

# What do Neonatal Nurses Know and Feel About Pain Management During Retinopathy of Prematurity Examination: A Qualitative Research

Özlem Metreş<sup>1</sup> , Burcu Aykanat Girgin<sup>2</sup> , Duygu Gözen<sup>3</sup>

## ABSTRACT

**Aim:** The purpose of this study was to determine feelings, pain-related knowledge, and pain management-related practices of neonatal intensive care nurses during the retinopathy of prematurity examination.

**Method:** The descriptive qualitative research design was used. In the study, the individual in-depth interviews were conducted with nurses by using the interview form with semi-structured open-ended questions. The data were evaluated by using the MAXQDA12.

**Results:** Two main themes were formed as "neonatal pain" and "retinopathy of prematurity examination" in line with the thematic analysis. In the study, it was determined that the nurses were able to limitedly identify the pain-induced physiological and behavioral symptoms in newborns, could not evaluate the symptoms and levels of pain by using pain scales with proven validity and reliability. The results indicated that the nurses provided the care based on their observations rather than evidence-based knowledge in the pain management.

**Conclusion:** Nurses should be informed through evidence-based training programs and supported to transfer the acquired knowledge into practice. And the results emphasizes that the subject of pain and pain management should be inserted in nursing education curriculum.

**Keywords:** Neonatal nurse, pain management, retinopathy of prematurity

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**ORCID IDs of the authors:** Ö.M. 0000-0002-6688-4027; B.A.G. 0000-0002-2601-8781; D.G. 0000-0001-9272-3561

<sup>1</sup>Istanbul Bilim University, Department of Pediatric Nursing, İstanbul, Turkey

<sup>2</sup>Health Sciences University, Faculty of Nursing, Department of Pediatric Nursing, İstanbul, Turkey

<sup>3</sup>Istanbul University-Cerrahpaşa, Florence Nightingale Faculty of Nursing, Department of Pediatric Nursing, İstanbul, Turkey

## Corresponding author:

Burcu Aykanat Girgin,  
Health Sciences University, Faculty of Nursing,  
Department of Pediatric Nursing, İstanbul, Turkey

**E-mail:** aykanat\_87@hotmail.com

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## INTRODUCTION

Retinopathy of prematurity (ROP) is a multifactorial disease that presents pathologically in the developing retinal vascularization of premature infants and may cause visual loss if untreated (Quiram & Capone, 2007). Diagnostic criteria in early diagnosis, treatment and follow-up of ROP vary by country (Arnesen, Duran, Silva, & Brumana, 2016).

According to the Turkish Retinopathy of Prematurity Guideline (2016) prepared by the Turkish Neonatology Society and the Turkish Ophthalmology Association in accordance with the data obtained as a result of national studies in Turkey, it is deemed suitable to screen all preterm infants with  $GA \leq 32$  weeks or  $BW \leq 1500$  g and preterm infants who have a  $GA > 32$  weeks or a  $BW > 1500$  g, receive cardiopulmonary support therapy or are seen to be at risk in terms of development of ROP by neonatologist and received cardiopulmonary support therapy with  $GA > 32$  weeks or  $BW > 1500$  g (Turkish Neonatology Society, 2016).

Retinopathy of prematurity examination is a painful procedure in NICUs and a major stressor for the infant (Kirchner et al., 2009; Mitchell et al., 2011). According to the definition of Taxonomy Committee of International Association for the Study of Pain (IASP), pain is an unpleasant emotional sensation and behavior pattern which is caused by a particular region of the body and is also related to the past experiences of an individual regardless of tissue damage (Bueno, Kimura, & Pimenta, 2007). Problems such as increased heart rate and decreased oxygen saturation (Mitchell et al., 2011), apnea and bradycardia periods (Wood & Kaufman, 2009), feeding intolerance (Chew, Rahman, Shafie, & Mohamad, 2005), delayed gastric emptying (Harrell & Brandon, 2007), and vomiting (Boyle et al., 2006) occur in premature babies due to ROP examinations which is a painful

procedure. In this context, pharmacological and non-pharmacological methods like oral sucrose (Thompson, 2005), topical anesthetic eye drops (Cogen et al., 2011; Mehta, Mansfield, & VanderVeen, 2010; Mitchell et al., 2004), inhaled nitric oxide administration (Mandel, Ali, Chen, Galic, & Levesque, 2011), nesting (Slevin, Murphy, Daly, & Q'Keefe, 1997), newborn individualized developmental care (Kleberg et al., 2008), giving pacifier for non-nutritive sucking (Boyle et al., 2006) and breast milk (Ribeire et al., 2013) are used in order to provide pain control.

Effective pain control in premature infants requires accurate knowledge, attitude and assessment skills of the healthcare team (Martins, Dias, Enumo, Maria, & Paula, 2013). The nurse in the neonatal intensive care team has responsibilities such as objective pain assessment (Pölkki et al., 2010), implementing the planned treatment and monitoring its effects and results (Akuma & Jordan, 2012). It is stated in the literature that nurses who provide care to painful children may experience emotions such as despair, sadness, and hopelessness (Schepper, Francke, & Abu-Saad, 1997). However, in addition to the pain management, knowledge, and practices of neonatal intensive care nurses based on a painful procedure which is ROP examination, no study evaluating their emotions and thoughts during procedure has been found. The purpose of this study was to determine feelings, thoughts, pain-related knowledge status, and pain management-related practices of neonatal intensive care nurses during the ROP examination.

### Research Questions

1. What is the knowledge level of neonatal nurses about pain in preterm infants?
2. What is the knowledge level of neonatal nurses about pain management during ROP examinations?
3. How do neonatal nurses feel during ROP examinations?

## METHOD

### Study Design

The descriptive qualitative research design was used.

### Sample

The data of the study were obtained from nurses working in the neonatal intensive care unit (NICU) of a training and research hospital in Istanbul. The inclusion criteria for the nurses were as follows; taking part in the ROP examination at least once and being voluntary to participate in the study. Criterion sampling method was used as data collection method in the study. The data collection stage of the study was ended when it reached a saturation point at which similar responses were received from the participants (Yıldırım & Şimşek, 2011). In this direction, the sample consisted of 6 nurses meeting the specified criteria.

### Data Collection

The data of the study were collected by carrying out face-to-face individual interviews with nurses between June-July 2015. Verbal and written consents of the participating nurses were obtained after they were informed about the purpose of the study and how the interview would be carried out. In order to continue uninterrupted communication during the interviews and for the participants to express their thoughts, knowledge and feelings in a comfortable manner, a private room hosting only the participating nurse and the researcher in the NICU was used. Each individual interview lasted about 1 hour. By using a semi-structured interview, the nurses were asked primarily about their demographic and clinical characteristics (age, gender, educational level, duration of nursing, working duration in neonatal intensive care, status of receiving education about pain). The nurses were then questioned

about the pain-related knowledge (defining pain, pain symptoms, physical and physiological changes seen in neonates during pain, status of using the pain scale, methods used to reduce pain during ROP examination, duties of the nurse in the ROP examination, recommendations of application in pain control in examinations). Additionally, the participating nurses were also interviewed about what they felt during ROP examinations and what were the feelings felt by them when they observed pain in the infants during the examinations.

All interviews were recorded by using a voice recorder. The sound record of each participant was listened to at least 3 times in order to ensure the validity of the study data. Each statement was converted to a written document.

### Data Analysis

The interview data were evaluated by carrying out qualitative content analysis (Hsieh & Shannon, 2005). The sound records were listened and converted into written documents by three researchers. The data in the written documents were transformed into themes and categories by three researchers independently considering key ideas and concepts. Individual analysis results were then shared by the researchers when they gathered together. The themes were finalized by discussing the differences observed between each other in categories and themes. In accordance with the answers given by the participants with the help of the applied thematic analysis, two main themes of the study were formed and sub-codes belonging to these themes were developed (Taylor, Kermode, & Roberts, 2006). Coding was made by using the MAXQDA12 qualitative data analysis program (Cerbenville, Germany) in the computer environment.

### Ethical Considerations

Ethics committee approval was received

for this study from the ethics committee of Çankır Karatekin University (Date: 20.11.2014; No: 10788). Verbal and written consents of the participating nurses were obtained after they were informed about the purpose of the study and how the interview would be carried out.

## RESULTS

As a result of the interviews carried out with 6 nurses, the saturation point was reached in the study. The average age of the nurses was  $29.33 \pm 6.43$ , all of them were female, 50% had bachelor's degree; 33.3% were high school graduates, and 16.7% had master's degree. It was also determined that 50% received education in neonatal pain management (neonatal intensive care nursing certificate program, during undergraduate education etc.).

It was found that the nurses worked as a nurse for averagely  $8.00 \pm 6.48$  years and they worked in the neonatal intensive care unit for  $5.66 \pm 3.88$ /years, and in the clinic for  $4.50 \pm 2.34$  years. The average duration of interview was determined as  $55.88 \pm 5.70$ /min.

As a result of the thematic analysis made in accordance with the answers obtained from the questions in the study; two main themes were formed as "neonatal pain" and "retinopathy of prematurity examination".

### Theme-1: Neonatal Pain

According to the answers of the participating nurses about the definition and symptoms of pain in newborn, the state of using pain scale, and methods used to reduce pain; it was determined that the pain definition of the majority of nurses (n=4) was parallel with the definition of pain accepted in the literature. "*Pain is an unpleasant/discomforting situation that develops anywhere in the body*" (Participant 5). "*Pain is an unpleasant feeling that causes reactions like extreme*

*mobility in the extremities, grimacing, crying, etc. in newborn due to damage anywhere in the body*" (Participant 1). "*Pain is a situation that disturbs the newborn*" (Participant 3). "*I think that pain is a disturbing and displeasing feeling for people, it is an unpleasant feeling*" (Participant 4).

Nurses reported symptoms of pain in newborns as changes in physiological parameters (increase in heart rate, decrease in oxygen saturation, tachypnea or apnea), limb movements (thrashing limb flexion/extension), grimacing, crying, and flushing. "*When the newborn is experiencing pain, heart rate increases, oxygen saturation decreases and after a while, the hands/arms swiftly bring flexion/extension, crying becomes too severe, and the newborn does not calm for a long time*" (Participant 4). "*When the newborn is experiencing pain, his first reaction is trying to avert his limbs and making his face grimace and he starts crying and flushing*" (Participant 2).

All the nurses (n=6) stated that they used a scale to assess pain level of the newborns during and after painful procedures in the unit. However, except for one nurse, the other five nurses expressed that they did not know the name of the pain scale used and which variables were evaluated to make scoring in this scale. "*I use scale to evaluate pain once a day in daily evaluation forms. I'm scoring based on my observations and I do not know how to rate the content. I increase the score by thinking that more frequent the procedures made for the infant are, higher the pain score is than the previous day. Usually the pain score is 0, it rarely is 1 or 2. What needs to be evaluated in this scale, can you give me information later*" (Participant 2). In addition, all the nurses reported that they did not use any pain scale during and after the retinopathy of prematurity examination. "*We do not use the pain scale for the retinopathy of prematurity*

examination. *I do not know if we should use it*" (Participant 3).

### **Theme-2: Retinopathy of Prematurity Examination**

When all of the nurses observed the pain experienced by the newborns during the retinopathy of prematurity examination, they experienced negative emotions, perceived the vulnerability of the infant, and felt helpless because they could not do enough to relieve the pain; however, they stated that the examination was necessary for the visual functioning of the infant.

*"I feel terrible during the ROP examination, I feel very sad when I see the baby's struggle. It must be a very painful procedure, because the baby is struggling too much during the procedure. I still think that they reflect the pain even just a little, they do not completely reflect their pain"* (Participant 2). *"I feel helpless for not being able to reduce the pain when I see the baby is having such struggling, I cannot stand to look at the doctor during the procedure, so I turn my face from the baby until the procedure is over. But even if it is painful, it has to be done, there is nothing we can do"* (Participant 3). *"I feel sad when I see the baby suffering during the procedure, it is a very difficult procedure and the thing attached to their eyes is very painful"* (Participant 4). *"I feel pity for them because they are exposed to painful procedures in the early period of their lives. However, I think there is no alternative way other than examination for the evaluation of the infants' visual function. So it is necessary to think that it is required for the infant, otherwise, I feel very sorry emotionally"* (Participant 1).

During the ROP examination, the nurses stated that they used approaches such as fixing the infant's head, dripping the anesthetic drops before the procedure, supporting implementation of the examination under soft

light, swaddling the baby to calm, providing a pacifier, touching, and administering oral sucrose. *"I fix the infant's head during the procedure. I also swaddle the infant. I think that the baby should be swaddled. It's easier both to keep the baby fixed and to calm down the baby. Sometimes, the doctor wants us to drip the drops before the procedure and I do so."* (Participant 1). *"I fix the infant's head during the procedure, I give a soft light so that the doctor can do his/her work comfortably, and the procedure takes a shorter time and the infant does not feel uncomfortable. I drip oral sucrose during the procedure so that the infant's pain is reduced and when the procedure is completed, I take and hug the infant to calm him/her down, I say "okay my baby, it is over. I do not know if talking is helpful, but he/she seems to be relaxing"* (Participant 5). *"I'm trying to do things I can in order to make the infant calmer and reduce the pain, for example I make the infant feel safe by touching him/her, I swaddle him/her so that he/she can feel hugged"* (Participant 4).

The nurses stated that they used topical anesthetic drops as a pharmacological method to reduce pain in ROP examination, but this method alone was not enough to reduce pain, or that they had no idea about its efficacy. *"I do not read the previous studies on effectiveness of pharmacological methods and I do not know about them; therefore, I have no idea"* (Participant 2). *"I do not consider that the drops alone are enough for pain management"* (Participant 4).

The nurses reported that they used various methods which included using pacifiers, administering oral sucrose, swaddling, touching and speaking with a soft voice as a non-pharmacological method to reduce pain during ROP examination and they thought that these methods were effective in relieving pain. *"I try to do things that make the infant*



*calmer and reduce the pain, for example I am touching the infant and making him feel safe, I swaddle the infant so he/she can feel hugged, baby becomes calmer and his/her crying decreases especially when he/she is swaddled and feels like he/she is in his mother's lap" (Participant 4). "I think it's very effective to touch the infant and dropping sucrose to his/her mouth while giving a pacifier. When I touch them, they cry less and the examination passes more easily. Also sucking for premature babies is something that makes them happy and calms them down. Even a drop of sucrose dropped to the mouth with the pacifier is very effective" (Participant 5).*

The nurses also made suggestions such as giving position and receiving training on effective methods in order to reduce pain during the examination. *"Trainings should be provided to us about the effective methods. We can reduce pain more effectively with the methods and trainings to be transferred into practice" (Participant 1). "Pharmacological method is not enough alone to reduce pain. Perhaps the fetal position can be given. You have to lay the infant in the supine position. Maybe, pressing his/her feet a little, pulling them towards the abdomen and holding the arms a little round shape. It is difficult to fix the infant during the ROP examination. You need to keep his/her head straight, it's hard to keep his/her body at the same time. I think that if there are two people, this might be different" (Participant 6).*

## DISCUSSION

Basic approach to reducing and controlling pain includes supporting the practices with scientific knowledge (Santos, Kusahara, & Pedreira, 2012). Pain definition of most of the participating nurses in the study is similar to the definition of IASP. Other participating

nurses defined the pain as suffering. Verbal expression of pain is the golden standard (Badr, 2013) and also the most important problem encountered in newborn pain assessment is the lack of verbal expression of pain response (Hall & Anand, 2014). Therefore, it is asserted that the experienced nurses in pediatrics and neonatology clinics are more effective in evaluating pain (Santos et al., 2012).

Pain assessment in newborns who cannot express themselves verbally is followed up by behavioral, physiological and hormonal changes (Derebent & Yiğit, 2008). Physiological changes seen in newborns during painful interventions are increased heart rate, increased respiratory rate, increased blood pressure, increased oxygen demand, muscular tonus, and increased intracranial pressure as well as sweating, flushing, and pallor (Badr, 2013). In the study, the nurses only gave the response of an increase in heart rate as an example of the physiological change caused by pain. Only one participating nurse reported that there may also be an increase in blood pressure and a decrease in oxygen saturation in addition to an increase in the heart rate.

In addition to physiological changes, crying, grimacing, squinting, wrinkling in the forehead, widening of the nostrils, extension/flexion movements in the arms and legs, squeezing fingers, throwing themselves backward, thrashing of limbs, writhing, and head banging are behavioral changes observed in the newborn during painful interventions (Derebent & Yiğit, 2008). While all of the participating nurses evaluated crying as a symptom of pain, the most (n=5) evaluated the flexion / extension movement in the arms and legs as a symptom of pain. It was determined that participating nurses did not evaluate the other behavioral changes during the pain except for these two symptoms. In Santos et al.'s (2012) study, the nurses assessed the facial movements of

the newborn as the first symptom of pain. In another related study, it was reported that symptoms of pain such as increased mobility in the arms and legs, increased blood pressure, and increased heart rate were observed (Young, Barton, Richards-Dawson, & Trotman, 2008). In the present study, the pain symptoms indicated by the nurses were similar to the literature; but it was observed that the nurses did not have enough knowledge about the other pain symptoms except for these symptoms and they could not adequately evaluate the symptoms of pain.

In the study, all the nurses stated that they used the scale to assess the neonatal pain level during and after painful procedures in the unit. However, a great majority of the nurses (n=5) reported that they did not know the name of the pain scale they used and which variables assessed to make the scoring in this scale, therefore, they could not determine the pain level while scoring and they had information needs on this subject. In addition, all the nurses stated that they did not use any pain scale during and after ROP examination stage and they had information needs. It is reported in literature that it is important for clinical nurses to participate in training programs on mechanism, assessment, and treatment options of pain. It is suggested that the knowledge level of the nurses is controlled after the training program and the knowledge is reflected to the daily care practices (Bernhofer, Hosler, & Karius, 2016). It is thought that the information needs of the nurses can be met by emphasizing the evaluation and management of neonatal pain more in the curriculum of nursing education, informing the neonatal intensive care nurses about symptoms, assessment, and management of pain with regular trainings and monitoring their transfer into the practice.

When all of the nurses observed the pain experienced by the newborns during ROP

examination, they experienced negative emotions, understood the infant's vulnerability, and felt helpless because they could not do enough to relieve the pain; however, they stated that the examination was necessary for the visual functioning of the infant. No study including the data about the feelings of the nurses during ROP examination has been found in literature. In their study Gale, Linda, Kools, & Lynch (2004) reported that the most stressful experiences of the parents with the infants in the newborn intensive care unit are the painful procedures performed to their infants. It was stated in the same study that parents experienced anxiety, helplessness, loss of control, uncertainty, and anxiety during painful procedures performed to their babies (Gale et al., 2004). In another related study, it was stated that the parents felt sadness, helplessness, frustration, fear, grief and anger (Obeidat, Bond, & Callister, 2009). The nurses in the present study also expressed that they felt helpless and sad and they saw the infant vulnerable during the ROP examinations which is a painful procedure similar to those parents' feelings. Additionally, by approaching the applied intervention professionally, they emphasized that this examination was necessary to evaluate the infants' visual functions.

ROP examination, in which retinal vascularization is examined, is ranked as the first among painful procedures in NICUs (Mitchell et al., 2004). Pharmacological and non-pharmacological methods for pain control appear to be applied together in ROP examinations (Cogen et al., 2011; Costa et al., 2013). Application of topical anesthetic drops, sucrose, glucose solutions, swaddling, pacifier usage, and implementation of individualized developmental care programs are recommended in the reduction of pain during ROP examinations performed with binocular indirect oph-

thalmoscope (Ribeire et al., 2013). It is reported that while pharmacological agents such as inhaled nitric oxide and topical anesthetic drops are not effective alone in pain control, its effectiveness increases when applied with nonpharmacological methods (Cogen et al., 2011; Mehta et al., 2010; Mandel et al., 2011). Sucrose is an effective non-pharmacological method preferred for achieving pain control during ROP examinations (Dilli et al., 2014). It was reported that the use of non-nutritional pacifiers was much more effective when used with other non-pharmacological methods and it had an important effect in reducing pain especially by giving with sucrose, one of the sweetening solutions (Boyle et al., 2006). It was also asserted that when used together with sucrose and swaddling, pacifiers reduced the symptoms of physiological and behavioral pain of preterm infants (O'Sullivan et al., 2014). In the present study, the participating nurses stated that they used approaches such as fixing the infant's head, dripping the topical anesthetic drops before the procedure, supporting implementation of the examination under soft light, swaddling to calm the infant, giving pacifiers, touching, giving oral sucrose during the ROP examination. The nurses also reported that while non-pharmacological methods were effective in reducing pain, pharmacological methods alone were not effective and they should be supported with non-pharmacological methods in reducing pain. From this point of view, it was determined that the results of the study were consistent with the literature (Boyle et al., 2006; Cogen et al., 2011; Mehta et al., 2010). While considering the results of the study and the literature (Cogen et al., 2011; Mandel et al., 2011), it was concluded that the combined use of pharmacological and non-pharmacological methods could be effective to reduce pain induced by ROP examination.

The nurses also offered recommendations like receiving training on positioning and effective methods for pain reduction and prevention to reduce pain during the examination. The nurses were thought to have educational needs in pain assessment and management when considering that they did not adequately identify the physiological and behavioral symptoms of neonatal pain, did not evaluate pain level with a scale with proven validity and reliability and they provided care based on their observations rather than knowledge in pain management. In accordance with the present study, in the literature it is recommended that nurses who are specialized in neonatal intensive care and have sufficient knowledge and skills should work to provide pain control, assessment instruments with proven validity and reliability should be used in assessing neonatal pain level, nurses should be regularly supported with training programs and the training results should be transferred into practice (Hall & Anand, 2014). It can be ensured for the nurses to be effective in reducing pain in newborns by providing evidence-based care approaches.

## CONCLUSION

In the study, it was determined that the nurses limitedly identified physiological and behavioral symptoms observed based on pain in newborns, did not evaluate the pain symptoms and levels by using pain scales with proven validity and reliability, and they provided care based on their observations rather than evidence-based information in the pain management. It was also found that when all of the nurses observed the pain experienced by the newborns during the ROP examination, they saw the infant's vulnerability, and felt sad and helpless because they could do enough to relieve the pain.



**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Çankırı Karatekin University (Date: 20.11.2014; No: 10788).

**Informed Consent:** Verbal and written consents of the participating nurses were obtained after they were informed about the purpose of the study and how the interview would be carried out.

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B.A.G.; Materials – B.A.G., Ö.M., D.G.; Data Collection and/or Processing – Ö.M., B.A.G.; Analysis and/or Interpretation – B.A.G., D.G., Ö.M.; Literature Search – B.A.G., Ö.M., D.G.; Writing Manuscript – B.A.G., Ö.M., D.G.; Critical Review – D.G., B.A.G., Ö.M.; Other – Ö.M., B.A.G., D.G.

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