelebi University	1	2.4
	Dokuz Eylül University	1	2.4	Karamanoğlu Mehmetbey University	3	7.3
	Düzce University	3	7.3	Kütahya University	1	2.4
	Ege University	3	7.3	Mersin University	1	2.4
	Erciyes University	2	4.9	Nevşehir Hacı Bektaş Veli University	1	2.4
	Eskişehir Osmangazi University	2	4.9	Ondokuz Mayıs University	1	2.4
	Gaziantep University	1	2.4	Pamukkale University	1	2.4
	Haliç University	1	2.4	Trakya University	2	4.9
	İnönü University	1	2.4	Yozgat Bozok University	1	2.4
Nature of the Study	Randomized Controlled Trial	29	70.7	Quasi-Experimental	3	7.3
	Experimental	8	19.5	Cross-Sectional Analytical Experimental	1	2.4
Academic Department	Nursing	26	64.4	Nursing + Child Health and Diseases	6	14.6
	Child Health and Diseases	9	21.95			

*MsD: master's degree *PhD: doctoral dissertation

Akbarı (2023), Alırkılıçarslan (2022), Avçin (2017), Ayar (2018), Çağlayan (2011), Kahraman (2015), Kale (2019), Önner (2024), Özdemir (2020), and Üğücü (2023) have examined fetal positioning, support positions, and prone positioning during blood sampling (Table 2).

Alırkılıçarslan (2022) investigated the effects on oxygen saturation and vital signs; Ayar (2018) on crying duration; Kahraman (2015) on stress and comfort levels; Önner (2024) on comfort level, crying duration, heart rate, and oxygen saturation; Özdemir (2020) on stress; and Üğücü (2023) on physiological parameters. All studies reported statistically significant effects (Table 2).

Akbarı (2023), Avçin (2017), Dinç (2023), Kale (2018), Karga (2021), Memiş (2023), and Özdemir (2020) have examined breastfeeding and pacifier use during the procedure (Table2).

Dinç (2023) and Özdemir (2020) specifically investigated comfort and stress levels during the procedure and concluded that these methods have a positive effect (Table 2).

Akbarı (2023), Akcan (2014), Atal (2019), Ezen (2018), Orcan (2024), Otlu (2023), and Özdemir (2020) have examined the use of various scent exposure methods, including breast milk, different types of breast milk, amniotic fluid, and lavender scent (Table 2).

Orcan (2024) compared comfort levels, and Özdemir (2020) examined stress levels; both found these methods to have a positive effect (Table 2).

Açıkbaş (2019), Avçin (2017), Ayar (2018), Karga (2021), Kınacı (2020), Memiş (2023), and Yücel (2018) have examined kangaroo care and holding methods (Table 2).

Ayar (2018) compared crying duration, and Kınacı (2020) assessed stress levels. Both studies found that the applied methods had a reducing effect on infants' crying duration and stress (Table 2).

Alırkılıçarslan (2022), Ayar (2018), Döral (2020), Işık (2022), Kanbur (2021), Kurnaz (2019), Otlu (2023), and Ünal (2022) have examined different auditory stimuli during blood sampling, including white noise, music, lullabies, and parental voices (Table 2).

Alırkılıçarslan (2022) investigated oxygen saturation and vital signs; Ayar (2018) examined crying duration; Döral (2020) assessed vital signs; Işık (2022) studied stress and physiological parameters; and Kurnaz (2019) and Ünal (2022) focused on physiological parameters. Their findings indicated that these auditory stimuli decreased respiratory rate, increased oxygen saturation, lowered heart rate, and effectively shortened crying duration (Table 2).

Dur (2014) and Merter (2015) compared the effectiveness of two different lancet types. It was determined that the automatic lancet used during blood sampling was more effective than the manual lancet in reducing pain, as well as shortening procedure and crying durations (Table 2).

Çetinkaya (2017), Deniz (2019), Küçüktepe (2022), Memiş (2023), Şafak (2021), and Yavaş (2020) examined the effectiveness of foot reflexology and foot massage (Table 2).

Çetinkaya (2017) examined the effect on crying duration, Küçüktepe (2022) investigated vital signs, and Yavaş (2020) studied the impact on comfort level (Table 2).

Antepli (2019), Çatal (2023), Deniz (2019), Dinç (2023), and Oğul (2018) explored acupressure, vibration, and shotblocker methods (Table 2).

Çatal (2023) found significant effects on crying and procedure duration, while Dinç (2023) reported significant improvements in comfort levels (Table 2).

Şafak (2021) and Üğücü (2023) examined the use of oral glucose during blood sampling and found

it to be effective in reducing newborn pain and improving vital signs (Table 2).

Uğur (2017) examined the effects of heat application prior to heel blood sampling on pain level, comfort, and procedure duration. It was determined that pre-procedure heat application reduced procedure time, number of punctures, and pain, while increasing comfort level (Table 2).

Erzurumoğlu (2014) and Hacısalihoğlu (2024) investigated swaddling, wrapping, and maternal gentle touch during blood sampling (Table 2).

Erzurumoğlu (2014) found reductions in vital signs and crying duration, whereas Hacısalihoğlu (2024) concluded that pain and physiological parameters were not significantly affected; however, the procedure duration was shorter in the wrapping and gentle touch groups (Table 2).

Gürsu (2024) aimed to investigate the effects on physiological parameters and stress levels. Although a significant increase in body temperature was observed in the radiant warmer environment compared to the incubator environment, it was determined that this difference does not have vital importance affecting the newborn's physiological parameters (Table 2).

DISCUSSION

In this study, a total of 41 theses—32 master's and 9 doctoral—related to various methods applied during blood sampling in newborns within the field of nursing were examined in detail in terms of quantity and content through the Higher Education Council National Thesis Database. The majority of these theses were conducted within nursing departments. The different methods investigated in the theses primarily included breastfeeding, exposure to various scents, positioning, kangaroo care, holding, auditory stimulation, and foot reflexology.

The aim was to examine the effects of these methods on reducing pain, crying duration, procedure time, and stress, as well as increasing comfort during blood sampling in newborns. Many studies reported similar results, indicating that different methods effectively influence pain and other parameters. However, it was observed that most studies tested repetitive methods with few novel approaches, leading to the conclusion that the existing theses are insufficient.

It should be emphasized that applying these interventions in newborns is crucial for their future well-being, and it is recommended to implement these cost-effective methods routinely.

Limitations

The results of this study are limited to master's and doctoral theses related to various methods applied during blood sampling in newborns, conducted within the departments of nursing and pediatric health and diseases, and made publicly available in the Higher Education Council National Thesis Database between the years 2011 and 2024.

Conflict of Interests: The authors have no conflict of interest to declare.

Financial Support: No financial support was received for this research.

Ethical Aspect of the Study: Since this study is a retrospective literature review, it does not have a direct impact on humans and/or animals. Therefore, there is no need for ethics committee approval.

Table 2: Analysis of Master's and PhD Theses

Author/ Year	Thesis Title	Type of Thesis	Objective	Sample Size	Type of Study	Result
Nermin Çağlayan 2011	The effect on pain of manipulating the preterm neonate into the facilitated tucking during drawing of blood from the heel.	MsD	His study aims to evaluate the effect of a manually administered fetal position on pain experienced by preterm newborns during heel blood sampling	A total of 41 preterm newborns, assigned to either the routine care group or the fetal position group	Experimental	It was determined that the manually administered fetal position is an effective method for alleviating pain and calming preterm newborns.
Esma Akcan 2014	The effect of amniotic fluid, breastmilk and lavender smell for reducing pain during heel-stick in newborns	PhD	To evaluate the effect of amniotic fluid, breast milk, and lavender scents on reducing pain during heel lance in newborn .	A total of 102 newborns, including 27 in the lavender group, 24 in the breast milk group, 27 in the amniotic fluid group, and 25 in the control group	Randomized Controlled Experimental	Lavender, breast milk, and amniotic fluid odors have been found to be effective methods in reducing pain during invasive procedures in newborns.
Şadiye Dur 2014	Comparison of the efficacy of two different types of lancets used in taking heel blood from neonates	MsD	Comparison of the Effectiveness of Two Different Types of Lancets Used During Heel Blood Sampling in Newborns.	A total of 70 newborns, including 35 in the automatic lancet group and 35 in the manual lancet group	Experimental	The automatic lancet used during heel blood sampling in newborns was found to be a more effective method than the manual lancet in reducing pain, shortening procedure time, and decreasing crying duration.
Zeynep Erzurumluoğlu 2014	The effect of safe swaddling (wrapping) on the perception of pain, vital signs and crying duration during heel lance in newborn	MsD	To determine the effects of safe swaddling on pain perception, vital signs, and crying duration during heel blood sampling in newborns.	A total of 74 infants, including 37 in the experimental group and 37 in the control group	Randomized Controlled Experimental	It has been determined that swaddling can be used to reduce pain and soothe newborns during procedures such as heel blood sampling.

Meltem Aslan 2015	Effects of non-pharmacological methods on the pain level occurs due to heel blood collection	MsD	To determine the effect of non-pharmacological methods on pain caused by heel blood sampling in healthy newborns.	A total of 100 newborns, including 50 in the experimental group and 50 in the control group	Experimental	Non-pharmacological methods can be used to minimize pain during heel blood sampling.
Özlem Selime Merter 2015	Effect of automatic lancet and manual lancet for heel blood sampling on level of pain at term infants	MsD	Investigation of the Effect of Manual Lancet and Automatic Lancet on Pain Levels During Heel Blood Sampling in Term Infants Objective:This study aims to investigate the effect of manual lancet versus automatic lancet on pain levels during heel blood sampling in term infants.	A total of 60 infants, including 30 in the experimental group and 30 in the control group	Cross-sectional Analytic Experimental	The use of automatic lancets during heel blood sampling has been found to reduce pain levels, complication rates, number of punctures, and blood collection time, while increasing the comfort of the newborn during the procedure.
Ayşe Kahraman 2015	The effect of pain, stress and comfort of developmental supporting positions during the heel lance in premature İnfants	PhD	This study aims to determine the effects of developmentally supportive positioning, provided by surrounding the infant during heel blood sampling, on pain, stress, and comfort in premature infants.	A single group of 33 newborns	Experimental	The prone position has been found to reduce pain, increase comfort, and decrease stress in premature newborns, and can be used as a non-pharmacological method for pain relief.
Emel Avçin 2017	Influence of breastfeeding, kangaroo care and facilitated tucking on pain reduction during newborn infants receiving heel blood	MsD	To evaluate the effects of breastfeeding, kangaroo care, and the fetal position on reducing pain during heel blood sampling in newborns.	A total of 140 newborns, including 35 in the breastfeeding group, 35 in the kangaroo care group, 35 in the fetal position group, and 35 in the control group	Quasi-experimental	Breastfeeding, kangaroo care, and the fetal position were found to be effective in reducing pain when compared between groups, with the fetal position group having a lower mean pain score than the other groups.

Özlem Karabıyık Uğurlu 2017	Healthy term newborn infants before getting heel pain level, comfort level, and the application is applied hot process duration of effect	MsD	To determine the effects of heat application prior to heel blood sampling on pain level, comfort level, and procedure duration in healthy term newborns.	A total of 80 newborns, including 40 in the experimental group and 40 in the control group	Experimental	It has been determined that heat application prior to a painful procedure reduces the procedure duration, number of punctures, and pain, while increasing the comfort level .
Hümeyra Çetinkaya 2017	Effects of TWO different methods applied before heel lancing procedure on the pain and duration of crying in newborns	PhD	To determine the effects of EMLA cream and leg massage applied prior to heel blood sampling on pain levels and crying duration in newborns	A total of 135 infants, including 45 in the leg massage group, 45 in the EMLA cream group, and 45 in the control group	Randomized Controlled Experimental	EMLA cream and leg massage are effective in reducing pain during heel blood sampling in newborns.
Gülen Yücel 2018	The effect of kangaroo care applied during the heel blood draw on the pain point of newborns	MsD	To examine the effect of kangaroo care applied during heel blood sampling on the pain score of newborns.	A total of 60 newborns, including 30 in the experimental group and 30 in the control group	Randomized controlled quasi-experimental	Kangaroo care has been found to reduce pain scores during repeated painful procedures.
Tanju Oğul 2018	The effect of the acupressure on the procedural pain before heel lancing in the neonates	MsD	To investigate the effect of acupressure applied to UB/BL60 and K/KI/KD3 acupuncture points on procedural pain relief prior to heel blood sampling in term newborns	A total of 63 newborns, including 31 in the experimental group and 32 in the control group	Quasi-experimental	Acupressure was found to be effective in alleviating pain associated with heel blood sampling.
Merve Ezen 2018	The effect on babies' pain of own mother's milk odour and different mother's milk odour during blood drawing process in newborn intensive care unit	MsD	To determine whether another mother's breast milk can be used to reduce pain in infants who cannot access their own mother's milk for any reason.	A total of 90 newborns, including 30 in the group exposed to their own mother's milk odor, 30 in the group exposed to another mother's milk odor, and 30 in the control group	Experimental	It has been determined that the most effective method for reducing pain in newborns is exposure to their own mother's breast milk odor; however, in cases where the infant cannot access their own mother's milk, the odor of another mother's milk can also be used.

Arzu Çantaş Ayar 2018	The effect of the white noise, holding and facilitated tucking position upon pain during blood-taking from the heel in neonates	MsD	To compare the effects of white noise, maternal holding, and hand-assisted fetal positioning on pain during heel blood sampling in healthy newborns.	A total of 160 newborns, including 40 in the maternal holding group, 40 in the white noise group, 40 in the hand-assisted fetal position group, and 40 in the control group	Experimental	The study found that newborns placed in the maternal lap position during and after the procedure had lower mean NIPS pain scores and shorter crying durations compared to those in the fetal position, white noise, and control groups.
Elif Kızılok Kale 2018	Effects of breastfeeding and facilitated tucking positioning on pain that occurs during hell-stick in newborns	MsD	To determine the effects of breastfeeding and fetal positioning methods on pain levels during heel blood sampling in term newborn.	A total of 105 newborns, including 35 in the breastfeeding group, 35 in the fetal position group, and 35 in the control group	Randomized controlled and Cross-sectional	Breastfeeding and fetal positioning during heel blood sampling were found to be effective methods for reducing pain in newborns, with breastfeeding being more effective than fetal positioning in alleviating pain.
Ayşe Özge Deniz 2019	The effects on pain of foot reflexology and acupressure during heel lancing in newborns	PhD	To determine the effects of foot reflexology and acupressure applied to Ki 3 and St 36 points prior to heel blood sampling on procedural pain in term newborns.	A total of 105 newborns, including 35 in the foot reflexology group, 35 in the acupressure group, and 35 in the control group	Randomized Controlled	Acupressure and foot reflexology applied prior to heel blood sampling have been found to be effective methods for pain reduction in newborns.
Nihal Antepli 2019	Effect of vibration applied during heel stick in newborn on pain	MsD	"Evaluation of the effect of vibration application on pain associated with heel blood sampling in neonates.	A total of 56 newborns, including 28 in the experimental group and 28 in the control group	Randomized Controlled Experimental	The vibration method used during heel blood sampling has been found to be an easy, non-invasive, and non-pharmacological approach, effective in reducing pain levels in newborn infants.
Hande Atal 2019	The effect of maternal odor and amniotic fluid odor on pain during heel lance in newborns	MsD	To determine the effects of maternal odor and amniotic fluid odor on reducing acute pain associated with heel blood sampling in term	A total of 90 newborns, including 30 in the amniotic fluid odor group, 30 in the maternal odor group, and 30 in the control group.	Randomized Controlled Experimental	Exposure to maternal odor and amniotic fluid odor during heel blood sampling are effective methods for reducing pain in newborns, with no significant

			newborns (gestational age 37–42 weeks).			difference found between the two odors in pain relief.
Pınar Açıkbaş 2019	Comparison of the effect of being on the lap of the mother, father and nurse on the newborns' pain during blood collection from the heel	MsD	o evaluate the effects of holding the newborn by the mother, father, or nurse versus placing the baby on the procedure table on pain levels during heel blood sampling in healthy newborns.	A total of 100 newborns, including 20 held by the mother, 20 held by the father, 20 held by the nurse, and 20 placed on the procedure table.	Randomized Controlled Experimental	It is recommended to perform painful procedures while holding the baby in the caregiver's arms.
Fethiye Kurnaz 2019	The effect of mother's voice, music voice and white noise applied during venous bloodletting from newborn on the pain and physical parameters	MsD	To evaluate the effects of maternal voice, music, and white noise on pain and physical parameters during venous blood sampling in newborns.	A total of 80 newborns, including 20 in the music sound group, 20 in the white noise group, 20 in the maternal voice group, and 20 in the control group	Randomized Controlled Experimental	All interventions applied in the experimental group were found to be effective in alleviating neonatal pain compared to the control group, with maternal voice identified as the most effective method.
Fuat Özdemir 2020	The effect of prone position, pacifier use and breast milk odor on stress and pain in term newborns during intravenous blood collection	MsD	To determine the effects of three different methods (pacifier use, prone positioning, and maternal breast milk odor) on reducing pain and stress during blood sampling in term infants hospitalized for hyperbilirubinemia in the neonatal unit.	A total of 80 newborns, including 20 in the maternal breast milk odor group, 20 in the pacifier use group, 20 in the prone positioning group, and 20 in the control group	Randomized Controlled Experimental	The feasibility of using alternative non-pharmacological methods such as maternal breast milk odor exposure, prone positioning, and pacifier use to reduce pain and stress during invasive procedures in infants has been established.
Özge Döral 2020	The effect of white noise and lullaby rest on pain and life findings in invasive intervention applied to rematured babies	MsD	To comparatively determine the effects of white noise and lullaby on pain perception and vital signs during painful procedures in premature infants.	A total of 66 premature infants, including 22 in the lullaby group, 22 in the white noise group, and 22 in the control group	Experimental	In this study, both white noise and lullaby played during blood sampling in premature infants were found to be effective in reducing pain, with the white noise

						group exhibiting lower pain scores compared to the lullaby group.
Seçil Yavaş 2020	Impact of foot massage given by mothers to their babies before heel lance on pain level and comfort	MsD	To evaluate the effects of maternal foot massage on pain and comfort levels in newborns undergoing heel blood sampling.	A total of 128 newborns, including 64 in the experimental group and 64 in the control group	Randomized Controlled Experimental	It was determined that maternal foot massage administered before painful procedures reduces the infant's pain level and distress while increasing comfort.
Özge Kınacı 2020	The effect of skin-to-skin contact on term neonatal pain-stress levels while receiving heel blood	MsD	To evaluate the effects of skin-to-skin contact on pain and stress levels in newborns, as well as maternal anxiety and distress during this process	A total of 68 newborns, including 34 in the experimental group and 34 in the control group	Randomized Controlled Experimental	Skin-to-skin contact has been identified as a supportive method during procedural pain caused by heel blood sampling.
Tuğba Karga 2021	Comparison of different methods for reducing pain in heel blood in newborns	MsD	Comparison of three different methods to reduce pain experienced during heel blood sampling in full-term newborns.	A total of 90 newborns, including 30 in the breastfeeding group, 30 in the skin-to-skin contact group, and 30 in the swaddling plus holding group.	Randomized Controlled Experimental	Among non-pharmacological methods used to reduce pain experienced during heel blood sampling in full-term newborns, breastfeeding was found to be the most effective method, followed by swaddling plus holding and skin-to-skin contact.
Merve Şafak 2021	Evaluation of the effect of oral glucose and foot reflexology on pain in heel blood collection process in newborn.	MsD	Investigation of the effectiveness of oral glucose and foot reflexology applied during heel blood sampling in newborns.	A total of 21 full-term newborns meeting the inclusion criteria for the study planned with a serial design	Quasi-experimental	Glucose and reflexology applications were found to be effective in reducing pain during heel blood sampling.
Bahar Nur Kanbur 2021	The effect of listening to müsic, white noise and heartbeat sound on pain during heel stick prosedurs in newborns	PhD	To determine the effects of white noise, heartbeat sound, and music listening on pain reduction during heel blood sampling in newborns.	A total of 84 newborns, including 21 in the white noise group, 21 in the heartbeat sound group, 21 in the music group, and 21 in the control group	Randomized Controlled Experimental	It was concluded that white noise, heartbeat sound, and music listening methods are effective in reducing pain during heel blood sampling in newborns.

Ayşegül Işık 2022	Effect of mother's heart beat sound on newborn's pain, stress and physiological parameters while taking heel blood	MsD	To evaluate the effect of playing the mother's heartbeat sound on pain, stress, and various physiological parameters in newborns during heel blood sampling.	25 newborns in the experimental group and 25 newborns in the control group, totaling 50 newborns	Randomized Controlled	It was concluded that playing the mother's heartbeat sound to the newborn during heel blood sampling reduces the newborn's respiratory rate, increases oxygen saturation, and decreases heart rate, thereby alleviating pain and stress.
Dudu Beren Alırkılıçarslan 2022	The effect of white noise and manual fetal position on pain, oxygen saturation and signs of life of newborns during blood collection	MsD	To determine the effects of white noise exposure, fetal positioning, and the combination of both during venous blood sampling on acute pain, oxygen saturation, and vital signs in term infants.	There are 40 infants in the white noise group, 40 in the fetal position group, 40 in the combined white noise and fetal position group, and 40 in the control group, making a total of 160 infants	Randomized Controlled Experimental	It has been determined that the use of white noise and the fetal position during venous blood sampling has a positive effect on the infant's pain and vital signs.
Ayşe Küçüktepe 2022	The effect of regional massage on pain and life findings in the newborn before blood collection	MsD	This study was designed to investigate the effects of regional massage administered prior to blood sampling on pain perception and vital signs in neonates.	A total of 96 neonates, including 49 in the experimental group and 47 in the control group, were included in the study	Randomized Controlled	It was concluded that regional massage is effective in reducing pain in neonates, and that neonatal nurses could be educated on this practice and it could be offered as an alternative method of care.
Tuba Ünal 2022	The effects of mother voice and father voice listened to newborns during heel blood collection on pain level and physiological parameters: A randomized controlled study	MsD	To determine the effects of maternal and paternal voice played during the heel-prick procedure on pain levels and physiological parameters in neonates.	A total of 90 neonates were included in the study, with 30 assigned to the maternal voice group, 30 to the paternal voice group, and 30 to the control group	Randomized Controlled Experimental	It was observed that the mother's voice was the most effective method for alleviating neonatal pain during the heel-prick procedure.
Sedef Seval Memiş 2023	The effect of foot reflexology, breastfeeding and kangaroo care on pain before heel blood collection in newborns	PhD	To comparatively investigate the effectiveness of non-pharmacological interventions—foot reflexology massage,	A total of 144 neonates were included in the study, with 36 in the Reflexology group, 36 in the Kangaroo Care group, 36	Randomized Controlled Experimental	Foot reflexology, kangaroo care, and breastfeeding were found to be ineffective in reducing pain during the heel-prick procedure. However, these interventions were

			kangaroo care, and breastfeeding—administered prior to heel-prick blood sampling in reducing pain in neonates.	in the Breastfeeding group, and 36 in the Control group		effective in alleviating pain before and after the procedure, providing comfort to the neonates.
Canan Dinç 2023	The effect of the shotblocker and breastfeeding on pain and comfort level during heel lance procedure in newborns: Randomized controlled trial	MsD	To evaluate the effects of non-pharmacological methods used during heel-prick blood sampling on pain and comfort levels in neonates admitted to a level one neonatal intensive care unit.	A total of 96 neonates were included in the study, with 24 in the Breastfeeding group, 24 in the Shotblocker group, 24 in the Breastfeeding + Shotblocker group, and 24 in the Control group.	Randomized Controlled	Among the groups, the lowest pain levels during the heel-prick blood sampling procedure were reported by the Breastfeeding and Breastfeeding + Shotblocker groups, while the highest pain levels were reported by the Shotblocker group. Regarding comfort levels, the Control group experienced the highest comfort, while the Breastfeeding and Shotblocker groups experienced the lowest comfort levels during the procedure.
Burcu Otlu 2023	Evaluation of the effect of use of breast milk odor and white noise on pain management during heel lance in premature newborns: A randomized controlled study	MsD	To investigate the effects of maternal breast milk odor and white noise on pain management during heel-prick blood sampling in preterm neonates.	A total of 66 neonates were included in the study, with 22 in the White Noise group, 22 in the Maternal Breast Milk Odor group, and 22 in the Control group	Randomized Controlled Experimental	It was found that both white noise and maternal breast milk odor as non-pharmacological methods could be effective in pain management in neonates, with no superiority of one method over the other.
Güzide Üğücü 2023	The effect of different concentration of oral glucose solutions and supportive positioning methods on pain and physiologic variables during heel stick sampling in	PhD	To determine the effects of different concentrations of oral glucose solutions and supportive positioning techniques on pain scores, physiological variables, and	A total of 128 preterm neonates were included in the study, with 32 in Group 1, 32 in Group 2, 32 in Group 3, and 32 in the Control group	Randomized Controlled	It has been stated that supportive positioning techniques, when used in combination with a 20% oral glucose solution, can be safely used to reduce pain responses and accelerate pain regulation during

	premature neonates: a randomized controlled study		total crying durations during heel-prick blood sampling in preterm neonates.			heel-prick blood sampling in preterm neonates.
Rabia Aleyna Çatal 2023	The effect of different methods on pain, crying time, and procedure time during heel lance in health infants: Randomized controlled study	MsD	To determine the effects of vibration and ShotBlocker methods, applied during the heel-prick blood sampling procedure, on neonatal pain levels, crying duration, and procedure time.	A total of 108 neonates were included in the study, with 36 in the ShotBlocker group, 36 in the Vibration group, and 36 in the Control group	Randomized Controlled Experimental	It has been determined that vibration therapy is an effective method for reducing pain levels in neonates during the heel-prick blood sampling procedure.
Negarın Akbarı 2023	The effect of facilitated tucking, maternal breast milk odor and non nutritive sucking during heel stick on procedural pain in preterm neonates	PhD	To determine the effects of non-pharmacological methods, including maternal breast milk odor, non-nutritive sucking, and the fetal position, on pain reduction during heel-prick blood sampling in preterm neonates.	A total of 144 preterm neonates were included in the study, with 36 in the Maternal Breast Milk Odor group, 36 in the Fetal Position group, 36 in the Non-Nutritive Sucking group, and 36 in the Control group	Randomized Controlled Experimental	It was found that the fetal position was the most effective intervention for reducing pain during the heel-prick procedure in neonates, while maternal breast milk odor and non-nutritive sucking were also found to be effective.
Büşra Önner 2024	The effect of facilitated tucking positions on pain, comfort, peak heart rate, and oxygen saturation of newborns during heel stick sampling	MsD	To determine the effects of supine, lateral, and prone fetal positions on pain, comfort, heart rate, and oxygen saturation in neonates during heel-prick blood sampling.	A total of 120 neonates were included in the study, with 40 in the Supine Fetal Position group, 40 in the Lateral Fetal Position group, and 40 in the Prone Fetal Position group	Randomized Controlled Experimental	It was determined that the lateral fetal position had significant effects on heart rate, oxygen saturation, pain, distress, and comfort levels.

Sezin Keziban Gürsu 2024	Effect of heel prick blood collection on physiological parameters and pain and stress levels of neonates in an incubator and radiant warmer environment	PhD	To investigate the effects of heel-prick blood sampling performed in incubator and radiant warmer environments on the physiological parameters, pain, and stress levels of neonates.	A total of 72 neonates diagnosed with hyperbilirubinemia were included in the study, with 36 in the Radiant Warmer group and 36 in the Incubator group	Randomized Controlled	Although a significant increase in body temperature was observed in the radiant warmer environment compared to the incubator, it was found to have no vital clinical impact on the neonate's physiological parameters.
Zeynep Orcan 2024	The effect of the scents of breastmilk and lavander on newborns' pain and comfort during the heel stick procedure at the newborn intensive care unit	MsD	This study evaluates the effectiveness of maternal breast milk and lavender scents applied during heel-prick blood sampling on neonatal pain and comfort.	A total of 36 neonates were included in the study, with 12 in the Maternal Breast Milk group, 12 in the Lavender group, and 12 in the Control group	Randomized Controlled Experimental	It was found that maternal breast milk and lavender scents applied during the heel-prick blood sampling procedure in the neonatal intensive care unit had a pain-reducing effect and an enhancing effect on comfort in neonates.
Aslıhan Hacısalihoğlu 2024	Effects of yakson method applied by mother and swaddling on pain and physiological parameters during heel stick in newborn	MsD	To examine the effects of swaddling and maternal affectionate touch during heel-prick blood sampling on pain and physiological parameters in neonates.	A total of 48 neonates were included in the study, with 16 in the Affectionate Touch group, 16 in the Swaddling group, and 16 in the Control group	Randomized Controlled Experimental	It was concluded that swaddling and maternal affectionate touch applied during heel-prick blood sampling did not affect pain levels or physiological parameters, but the procedure duration was shorter in the swaddling and affectionate touch groups.

*MsD: master's degree *PhD: doctoral dissertation

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