Original Article

Knowledge Levels of Nursing Students on Pain Assessment and Management in Newborns: A Descriptive Study

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Abstract
Objective: The aim of this study is to examine the knowledge of nursing students about the assessment and management of neonatal pain.
Methods: The study is a descriptive, cross-sectional study. The study was conducted with 240 nursing students between February and June 2022. “Individual Identification Form” and “Information Form on the Evaluation of Pain in Newborns” were used to collect the data.
Results: Of the students included in the study, 85.4% were female and the mean age was 22.42±0.17 years. 71.7% of the students stated that they could evaluate pain in newborns, and 71.3% stated that they knew the scales used in the evaluation of pain. Furthermore, 59.2% of them stated that the first method to be used for pain control was non-pharmacological interventions, and 60% of them stated that they knew what to do in case of pain in newborns.
Conclusion: It has been determined that the majority of students participating in this study had sufficient knowledge about the assessment of pain in newborns. However, they do not have sufficient knowledge about non-pharmacological practices such as nesting intervention, the use of sweet liquids such as sucrose/glucose, and music therapy, which are effective in the management of pain.

Keywords: Newborn, Nursing, Pain, Student.

Introduction

Pain refers to the unpleasant sensory and emotional experience associated with or resembling actual or potential tissue damage. Neonates respond to acute pain with changes in physical and behavioral patterns. The assessment of pain in infants poses a significant challenge to healthcare professionals, primarily due to their inability to verbalize their discomfort (Treiman-Kiveste, Pölkki, Kalda & Kangasniemi, 2022). As part of the standard care protocol for newborn babies in the first 24 hours of life, various injections are administered, including vitamin K injections, intravenous interventions, heel pricks, and blood sampling. For hospitalized babies, the pain experiences inherent in the required medical care are frequent and often

severe; newborns needing intensive care undergo approximately fourteen painful procedures per day in the hospital (Williams and Lascelles, 2020). Untreated pain in newborns may result in prolonged hospitalization, the memory of a painful experience, or a low pain threshold (Treiman-Kiveste et al., 2022). Therefore, correct assessment and management of pain in newborns is important.

The most important problem encountered when assessing pain in newborns is that newborns cannot respond verbally to pain. Physiological and behavioural markers are observed to define the pain felt by newborns (Witt, Coynor, Edwards &Bradshaw, 2016). The use of pain assessment scales provides consistency between nurses and other clinicians and provides an accurate measure of the presence of stress, pain, or discomfort.

These scales allow both the determination of the level of pain and the accurate description of the effect of pharmacological and non-pharmacological treatment interventions on the pain of the newborn (Perry et al., 2018). Assessment of infant pain requires nurses to be able to recognize pain and to use validated and objective pain assessment scales. The pain of newborns is often under-assessed and under-documented. Furthermore, the utilization of pain assessment scales remains limited in clinical practice. Therefore, pain is poorly managed and newborns receive unnecessary medication (Treiman-Kiveste et al., 2022).

Although there have been developments in the control of pain in the newborn, nurses continue to have difficulty in providing timely and effective pain management for the newborn. To manage pain effectively, pain should be assessed accurately. To assess pain accurately, the scales used in pain assessment require knowledge of the changes in physiological and behavioral parameters that occur in case of pain in the newborn. Therefore, it is important to increase the knowledge and awareness of nursing students, who are the nurses of the future, about the assessment and management of pain in newborns. It was found that education on pain and its management in newborns increased the level of knowledge (Buyuk, 2020; Costa, Silva, Peres, Duarta & Bueno, 2022).

It is recommended that the content of pain and its management in the neonatal period in the curriculum of schools should be reviewed and improved with new educational methods (Buyuk, 2020). This study aims to examine the knowledge of nursing students about the assessment and management of neonatal pain. In line with this purpose, the following research questions were determined.

1. Is the level of knowledge of nursing students about the assessment of pain in the newborn adequate?

2. Do nursing students have knowledge about non-pharmacological interventions that can be used in the management of pain?

Material and Method

Aim and Type of Research: This study is a descriptive study aiming to examine the knowledge of nursing students about the assessment and management of neonatal pain.

Research Population and Sample: The population of the study consisted of 509 students studying at the Faculty of Nursing of a university and attending Child Health and Disease Nursing lessons. In this study with a known population, 234 students were found sufficient for the sample of the research at a 5% error level and 95% confidence interval (Altunisik, et al., 2012). The inclusion criteria of the study were to be educated in the relevant faculty and to have taken Child Health and Disease Nursing lessons. A total of 240 people who volunteered to participate in the

study and completed the research forms completely were included in the study.

Data Collection: The study was conducted between February-June 2022 at the Faculty of Nursing of a University. The data were collected by the researcher through a face-to-face questionnaire method. After obtaining ethics committee permission from the Scientific Research and Publication Ethics Committee of the University where the research was conducted, the data collection phase started. The students were informed about the purpose of the study and included in the study after their consent was obtained. Students were informed that whether they were included in the study or not would not affect their school success. The data were collected face-to-face by the researchers. Students were given 10 minutes to complete the form.

Data Collection Tools: "Identification Form" and "Information Form on the Evaluation of Pain in Newborns" were used to collect the data.

Identification form: It consisted of 7 questions about sociodemographic characteristics and expert opinion was obtained.

Information form on the assessment of pain in newborns: This form, which was developed by the researchers in line with the literature, consists of 22 items aiming to evaluate students' knowledge on the assessment of pain in newborns (Jacob, 2013; Toruner and Buyukgonenc, 2018; Eroglu and Arslan, 2018**).** One of the techniques used to prove the language and cultural equivalence and content validity of the items with numerical data and to evaluate the expert opinion is the Content Validity Index (CVI). In this criterion, the experts evaluate each item according to the options "1: not appropriate", "2: the items need to be adapted", "3: appropriate but minor changes are required", and "4: very appropriate". If 80% of the items are evaluated between 3 and 4 points by the experts, the CVI score is determined as 0.80 and the score should be 0.80 and above for content validity (Esin, 2014). For the content validity of the form, expert opinion was obtained from 7 experts in Child Health and Diseases Nursing. It was determined that the CVI scores of all items of the Information Form on the Assessment of Pain in Newborns were above 0.80. No item was removed or modified in the form.

Data Analysis: SPSS 25.00 package program was used to analyze the data obtained after the research. Descriptive statistics were used to analyze the socio-demographic characteristics of the students, findings related to pain assessment, and findings related to pain management.

Ethical Considerations: In order to conduct the research, the Scientific Research and Publication Ethics Committee Ege University was applied and the approval of the ethics committee of the relevant University was applied and the approval of the ethics committee (Date-Number: 27.01.2022-E.555741) was obtained. Written informed consent was obtained from the students included in the study.

Results

The mean age of the students participating in the study was 22.42±0.17, and was 85.4% female. The mean achievement score of the students was 3.30±0.34. While 72.5% of the students stated that they preferred the nursing profession willingly, 27.5% of them stated that they preferred it against their will for reasons such as employment opportunities, the sufficiency of their scores in this field, and the guidance of their parents (Table 1).

Almost all of the students who participated in the study stated that newborn babies can perceive pain. When asked how pain in newborns is evaluated, 77.5% of the students stated that pain in newborns can be decided according to the verbal expression of the parents, 50.4% according to physiological parameters, and 47.5% using a scale. More than half

of the students stated that they could evaluate pain in the newborn and knew the scales used in pain assessment. 92.9% of the students stated that crying, 95.4% restlessness, and 80.4% general and widespread body movements, pulling off the arm/leg, and strong blows are signs of pain. In the case of pain, 83.3% of the students reported physiological changes such as an increase in heart rate, 61.7% reported a decrease in oxygen saturation, and 80% reported an increase in respiratory rate (Table 2).

Findings related to the management of pain in newborns are given in Table 3. When the students were asked about the interventions that cause pain, 86.7% stated that peripheral intravenous catheter intervention, 82.1% endotracheal aspiration, 87.9% heel stick, and 88.3% IM injection were the interventions that cause pain in newborns. While 60% of the students stated that they knew what to do in case of pain in newborns, 59.2% of them stated that the first method they would apply in pain control was non-pharmacological interventions.

Almost all of the students stated that it is very important to control pain and that serious problems may develop in newborns due to pain that is not controlled for a long time. When the students were asked about the conditions affecting the experience of pain in newborns, 57.9% stated that gestational age, 20.4% health status of the newborn, 32.9% environmental factors such as heat, sound, light, and 57.5% family support were effective. When asked about non-pharmacological practices that can be used in the management of pain in newborns; 73.3% used non-nutritive sucking, 61.7% used kangaroo care, 78.3% used massage, 49.6% music therapy, 73.3% touching, 81.3% maternal voice, 87.9% maternal odor, 39.2% oral administration of sweet liquids such as sucrose/glucose, 25.4% nesting, and 66.3% positioning (Table 3).

Table 1. Sociodemographic Characteristics

	n	%	X±SD	Min.	Max.
Age			22.42±0.17	20.0	38.0
Gender					
Female	206	85.4			
Male	34	14.6			
Marital Status					
Single	230	96.2			
Married	9	3.8			
Achievement Point Average			3.30±0.34	2.00	3.95
Preferring the profession voluntarily					
Yes	174	72.5			
No	66	27.5			

Table 2. Findings Related to the Evaluation of Pain in Newborns

	n	%
Newborns can perceive pain	225	93.8
How to assess pain in newborns? *		
Verbal expression of the parent	186	77.5
Behaviour	168	70
Physiological parameters	121	50.4
From physician notes	210	87.5
Using scale	114	47.5
I can make the evaluation of pain in the newborn baby	171	71.7
I know the scales used in the evaluation of pain in newborns	172	71.7
"Crying" in the newborn is a symptom of pain	223	92.9
Restlessness in newborns is a symptom of pain	229	95.4
In the newborn, "grimacing, eye squeezing, wrinkling of the eyebrows and forehead" are pain symptoms	225	93.8

In the newborn, "general and widespread body movements, pulling in the arm/leg, strong blows" are among the pain symptoms	193	80.4
In newborns, heart rate increases in case of pain	200	83.3
Oxygen saturation decreases in neonates in case of pain	148	61.7
In newborns, heart rate decreases in case of pain	145	60.4
In case of pain in newborns, the depth of breathing decreases	59	24.6
Respiratory rate increases in case of pain in newborns	192	80

*More than one option was ticked

Table 3. Findings Related to Pain Management in Newborns

	n	**%**
Peripheral intravenous catheter in neonates is one of the interventions that cause pain *	208	86.7
Endotracheal aspiration is one of the interventions that cause pain in neonates *	197	82.1
Heel stick in newborns is one of the procedures that cause pain*	211	87.9
IM injection in neonates is one of the interventions that cause pain *	212	88.3
I know what to do in case of pain in newborns	144	60

Which is the first method to be used in pain control of the newborn?			
Pharmacological treatment		98	40.8
Non-pharmacological		142	59.2
Pain that is not controlled for a long time causes neurological and behavioural problems. Therefore, it is very important to control pain in newborns		223	92.9
According to you, which one(s) of the following are among the factors affecting the newborn's experience of pain?*	**Gestational age**	139	57.9
	Health status	49	20.4
	Newborn development	162	67.5
	Previous pain experience of the newborn	179	74.6
	Environmental factors (such as heat, sound, light)	79	32.9
	Medicines	151	62.9
	Family support	138	57.5
	Hot applying	100	41.7
	Cold applying	104	43.3
	Non-nutritive suction	176	73.3
	Kangaroo care	148	61.7

Which one(s) of the following are among the non-pharmacological interventions that can be used in the approach to pain in newborns?*	**Massage**	188	78.3
	Music therapy	119	49.6
	Swaddling	124	51.7
	Touching	176	73.3
	Maternal voice	195	81.3
	The odor of breast milk	157	65.4
	Maternal odor	211	87.9
	Oral administration of sucrose, glucose or other sweet liquids	94	39.2
	Nesting	61	25.4
	Positioning	159	66.3

*More than one option was ticked

Discussion

Evaluation of Pain in Newborns

In our study, almost half of the students (47.5%) stated that scales should be used for the assessment of pain, 70% stated that pain could be assessed by monitoring the behavior of the newborn and 50.4% stated that pain could be assessed by monitoring changes in physiological parameters.

In a study, half of the participants (51%) stated that pain assessment scales were necessary when assessing the pain of infants, while most of the participants stated that the pain scale was unfamiliar to them and that they did not use this pain scale in practice (Treiman-Kiveste et al., 2022).

In another study, the majority of the participants (86.4%) stated that the use of scales was important in the assessment of pain (Pölkki, Korhonen and Laukkala, 2018).

In our study, more than half of the students (71.7%) reported that they were able to evaluate pain and almost all of them reported that symptoms such as crying (92.9%), restlessness (95.4%), grimacing, eye squeezing, wrinkling of the eyebrows and forehead (93.8%) were pain symptoms. It was determined that the students participating in our research had general knowledge about the behavioural symptoms of pain.

In a study, most of the participants stated that they routinely observed infant behavioral changes such as crying/moaning (88%) and state of arousal/alertness (82%) in the assessment of pain in newborns (Treiman-Kiveste et al., 2022). In another study, the majority of the participants stated that they observed behavioral changes such as crying/moaning (98.9%), arm movements (90.8%), leg movements (89.5%), general facial expressions (95.3%), brow bulge (78.6%) and eye squeezing (75.4%) in the evaluation of pain in newborns (Pölkki et al., 2018).

In this study, similar to our study, the majority of the participants had knowledge about the behavioural changes that can be observed in the assessment of pain.

In our study, 83.3% of the students stated that the heart rate increased 60.4% stated that it decreased, 80% stated that the respiratory rate increased and 61.7% stated that the oxygen saturation decreased in case of pain. These findings show that students do not have sufficient knowledge about changes in physiological parameters in case of pain.

In another study, when assessing pain in newborns, more than half (55%) of the nurses reported that they observe breathing, and one quarter (26%) of respondents observed blood pressure (Treiman-Kiveste et al., 2022). In this study, similar to our study, it was determined that the participants did not have sufficient knowledge about the changes in physiological parameters in case of pain. In another study, the majority of the participants stated that they observed physiological parameters such as heart rate (81.6%), respiratory rate (82.2%), and oxygen saturation (88.1%) in the evaluation of pain in newborns (Pölkki et al., 2018).

Management of Pain in Newborns

In our study, 86.7% of the students stated that peripheral intravenous catheter, 82.1% endotracheal aspiration, 87.9% heel stick, and 88.3% IM injection were the interventions that cause pain in newborns.

In one study, almost all participants (90.3%) reported that neonates experience pain during minor procedures (Cong, Delaney & Vazquez, 2013).

In a systematic review study, it was stated that standard procedures such as endotracheal aspiration, heel prick, and peripheral intravenous catheter interventions caused pain in newborns (Hatfield, Murphy, Karp and Polomano, 2019).

In our study, almost all of the students (92.9%) stated that uncontrolled pain can cause neurological and behavioral problems, while in another study, the majority of the participants (86.5%) stated that recurrent

painful procedures are a great risk for neuro-developmental problems (Cong et al., 2013).

In our study, 57.9% of the students stated that gestational age, 20.4% health status of the newborn, 67.5% development of the newborn, 74.6% previous pain experience of the newborn, 32.9% environmental factors such as heat, sound, light, 62.9% medications, and 57.5% parental support were the conditions affecting the pain experience in newborns.

In a study, the majority of participants (70%) stated that they did not receive parental support during a painful procedure (Treiman-Kiveste et al., 2022). In another study, the majority of participants (80.2%) stated that preterm newborns were more prone to pain (Cong et al., 2013). In our study, more than half of the students (59.2%) stated that the first method they would apply for pain control was non-pharmacological interventions.

Of the non-pharmacological interventions that can be used to alleviate pain, 87.9% of the students stated that maternal odor, 81.3% maternal voice, 78.3% massage, 73.3% non-nutritive sucking, 66.3% positioning, and 65.4% breast milk odor. It has been determined that a significant proportion of the student population demonstrated cognizance of practices such as the use of maternal voice, the olfactory cues of breast milk, the administration of pacifiers, massage, positioning, and kangaroo care.

However, it has been determined that their awareness of non-pharmacological interventions such as nesting, music therapy and the use of sweet liquids such as sucrose/glucose is insufficient (Hartley et al., 2015; Carter & Brunkhorst, 2017; Kurdahi et al., 2017; Ullsten, Eriksson, Klässbo & Volgsten, 2017; Bucsea &Riddell, 2019; Shen, Huang, Leng, Luo & Zheng, 2022; Tucker, Tiwari & Carter, 2023) was insufficient. In a study, most of the participants reported using non-pharmacological methods such as touching (83%) or positioning the baby (78%) to control pain. Very few participants reported using non-pharmacological methods such as non-nutritive sucking (23%), swaddling, and kangaroo care (11%) (Treiman-Kiveste et al., 2022).

In another study, most of the participants stated that they used touch (93.5%), positioning (87.7%), facilitated tucking (84.2%), breastfeeding (2.4%), kangaroo care (8.5%), oral sucrose with non-nutritive sucking (79.8%) and music (2.8%) to alleviate pain (Pölkki et al., 2018). In another study, more than half of the participants (61.2%) stated that non-pharmacological interventions and the majority of the participants (78.5%) stated that pharmacological treatments were effective methods to relieve pain in newborns (Cong et al.,2013).

Similar to our study, in these studies, it was observed that effective methods such as oral administration of sweet liquids such as sucrose and listening to music were not used to alleviate pain in newborns.

Limitations: The present study is subject to certain limitations; firstly, it was conducted exclusively with nursing students from a single university. The incorporation of options in the data collection form related to the evaluation and management of pain may have increased the probability of students selecting the correct option. It is recommended that these questions be rephrased as open-ended questions in future studies to enhance the validity of the results.

Conclusion: The students participating in this study have been made aware of the fact that newborns can experience pain. The participants possess knowledge regarding the alterations in behavioral parameters in the event of pain in newborns. However, their understanding of changes in physiological parameters is deemed inadequate. It has been determined that the participants had sufficient knowledge about the practices that cause pain in the newborn and the conditions that may be caused by uncontrolled, prolonged pain sensations. In the study, the participants are aware that the first method to be used in pain management is non-pharmacological interventions. In addition, while participants'

knowledge of non-pharmacological practices such as positioning, maternal scent, breast milk scent, maternal voice, and non-nutritive sucking is adequate, their knowledge of practices such as nesting, oral administration of sweet liquids such as sucrose/glucose, and music therapy is inadequate.

Implications for Practice: This study highlights the need for curriculum adjustments to address nursing students' knowledge gaps in neonatal pain management. Greater emphasis should be placed on non-pharmacological methods (nesting, sweet solutions, music therapy), neonatal pain perception, the use of pain assessment scales, and recognizing physiological changes. Increasing simulation-based training and clinical practice opportunities can enhance students' competencies in this area.

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