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THE ROLE OF NURSES IN IMPROVING THE QUALITY OF LIFE OF NEONATES THROUGH PAIN MANAGEMENT: A LITERATURE REVIEW

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ABSTRACT
Pain in neonates is a problem that must be taken seriously. In addition to causing physiological disturbances, pain in neonates can have long-term consequences including behavioural changes, hypersensitivity to pain and neurodevelopmental disorders. Nurses have an important role in improving the quality of life of neonates through pain management. This study aims to provide alternatives in the prevention of pain in neonates non-pharmacologically and is expected to apply pain instruments (as a basis for pain assessment) and improve collaboration, education and supervision in the prevention of pain in neonates. The method used in this study was literature review. Searching academic articles through Online Database searches through ClinicalKey for Nursing, Proquest, Science Direct and Pubmed from 2020-2024 with the Prisma approach, then filtering with PICO (Population, Intervention, Comparative, Outcome) obtained 10 suitable articles. Based on several studies, the role of nurses in improving the quality of life of neonates is effective pain management through pain assessment, non-pharmacological interventions (skin to skin contact, breastfeeding, maternal voice, facilitated tucking positioning, massage, olfactive stimulation, sucrose administration, nesting positioning and Yakson touch therapy). In addition, education, supervision and a comprehensive approach and collaboration between teams are needed. Pain management in neonates is important in neonate care, it is recommended that there is a bundle of pain management in neonates which contains a structured plan, and integrated guidelines to prevent and manage pain in neonates.

Keywords: bundle; comprehensive approach; neonate; pain management

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INTRODUCTION

Pain in neonates is a challenging problem that must be taken seriously. Newborns are characterised by more sensitive, acute, widespread and persistent pain compared to older children and adults. (Zhao et al., 2022). The physiology of neonatal pain differs from the pain physiology of children and adults due to several aspects that change the way newborns experience pain. First and foremost, the NMDA receptor area on the dorsal horn is larger. This increases the perception of pain stimulus from the periphery. Secondly, GABA is excitatory, although it normally inhibits excitatory glutamate at the spinal cord level. Lastly, because the inhibitory descending pathway in the spinal cord is immature, intracranial pain signals cannot be controlled (Masters et al., 2022). Preterm infants undergo at least 7 to 17 invasive procedurs every day (Cruz et al, 2016). The most common procedures performed in the NICU are heel lancing and venipuncture (Bellieni et al., 2018).

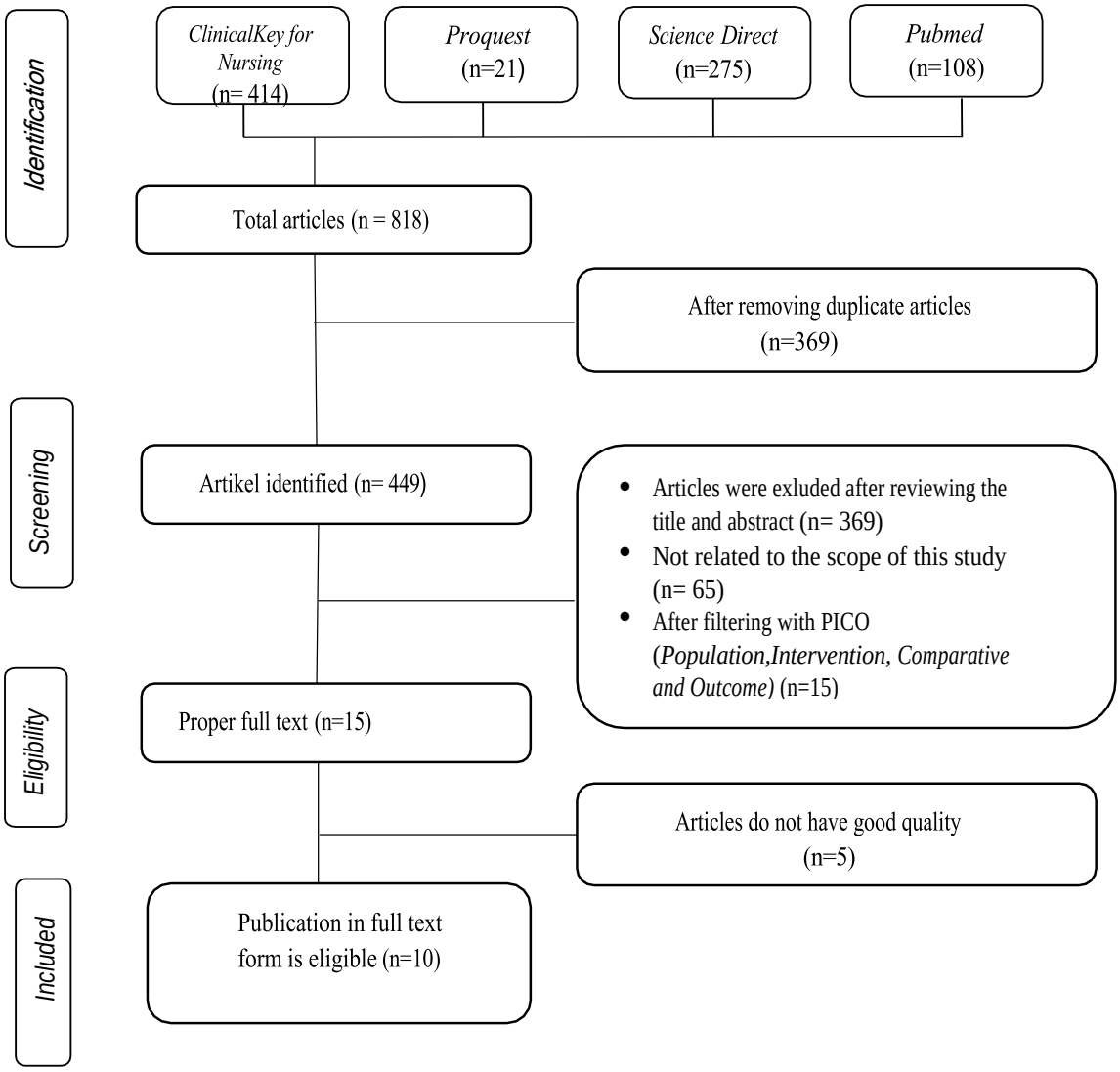
Previous research Cruz et al. (2016) found that newborns in the neonatal intensive care unit (NICU) experienced an average of 7.5-17.5 procedures per day. Research conducted by Orovec, A., et al, 2019, found that of the 242 infants studied, there were 10,469 painful procedures (4,801 tissue breakdown procedures and 5,667 non-tissue breakdown procedures). According to Hockenberry et al., (2017)exposure to untreated pain in premature infants can have a negative impact, including physiological disorders (changes in vital signs, decreased oxygen saturation, changes in skin colour), behavioural changes (crying, whimpering, grimacing) and changes in condition (changes in sleep-wake cycles, changes in feeding behaviour, changes in activity levels, fussy and easily aroused).The impact of exposure to pain severely affects the developing nervous system with persistent long-term effects. Early neonatal exposure to uncontrolled pain will result in abnormal neurodevelopment, in school-aged children there is a depletion of cortical areas of the brain especially in the frontal and parietal lobes which play an important role in cognitive function, emotional control and sensory processing. (Bucsea & Pillai Riddell, 2019).

An immature nervous system and repeated exposure to pain can lower pain thresholds, which can make babies even more sensitive to subsequent painful events. Changes in pain sensitivity may persist beyond the neonatal period, which may result in poorer brain development (Olsson et al., 2021).The impact of pain in neonates is serious but pain management interventions are still limited. This literature review is expected to provide alternatives in the prevention of pain in neonates non-pharmacologically and is expected to apply pain instruments (as a basis for pain assessment) and improve collaboration, education and supervision in the prevention of pain in neonates

METHOD

This study used a comprehensive literature review method to collect, evaluate and analyse literature relevant to the research topic. The selected literature comes from various reliable sources such as scientific journals, academic books and recent research reports that discuss the role of nurses in pain management in neonates, with two keywords namely pain management and neonate.The literature review process is carried out systematically and structured, with the steps of determining the topic, searching the literature, filtering and selecting the literature, analysing and synthesising the literature and presenting the results. Searching for academic articles through Online Databases, searching through ClinicalKey for Nursing, Proquest, Science Direct and Pubmed from 2020 - 2024 with the Prism approach, then filtering with PICO (Population, Intervention, Comparative, Outcome) obtained 10 suitable articles. The population in this literature is newborns from 0- 28 days of age. Intervention in this literature is non-pharmacological pain management. Comparative in this literature is an article with RCT research, meta-analysis, systematic review, and qualitative study. Outcome in this literature is non-pharmacological pain management in neonates can be applied.

RESULTS



Gambar 1. The study selection process of literature adapted from Prisma

Table 1.
Details of the results of the Preferred Journals for Literature Review

Author/Year	Tittle	Journal name	Objective	Method	Result
CChen, Y., et al (2024)	*The effect of maternal voice and non-nutritional sucking on repeated procedural pain of heel prick in neonates: A quasi-*	BMC Pediatrics	Evaluate the effect of non-nutritional sucking, mother's voice or combination non- nutritional sucking with mum's voice	*A quasi-experimental study*	*Non-nutritional sucking* and maternal voice significantly reduced PIPP pain scores in neonates ($p<0.05$). The pain- reducing effect was stronger in the combination group than the other groups.

	experimental study				
Magor, Nagwa R.E,. et al., (2024)	*Effectiveness of nesting positioning and Yakson touch on physiological, behavioral state and pain caused by blood sampling procedures in preterm neonates*	Journal of Neonatal Nursing	effectiveness of *nesting positioning* behaviour al status and pain at the time of the sampling procedure blood in pretermneonates	*A quasi-expremental study*	The combination of *nesting positioning* and Yakson touch therapy can stabilise behaviour and reduce pain during blood collection procedure in pretermneonates
Neshat., et al, (2023)	*Organizational chalenges of pain management in neonatal intensive care unit: A qualitative study*.	BMJ Open	This study aimed to explore organisational challenges to neonate pain management in theNICU	*A qualitative study* comprising 31 NICU nurses and doctors in a hospital Hospital Tabriz Children's Hospital, Iran through interviews and FGDs	Challenges in neonatal pain managementcome not only from clinical factors, but alsofrom organizational factors (collaborative programmes between members of thecare team, educationprograms education, supervision and comprehensive approach)
Liu, Jiang, et al, (2022)	*The effectiveness of massage interventions on procedural pain in neonates: A systematic review and meta-analysis*	Medicine	Evaluating the safety and effectiveness of massage for pain management in newborns	*A systematic review and meta-analysis* There were 11 studiesinvolving 755 newborns	The meta-analysis showed that massage caneffectiv
Velumula, P.K,.et al (2022)	*Breast milk vs 24% sucrose for procedural pain relief in preterm neonates: A non-inferiority randomized controlled trial*	Journal of Perinatology	Comparing pain scores between two groups, i.e. breast milk and 24%sucrose in preterm neonates underwent	*A randomized, single blinded*	There is no difference between the two groups (50% percentile coefficient, 0.95% CI;-

					0.49 to 0.49) Breast milk is no worse than 24% sucrose in providing analgesia during heel prick in moderate and late preterm infants
Avcin, Emel & Kucukoglu, Sibel (2021)	*The Effect of Breastfeeding, Kangaroo Care, and Facilitated Tucking Positioning in Reducing the Pain During Heel Stick in Neonates*	Journal of Pediatric Nursing.	Comparing non-pharmacological pain management. *breastfeeding*, KMC, *and facilitated tucking positioning*	*A quasi-experimental* consisting of healthy neonates with agestational age of 37 weeks or more and a weight of >2500 grams and no problem in sucking/breast feeding	*Breastfeeding*, KMC and *facilitated tucking* can help reduce the pain of heel pricking. *Facilitated tucking* and *positioning* hadless crying and lower pain during the puncture than the other groups ($p<0.05$).
Emma, O., et al (2021)	*The use and reporting of neonatal pain scales: a systematic review of randomized trials*.	The Journal of the International Association for the Study of Pain	Evaluating neonatal pain scale reporting with *randomized trials*	*A systematic review*	Out of the 3.178 trials found 352 with 29.137 infants and 22 pain scales. The most used pain scale. The most used pain scale was *Premature Infant Pain Profile* (48%) and *the Neonatal Infant Pain Scale* (23%)

Faugere, GD et al (2020)	*Systematic review and meta-analysis of olfactive stimulation interventions to manage procedural pain in preterm and full-term neonates*	International Journal of Nursing Studies	Aim evaluate effectiveness	*A systematic review and meta-analysis*	A meta-analysis showed that olfactive stimulation using familiar odours is effective compared to standard care on pain recreation (SMD -0.69; 95% CI -0.93 to -0,44; l2=20%, p=<0.00001) and no adverse events were reported.
Yilmaz, D & Inal, S. (2020)	*Effects of three different methods used during heel lance procedures on pain level in term neonates*	Japan Journal of Nursing Science	Experimentally determine the effects three different methods (*swaddling; swaddling and holding; swaddling, holding and breastfeeding*).	*A randomized controlled trial*	Pain scores in the combination of swaddling, holding and breastfeeding combination group were lower than in the other groups.
Somashekhar, N., et al (2020)	*Blinded randomized crossover trial: Skin-to-skin care vs. sucrose for preterm neonatal pain*	Journal of Perinatology	Comparing *skin to skin care* and oral sucrose for pain control in preterm neonates	*Blinded randomized crossover trial* Preterm neonates of gestational age week requires heel stabbing.	*Skin to skin care* and *Skin to skin care* and sucrose have comparable clinical effectiveness for pain control of preterm neonates.

DISCUSSION

Pain in newborns is real and needs attention. Pain that occurs in neonates is a neural perception that is influenced by injury or pain stimuli associated with consciousness in newborns that triggers pain (Hockenberry et al., 2017). Pain can affect infant development. The results of the literature review search show that proper pain management can improve the quality of life of neonates. The role of nurses in managing pain is very important, because nurses interact with patients for 24 hours. Objective and reliable pain assessment is considered the basis for safe and effective pain management. According to Olsson et al., (2021) in a systematic review, it was found that the most widely used pain scale was PIPP (Premature Infant Pain Profile) as much as 48% and NIPS (Neonatal Infant Pain Scale) as much as 23%. In the study Blomqvist et al., (2020) showed that most NICUs have pain assessment guidelines but there are differences of opinion regarding interprofessional discussions about pain assessment. Most respondents expressed a positive attitude towards pain assessment but recognised the lack of intervention after assessment. With pain assessment, it can provide appropriate pain management interventions in neonates.

Research conducted Chen et al. Non-nutritional sucking and maternal voice significantly reduced PIPP pain scores in neonates ($p<0.05$). The combination group had lower pain scores

compared to other groups. Exposure to maternal voice has the potential to provide important brain stimulation for preterm infants that can support the maturity and development of brain areas. Research conducted by Chirico et al (2017), also showed significant results, namely during the heel blood sampling procedure, newborns exposed to recorded maternal voices showed lower PIPP (Premature Infant Pain Profile) scores and decreased oxygen saturation than the control group who were not exposed to maternal voices. Chen et al., (2021) conducted a study that the effect of maternal voice on patients undergoing venipuncture, the intervention group showed significantly lower NIAPS (Neonatal Intervention Acute Pain Scale) scores, behavioural indicator scores and physiological indicator scores compared to the control group. Compared to the control group, research conducted by Avcin & Kucukoglu, (2021) found that facilitated tucking resulted in less crying and pain. Facilitated tucking is the act of facilitating the position of oblique flexion to one side, where one hand gently fixes the baby's head and hand area, and the other hand fixes the baby's legs and buttocks area. (Liaw et al., 2012).. Providing facilitated tucking action can reduce the pain scale in premature infants when blood sampling is performed (Astuti, Eka et al., 2022).

According to Liu et al. showed that massage can effectively decrease the duration of crying, a smaller decrease in blood oxygen saturation during and after the procedure, but is not effective for variations in respiratory rate after the procedure, and heart rate during and after the procedure. Massage has a positive effect on newborn pain reduction. Massage can reduce stress and improve blood circulation can reduce cortisol levels and increase endorphin, serotonin and dopamine. Massage can alleviate neonate pain, improve sleep and have a positive impact on neonate growth and development. (Zargham-Boroujeni et al., 2017). Premature newborns who received nesting and Yakson touch showed increased physiological stability, decreased behavioural levels, and experienced less pain compared to the control group. Yakson's touch and nesting are low-cost therapies, easy to use, and have no negative side effects. Therefore, it is imperative to incorporate these into the care that neonate nurses provide for preterm newborns in the NICU, as well as into ongoing training programmes (Magor et al., 2024).

In their meta-analysis, De Clifford-Faugere et al., (2020) showed that olfactive stimulation using familiar odours was effective compared to standard care on pain recurrence (SMD -0.69; 95% CI -0.93 to -0.44; l2=20%, p=<0.00001) and no adverse effects were reported. Research conducted by (Maya-Enero et al., 2022) showed that the intervention group in infants who were given lavender aromatherapy inhalation during frenotomy had decreased crying duration and lower NIPS scores compared to the control group. Research conducted (Razaghi et al., 2020) showed that the use of aromatherapy with lavender and the administration of 30% glucose can be applied in reducing pain during blood collection. In research Yilmaz & Inal, (2020) showed that the combination of swaddling, holding and breastfeeding had lower pain scores than the other groups. The newborn sucking reflex is a multifaceted sensory approach that combines the taste and suction of breast milk while in the mother's arms which is a tactile, auditory, visual and olfactory component that can cause sensory diversion to reduce pain in newborns (Obeidat & Shuriquie, 2015). (Obeidat & Shuriquie, 2015).

The next pain management is the administration of sucrose. Sucrose administration has been widely studied which shows that sucrose is effective in managing pain during invasive actions. Research conducted by Nimbalkar et al., (2020) shows skin to skin contact and sucrose have comparable clinical effectiveness for pain management in premature neonates. Other research conducted (Velumula et al., 2022) showed no difference between both breast

milk group and 24% sucrose group (50% percentile coefficient, 0.95% CI; -0.49 to 0.49). Breast milk was no worse than 24% sucrose in providing analgesia during heel prick in moderate and advanced preterm infants. This study suggests that if sucrose is not available then it can be replaced with breast milk for pain management in neonates. In his research Neshat et al.showed that the challenges in neonatal pain management do not only come from clinical factors, but also from organisational factors (collaborative programs between members of the care team, educational programs, supervision and comprehensive approaches). In a study conducted by Mala et al., (2023) showed that the education programme had a significant impact on the competence of nurses and midwives in Thailand in the management of neonate pain. Continuing education is required to maintain clinical competence in the field of pain management. Effective and comprehensive pain management requires collaboration, education, supervision and a comprehensive approach.

Nurses have an important role in improving the quality of life of neonates, namely effective pain management through pain assessment, non- pharmacological interventions (skin to skin contact, maternal voice, facilitated tucking positioning, massage, olfactive stimulation, sucrose administration, nesting positioning and Yakson touch therapy). In addition, education, supervision and a comprehensive approach and collaboration between teams are needed. Effective pain management can improve recovery, shorten length of stay and reduce the cost of care and prevent neuro-behavioural problems in neonates.

CONCLUSION

Pain management in neonates is an important thing that needs to be understood in neonatal care. Effective pain management can improve recovery, shorten length of stay and reduce the cost of care and prevent neuro-behavioural problems in neonates. There is a need for a pain management bundle in neonates that contains a structured plan, integrated steps to prevent and manage pain in neonates comprehensively.

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