University of Kerbala /Collage of Nursing

Effectiveness of Educational Program on Nurses' Knowledge Regarding Neonatal Pain Management

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By

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﴿فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ ۗ قل

وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَىٰ

إِلَيْكَ وَحْيُهُ ۖ وَقُلْ رَبِّ زِدْنِي عِلْمًا﴾

"صدق الله العلي العظيم"

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Dedication

To my father with love and respect forever....

To my mother with love and respect forever....

To my brothers with love and respect forever....

Israa

2022

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Abstract

Background: Pain is a negative experience and an emotive, neonatal period is the period from birth to the first twenty-eight days of human life, pain management prevent short and long-term problems that affect newborns suffering from untreated pain, and pain management include pharmacological and non-pharmacological method.

Objective: Present study aims to evaluate the effectiveness of the educational program on nurses' knowledge regarding neonatal pain management

Method: A quiz-experimental study design was carried out in Kerbala Teaching Hospital for Children at Holy Karbala City between the periods from 15th of October 2021 to 12th of July 2022. Two groups of (25) study group nurses and (25) control group nurses were selected. The data were analyzed by using the program of Statistical Package of Social Sciences (SPSS) Version 22.

Result: There were high statistical differences between the period before and after applying of the educational program. In the study group about (64%) of nurses expressed a poor level of knowledge at the pre-test period of measurement concerning neonatal pain management. While, after application of education program, (72%) of nurses expressed a good level of knowledge at the post-test period of measurement. The study found there were no statistical differences between the effectiveness of the educational program and nurses' age, gender, educational level, years of experience, and having neonatal pain management training courses.

Conclusion: The study concluded, that the majority of participant nurses' were female, school nursing, no participant in a training course about

neonatal pain, less than five years of experience, the 20-29 years old where the high percentage. There was a clear improvement of the knowledge of nurses regarding how to manage newborns pain after applying the educational program.

Recommendation: Neonatal pain should be included in nursing curriculum for all educational levels.

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List of Abbreviations

Items	Meaning
&	And
BP	Blood pressure
BPSN	Bernese Pain Scale Neonates
DAN	Douleur Aigue Nouveau-ne
et al.	et alias
ex	Example
F	Frequency

Fig	Figure
H_1	Alternative Hypothesis
HS	Highly Significant
H_0	Null Hypothesis
ID	Intradermal
IM	Intramuscular
IV	Intravenous
Kg	Kilogram
KMC	Kangaroo Mother Care
L	Low
Mcg	Microgram
Mg	Milligram
Min	Minute
Ml	Milliliter
M	Moderate
M.S	Mean of Score
M	Statistical Mean
NB	Newborn
NCUs	Neonatal Care Units
NFCS	Neonatal Facial Coding System
N.H.S	National Health Services
NICUs	Neonatal Intensive Care Units
NIPS	Neonatal Infant Pain Scale
NISC	Neonatal Intensive Special Care
No.	Number
N-PASS	Neonatal Pain, Agitation and Sedation Scale
NPO	No think by oral

NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OECD	Organization for Electronic Co- operational and Development
PIPP	Premature Infant Pain Scale
PMA	Post menstrual age
PO	By oral
PR	By rectal
PR	Pulse rate
P value	Probability Value
Q	Every
S	Significant
S.D	Standard Deviation
SFR	Self-family room.
SE	side effects
Sig	Level of Significance
SPSS	Statistical Package for Social Science
SQ	Subcutaneous
SSC	skin-to-skin contact
TDD	*total daily dosing*
WHO	World Health Organization

Chapter One

Introduction

Chapter One

1.1. Introduction

The first 28 days of a human's life, the period known as the neonatal phase, when problems such as hyperbilirubinemia and respiratory distress syndrome might occur. Prematurity is infants who are born before thirty-seven weeks of gestation report the greatest number of admissions to the Neonatal Care Units and it may predispose the infant to difficulties that continue until adulthood. A post-term newborn who is delivered after forty-two weeks of gestation has a significant risk for mortality rate rather than term neonates (wilson, 2019).

Pain is a negative experience and an emotive. However, even when a newborns cannot express their pain verbally, actual or potential tissue injury causes them to experience the sensation that is undeniably felt in a specific area of the body (Aydede, 2017).

Preterm newborns, who lack fully established descendent inhibitory pathways, can perceive pain as early as 24 weeks gestation. Preterm newborns' still-developing brain systems make their autonomic and neuroendocrine systems sensitive to pain and stress (Maxwell et al., 2019).

Neonatal pain can come from a variety of factors, the most common of which is procedural pain, which occurs when preterm or ill babies have the painful procedures they must endure each day in the hospital, causing them to experience frequent and often severe pain (Bucsea & Riddell, 2019)

In the neonatal intensive care unit (NICU) basic procedures such as venipuncture and lumbar puncture cause pain that, if not treated, can lead to undesirable cardiovascular, physiological, hormonal, respiratory, behavioral, and metabolic responses (Suleiman et al., 2019).

Surgical Procedure for newborns can result in abnormal pain reactions such as hyperalgesia and prolonged pain states (BrKasher et al., 2014).

Newborns may also experience neuropathic pain, which is often linked to neonatal brain trauma and results from damage to the nervous system as a result of abnormal nervous system operation. After nerve damage, there are synaptic alterations and pain hypersensitivity in this location (Inoue & Tsuda, 2018).

Disease processes can also cause pain in newborns, such as gastroenteritis, which induces vomiting, abdominal pain, dysphagia, and weight loss in neonates, rarely a fever (Lee et al., 2019).

Studies have established that early neonatal exposure to mismanaged pain has been connected to several undesirable long-term effects, such as the development of pain hypersensitivity, harmful psychological symptomology, and altered neurodevelopment. These findings underline the critical importance of pain management in newborn healthcare (Bucsea & Riddell, 2019).

Significant progress has been made in the treatment of newborns pain. Nurses and other health care personnel need an emphasis on pain prevention, employing routine pain assessments that should be done routinely every 4-6 hours or if clinically indicated and offered both non-pharmacologic and pharmacologic treatments for all newborns who are admitted to the hospital (Hall & Anand, 2014).

The treatment of high-risk newborns in critical care units is a relatively new field in resource-limited countries, even though it more difficult to detect pain in neonatal populations since they are unable to report it themselves. As a result, neonatal nurses have a duty to recognize and treat neonatal pain (Muteteli et al., 2019).

Nurses reported a limited degree of understanding regarding the clinical management of pain, which is not a part of the normal neonatal care routine. They had no idea that rating scales could be used to assess pain. Having scientific knowledge is highly significant, as it gives required ways for newborn care, focusing on the enhancement of the quality of the health care delivered and in the humanization of nursing care, considering pain as the fifth vital sign (Dames et al., 2016).

Training about neonatal pain treatment had a substantial effect on nurses' knowledge levels. Having a neonatal pain management policy in place, receiving a pain management education program, and having a category of knowledge about pain management were all connected with nurses' use of pain management in neonatal units (Wari et al., 2021).

1.2. Importance of the Study

Neonatal Pain is a common occurrence, and all neonates are subjected to pain early in their lives. Pain has a cost in neonates because it generates problems with neurodevelopment, deficits, behavior, and long-term cognitive, social, and emotional disorders, which are often irreversible. In the neonatal care units, nurses play a critical role in pain assessment and treatment (El Awady & Gharib, 2021).

There has been a steady decline in the number of newborn deaths worldwide, with the world health organization estimating that from 5 million in 1990 to 2.4 million in 2019, but the mortality rate for children under five years old is still high. The most dangerous time for newborn deaths is during their first week of life because of complications related to inadequate skilled care or poor quality care at birth and treatment in the days immediately after birth and during the initial days of life (WHO, 2020).

Approximately 10 percent of newborns require neonatal care, and during their hospitalization, they endure various unpleasant procedures. (Anand et al., 2017).

Despite substantial advances, the number of painful procedures performed on institutionalized infants without adequate analgesics remains high (Cruz, 2016).

During their first two weeks in the Neonatal Intensive Care Unit (NICU), newborns endure painful measures of an average of 134 (Valeri et al., 2015).

Many invasive treatments are performed on newborns who are in critical condition. Prematurely born babies face an average of 10 to 16 unpleasant procedures per day in the NCUs (Mehrnoush & Ashktorab, 2016).

Costa et al. (2017) indicated that 34.7 percent of neonatal care units nurses were found to never use pain assessment scales.

Newborns admitted to hospitals have the right to secure, efficient, and effective pain relief measures because they are frequently exposed to painful experiences that lead to altered neurobehavioral lifelong changes (Perry et al., 2018; Wallace & Jones, 2017).

Neonate pain treatment must be effective in order to lessen acute physiological and behavioral suffering as well as to improve both short-term as well long-term results (Walker, 2014).

Pain management is a crucial topic that influences the prognosis of newborns. The knowledge and attitudes of nurses on pain treatment can affect the quality of their practice. In order to empower neonatal professionals, continued education in newborn pain management is essential; additional research is required to determine how to transform instruction into more dependable practice (Peng et al., 2021).

Nurses' knowledge is deficient in neonatal pain management. A gap lies between their attitude and practice. So educational programs are needed to develop assess and manage pain in newborns (Muteteli et al., 2019).

Knowledge gap of pain control and nurses' assessment of preterm infants' discomfort could be considered barriers to appropriate pain management, which impact newborns suffering from pain (Hoda, 2020).

Nurses do not assess and treat newborns' pain in a systematic manner. As a result, knowledge translation strategies must be used to improve pain management in newborns (Costa et al., 2017).

The educational program had a significant positive effect on neonatal nurses' working to treat infant pain, so further frequent continuing education for neonatal nurses is needed to encourage common use of non-pharmacological techniques in nursing practice (Abd El-Aziz et al., 2018).

1.2. Problem Statement

A large number of unpleasant and stressful procedures are performed during newborn hospitalization, yet neonates get few particular pain management methods (Maciel et al., 2019).

Pain management techniques that are not pharmacological can be used to alleviate discomfort or supplement other treatments for chronic pain. Moderate or severe pain necessitates the use of acetaminophen, non-steroidal anti-inflammatory medications, morphine, fentanyl, ketamine, or dexmedetomidine to avoid side effects or tolerance/withdrawal, either alone or in combination with other anesthetics (Hall & Anand, 2014).

A stressful hospital environment and several painful treatments might cause short- and long-term consequences if the pain isn't managed. pain is undertreated despite evidence of newborn discomfort and guidelines. This gap

is caused by a lack of evidence-based knowledge application and time constraints (Balice-Bourgois, Zumstein-Shaha, et al., 2020).

An educational program will be the best method for increasing nurses' knowledge about how to care for and manage pain-affected neonatal populations.

1.3. Study Objectives

1. To assess nurses' knowledge regarding neonatal pain management
2. To implementation of educational program.
3. To evaluate the effectiveness of an educational program on nurses' knowledge regarding neonatal pain management
4. Find out the differences between nurses' knowledge at pre-post test scores with regards to their demographic characteristics.

1.4. Research Question

Does the application of neonatal pain management programs affect nurses' knowledge regarding neonatal pain management?

1.6. Hypotheses

Null hypotheses H0: There is no significant difference in nurses' knowledge scores between study and control groups at post-test**.**

Alternative H1: There is a significant difference in nurses' knowledge scores between study and control groups at posttest**.**

1.7. Definition of the Terms

1.7.1. Effectiveness

Theoretical Definition

Performing or functioning to the best of one's ability with the least amount of time and effort (Müller et al., 2018)

Operational Definition

The goals that achieved from identified manner to identified sample.

1.7.2 Educational Program

Theoretical Definition

A collection of educational activities that are organized to achieve a specific goal or to complete a set of educational tasks (Organization for Economic Cooperation and Development [OECD], 2018).

Operational Definition

A program that aimed to increase the knowledge of nurses through a learning manner.

1.7.3. Knowledge

Theoretical Definition

Knowledge is justified true belief It necessitates knowing a proposition indicates it's true. A false argument means the person doesn't know what he states. (Bolisani & Bratianu, 2018).

Operational Definition

Information cognition about pain-reducing measures that are achieved in different manners.

1.7.5. Neonatal Pain

Theoretical Definition

Neonatal pain is a complicated, subjective, and multidimensional phenomenon, making assessment difficult, which is exacerbated by the inability to convey pain verbally in this age group (Hall & Anand, 2014).

Operational Definition

A bad emotional experience happens for neonatal patients.

1.7.6 Management

Theoretical Definition

Management is defined as "a set of activities directed at an organization's resources (human, financial, physical, and information) with the goal of achieving organizational goals in an efficient and effective manner" (Griffin, 2013).

Operational Definition

A measure that taken in order to achieve pain relief for newborns

Chapter Two

Review of Literature

2.1. Neonatal Pain: Overview

The impression about neonates do not suffer from pain is not new, Neonatal pain was largely ignored and misunderstood (Darwin et al., 2015).

Salekin et al. (2021) suggested that multimodal and unimodal postoperative pain assessment, and measure the impact of time-based information combination, and integration of temporal information clearly advances the performance as compared to the non-temporal approach there was a noticeable improvement in pain assessment and management of neonate.

Misinterpretation or neglect of an infant's pain experience can result in misdiagnosis and over- or under-treatment. Poor pain management and therapy in newborns can result in long-term changes in brain structure and function. To remedy these flaws, the present method should be supplemented with an automated system that continuously monitors different pain indicators and provides a quantitative assessment (Zamzmi, 2017).

Health care professional should be routinely checking for signs of newborn pain and discomfort, decreases the number of painful procedures, prevent or manage acute pain caused by medical interventions, and treatment of post-operative pain, and prevent long-term or recurrent distress in the neonatal care units (Hall & Anand, 2014).

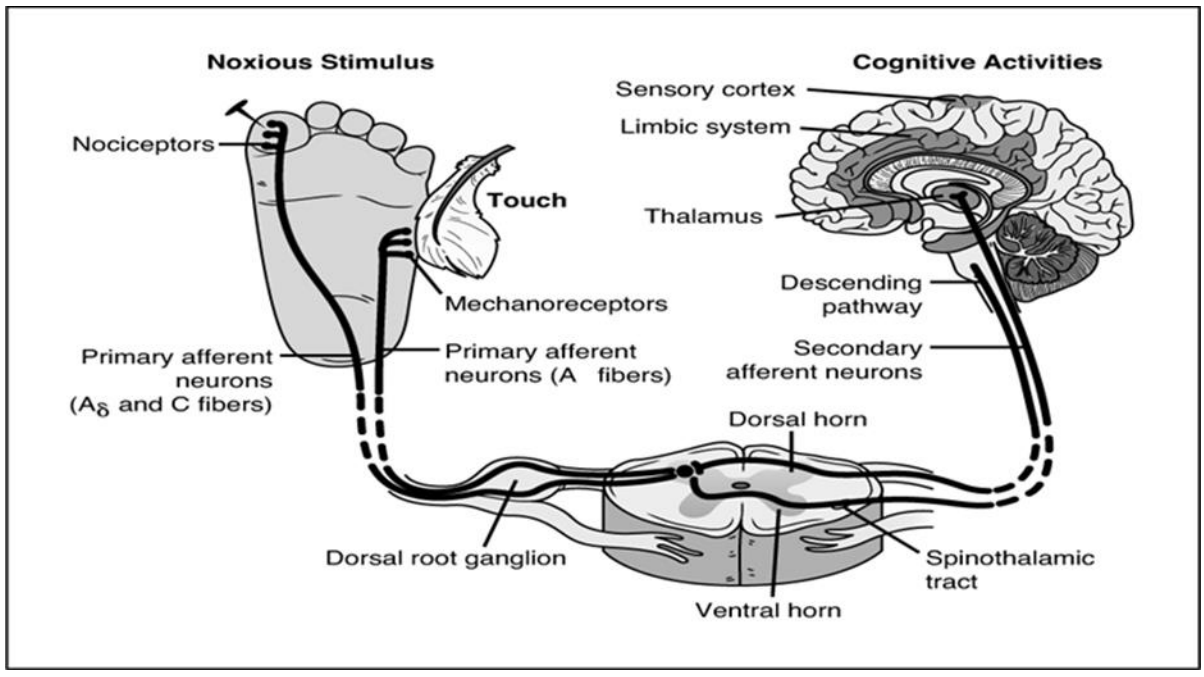
Furthermore, findings illustrated the factors in managing neonatal pain including; nurses' knowledge scores and educating on neonatal pain

management in the workplace, and getting a newborn's pain management policy (Wari et al., 2021).

2.2. Process of Neonatal Pain

Marko et al. (2016) mentioned that Neonatal pain has four processes for pain perception include the transduction when noxious stimuli are presented to nociceptors, transmission path of stimulus transmission from the transduction site to the spinal cord, next to the brain stem, and finally to the extreme levels of the brain modulation neurotransmitters in the path to perception and perception can stop or improve painful stimuli. the brain receives the final session of a pain network effect shown in figure 1.

Fig 1. Process of Neonatal Pain from Noxious Stimuli



(Marko et al., 2016)

Fitri et al. (2019) distinguished between pain and stress in neonates and showed that the key variance between them is the motivation that stimulates a response. Pain is always caused by harmful stimuli such as tissue injury, stress results from non-invasive homeostatic threats. Both pain and stress include neuronal and endocrine pathways, therefore their effects are physiological, metabolic, and behavioral. Pain and stress both contribute to changes in neurobiology and behavior that reduce the quality of life. Preventing neonatal pain and stress is significant for future prevention.

Frequent painful stimuli in newborns result in both short-term and long-term complications. These include stress responses, abnormal somatosensory and physiological variability such as increase or decrease heart and pulse rates decrease oxygen saturation, effects on long-term neurodevelopment, and behavioral and socio-emotional outcomes (Lim & Godambe, 2017).

Several studies revealed that physical pain in infancy has a particularly long-term impact on newborns, with consequences ranging from long-term brain alterations and development to subsequent changes in pain sensitivity and maladaptive behavior (Johnston et al., 2017; Maxwell et al., 2019).

Walker (2019) stated that changes in biological components that influence pain (peripheral and central somatosensory function and regulation, brain structure and connectivity, and psychosocial factors) have been documented in infants and young people born very preterm or extremely preterm, gender, coping style, mood, parental response, previous gestational age and cumulative pain exposure from harmful treatments and neonatal surgery affect the level of alteration.

2.3.Types of Neonatal pain

There are many kinds of neonatal pain nociceptors are termed because of their ability to convey damaging stimuli, therefore nociceptive pain perceives thermal, mechanical, and chemical threats to body tissues. Neurological weakening or dysfunction causes neuropathic pain. Another classification is somatic and visceral pain, visceral discomfort affects organs and cavity linings, connective tissue, skin, blood vessels, muscles, and bones are affected by somatic pain (Marko et al., 2016).

Because of underlying illness conditions or procedures, neonatal patients frequently experience acute pain. Even in institutions with limited newborn pain care, it is vital to describe proper pain management and pharmacological options that are safe and effective for neonatal patients (Shah & Siu, 2019).

Acute nociceptive pain is an important defense system for detecting danger signals that endanger equilibrium and survival. Chronic pain, on the other hand, is caused by maladaptive nervous system function rather than the persistence of acute nociceptive impulses. Microglia are also being discovered to play a role in brain regions involved in emotional and memory-related elements of chronic pain (Inoue & Tsuda., 2018).

Pathological pain is classified as either neuropathic (involving nerve injury) or dysfunctional (representing improper nervous system function) and is called a "nervous system illness" (DiLorenzo et al., 2016).

Acute pain would be procedural pain and chronic pain would be incurable neurodegenerative diseases or cancer. An example of visceral pain

would be the insertion of a chest or gastrointestinal tube. An example of somatic pain would be venipuncture (Marko et al., 2016).

2.4 Assessment of Neonatal Pain

Despite the fact that certain health professionals, primarily nurses, recognize the presence of pain in the neonatal population, their assessment is still done experimentally in care settings, particularly by isolated assessments of physiological and behavioral characteristics, mostly crying (Hatfield & Ely, 2015).

The facial expression pictures are divided into four categories: severe pain expression, mild pain expression, crying expression, and calmness expression, with 2750 neonate face expression images in each category (Yan et al., 2020).

It has been documented in several studies that there are forty pain assessment scales that used to neonatal pain some of these scales are demonstrated in table 1 (Perry et al., 2018).

Xie et al. (2021) noted that after the improvement of neonatal pain assessment four scales of Neonatal Facial Coding System (NFCS), Douleur Aigue Nouveau-ne (DAN), Neonatal Infant Pain Scale NIPS, and Premature Infant Pain Scale (PIPP) were examined for their reliability and internal consistency; the PIPP and NIPS have good clinical efficacy and are better select for assessing procedural pain in premature infants, also NFCS, DAN scales have high reliability and internal consistency.

These scales are considered the basis for safe hands and sufficient pain management, but health care providers may be confused about them (Eriksson & Campbell, 2019).

Table (1): Neonatal Pain Assessment Scales

Tool	**Domains**	**Score**	**Reliability**
Neonatal Facial Coding System-Revised (NFCS-R)	Five domains of facial expression	0–5	High inter-rater and construct validity
Premature Infant Pain Profile-Revised (PIPP-R)	Physiological (two), behavioral (three), and contextual (two) elements	0–18	Moderate consistency Good validity
Neonatal Pain, Agitation and Sedation Scale (N-PASS	Five items: crying; behavior state; third-person face; fourth-person tone of extremities; fifth-person vital sign changes (choice of heartbeat; pulse rate; oxygen saturation.	0–13 for preterm 0–10 for term	A high degree of repeatability Validity is extremely high When the score is greater than three, medical attention is highly recommended

Neonatal Infant Pain Scale (NIPS)	Indicators of six behavioral traits	0–7	Consistency is high, but validity is limited
Bernese Pain Scale Neonates (BPSN)	Indicators of three bodily functions and six behavioral traits	0–27	High consistency High validity

(McPherson et al., 2020)

Even if they're not critically ill or getting intensive care, all NBs should be examined for discomfort and stress. Systematic pain evaluation helps in pain management. This quality improvement project's success is due to process mapping, inter-professional teamwork, and cultural change agents (Lyngstad, 2022).

Also, studies demonstrated it was difficult to assess pain in newborns due to their development physical, cognitive, and behavioral. Pain assessment tools allow nurses and other health care workers consistency in measuring pain, stress, and discomfort. These scales not only measure pain but also the effect of non-pharmacological and pharmacological therapies on neonatal pain (Perry et al., 2018).

The multidimensional neonatal pain evaluation, behavioral, physiological signs, endocrine-metabolic alterations, environmental, and neurophysiological components are significant. Based on these indicators, unique pain assessment methods for NBs have been developed and validated (Harrison et al., 2015).

2.5. Nurses' Barriers to Implementing Neonatal pain Management

There are many barriers to implementing neonatal pain in nursing staff these barriers include; absence of awareness of neonates' ability to feel pain, the absence of awareness of clinical settings everywhere pain is perceived, the inability of neonates to express pain precisely, nurses desire to accomplished procedures without analgesia as there is fewer power, unwillingness to use analgesics because of side effects, worry of generating confidence on opioid drugs, absence of knowledge on pain assessment scales, absence of awareness on pharmacological and non-pharmacological pain management methods including absence of awareness of painless methods of analgesia, and low of knowledge about the neonatal pain management intervention within the scope of nursing (Sujatha et al., 2015).

Another study showed that deficient nursing professionals and lack of knowledge about pain complications were the most significant causes of the low level of application of pain management methods for neonates (Zahedpasha et al., 2017).

Healthcare workers barriers to neonatal pain management and evaluation include a lack of routine and protocols, training on neonatal pain, assessment tools, and greater security for pain evaluation and treatment. Identifying these barriers is key to creating knowledge-transfer strategies to overcome them and improve neonatal care (Christoffel et al., 2016).

Mehrnoush et al. (2018) indicated that a decrease in knowledge of educational courses, loss of an infant pain management policy, and management matters were the key problems in the manner of application of

infant pain management by nurses and physicians. strategies are required to decrease or eliminate these barriers.

So as common barriers to effective pain treatment include a lack of willingness to adapt, a lack of information, fear of side effects, an incorrect interpretation of pain signals, a lack of resources and a lack of confidence in the tools used to measure pain, so In newborn assessment and management, there are gaps in knowledge, evidence and practice (Cong et al., 2013).

2 .6. Non-Pharmacological Neonatal Pain Management

Untreated pain in NBs has obvious short- and long-term consequences, necessitating a multimodal approach that includes both nonpharmacological and pharmaceutical measures. Nonpharmacological approach with possible advantages earlier to minor painful procedures (Hatfield et al., 2019).

Breast milk, music, skin-to-skin contact, kangaroo mother care, and facilitated tucking are examples of nonpharmacological pain relief. as demonstrated in box 1 (Carachi & Williams, 2020).

Box (1): Non-pharmacological pain management

Common non-pharmacological analgesic interventions used in the neonatal period	
Tactile	**Environmental**
	Lighting
Skin to skin contact	Day/night cycles
Non-nutritive sucking (e.g. pacifier)	Noise/Quiet Clustering
procedures	
Swaddling/facilitated tucking	Procedure modification
Kangaroo Care	
Heel massage	
Taste	
Breast Feeding	
Experienced practitioner	

(Carachi & Williams, 2020)

Pillai et al. (2012) indicated that Pain behaviors associated with acutely painful procedures can be effectively managed in neonates, and older infants using a variety of non-pharmacological interventions.

2.6.1 Kangaroo Mother Care (KMC)

Kangaroo mother care is a simple method of reducing mortality as well as morbidity in NBs, but it is generally delayed due to obstacles. Among mothers, physical and mental health decline, lack of required awareness, and fear of practicing KMC were the most significant perceived impediments to

KMC, while benefits were strengthening KMC mother and newborn and increasing confidence in retaining babies (Abbasi et al., 2019).

Adoption of KMC requires training, orientation, supportive supervision, and assistance, integration into quality improvement, continuity of care, and client-centered care. Involving health ministries and other implementers from the start may assist mobilize resources for scaling up KMC and monitoring services (Bergh et al., 2014).

As noted by Bergh et al. (2014) the position of KMC is held infant direct skin-to-skin contact on the mother's chest in an upright position under his mother's clothes. So a mother can provide her kid with exclusive breastfeeding, KMC, and for a long time (over 18 hours per day), but commencement, continuity, and length may vary depending on the infant's stability and the environment of care. During the application of KMC With proper follow-up, the mother and her infants can be discharged from the hospital.

Most nurses thought that KMC was beneficial for mothers and infants, but others thought it was impossible for all NBs. Most nurses believed KMC should be limited to newborns on intravenous therapy, intubated, or with an umbilical catheter. There was a strong correlation between nurses' knowledge and their opinions about kangaroo mother care (Shattnawi et al., 2019).

A study by Chidambaram et al. (2014) demonstrated that despite of effect of KMC on relieving heel prick pain among preterm babies, only a few studies have been done on KMC ability to reduce discomfort in preterm infants.

When compared to standard treatment, a similar study found that KMC is an effective non-pharmacological and safe technique for reducing premature neonates' pain like venipuncture (Bhandekar & Malik, 2018).

Kangaroo mother care can be used to reduce procedural pain, were associated with a significant reduction in pain score both one minute and five minutes after vaccination, as well as a reduction in cry duration and a stable heart rate when used with infant vaccination (Pandita et al., 2018).

2.6.2. Skin to Skin Care (SSC)

The finding of previous studies revealed the benefits of contact between the skin and the skin in which newborns wearing only a diaper are held next to their mother's bare chest reducing pain scores associated with procedural pain in newborns, besides another benefit including improved breast milk production, and duration of breast feeding, satisfaction of parents and sleep organization (Johnston et al., 2017).

Shukla et al. (2018) reported that compare father and mother skin-to-skin care provided to their infants indicated that no differences between the effect of father and mother skin-to-skin care provided for reducing infants pain, this study consider bases for closer involvement of the fathers for participation in neonatal care.

Over the last two decades, there has been a greater emphasis on the use of family-centered care interventions like SSC in Neonatal Intensive Special Care Units. SSC between a parent and their newborn has been proved to improve parents' mental and emotional health as well as bonding and attachment between parent and child. This may lead to further benefits, such

as reduced parental melancholy and anxiety while in the NISC Unit, improved physical health, and higher emotions of bonding between parents and their neonates (Jones & Santamaria, 2018).

Contact with the skin has been shown to promote nursing, milk production, parental satisfaction, and bonding. Both parents can be encouraged to provide skin-to-skin care for NBs in the NCUs, following appropriate rules and protocols. Despite apparent physiologic stability during skin-to-skin care, newborns in the NCUs should be monitored for airway patency and the stability of endotracheal tubes, arterial and venous access devices, and other life support equipment (Baley et al., 2015).

It is possible to colonize a baby with the skin microbes of their caregiver directly through skin-to-skin care, which is preferable to the infant being exposed to unhealthy bacteria in the hospital (Hartz et al., 2015).

When compared to abdominal skin contact, kangaroo skin contact has a similar effect on maternal attachment behaviors and has a beneficial influence on attachment behaviors as well as several components of emotional behaviors (Adeli & Aradmehr, 2018).

2.6.3 Swaddling and Facilitated Tucking

Swaddling is a non-pharmacological intervention that is safe, quick, easy, and effective for reducing pain and increasing oxygen saturation in NBs, as well as reducing the negative effect of physical activity on oxygen saturation and peak heart rate (Erkut & Yildiz, 2017).

There is some evidence that swaddling is an acceptable stress-reduction treatment for NBs, therefore it is a well-known technique in developmental care programs (Lejeune et al., 2021).

Traditional swaddling, which involves restricted immobility of the infant's lower limbs, is a risk factor for Developmental Dysplasia of the Hip, but swaddling that allows the infant to move his or her hips flexion-abduction without restriction, as well as the use of baby-wearing equipment that maintains a hip-flexion-abduction and knee-flexion posture, are both ideal for hip development (Vaidya et al., 2021).

Although that Facilitated tucking position was efficient in pain management of NBs when compared to routine care, Facilitated tucking compared to opioid or oral glucose did not achieve a significant reduction in pain intensity (Gomes et al., 2020).

2.6.4 Music Therapy

Music therapy can improve neonatal function and reduce anxiety in parents. Live music synchronized to an infant's vital signs, provided by a certified music therapist with First Sounds rhythm, breath, and lullaby training, improves bonding for infant–parent dyads and triads (Loewy, 2015).

Premature infants' heart rates, sleep–wake state scores, and facial expressions of pain were reduced after painful procedures such as blood sample were performed by playing music, so they can reserve their energy for their growth and development (Shabani et al., 2016) .

Jain et al. (2019) reported that when music therapy is used as a means of reducing neonatal pain during vaccinations, it can also have a good impact on the baby's behavior and physiological signs.

The heart rate, pain perception, and oxygen saturation of healthy neonates suffering from procedural pain are all affected by short-term exposure to music and heartbeat sound recordings (Rossi et al., 2018).

2.6.5 Breastfeeding

Fan et al. (2019) suggested that in the absence of neonatal complications breast feeding is beneficial for all birth infants including term, post-term and pre-term neonates and there was no an association between infants' gestational age and breastfeeding duration and exclusivity, so in the absence of complication, there is no need for too shorter duration or exclusive breast feeding .

According to Wilson et al. (2019) Contraindications to breastfeeding include; Maternal chemotherapy, a mother who had exposure to radioactive materials, maternal infection Cytomegalovirus, Human T-cell leukemia virus type I or II, Maternal herpes simplex lesion on a breast, Active tuberculosis not under treatment in mother, Human immunodeficiency virus in mothers in the industrialized world, maternal substance abuse, number of drugs are contraindicated for breastfeeding Mothers and Galactosemia in the infant.

Despite the fact that there have been few studies that have evaluated the significant of breast feeding in decrease pain in NBs, breastfeeding or breast milk should be used to alleviate procedural pain in neonates undergoing a

single painful procedure rather than placebo, positioning, or no intervention (Shah et al., 2017).

providing breast feeding during and following vaccination had reduced behavioral responses for pain that involve a decreased duration of crying and decreasing pain scores (Harrison et al., 2016).

2.6.6 Non-Nutritive Sucking

Non-nutritive sucking is defined as any repetitive oral activity that does not respond to food stimuli (Mohamed et al., 2018).

Preterm infant survival rates have increased in recent years, but oral feeding difficulties are the most common problems they face, NNS programs were effective in improving immature newborns' oral feeding skills and weight gain (Asadollahpour et al., 2015).

It was predicted that using NNS as a strategy to assist parents in identifying and responding to early communication and oral readiness signs would boost confidence in neonatal management and allow for faster discharge home (Harding et al., 2014).

The study of Ozkan et al. (2022) Indicated that NNS is an effective non-pharmacologic method for reducing pain scores in premature infants in most neonatal care units across the world.

While using the N-PASS and were correlated with the pain evaluation by NFCS and NIPS that NNS is considered a secure and effective pain-relief method during the procedural pain in term neonates, also it can be used even at home not only at the hospital to prevent short and long term complication later in childhood (Vu-Ngoc et al., 2020).

2.6.7 Massage Therapy

Neonatal massage is defined as "a methodological touch intended to stimulate child through various methods, but most consist of both tactile and kinesthetic stimulation (rubbing and series of limb extensions) ". Premature infants are deprived of the cutaneous stimulation that occurs during intrauterine development as well as continuous contact with their parents. It has an adverse effect on both the psychological and biological development of newborns. Because of this knowledge, many neonatal units have begun to implement therapeutic massage protocols to aid in the neuromotor and emotional development of preterm infants (Alvarez et al., 2017).

Massage therapy improved daily weight gain in both low and very low birth weight preterm neonates, with greater benefits observed when preterm neonates received moderate pressure massage (Lu et al., 2020).

The therapeutic practice of massaging an infant has been around for decades and is now used all across the world. For newborns who undergo painful surgeries, are in a stressful NCUs, and are separated from their parents, baby massage has been shown to relieve stress and improve bonding, promote body weight, food tolerance, and neurological development in infants who receive it (Pados & McGlothen-Bell, 2019).

Massage therapy is an effective and safe non-pharmacological method for relieving pain in neonates as it can prevent long-lasting physiologic and neurodevelopmental consequences (Fitri et al., 2019).

A two to three-minutes massage of the lower limbs, heel, dorsal region, or at the site of the painful procedure can reduce scores on the Neonatal Pain

Infant Pain Scale and the Premature Infant Pain Profile, as well as provide physiological stability like decreased heart and respiratory rate and behavioral improvement like decreased crying time, improved painful procedure performance, improved oxygen saturation, and support neurological development (Costa et al., 2017).

Ayuningrum (2019) Showed that massage therapy might be used as an effective, safe non-medical intervention and low-cost intervention. it had many benefits not only providing comfort but can improve sleep quality, promoting physical growth, and decrease psychological stress that will eventually promote the baby's growth.

The stress, anxiety, and depression levels of parents who massaged their newborns were reduced. In order to promote the health and well-being of parent-infant relationships, neonatal nurses can obtain infant massage education and certification and teach parents infant massage techniques (Pados & McGlothen, 2019).

2.6.8 Oral Sucrose

There was strong evidence that the administration of sucrose on the infant's tongue with a pacifier, syringe, or cup and given before two minutes of the procedure can manage short-term pain from five to eight minutes after the procedure also this method is effective in decreasing changes of heart rate, reduce crying time and facial grimacing or tactile and orogustatory stimuli may activate endogenous opioid and non-opioid pathways, respectively, in the body (Perry et al., 2018).

Another study also indicated that Sucrose is safe and effective for reducing procedural pain from single events. It is necessary to administer sucrose to neonates on a regular basis, as well as to combine it with other non-pharmacological and pharmacological treatments. Studying the effects of sucrose on extremely preterm, unstable, and ventilated NBs is an area in which research is needed. Many research is needed into the minimally effective dose of sucrose during a single painful procedure and the effect of repeated sucrose administration on pain. recommended dose of sucrose is shown in table 2 (Stevens et al., 2016).

Sucrose administration and swaddling practice had no difference in the response of neonatal pain; thus, both non - pharmacologic interventions had the same ability in reducing neonatal pain response in the blood sample through the heel (Huda et al., 2018).

Table(2): Recommended Dosage of 24% Sucrose Administration Recommended by IASP

Gestational age	**Dosage of sucrose**
24–26 weeks	0.1 Ml
27–31 weeks	0.25 mL
32–36 weeks	0.5 mL
>37 weeks	1 Ml

(Perry et al., 2018)

2.6.9 Combination of Care

Bucsea and Riddell (2019) revealed that the Combining certain pain management measures results in stronger analgesic effects compared to administering single techniques.

Shah et al. (2017) showed that the combination of music therapy with sucrose provided better pain relief during heel prick than when sucrose or music was used alone in the mature and stable neonates.

Evidence suggests that giving preterm neonates expressed breast milk and kangaroo mother care results in pain relief as opposed to just giving them expressed breast milk. So KMC and expressed breast milk should be the first method used to manage pain in preterm neonates (Shukla et al., 2018).

The swaddling and expressed breast milk method provides clinically superior non-pharmacological pain relief and is the method recommended by nurses for orogastric tube insertion procedures and preterm infants (Cirik & Efe, 2020).

When Pacifiers and swaddling can reduce premature infants' pain score and heart rate during invasive procedures, so they can be used as an alternative to pain management in premature infants (Efendi et al., 2018).

2.6.10. Environmental Control

Environmental control includes reducing noise and light, minimizing the number of painful procedures, establishing quiet and serene atmospheres, planning, considering the least painful procedure, and including parental

presence during the procedure will result in batter pain relief (Balice-Bourgois, Newman, et al., 2020).

The environment is like a two-edged knife. Environmental conditions that depress cerebral functions, induce abnormal developmental processes and on the other hand, the opportunities to empower brain plasticity (Sale, 2018).

Hatfield et al. (2019) stated that behavioral and environmental control reduce the bio-behavioral pain response in preterm infants.

Many cultural and organizational features of NCUs suggested the effect of parent involvement during pain management and support of parent-centered pain management in neonates should be encouraged by the organization (Marfurt et al., 2016).

In the neonatal care units, nurses play a key role in forming the environmental conditions and in developing relationships between the newborns and their parents. Nurses can improve the short- and long-term outcomes of vulnerable infants by encouraging and facilitating early, frequent, and long-lasting SSC of at least 60 minutes in length (Vittner et al., 2018; Weber et al., 2018).

2.7 Pharmacological Neonatal Pain Management

Pharmacological pain relief in newborns is extremely difficult to evaluate. Because of the difficulty in measuring pain and pain relief in these vulnerable patients, as well as the constantly changing pharmacokinetics and pharmacodynamics of common drugs used during clinical practice to treat neonatal pain (Van et al., 2018).

2.7.1 Topical anesthesia

Ophthalmology, otolaryngology, dental and oral surgery, urology and cosmetic surgery are just some of the medical and surgical fields that make extensive use of topical anesthetics. After direct application, they result in a superficial reduction in pain sensation. Using free bases; increasing the concentration of the drug; lowering the melting point; using physical and chemical permeation enhancers and lipid delivery vesicles can improve their delivery and effectiveness. Anesthetic agents available for use include eutectic mixtures of local anesthetics such as euthetic mixture of local anesthetic -max, lidocaine, and benzocaine (Kumar et al., 2015.)

Results showed that as well as pain scoring should be a part of routine monitoring in neonatal care units, topical anesthetic agents were effective in reducing procedural pain in infants (Kaur et al., 2019)

The use of topical anesthesia with EMLA cream was used effective for reducing neonatal pain associated with procedure like venipunctures and lumbar punctures (Balice-Bourgois, Newman, et al., 2020).

Although Courtois et al. (2016) supported the search of harmless and efficient approaches to decease number of heel stick, the greatest heel sticks were carry out with analgesia, The high incidence of this procedure and the identified side effects of recurring pain in neonates must support the search of harmless and efficient approaches to decrease their number.

2.7.2 Local Anesthesia

Many studies showed the effect of using local anesthesia in neonates as it can decrease physiological variable associated with procedure pain

(circumcision) had decreasing mean pain scores, heart rate and increasing oxygen saturation mean respiratory rate. Should no longer application of circumcision without anesthesia in the clinical setting (Fikin & Yohanna, 2020).

Analgesia via regional analgesia is effective during surgery, but the higher complication rates in neonates emphasize that proper monitoring and drug selection are critical (Walker, 2014).

Despite the benefits of local anesthesia, systemic toxicity from local anesthesia is most common in infants under 6 months of age and is associated with bolus dosing and penile nerve blocks. It can be treated by securing the airway, implementing cardiopulmonary resuscitation, suppressing seizure activity, and administering intravenous lipid emulsion at the first sign of toxicity (Boretsky, 2019).

2.7.3 Non-Opioid Analgesia

The study indicated that administering regular doses of paracetamol within the first 48 hours following surgery or in the event of an acute deterioration would be an efficient analgesic (Rostas, 2017).

Hammer et al. (2020), showed that using dexmedetomidine as a preventative drug to help reduce opioids in chronic, long-term patients is also possible, as dexmedetomidine does not affect respiratory function. Consider switching to dexmedetomidine if the clonidine infusion reaches its maximum dosage and is still ineffective. Dexmedetomidine should only be used for a few days at a time to minimize the risk of withdrawal. Table 3 showed the

most appropriate pharmacological and alternative non-pharmacological pain management.

Analgesic and antipyretic properties of NSAIDs make them popular among children. Ibuprofen can be purchased over the counter for children as young as three months old. Because of the risk of kidney damage and bleeding problems, such as intraventricular hemorrhage and gastric erosion, below this age, they are not recommended for use as illustrated in table 4 (Anderson & Hannam, 2019).

Table (3): Non-Opioid Drugs and their Alternative Management.

Non-Opioid Pharmacologic	**Local & Regional Anesthesia**	**Non-Pharmacoklogic Alternatives**
Acetaminophen NSAIDs (ibuprofen, ketorolac) Gabapentin Dexmedetomidine	Neuraxial Blockade (spinal, epidural) Local Anesthetics (lidocaine, bupivacaine) Topical Anesthetics (EMLA)	Skin-to-Skin Care Facilitated Tucking Oral Sucrose/Glucose Breastfeeding Non-nutritive Sucking

(Squillaro et al., 2019)

Table (4): Common Medication Used to Relieve Pain in Neonates.

Non-Opioid Pharmacologic Analgesics	**Routes**	**Advantages**	**Disadvantages**
Acetaminophen	by oral, intravenous, by rectal	Combined analgesic and antipyretic No respiratory depression PR and IV options for No think by oral Morphine consumption .should be reduced	Precluded in patients with compromised liver function Enteral and rectal delivery variable absorption
Non-Steroidal Anti-Inflammatory Drugs	PO, IV	There is no hypoxemia of the .respiratory system The presence of anti-inflammatory and pain-relieving effects	The kidneys have been damaged Bleeding in the digestive tract
Gabapentin	used Orally	Feeding intolerance is reduced	tachycardia, bradycardia, emesis, and

		Less benzodiazepines and opiates are used	irritability are all signs of autonomic instability following a sudden cessation of use
Dexmedetomidie	Intravenous intra muscular intranasal, buccal	Anti-anxiolytic, sedative, and analgesic Rapid onset Limited respiratory depression Procedural sedation does not necessitate intubation	Off-label use is currently permitted in neonates need for Continuous monitoring Side effects of hypotension and bradycardia

(Carachi & Williams, 2020)

2.7.4. Opioid Analgesia

Premature infants with comfort scale scores clearly showing the need for sedation and requiring prolonged mechanical ventilation have a wide range of treatment options (Zimmerman et al., 2017).

Strict synchronization and minimization of oxygen consumption are required when an infant's physiology necessitates continuous analgesia and sedation (Ancora et al., 2019).

Successfully treating pain with opioids has been proven to be effective in critically ill neonates, but analgesic alternatives to opioids have emerged as both primary and supplementary therapies. Neonatal and infant neurodevelopmental outcome risks can be reduced by using non-opioid pain management methods table 5 shown opioid drug (morphine) and another non opioid drugs dosage and note about it (Swain et al., 2017).

Table (5):Common Opioid and Non- Opioid Pain Medication to Relieve Pain for Neonatal Patients.

Drug	**Dosage**	**Note**
Paracetamol	PRETERM NEONATES (28 - 32 weeks post menstrual age) IV: 7.5 mg/kg 8 hourly Oral/Rectal: Loading Dose: 20 mg/kg Then: 10 - 15 mg/kg 8 to 12 hourly Max daily dose: 30 mg/kg/day PRETERM NEONATES (32 to 36 weeks PMA) IV: 7.5 mg/kg 8 hourly Oral/Rectal: Loading Dose: 20 mg/kg Then: 10 to15 mg/kg 6 hourly Max daily dose: 60 mg/kg/day NEONATES (>36 weeks PMA) IV: 10 mg/kg 6 hourly Max dose: 30 mg/kg/day Oral/Rectal: Loading Dose: 20 mg/kg Then: 10 -15 mg/kg 6 hourly Max daily dose: 60 mg/kg/day	Rectal route less reliable than IV or oral routes Care in neonates less than 28 weeks PMA. Suggest decreasing dose and increasing dose interval. Consider weight of child

Ibuprofen	TERM NEONATES Oral: 5 mg/kg 12-24 hourly	Not generally recommended for use in neonates
Morphine immediate release preparations	PRE-TERM AND TERM NEONATES: Oral: 50-100 mcg/kg 6 hourly IV: Bolus: 50-100 mcg/kg 6 hourly Continuous Infusion: 5- 20 mcg/kg/h	Use lower doses with lower gestational age, lower weight and if opioid naive Suggested initial doses; monitor for adverse effects

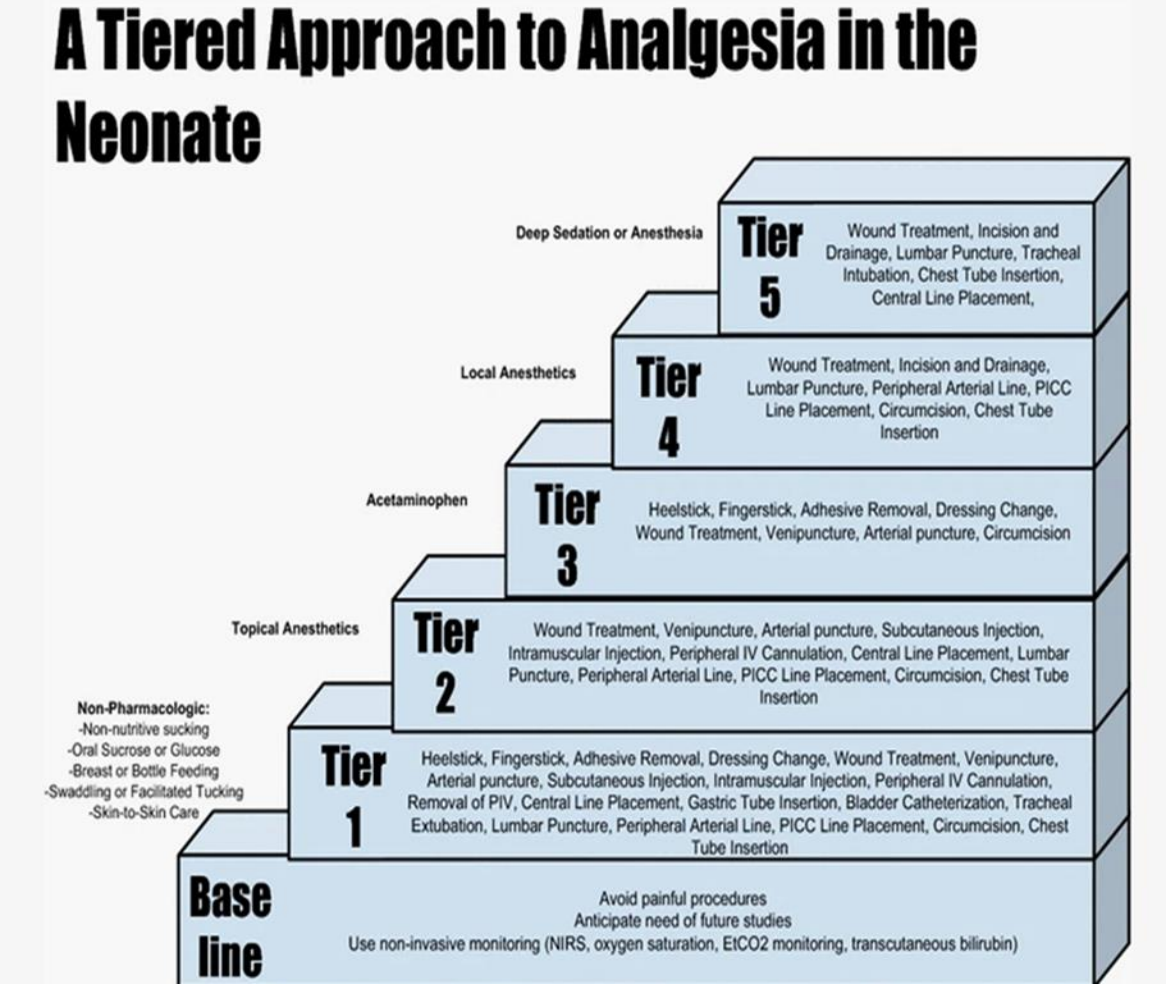
(Donato et al., 2019)

According to Palmer et al. (2018) tramadol is inefficient as an opioid agonist. Water-soluble mild opioid. Breast milk included tiny levels. In term babies, tramadol metabolism matures in one to two months. Low amounts of tramadol in breast milk harm babies.

Newborns opioid consumption quickly resembles adult norms. These drugs have hazards similar to those in adults (Thigpen et al., 2019) .

There are recommend for a level approach for the care of newborns' pain, this including environmental, non-pharmacologic, and pharmacologic pain management that will improve long-term neurologic and behavioral outcomes, as well as parent and provider satisfaction as mentioned in figure 2 (Witt, 2016).

Fig 2. A Tiered Approach to Analgesia in Neonates



(Witt, 2016)

2.8. Conceptual Framework

Vital to completing advanced educational and training programs beyond the undergraduate degree level is realizing specific dispositions and traits (Willis, 2021).

Adult learning theory is crucial for designing and implementing education programs, especially healthcare professional training. Variation in theory use in healthcare professional education programs may be related to a lack of understanding of the breadth of learning theories accessible and a lack of particular, in-context examples to enable educators evaluate various theories relevant to their teaching situation (Mukhalalati & Taylor, 2019).

There are four principles in adult learning theory including : adults must be involved in the planning and evaluation of their instruction, experience (including mistakes) serves as the basis for the learning activities, adults are most interested in subjects that have immediate relevance and impact to their job or personal life finally, adult learning is problem-centered rather than content-oriented (Pappas, 2013).

2.9. Nurses' Knowledge related neonatal pain management

Goldman (2013) mentioned that the knowledge is the information, understanding and skills that are gained through education, training and experience in this case knowledge of neonatal pain prevention and control .

All neonatal practitioners should prioritize the management of acute pain in neonates. Pediatric and neonatal patients can benefit from the use of age-appropriate pain assessment instruments, as well as a better understanding

of the mechanisms of action of various non-opioid and opioid medications (Shah & Siu, 2019).

Nurses' impression of effectively-managed pain is strongly linked to the use of suitable and accurate pain tools, clear and research-based guidelines, as well as training (Cong et al., 2013).

Sujkatha et al. (2015) explored that the level was an increase in the nurses’ knowledge toward neonatal pain management.

Results from a landmark study implied that were several gaps in healthcare professional knowledge about assessing and treating pain in newborns, as well as the importance and value of recording and documenting this pain, so it is necessary to develop strategies for education and training of health professionals in order to minimize this knowledge deficit (Christoffel et al., 2016).

There were need for training about pain management in clinical setting for pediatric surgical nurses (Efe et al., 2013).

Several studies founded that there was a need for national guidelines in order to ensure the efficient pain treatment to all neonates. In addition, educational interventions for nurses are needed to improve pain assessment and management practices in the NICUs (Pölkki et al., 2018).

Evidence indicated that nurses often misjudge the need of pain alleviation management for neonates and they had limited use of pharmacologic measures and non-pharmacologic comfort measures in newborns care units, so study recommended the systematic approaches to

implement guidelines, such as adaptation of guidelines, dissemination of guideline content to all NCU staff (Jeong et al., 2014).

2.10. Previous Studies

First study: Akuma and Jordan (2012) performed a study "Pain management in neonates: a survey of nurses and doctors". This study aimed to describe doctors and nurses' knowledge and practices regarding newborns' pain procedural pain assessment and management strategies. The study was conducted in seven neonatal intensive care units in one area of the United Kingdom, sample were all nurses and doctors working in neonatal intensive care units. Few (between 21% and 37%) received neonatal pain education, and only about 25% used widely accepted devices to measure pain in newborns. 29(47 percent) doctors and 85(62 percent) nurses were able to access pain management recommendations; 20(18 percent) claimed that these have been audited; Respondents have a high level of expertise, mean score 82% (SD13·3%), They agreed that neonates feel pain and need analgesia, Statistically significant differences between current and optimal practice were acknowledged.

Second study: Mohamed et al. (2018) stated a study on the "Effect of educational program on pediatric nurses' knowledge and practice regarding selected nonpharmacological techniques to relieve pain in the neonate". The objective was to create and implement a training curriculum for pediatric nurses on various pain-relieving non-pharmacological strategies. The study utilized a pre/post-quasi-experimental research design. Minia University for Obstetrics and Pediatrics and General Hospitals conducted the research in their neonatal care facilities. It was decided to use a sample size of 41 nurses

for this investigation. The following data gathering technologies were used to conduct an educational program for nurses: (3) Educational and training program, (2) Observation checklists, and (1) pre-designed questionnaire sheet. It's clear that knowledge and practice scores rose significantly in the post- and follow-up program phases, with a statistically significant difference ($p < 0.001$).

Third study: Wari et al. (2021) conducted a study "Knowledge and Practice of Nurses and Associated Factors in Managing Neonatal Pain at Selected Public Hospitals in Addis Ababa, Ethiopia, 2020". The study's goal was to evaluate the knowledge and practice of newborn intensive care unit nurses in Ethiopia and the parameters associated with neonatal pain management in a selected public hospital. From April to May 2020, four public hospitals in the Ethiopian capital, Addis Ababa, were selected for the study. Using a semi-structured and self-administered questionnaire, a simple random sample procedure was employed to select study participants. Using a logistic regression model, odds ratios were calculated to see how strongly an outcome was linked to its predictor. A total of 119 neonatal intensive care unit nurses participated in this study, with a 96.6 percent response rate. According to the findings, 68.7% of nurses had acceptable knowledge and only 32.2% had good practice when it came to managing newborn pain.

Fourth study: Popowicz et al. (2021) performed a study "Knowledge and Practices in Neonatal Pain Management of Nurses Employed in Hospitals with Different Levels of Referral—Multicenter Study". The purpose of this study was to determine how well nurses understand and deal with neonatal pain. Nurses were asked to fill out an questionnaire to measure their knowledge towards pain management, as well as their actual practice.

Research indicated that nurses had sufficient understanding about pain managing in neonates but poor level of practice toward pain assessment for newborns.

Five study : Peng et al. (2021) conducted a study " Knowledge, Attitudes and Practices of Neonatal Professionals Regarding Pain Management ". The purpose of this study was to determine how well neonatal specialists understand and deal with neonatal pain. Study was conducted in two medical centers, and three general hospitals in four cities in Taiwan Neonatologists and nurses were asked to fill out an online questionnaire to measure their knowledge and attitudes towards pain management, as well as their actual practice. Research indicated that nurses had different levels of knowledge and attitudes about pain evaluation and management, with nurses showing less professional expertise and more negative attitudes. A lack of understanding and a negative attitude toward providing enough opioid analgesics for unwell infants during invasive operations and even dying neonates were also found in the research. Continuing education in newborn pain treatment is desperately needed in order to give neonatal professionals more leverage.

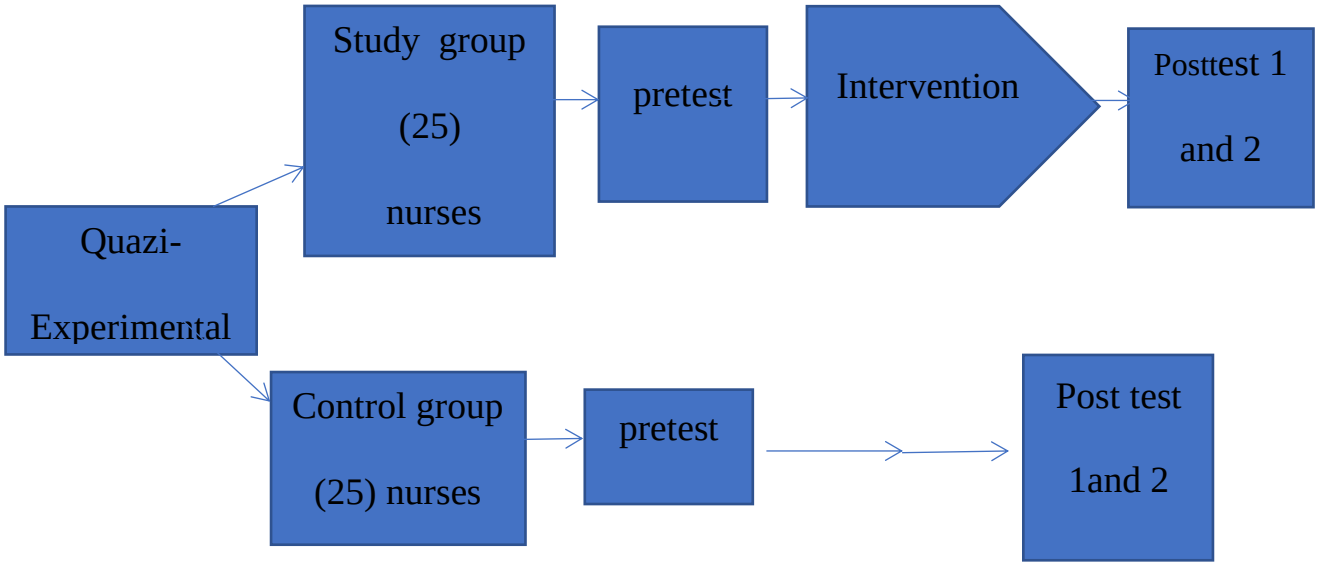
Chapter Three

Methodology

3.1. Design of Study

To achieve the aims of this study, For both the study and control groups, a quasi-experimental study design was used, with pre and post-tests applied. which conducted for the period from 15th of October 2021 to 12th of July 2022.

Fig 3-1: Steps of quasi-experimental study



3.2. Administrative Arrangements

The official permissions were obtained from relevant authorities before collecting the study data as follow:

1. Protocol of research and official permission taken from University of Kerbela / College of Nursing to conduct the study.
2. The title, constructed educational program and questionnaire were presented to the Ethics Committee formed within the College of

Nursing, which reviewed the study tools (program and questionnaire), and therefore agreed to conduct the study (Appendix B).

3. In the last step of the administrative arrangements, an official letter by the (Training Department and Development) Kerbala Health Directorate (Appendix A).
4. An official permission presented at Kerbala Teaching Hospital for Children (Appendix A).

3.3. Ethical Considerations

Ethical obligations are one of the most important things that the researcher must follow and abide it when doing the study.

This study were presented to the Ethics Committee formed within the College of Nursing who agreed it will not cause any harm to anyone.

The questionnaire was taken from Costa et al. (2017), Permission taken from the researcher (Appendix F).

Before the starting of gathering the data from the sample who are participating in the study, the researcher given a brief explanation about the scientific background of the research and what is the role of the nurses who agree to participate in this study, to give them a complete and clear picture about the study to be carried out. The researcher clarified the main purpose and desired goal of conducting this study for the sample to be including in the study, as well as adhere to the strict confidentiality of the data taken from the study sample and pledge to use it for scientific purposes related to the study only.

On the other hand, the researcher emphasized that all nurses who are participating in the study had the right to not complete their participation and withdraw from this study in the event that they felt uncomfortable or annoyed

with some of the items in the questionnaire that was prepared as a research tool or the researcher's method of collecting data or anything else.

3.4. Setting of the Study

The research was performed in Kerbala Teaching Hospital for Children It was affiliated to Al-Husseini Hospital, after which it became an independent hospital that receives all sick children, and from all Iraqi governorates, and displaced children. It contains an emergency ward and inpatient ward to treat children with many diseases, even some genetic diseases such as thalassemia and hemophilia. In addition to places to care for newborns.

The educational program was implemented in these hospital at Neonatal Care Units (NCUs). It contains 5 places deals with neonates (NICU, Neonatal emergency care unit, Phototherapy care unit, Neonatal care ward, Premature care unit). It also contains 87 nurses deals with the provide nursing care for patients who are neonates.

3.5. Sampling

A non-probability "convenience" sample had been consisted of (50) nurses was chosen to obtained represent data. The sample size was (50) nurses classified into two groups each group had (25) participant as experimental group and (25) nurses as control group both of them where working in NICU, Neonatal emergency care unit, Phototherapy care unit, Neonatal care ward, Premature care unit. Only the interventional group is subjected to the training courses deals nurses knowledge towards neonatal pain management, rather than control group.

3.6. Steps of the Study

The present study was conducted in the following steps:

3.6.1.Preliminary Assessment of Nurses' Knowledge about Neonatal Pain Management

The goal of this part of study was to assess the nurses' knowledge of neonatal pain management to find out the qualitative of information needed for nurses who participate in the program. The researcher used an closed-ended questionnaire format to complete this part of the study. A review of relevant literature and the authors' personal experiences with the knowledge questions were used to develop the format's content. A test was administered to a group of ten nurses working at neonatal care units as for an assessment of the nurses needs after that they were excluded from the study. Each nurse was specifying the time frame to answer the questions between (15-20) minutes. Most nurses were found to be lacking in knowledge, according to the results of the assessment about neonatal pain management (only 10% of participant had good knowledge) (Appendix c).

3.6.2. The development of an educational program

As a result of nurses' needs and information gleaned from previous studies and research, the educational program was designed. Review of the program by nursing experts from various specialties (Appendix E). Based on the advice of these experts, changes were made to the program form's content. They have agreed that the program was designed efficiently to improve nurses' knowledge of pain management (Appendix D).

3.7. Assignment for a group

3.7.1.Control Group:

Nurses Participants in the control group were not involved in the program lectures. The group was exposed only to the usual activities of

teaching and their information according to their practice and theoretical study.

3.7.2.Study Group:

This group had similar characteristics to the control group they had been given lectures on neonatal pain management.

The program consisted of four sessions and was implemented for 4 days period from 30th January to 2th February in 2022 at Continuing Education Hall. Each session deals with the following:

First Session: Introduction, Sunday 10:30 – 11:22 O'clock Am

Aimed to identify:- General characteristics of the newborns and introduction of neonatal pain

- Definition of newborns
- Hearing ability of a newborn baby.
- Seeing ability newborns.
- Newborns weight and height.
- Most of the health problems that a newborn suffers.
- Definition of neonatal pain
- Type of neonatal pain
- Process of neonatal pain
- Reactions of newborns to pain

Second Session: Neonatal pain assessment, Monday 10:30 – 11:22 O'clock Am

Aimed to identify:- How to assess the pain of a newborns

- The most important scales used to assess pain.
- NIPS scores

Third Session: Non-pharmacological treatment of neonatal pain, Tuesday 10:30 – 11:22 O'clock Am

Aimed to demonstrate:-Non-pharmacological pain relieve

- Non-nutritive feeding
- Kangaroo mother care
- Skin hold
- Oral sucrose
- Breastfeeding
- Music therapy
- Massage
- Swaddling
- Combination of care
- Environmental control

Fourth Session: Pharmacological treatment of neonatal pain, Wednesday 10:30 – 11:22 O'clock Am

Aimed to clarify:- Pharmacological pain relieve

- Topical analgesics.
- Local analgesia
- Non-opioid analgesics .
- Opioid analgesics.

3.8.Study Instrument

The questionnaire is one of the means to help collect data that contribute to achieving the results expected by the study, so the researcher designed this questionnaire, which aims to clarify the study's objectives and significance by obtaining answers to the study's questions.

The researcher used two tools to collect data from study participants as the following:

First one is the socio-demographic variables (age, gender, education level, years of experience and participation in training sessions).

Second one is the knowledge of the nurses, in present study the questionnaire of Costa et al. (2017) were modified to measures nurses' knowledge regarding pain management of newborns admitted to NCUs which are evaluated on 5-point such as (disagree, partially disagree, don't know, partially agree, agree) and include:

a) Nurses knowledge related to characteristics of neonatal pain:
Which composed of (11) items.

b) Nurses knowledge related to neonatal pain assessment: Which composed of (11) items .

c) Nurses knowledge related to neonatal pain management: Which composed of (13) items.

Researcher adhered to the rules of writing the questionnaire due to the importance of the type of information that the researcher is keen to be sufficient and comprehensive for all aspects of the ;problem and can be relied upon and trusted. To vague and complex answers. The type of questions was of the closed-ended type, which required answering with reference to what was appropriate.

3.9. Questionnaire Validity

In order to ensure the validity of the questionnaire, one must make sure that it includes all of the elements that are necessary for the analysis, as well as the clearness of its sentences and terminology, so that it can be understood by anyone who uses it.

The validity of the questionnaire was tested by presenting the instrument to (11) specialists (Appendix E), (4) of them were working in nursing collage at Kerbela university, (3) were working in nursing collage at Babylon university in different fields, (1) was working in nursing collage at Al- kut collage and remaining (3) were pediatric pediatricians working in

Kerbela hospitals one in Kerbala Teaching Hospital for Children and remaining two was in Al-Hendia hospital. to make it more valid, interviewees were asked for their opinions and suggestions on each of the study questionnaire items in terms of its textual appropriateness, organization with the dimension of variables it was assigned to and suitability for the context of the study population.

The experts responses indicated that minor changes should be done to some items and it's were made according to their suggestions, then the final draft was completed to be ready for conducting the study.

Most of expert agreed to make scale classified into nurses knowledge related to characteristics of neonatal pain, nurses knowledge related to neonatal pain assessment and nurses knowledge related to neonatal pain management rather than of being general and not classified, and most of expert suggested that questions to assess nurses' knowledge about non-pharmacological pain management to be more specified by adding some another questions, These questions including the items of (Kangaroo mother care is effective method for newborns pain relief, Oral sucrose can't relief newborns pain, Swaddling is one of the Non- pharmacological measures to relief newborns pain, Massage don't relief newborns pain)

3.10. Pilot Study

This preliminarily study was conducted to determine the stability and credibility of the study tool, clarity and its efficiency which confirmed, and standard time required to collect data for each subject which can estimated during the interview procedures and to difficulties identification that may encounter.

The pilot study aimed to achieve the following objectives.

1. Developing and testing adequacy of research instruments.

2. Assessing the feasibility of instrument.
3. Recognizing logistical issues that may arise as a result of the proposed methodology.
4. Examining the proposed data analysis methods to identify possible problems.
5. Estimate range of time during collected data by the researcher.

Results of pilot study

1. The questionnaire is reliable.
2. The time required for answering the questionnaire ranged from (15-20) minutes.
3. The instrument items were clarify and understood the phenomenon knowledge of nurses about pain management for neonatal population.

Before the questionnaire reached its final form, it went through the following stages:

1. Determining the data that will be collected through the questionnaire according to the study questions.
2. Determining the method and format of the questionnaire.
3. Determining the type of criterion that determines the type of answer in the questionnaire.
4. Presenting the questionnaire to the supervising to express his opinion and observations in developing the questionnaire and modifying it based on his observations.
5. Presenting the questionnaire to a number of panel of experts to express their opinion and observations in developing the questionnaire and modifying it based on what they submitted.

6. Conducting a reliability test on it by distributing the questionnaire to a sample of 5 nurses.
7. Writing the questionnaire in its final form, then printing, reviewing and distributing it in a same formula before and after education program.

3.11. Reliability of the Questionnaire:

The reliability of the study instruments implies ensuring that the answer will be almost the same if it is repeatedly given to all the same persons at different periods. This can be done by comparing the results of previous applications.

After confirming the apparent validity of the study tool, the researcher applied it to a random exploratory sample of 5 nurses selected for pilot study than excluded from the study, by using the test-retest method, where each nurses from the sample was given a number from 1 to 5 and the questionnaire was distributed to them without prior known of them that they are a sample to measure the stability of the tool, and after an interval of about one week, 5 questionnaires were redistributed to the same exploratory sample, where the members of this sample were later excluded from the original sample on which the final study was conducted. Reliability coefficient using the sample coefficient of Alpha Cronbach as shown below.

Table 3-1:Reliability of the Studied Questionnaire

Reliability Cronbach's Alpha		
Knowledge	Test	Re-test
	0.82	0.89

3.12. Measurements at Pre-test, post-test 1 and a 1-Month Follow up After the Educational Program (post-test)

In order to evaluate the nurses' prior knowledge prior to the start of the recently designed program, a pre-test was developed and administered to the sample. A list of (35 items for knowledge towards neonatal pain management) were used to assess knowledge. A post–test consisting of the exact questions was administrated two weeks after the educational program was applied. Than post-test two follow up test after one month of second test.

3.13.Methods of Data Collection

Self–reported questionnaire was used. The implementation was carried out in Kerbala Teaching Hospital for Children throughout the period from 15th of October 2021 to 16th of April 2022.

The implementation of the program which was introduced to groups included the following:

3.13.1.In the study and control groups, each nurses filled out a demographic data form.

3.13.2.A pre-test was given to all of the nurses in the study to assess their knowledge, the pre-test lasted (15-20) minutes.

3.13.3.Study group were summoned to the classroom sessions in the Continuing Education Hall to take part in an educational program.

3.13.4.There were (35) questions on the nurses knowledge test. Both the study and control groups were given various alternatives. The examination was designed to evaluate the nurses knowledge on neonatal pain management.

3.13.5.Each group will take 60-90 minutes to complete.

3.13.6.The control group had the same procedures as the experimental group, with the exception of the educational program.

3.13.7.These sessions included the following teaching materials:
(classroom, lectures, computer, data show, book late demonstrate, note book).

Table 3-2: Steps for of this study

Step	Number of participated nurses	Period
Assessment of need	10	15 th October 2021-20 th October 2021
Pilot study	5	10 th November 2021 – 20 th November 2021
per-test exam	50	21 th December 2021 -21 th January 2022
Implementation of the program lecture	25 study group only	30 January 2022 - 2 February 2022

post- test 1 exam	25 study group and 25 control group each group was separated from other	16 th February 2022 - 30 th February 2022
post- test 2 exam	25 study group and 25 control group each group was separated from other	1st April 2022 – 16 th April 2022

3.14. Rating Scores

In order to statistically analyze the score rating includes the following:

Disagree × 0

Partially disagree × 1

Don't know × 2

Partially agree × 3

Agree × 4

There are some of items have wrong statement so rating of it was as the following:

Disagree × 4

Partially disagree × 3

Don't know × 2

Partially agree × 1

Agree × 0

The overall responses according to total mean of score for knowledge related to neonatal pain management which follow:

Scores = 0-46 refer to Poor Knowledge

Scores = 47-93 refer to Fair Knowledge

Scores = 94-140 refer to Good Knowledge

3.15. Statistical Analysis Approach

In order to statistically analyze the data collected from the study sample to arrive at the results, the researcher used the SPSS version (22) and Microsoft Excel (2010) program to analyze this data and deal with it statistically, to obtain the final results of the research based on a set of statistical tests.

3.15.1. Descriptive approach

Descriptive statistics includes a set of mathematical and statistical methods that are adopted to describe the main features of a data quantitatively by using tables and charts. Descriptive statistics always aim to present and describe the data which is required to be processed, organized, summarized and categorized, as well as presenting them in a simple and clear manner that makes it easier for the recipient to recognize and understand its content. The analysis performed through use:

A. Statistical tables "Frequencies and percent" which are:

$$\% = \frac{\boldsymbol{Frequency}}{\boldsymbol{Sample\ Size}}\ x100$$

B. Statistical Mean "*M*".

The average score can be calculated by using the following:

$$M.S = \frac{\sum \mathrm{ri} = 1\mathrm{Fi}\ \mathrm{x}\ \mathrm{Si}}{\sum \mathrm{ri} = \ 1\mathrm{Fi}}\ x100$$

C. Standard Deviation (SD).

$$SD = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(Xi - \bar{\chi})^2}$$

D. It used a correlational coefficient "Cronbach alpha" used in estimating the internal consistency of the study tool, which can be calculated by using the following:

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\sum_{i=1}^{K}\sigma_{ii}}{\sum_{i=1}^{K}\sum_{j=1}^{K}\sigma_{ij}}\right]$$

K represents the total number of items being questioned, and _ij represents the investigate variance in between item being questioned. Take note that the ii denotes the variance of item I, not the standard deviation.

3.15.2. Inferential approach

1. t-test

A. Paired Sample t-test

To assess the significance difference between pre-test and post-test in one group, such as pre-post test for study group and pre-post test for control group.

B. Independent Sample t-test

To assess the significance difference between two groups of measurement, such as pre-test of study group and pre-test of control group; post-test of study group and post-test of control group

Independent sample t- test used to made comparison with two independent groups in order to assess if there were statistically significant difference between them.

$$\frac{\bar{x}_1 - \bar{x}_2}{Sp\sqrt{n_1 - 1)s_{21} + (n_2 - 1)s_2/n_1 + n_2 - 2}}$$

2. Variance analysis

Analysis of variance (ANOVA) testing for similarity when the mean's variable were different to determine whether or not the means are identical.

Table(3-2) analysis of variance

Source of variance	Sum of squares	Degree of freedom	Mean of square	F-statistics
Between groups	$SSB=\sum \frac{(\sum X)^2}{n} - \frac{(\sum X)^2}{n}$	DFB=1	SSB / DFB	MSB / MSW
Within groups	$SSW=(\sum X)^2 - \frac{(\sum X)^2}{n}$	DF=N-K	SSW / DFW	
Total	$SST=(\sum X)^2 - \frac{(\sum X)^2}{n}$	DFT=N-1		

P-value (≤0.05)

Chapter Four

Chapter Four

The finding of data analysis systematically in figures and tables, which are corresponded with the objectives of the study as follows:

Table 4-1:Study-Control Groups Socio-Demographic Variables (SDVs)

Table4-1-1:Age Group of the Study Sample

	Classification	Study		Control		*p-value*
		Freq.	%	Freq.	%	
Age /years	20-29years old	18	72.0	17	68.0	*0.618*
	30-39years old	3	12.0	3	12.0	
	40-49years old	4	16.0	4	16.0	
	50 and older	0	0.0	1	4.0	
	Total	25	100.0	25	100.0	
	Mean± SD	*27.44 ± 7.492*		*30.08 ± 8.592*		

The age of the participants is shown in the results; the average age of the nurses in the study group is 27, and the age group 20-29 years has the highest proportion of nurses (n = 18; 72 percent). While the control group's average age was 30 years, the age group 20-29 years had the highest percentage of nurses in the control group (n = 17; 68 percent). In both groups, there are no statistically significant differences in nurse age groups (p = 0.618).

Table4-1-2:Gender of Study Sample

	Classification	Study		Control		*p-value*
		Freq.	%	Freq.	%	
Gender	Male	2	8.0	4	16.0	*0.394*
	Female	23	92.0	21	84.0	
	Total	25	100.0	25	100.0	

In terms of gender, female nurses outnumbered male nurses in both the study and control groups (n=23; 92%) and (n=21; 84%), respectively. Both groups of nurses had significant gender disparities (p=0.394).

Table4-1-3:Education Level of Study Sample

	Classification	Study		Control		*p-value*
		Freq.	%	Freq.	%	
Education Level	School Nursing	21	84.0	20	80.0	*0.738*
	Diploma in Nursing	3	12.0	4	16.0	
	Bachelor in Nursing	1	4.0	1	4.0	
	Total	25	100.0	25	100.0	

In terms of education, the study participants in both the study and control groups (n=21; 84 percent) expressed a school nursing (n=20; 80 percent) respectively. In both groups, there were no significant differences in nurse education levels (p=0.738).

Table4-1-4:Experience in Years of Study Sample

	Classification	Study		Control		*p-value*
		Freq.	%	Freq.	%	
Years of Experience	<5years	17	68.0	14	56.0	*0.705*
	5-10years	2	8.0	10	40.0	
	>10years	6	24.0	1	4.0	
	Total	25	100.0	25	100.0	

Years of relevant experience both the research and control groups had nurses with fewer than five years of experience (n=17; 68%) and (n =14; 56%), respectively. The years of experience of the nurses in both groups were not significantly different (p=0.705).

Table4-1-5:Training Courses of Study Sample

	Classification	Study		Control		*p-value*
		Freq.	%	Freq.	%	
Training Courses	No	19	76.0	18	72.0	*0.753*
	Yes	6	24.0	7	28.0	
	Total	25	100.0	25	100.0	

In terms of training courses, neither the study nor the control groups had any participants (n=19; 76 percent) or (n=18; 72 percent), respectively. In both groups, there were no significant differences in nursing training (p=0.753).

Table 4-2:Nurses' Knowledge about Neonatal Pain Management (*Study and Control Groups*)

Table 4-2-1:Nurses Responses at Pre-post-test I Regarding to Knowledge about Neonatal Pain Management (*Study Group*)

Study group knowledge		Pre-test		Post-test I		*p-value*
		M ± SD	*Ass.*	*M ± SD*	*Ass.*	
1	Newborns feel pain	3.16±0.986	Pass	3.52±0.962	Pass	*.232*
2	Pain can affect newborn's vital signs	0.92±1.151	Fail	2.32±0.748	Fair	*.000*
3	Pain can't affect newborn's oxygen saturation	1.24±1.362	Fail	1.48±1.004	Fair	*.434*
4	Pain can affect newborn's facial expressions,	1.56±1.416	Fair	1.04±1.457	Fail	*.119*
5	Pain can't affect newborn's limb movements	1.32±1.314	Fail	2.24±0.522	Fair	*.001*
6	Pain can affect newborn's crying	1.16±1.312	Fail	2.92±0.571	Pass	*.000*
7	Light and noise can't affect newborn's reactions to pain	1.04±1.240	Fail	2.08±1.411	Fair	*.903*
8	Newborn pain is not recognized by nurses.	1.24±1.392	Fail	2.60±0.912	Fair	*.265*
9	newborns don't react to pain in a particular way	1.24±1.392	Fail	1.82±1.394	Fair	*.760*
10	Pain isn't considered as one of the Vital signs in newborns	1.28±1.369	Fail	2.72±0.737	Pass	*.000*
11	Newborns who are subjected to unpleasant	1.20±1.258	Fail	2.88±0.600	Pass	*.000*

	procedures on a regular basis may experience developmental problems					
12	The nursing prescription should include a pain assessment.	1.04±1.306	Fail	1.84±1.280	Fair	*.486*
13	Systematized pain evaluation in infants is required.	1.16±1.280	Fail	3.04±1.428	Pass	*.000*
14	Without the use of scales, neonatal pain can be measured.	1.08±1.187	Fail	3.2±1.224	Pass	*.000*
15	The use of scales to assess pain is critical in the practice.	1.40±1.384	Fair	3.04±1.619	Pass	*.001*
16	It's critical to keep track of pain on the newborn's chart.	0.64±1.150	Fail	2.56±1.894	Fair	*.001*
17	Pain assessment must be documented before it may be controlled.	1.12±1.332	Fail	2.64±1.823	Fair	*.009*
18	Nurses are well-versed in assessing pain in neonates.	1.12±1.201	Fail	3.08±1.288	Pass	*.000*
19	Pain management in newborns doesn't depend on its assessment	0.84±1.067	Fail	3.36±1.036	Pass	*.000*
20	Recording newborn’s pain assessment will not result in relief	1.08±1.151	Fail	3.32±1.029	Pass	*.000*
21	Comfort scale depends on newborns oxygen saturation	1.16±1.312	Fail	3.08±1.497	Pass	*.000*
22	Comfort scale doesn't assess newborns postoperative pain	0.92±1.255	Fail	3.32±1.107	Pass	*.000*
23	Having knowledge of Non pharmacological measures for pain relief helps its relief	1.04±1.368	Fail	2.92±1.656	pass	*.000*
24	Using Non pharmacological measures for pain relief is necessary	1.24±1.300	Fail	3.36±0.994	Pass	*.000*
25	Parents cannot help pain management in newborn	0.88±1.301	Fail	3.32±1.107	Pass	*.000*
26	The medical/clinical diagnosis of newborns not influences pain management	0.88±1.235	Fail	3.08±1.441	Pass	*.000*
27	Nurses joint decisions are needed for pain management in newborns	1.16±1.312	Fail	3.04±1.457	Pass	*.000*

28	Kangaroo mother care is effective method for newborns pain relief	1.04±1.171	Fail	3.12±1.394	Pass	*.000*
29	Oral sucrose can't relief newborns pain	0.92±1.222	Fail	3.36±1.036	Pass	*.000*
30	Swaddling is one of the Non- pharmacological measures to relief newborns pain.	0.92±1.320	Fail	3.36±1.220	Pass	*.000*
31	Massage don't relief newborns pain	0.68±1.281	Fail	3.2±1.354	Pass	*.000*
32	Sedatives relieve pain in newborns	0.6±1.1902	Fail	3.28±1.242	Pass	*.000*
33	Opioid analgesics are appropriate to relieve pain in newborns	0.56±1.00	Fail	3.36±1.186	Pass	*.000*
34	Opioid analgesics are not suitable for newborns undergoing mechanical ventilation	0.76±1.200	Fail	3.32±1.249	Pass	*.000*
35	Non-Opioid analgesics are suitable for pain relief in newborns	0.72±1.137	Fail	3.24±1.267	Pass	*.000*

Level of Assessment (Fail= 0 – 1.33, Fair= 1.34 – 2.66, Pass= 2.67 – 4)

The results showed that the study sample responses to the pre-post tests were assessed in terms of knowledge about newborn pain treatment. The results show that the nurses failed all of the investigated items (M <1.34) at the pre-test for the study group, with the exception of item (1), where the replies were pass and items (4) and (15) were fair. While nurses gave pass responses to most of analysed items (M > 2.66) after completing the education program. Between the pre-test and post-test, there were extremely significant differences in knowledge scores (p 0.05).

Table 4-2-2. Overall Nurses' Knowledge of Neonatal Pain Management in the Study Group

Weighted	*Pre-test*			*Post-test-I*		
	Freq.	%	*M± SD*	Freq.	%	*M± SD*
Poor (*M=0-46*)	16	64.0	*38.32* ± *32.055*	2	8.0	*96.36* ± *22.965*
Fair (*M=47-93*)	8	32.0		5	20.0	
Good (*M=94-140*)	1	4.0		18	72.0	
Total	25	100.0		25	100.0	

Findings illustrated that the (64%) of nurses expressed a poor level of knowledge at the pre-test period of measurement (*M ± SD=38.32 ± 32.055*) with regard neonatal pain management. While, after application of education program, findings demonstrated that the (72%) of nurses expressed a good level of knowledge at the post-test period of measurement (*M ± SD=96.36 ± 22.965*).

Table 4-2-3:Differences in general responses to the research group's knowledge between the pre-test and post-test

Study Group Knowledge	Weighted	Mean	SD	t-	df	p-value
	Pre-test	1.09	0.915	7.721	24	*0.000*
	Post-test I	2.75	0.656			

The study's findings revealed that there was a statistically differences in knowledge scores between pre and post-test measurements (p = 0.000). When compared to the statistical mean, the study results show that nurses' knowledge of neonatal pain management has improved at the post-test (M SD= 2.75±0.656) compared to pre-test scores (M SD=1.09±0.915).

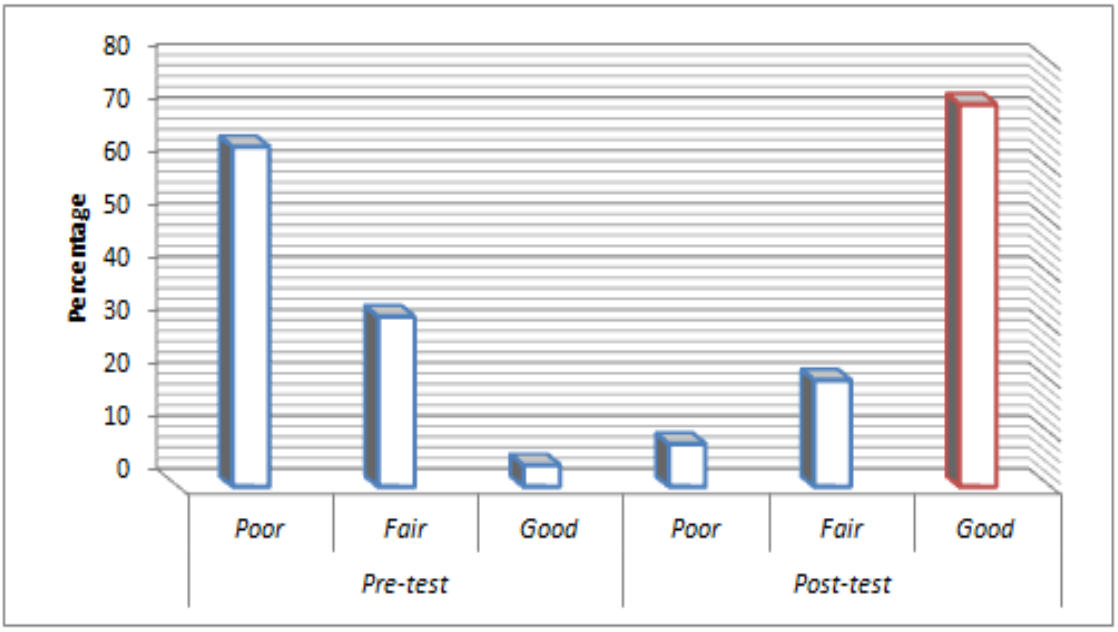


Figure 4-1: Comparison of Overall Responses for Study Groups

Table 4-2-4: Nurses Responses at Post-tests I and II tests Regarding to Knowledge about Neonatal Pain Management (*Study Group*)

Study group knowledge		Post-test I		Post-test II		*p-value*
		M ± SD	*Ass.*	*M ± SD*	*Ass.*	
1	Newborns feel pain	3.52±0.962	Pass	3.36±1.075	Pass	*.303*
2	Pain can affect newborn's vital signs	2.32±0.748	Fair	2.22±0.791	Fair	*.327*
3	Pain can't affect newborn's oxygen saturation	1.48±1.004	Fair	1.46±1.122	Fair	*.124*
4	Pain can affect newborn's facial expressions,	1.04±1.457	Fail	1.02±1.508	Fail	*.527*
5	Pain can't affect newborn's limb movements	2.24±0.522	Fair	2.20±0.816	Fair	*.727*
6	Pain can affect newborn's crying	2.92±0.571	Pass	2.88±0.725	Pass	*.527*
7	Light and noise can't affect newborn's reactions to pain	2.08±1.411	Fair	2.01±1.518	Fair	*.538*
8	Newborn pain is not recognized by nurses.	2.60±0.912	Fair	2.42±1.021	Fair	*.285*
9	newborns don't react to pain in a particular way	1.82±1.394	Fair	1.12±1.394	Fail	*.311*
10	Pain isn't considered as one of the Vital signs in newborns	2.72±0.737	pass	2.68±0.852	Pass	*.112*
11	Newborns who are subjected to unpleasant	2.88±0.600	pass	2.84±0.746	Pass	*.213*

	procedures on a regular basis may experience developmental problems					
12	The nursing prescription should include a pain assessment.	1.84±1.280	Fair	1.96±1.398	Fair	*.351*
13	Systematized pain evaluation in infants is required.	3.04±1.428	Pass	2.88±1.508	Pass	*.724*
14	Without the use of scales, neonatal pain can be measured.	3.2±1.224	Pass	3.12±1.301	Pass	*.137*
15	The use of scales to assess pain is critical in the practice.	3.04±1.619	Pass	2.84±1.700	Pass	*.427*
16	It's critical to keep track of pain on the newborn's chart.	2.56±1.894	Fair	2.60±1.848	Fair	*.827*
17	Pain assessment must be documented before it may be controlled.	2.64±1.823	Fair	2.60±1.755	Fair	*.127*
18	Nurses are well-versed in assessing pain in neonates.	3.08±1.288	Pass	3.1±1.322	Pass	*.927*
19	Pain management in newborns doesn't depend on its assessment	3.36±1.036	Pass	3.28±1.100	Pass	*.457*
20	Recording newborn’s pain assessment will not result in relief	3.32±1.029	Pass	3.20±1.118	Pass	*.107*
21	Comfort scale depends on newborns oxygen saturation	3.08±1.497	Pass	3.04±1.540	Pass	*.307*
22	Comfort scale doesn't assess newborns postoperative pain	3.32±1.107	Pass	3.24±1.200	Pass	*.321*
23	Having knowledge of Non pharmacological measures for pain relief helps its relief	2.92±1.656	pass	2.92±1.579	Pass	*.386*
24	Using Non pharmacological measures for pain relief is necessary	3.36±0.994	Pass	3.28±1.100	Pass	*.306*
25	Parents cannot help pain management in newborn	3.32±1.107	Pass	3.12±1.268	Pass	*.313*
26	The medical/clinical diagnosis of newborns not influences pain management	3.08±1.441	Pass	2.96±1.485	Pass	*.322*
27	Nurses joint decisions are needed for pain management in newborns	3.04±1.457	Pass	2.84±1.545	Pass	*.317*

28	Kangaroo mother care is effective method for newborns pain relief	3.12±1.394	Pass	3.04±1.457	Pass	*.221*
29	Oral sucrose can't relief newborns pain	3.36±1.036	Pass	3.20±1.190	Pass	*.524*
30	Swaddling is one of the Non- pharmacological measures to relief newborns pain.	3.36±1.220	Pass	3.24±1.331	Pass	*.728*
31	Massage don't relief newborns pain	3.2±1.354	Pass	3.24±1.300	Pass	*.321*
32	Sedatives relieve pain in newborns	3.28±1.242	Pass	3.28±1.242	Pass	*.327*
33	Opioid analgesics are appropriate to relieve pain in newborns	3.36±1.186	Pass	3.28±1.275	Pass	*.337*
34	Opioid analgesics are not suitable for newborns undergoing mechanical ventilation	3.32±1.249	Pass	3.24±1.331	Pass	*.127*
35	Non-Opioid analgesics are suitable for pain relief in newborns	3.24±1.267	Pass	3.16±1.344	Pass	*.197*

Level of Assessment (Fail= 0 – 1.33, Fair= 1.34 – 2.66, Pass= 2.67 – 4)

The findings showed that the study sample responses to the post-tests one and two with relation to knowledge of newborn pain management were assessed at the post-tests one and two after one month. The results show that the nurses in the study group passed most of the items on the post-test (M >2.66). The nurses also reported the same views after a month. Between post-test one and post-test two, there were no significant differences in knowledge scores (p >0.05).

Table 4-2-5. Overall Nurses' Knowledge of Neonatal Pain Management in the Study Group overall levels

Weighted	*Post-test-I*			*Post-test-II*		
	Freq.	%	*M± SD*	Freq.	%	*M± SD*
Poor (*M=0-46*)	2	8.0	*96.36 ± 22.965*	3	12.0	*94.4±26.976*
Fair (*M=47-93*)	5	20.0		4	16.0	
Good (*M=94-140*)	18	72.0		18	72.0	
Total	25	100.0		25	100.0	

Findings illustrated that the (72%) of nurses expressed a good level of knowledge at the post-test period of measurement after implementation of education program (*M ± SD=96.36 ± 22.965*) with regard neonatal pain management. While, after a month, findings demonstrated that the (72%) of nurses expressed a good level of knowledge at the post-test period of measurement (*M ± SD=94.4±26.976*).

Table 4-2-6: By their overall replies to the study group's knowledge results: A differences in replies between post-I & II

Study Group Knowledge	Weighted	Mean	SD	t-	Df	p-value
	Post-test-I	2.75	0.656	0.864	24	*0.396*
	Post-test-II	2.69	0.770			

In terms of the statistical mean, the results revealed that there is no statistically-difference in knowledge scores between two periods of measurements (the first post-test and the second post-test) (p = 0.396). The study's findings suggest that the neonatal pain management education program is still effective after has been passed.

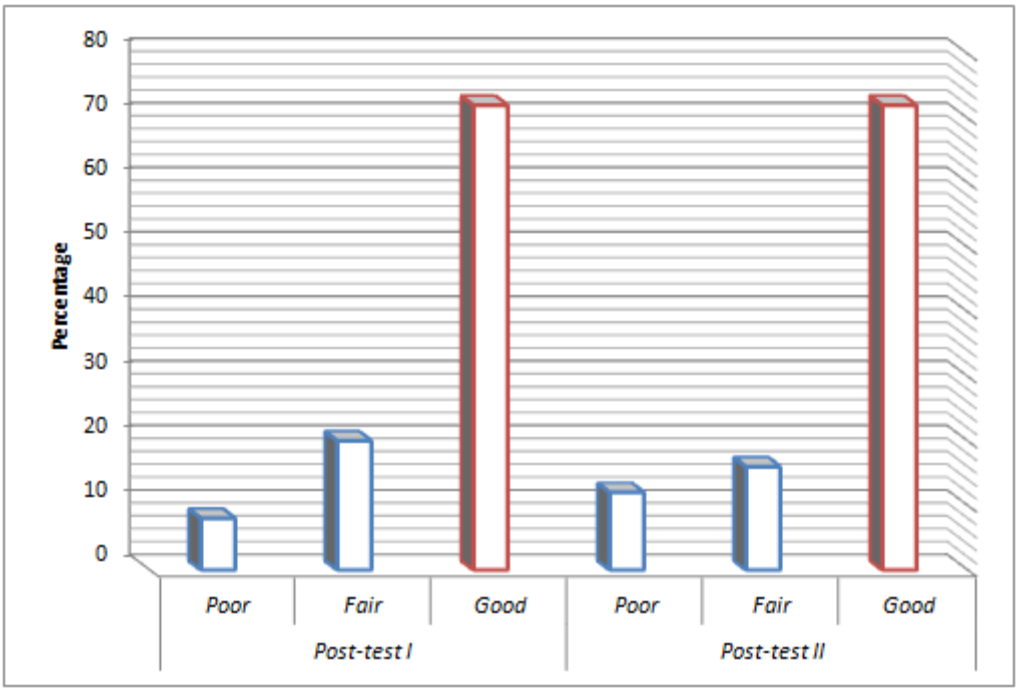


Figure 4-2: Comparison of the study group's general answers at two levels of measurement (the first post-test and the second post-test)

Table 4-2-7: Nurses Responses at Pre-post-tests Regarding to Knowledge about Neonatal Pain Management (*Control Group*)

Control group knowledge		Pre-test		Post-test		*p-value*
		M ± SD	*Ass.*	*M ± SD*	*Ass.*	
1	Newborns feel pain	3.32±1.029	Pass	3.48±0.770	Pass	*.103*
2	Pain can affect newborn's vital signs	1.12±1.268	Fail	1.24±1.300	Fail	*.327*
3	Pain can't affect newborn's oxygen saturation	1.40±1.354	Fair	2.08±1.351	Fair	*.024*
4	Pain can affect newborn's facial expressions,	1.64±1.380	Fair	1.64±1.380	Fair	*.327*
5	Pain can't affect newborn's limb movements	1.40±1.290	Fair	1.42±1.290	Fair	*.327*
6	Pain can affect newborn's crying	1.24±1.300	Fail	1.36±1.319	Fair	*.327*
7	Light and noise can't affect newborn's reactions to pain	1.16±1.280	Fail	1.28±1.307	Fail	*.538*

8	Newborn pain is not recognized by nurses.	1.36±1.410	Fair	1.48±1.417	Fair	*.185*
9	newborns don't react to pain in a particular way	1.36±1.410	Fair	1.44±1.386	Fair	*.321*
10	Pain isn't considered as one of the Vital signs in newborns	1.40±1.384	Fair	2.52±1.005	Fair	*.322*
11	Newborns who are subjected to unpleasant procedures on a regular basis may experience developmental problems	1.28±1.307	Fail	1.28±1.307	Fail	*.333*
12	The nursing prescription should include a pain assessment.	1.12±1.301	Fail	1.16±1.344	Fail	*.321*
13	Systematized pain evaluation in infants is required.	1.20±1.354	Fail	1.32±1.375	Fail	*.324*
14	Without the use of scales, neonatal pain can be measured.	1.12±1. 166	Fail	1.24±1.200	Fail	*.337*
15	The use of scales to assess pain is critical in the practice.	1.44±1.356	Fair	1.56±1.356	Fail	*.327*
16	It's critical to keep track of pain on the newborn's chart.	0.68±1.144	Fail	0.76±1.234	Fail	*.327*
17	Pain assessment must be documented before it may be controlled.	1.20±1.322	Fail	1.29±1.322	Fail	*.327*
18	Nurses are well-versed in assessing pain in neonates.	1.20±1.190	Fail	1.31±1.190	Fail	*.327*
19	Pain management in newborns doesn't depend on its assessment	0.92±1.077	Fail	1.08±1.222	Fail	*.327*
20	Recording newborn’s pain assessment will not result in relief	1.16±1.143	Fail	1.16±1.143	Fail	*.227*
21	Comfort scale depends on newborns oxygen saturation	1.24±1.300	Fail	1.28±1.369	Fail	*.317*
22	Comfort scale doesn't assess newborns postoperative pain	1.00±1.258	Fail	1.16±1.374	Fail	*.311*
23	Having knowledge of Non	1.12±1.363	Fail	1.24±1.392	Fail	*.326*

	pharmacological measures for pain relief helps its relief					
24	Using Non pharmacological measures for pain relief is necessary	1.32±1.281	Fail	1.32±1.281	Fail	*.326*
25	Parents cannot help pain management in newborn	0.88±1.301	Fail	0.92±1.290	Fail	*.323*
26	The medical/clinical diagnosis of newborns not influences pain management	0.96±1.240	Fail	1.08±1.288	Fail	*.322*
27	Nurses joint decisions are needed for pain management in newborns	1.24±1.300	Fail	1.36±1.319	Fair	*.327*
28	Kangaroo mother care is effective method for newborns pain relief	1.12±1.166	Fail	1.12±1.166	Fail	*.321*
29	Oral sucrose can't relief newborns pain	1.00±1.224	Fail	1.08±1.222	Fail	*.324*
30	Swaddling is one of the Non-pharmacological measures to relief newborns pain.	0.96±1.337	Fail	1.08±1.382	Fail	*.328*
31	Massage don't relief newborns pain	0.76±1.300	Fail	0.88±1.363	Fail	*.321*
32	Sedatives relieve pain in newborns	0.64±1.186	Fail	0.76±1.267	Fail	*.327*
33	Opioid analgesics are appropriate to relieve pain in newborns	0.64±1.036	Fail	0.69±1.039	Fail	*.337*
34	Opioid analgesics are not suitable for newborns undergoing mechanical ventilation	0.76±1.200	Fail	0.80±1.190	Fail	*.327*
35	Non-Opioid analgesics are suitable for pain relief in newborns	0.80±1.154	Fail	0.92±1.222	Fail	*.127*

Level of Assessment (Fail= 0 – 1.33, Fair= 1.34 – 2.66, Pass= 2.67 – 4)

The results showed that the study sample responses to the pre-post tests were assessed in terms of knowledge about newborn pain management. The results show that the nurses in the control group failed most of the pre-test items. In addition, nurses gave fail replies in the post-test for most of the

items studied. Between the pre-test and post-test, there were no significant differences in knowledge scores (p> 0.05).

Table 4-2-8.Control Group Nurses' Knowledge about Neonatal Pain Management

Weighted	*Pre-test*			*Post-test*		
	Freq.	%	*M± SD*	Freq.	%	*M± SD*
Poor(*M=0-46*)	16	64.0	*41.16 ± 30.357*	15	60.0	*44.48 ± 32.106*
Fair (*M=47-93*)	8	32.0		8	32.0	
Good (*M=94-140*)	1	4.0		2	8.0	
Total	25	100.0		25	100.0	

Findings illustrated that the (64%) of nurses expressed a poor level of knowledge at the pre-test period of measurement (*M ± SD=41.16 ± 30.357*) with regard to neonatal pain management. Also, findings demonstrated that the (60%) of nurses expressed a poor level of knowledge at the post-test period of measurement (*M ± SD=44.48 ± 32.106*).

Table 4-2-9: Difference between overall responses to the knowledge scores in two tests

Control Group Knowledge	Weighted	Mean	SD	t-	Df	p-value
	Pre-test	1.17	0.867	1.284	24	*0.212*
	Post-test	1.27	0.917			

The results showed that there were no statistically differences in knowledge scores between the two measurement periods (pre and post-test) (p = 0.212) and that there was no improvement in the nurses' knowledge of neonatal pain management in the post-test (M SD = 1.27±0.917) compared to the scores for the previous test (M SD = 1.17±0.867) in terms of the statistical mean.

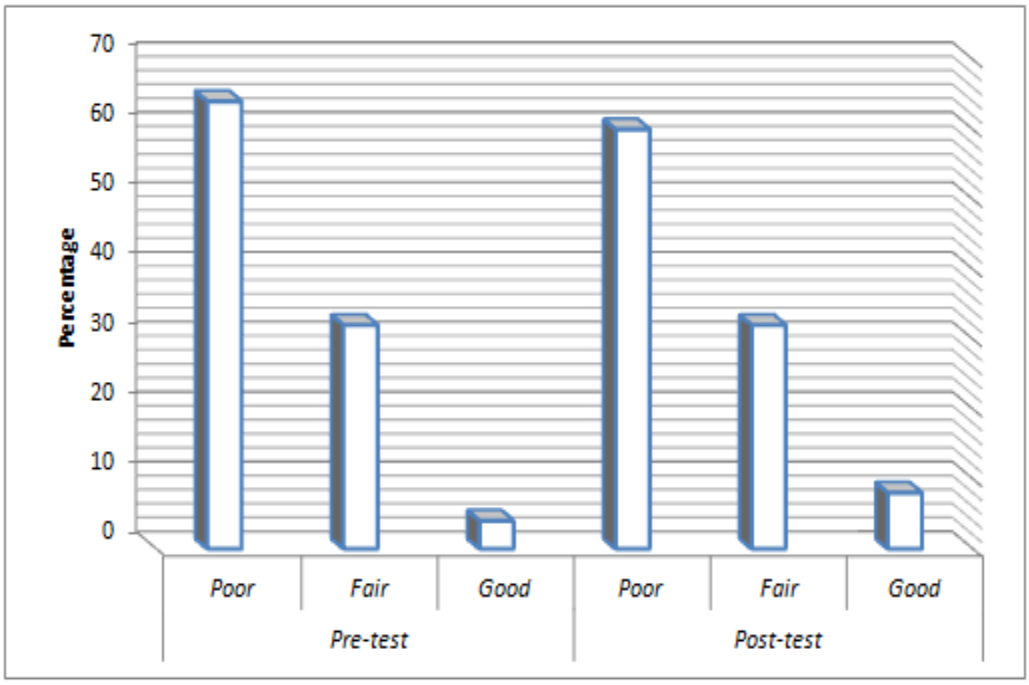


Figure 4-3: For the control group, a comparison of general responses at two levels of measurement was made

Table 4-2-10: Knowledge relating to Neonatal Pain Management was tested using an independent sample t-test between the Study and Control Group replies during the pre-post exam

Pre-test Knowledge	Weighted	Mean	SD	t-	Df	p-value
	Study	1.09	0.915	0.322	48	*0.749*
	Control	1.17	0.867			
Post-test Knowledge	Study	2.75	0.656	6.571	48	*0.000*
	Control	1.27	0.917			

During the pre-measurement test period (p = 0.749), there was no difference between study groups (MSD = 1.09±0.915) and control groups

(MS SD = 1.17±0.867). In the post-measurement period (p = 0.000), Between the study groups, there is a statistically-difference (MSD = 2.75±0.656) and the control group (MS SD = 1.27±0.917). In terms of the statistical mean, the study results show that after the program was implemented, the study group's replies improved when compared to the control group.

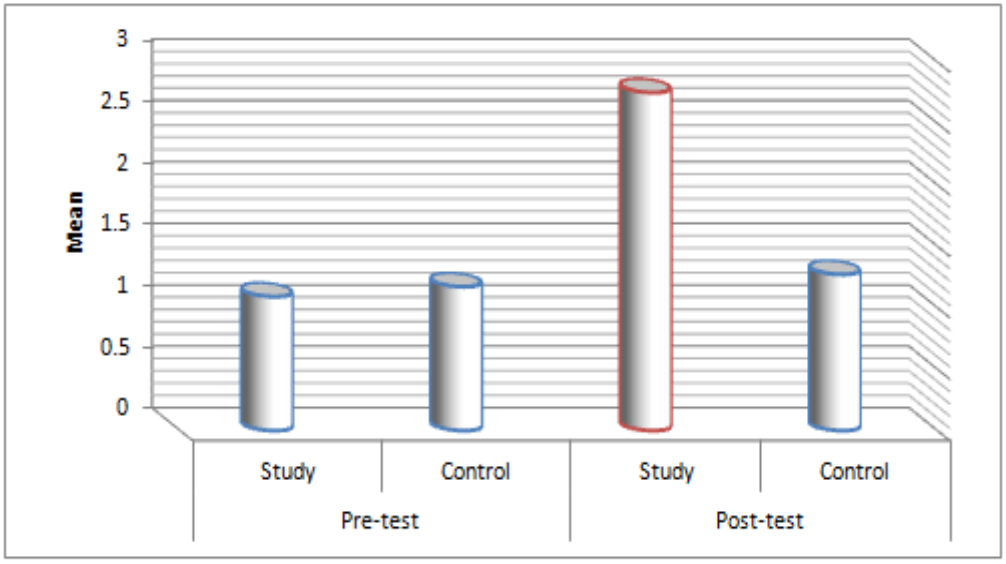


Figure 4-4:At two levels of measurement, the responses of the overall study and the control groups were compared (pre-test and post-test)

4.3. Statistical Differences in Two Test Knowledge of Nurses towards Neonatal pain Management with regards their Socio-demographic Characteristics (*Study Group*)

Table 4-3-1: Significant Differences in Knowledge and Nurses Age (*n=25*)

Age	Variance-Source	Squares-Sum	Df	Square-Mean	F	*p-value*
Pre-test knowledge	Between-Groups	.754	2	.377	.428	.657 No-sig.
	Within-Groups	19.377	22	.881		
	Total	20.132	24			
Post-test knowledge	Between Groups	1.406	2	.703	1.732	.200 No-sig.
	Within Groups	8.927	22	.406		
	Total	10.333	24			

There were non- significant variations in nurses' understanding of neonatal pain treatment between age groups at pre-test (p=0.657) and post-test (p=0.200) after the education program.

Table 4-3-2: Significant Differences in Knowledge and Nurses Gender (*n=25*)

Pre-test knowledge	Gender	Mean	SD	t-	df	*p-value*
	Male	.514	0.606	0.932	23	*0.361*
	Female	1.14	0.930			
Post-test knowledge	Male	2.54	0.888	0.465	23	*0.646*
	Female	2.77	0.655			

There were non- significant variations in nurses' knowledge of neonatal pain treatment between male and female nurses at two points of measurement, pre-test (p=0.361) and post-test (p=0.646) after the education program.

Table 4-3-3: Significant Differences in Knowledge and Nurses Education Level (*n=25*)

Education	Variance-Source	Squares-Sum	Df	Square-Mean	F	*p-value*
Pre-test knowledge	Between-Groups	3.339	2	1.669	2.187	.136 No-sig.
	Within Groups	16.793	22	.763		
	Total	20.132	24			
Post-test knowledge	Between Groups	.018	2	.009	.020	.981 No-sig.
	Within Groups	10.314	22	.469		
	Total	10.333	24			

There were non- significant variations in nurses' understanding of neonatal pain treatment based on education level at pre-test (p=0.136) or post-test (p=0.981) after the education program was implemented.

Table 4-3-4: Significant Differences in Knowledge and Nurses Years of Experience (*n=25*)

Experience	Variance-Source	Squares-Sum	Df	Square-Mean	F	*p-value*
Pre-test knowledge	Between-Groups	.250	2	.125	.138	.872 No-sig.
	Within Groups	19.882	22	.904		
	Total	20.132	24			
Post-test knowledge	Between Groups	.356	2	.178	.392	.680 No-sig.
	Within Groups	9.977	22	.453		
	Total	10.333	24			

There were no significant variations in nurses' understanding of neonatal pain treatment based on years of experience at pre-test (p=0.872) or post-test (p=0.680) after the education program was implemented.

Table 4-3-5: Significant Differences in Knowledge and Nurses Training Courses (*n=25*)

Training courses	Variance-Source	Squares-Sum	Df	Square-Mean	F	*p-value*
Pre-test knowledge	Between-Groups	.086	1	.086	.099	.756 No-sig.
	Within Groups	20.046	23	.872		
	Total	20.132	24			
Post-test knowledge	Between Groups	.018	1	.018	.041	.841 No-sig.
	Within Groups	10.314	23	.448		
	Total	10.333	24			

There were no significant variations in nurses' understanding of neonatal pain management training at pre-test (p=0.756) and post-test (p=0.841) after the education program was implemented.

Chapter Five

Chapter Five

Discussion of the Study Results

Good Neonatal pain management prevents short- and long-term complications and this is the responsibility of all medical staff including nursing staff. despite this care consider from ethical principle also its leads to achieve high quality and safety of nursing care.

5.1 Demographic Characteristics of the Study Sample

Findings in table (4-1-1) presented nurses age, the mean age were 27 in study group; and in control group were 30, age of (20-29) years old were recorded as the highest value of participant in study and control groups. no-significant differences were in age groups for participants in both groups *(p=0.618)*, this absence of a significant difference means that the sample is homogeneous between the two groups. Because most of them graduated with school nursing, so readers find them from the youth group. This findings come with Qasim et al. (2021), presented that 49% of nurses' ages were < 30 years. Nurses have been recruited for several years, and the large number of employees who have retired in recent years may be the cause for this result.

The high percentage were female nurses in both study and control groups (n=23; 92%) and (n=21; 84%) respectively. No significant differences for nurses gender in both groups (*p=0.394*) (table 4-1-2). The absence of a significant difference means a strong point that serves the educational program for the purpose of comparison.

Peng et al. (2021) founded the majority of physicians participants were female since all participating nurses were female, 66 (100%) female. This might be because of nursing professional have female nurses more than

male nurses or perhaps because of female nurses who working in neonatal unit care more than male.

In regard with educational level, the study participants expressed a school nursing in both study and control groups (n=21; 84%) and (n=20; 80%). There were no-significant differences in educational level for sample in both groups (*p=0.738*) (table 4-1-3).

This findings opposite to numerous studies including study of Kostak et al. (2015) who showed that 316 (65%) nurses had bachelor's degrees.

But in this study in Kerbala Teaching Hospital for Children the number of nurses who had bachelor's degree in nursing where low in all hospital and school nursing may be the most percentage of nursing staff.

Concerning years of experience, the nurses in both study and control groups had less than five years of experience (n=17; 68%) and (n=14; 56%) respectively. There were no-significant differences in years of experience for nurses in both groups (*p=0.705*) (table 4-1-4), this may due to nurses were young and institute graduated.

This result come consisting with Razeq et al. (2016), who showed that 60 percent of neonatal nurses had less than five years of experience.

Training sessions related findings, the nurses in both study and control groups exhibit no participants in training session (n=19; 76%) and (n=18; 72%). There were no-significant differences in training for nurses in both groups (*p=0.753*)(table 4-1-5).

The study consistent with Tarjoman et al. (2019), 16 (27.6 percent) volunteers attended the pain control session, while the majority, 42 (72.4 percent), did not attend any pain treatment seminars over the last two years.

No training might because of institutional policies not focusing of neonatal pain management programs.

5.2. Nurses' Knowledge towards Neonatal pain management

5.2.1.Nurses' Knowledge towards Neonatal pain management at Pre-Test for both Groups (Study and Control)

A total of 35 questions were used to measure the knowledge of respondents regarding neonatal pain management and the mean score was 94-140 as a greater level, 47-93as moderate level and 0-46 as a lower level. In current study findings, nurses expressed a poor level of knowledge with regard neonatal pain management at the pre-test period of measurement for both study group *(M ± SD=38.32 ± 32.055*) (table 4-2-2) and control group (*M ± SD=41.16 ± 30.357*) (table 4-2-8) with no statistically significant difference between the two groups (p =0.749).

After compared this finding with another studies without intervention it founded that the study is not in congruence with Cong et al. (2013) who indicated that nurses had adequate knowledge on pain treatment measures.

On the same direction Wari et al. (2021) revealed that 68.7 percent of nurses were found to have appropriate knowledge in this area.

Muteteli (2019) demonstrated in their findings neonatal pain and its care were not well-understood by the large majority of the nurses and midwives who provided it (74.2 percent).

Peng et al. (2021) proved that nurses demonstrating lower professional knowledge and more unfavorable attitudes toward pain management.

According to Costa et al. (2017) although nurses acknowledged that neonatal pain was a real phenomenon, they did not conduct pain assessments on infants nor did they treat their pain in a standardized manner. In order to achieve better pain management for infants, it is essential to apply different approaches for information translation.

On the same line, Ahmed (2020) showed that the lack of understanding regarding the significance of neonatal pain management would result in a resistant attitude, which would then result in poor practice.

Study of Carlsen et al. (2021) concluded that pain assessment scales are popular among nurses, but this is not necessarily reflected in their clinical practice. A lack of knowledge about pain scales appears to limit the extent to which they can be used.

Perry et al. (2018) presented barriers to adequately managing neonate's pain include lack of time, knowledge, mistrust or misunderstanding of assessment methods and conflict between clinicians. According to this result knowledge about neonatal pain management effect on its practice.

A lack of adequate professional knowledge, a lack of expertise in the use of pain assessment tools, a low priority placed on controlling environmental cues, a lack of knowledge about pain medication and the tendency to overestimate the severity of a patient's pain are some of the main roadblocks to effective pain management in neonates admitted to an NCU in a developing country, as per experts (Mehrnoush et al., 2018).

Doctors don't prescribe analgesics for neonatal discomfort, as identified by nurses professionals. All neonatal caregivers may lack information and have beliefs and attitudes that hinder pain management (Nimbalkar et al., 2014).

Khoza (2014) recommended adopt a guideline to standardize practice and maintain good and effective pain treatment in newborns that's also effect of the nurses' knowledge and experience in this area.

Generally all causes mention above may be causes of nurses low level of practice and knowledge about how to manage pain in neonates. In this study the main causes of nurses' poor knowledge may be is the absence or little training courses about neonatal pain management and poor of implementation of a guideline about pain assessment and management for neonates to standardise practice.

Difficulty to chosen random selection of sample (convenience sample) is one of the study limitation that make generalization of the result impossible.

5.2.2.Nurses' Knowledge towards Neonatal Pain Management at Post-Test for both Groups (Study and Control)

In current study findings, nurses in study group expressed a good level of knowledge with regard neonatal pain management at the post-test period of measurement (*M ± SD=96.36 ± 22.965*) after application of education program (table 4-2-2). While, nurses in control group expressed a poor level of knowledge (*M ± SD=44.48 ± 32.106*) with regard neonatal pain management at the post-test period of measurement (table 4-2-8).

Highly statistical significant difference is found between the groups study (*M ± SD=96.36 ± 22.965*) and control (*M ± SD=44.48 ± 32.106*) with regards knowledge towards pain management for neonate (table 4-2-10). The statistical mean shows that the knowledge scores of the study group have improved after the implementation of the educational intervention in comparison to the control group.

(El-husseiny et al., 2019) also indicated that there were improvement in nursing knowledge after application of the program

Similarly (Mohamed et al., 2018) illustrated the benefit of training program to increase nurses knowledge concerning neonatal pain management and give interpretation that is because they could learn more about newborn pain treatment and gain more from it if they receive training in this area.

organizational variables have an important influence in the development of neonatal healthcare services, particularly in regard to pain control. All those who work with newborns must receive the proper training (Azza & Nabila, 2020)

Hoda (2020) and other numerous studies shows that best methods to increase knowledge are though educational program this might be because of commitment of the sample, use of modern educational method e.g. use of power point, Dissection is effective method for increasing knowledge level.

Else in this study there are use of modern educational technique and focus on discussion method and study sample is active and is commitment in the study program.

There is accepted hypothesis that states (There were significant differences in nurses knowledge between study group and control group), nurses in the study group achieved considerable benefit from educational

program concerning nurses knowledge towards neonatal pain management (t-test= 7.721p=0.000) (poor to good knowledge).

5.2.3. Statistical Differences in Two Test Knowledge of Nurses towards Neonatal Pain Management with regards their Demographic Characteristics (Nurses Age group, Gender, Education Level, Years of Experience and Training Courses)

Findings illustrated that there are no statistical differences of sample knowledge about neonatal pain management with regard at pre-test and post-test after education program with regards to age groups (table 4-3-1). This findings means that the nurses knowledge towards neonatal pain management not influenced by the different age groups, nurses who are young and older which have been the same level of knowledge.

Furthermore findings illustrated there no found of significant differences in nurses knowledge about neonatal pain management at two period of measurement before and after educational program with regard male and female nurses (table 4-3-2). nurses' knowledge about neonatal pain management does not depend on gender, but rather on the educational program.

Concerning educational level findings illustrated there is no statistical differences in nurses knowledge about nursing documentation with regard educational level before and after implementation of education program (table 4-3-3).

Findings illustrated that were no statistical differences in nurses knowledge about neonatal pain management with regard years of experience before and after implementation of education program (table 4-3-4).

Findings illustrated there were no significant differences in nurses' knowledge of newborn pain management with regard to training (table 4-3-5).

This finding of demographic data and nurses knowledge are in line with Sujatha et al. (2015), showed there is no correlation between staff nurse knowledge ratings after program and demographic characteristics including age, gender, educational level, total clinical experience and prior knowledge of neonatal pain treatment in the study as well.

Hoda (2020) indicated After implementing the program, nurses' years of experience and total knowledge score differed statistically, but there was no statistical difference between nurses' ages and total knowledge score.

Study result consistent with El Awady and Gharib (2021) showed that there were no statistical difference between years of experience, age, and training courses and nurses knowledge scores at pre and post-test.

Causes of no differences between nurses' demographic variables and their knowledge in the current study at pretest scores may be because of number of nurses who had training courses were deficit and more of participant nurses were within the age of (20-29) years old and female, else from the main causes including that curriculum of all educational levels for participant nurses were not focus on neonatal pain management in their academic study.

In the present study educational program is not affected by participant age, gender, years of experience, educational levels, and training course because all of them were attentive, helpful and interested in the educational program, so it can be applied to increase same of nurses of nurses who participated in study group knowledge regardless of these variables.

Many research results showed that there was a gap in the knowledge of neonatal nurses regarding neonatal pain management and neonate can't

report their feeling of pain verbally which makes neonatal pain assessment and management very difficult for nurses who work in neonatal care units, so this study is very important to increase nurses' knowledge about how to manage pain in neonates.

Chapter Six

Chapter Six

Conclusion and Recommendations

6.1. Conclusion:

In light of the results discussion and their interpretations, our study concludes that:

1. The majority of nurses who participated in the study are within the age group of (20-29) years old.
2. The majority of nurses who participated in this study are female
3. Most percentages of the participants in the study have a school in nursing as a level of education.
4. The major percentage of the study sample have less than five years of experience.
5. The main percentage of the study sample has no training courses about neonatal pain.
6. Knowledge of nurses in terms of neonatal pain management is deficient.
7. There are no differences in nurses' knowledge regarding neonatal pain management between control and study groups at pre-test.
8. After the post-test for the study group, nurses' knowledge improved. due to an educational program concerning neonatal pain management. While control group did not present any improvement in their knowledge in pre and post-test.
9. Nurses' knowledge has been not influenced by their nurses' demographic characteristics (age, gender, education level, years of experience, and training course).

10. Thus accept the alternative hypothesis and demonstrate that nurses in the study group achieved considerable benefit from the educational program concerning neonatal pain management.

6.2. Recommendations:

The present study could recommend, based on the above-stated conclusion, that:

1. It is imperative that the health department adjust training on neonatal pain management to encourage nurses to participate.
2. It is recommended to make guidelines about the neonatal pain assessment scale available in all neonatal care units.
3. Neonatal pain should be included in the nursing curriculum for all educational levels.
4. Additional studies about neonatal pain and how to manage it are recommended to be conducted by a large number of nurses and for other health care personnel.

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Appendices

Administrative Agreements

Appendix A-I

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

العدد: ١٠٥/ ٤٠٦
التاريخ: ١٤/ 11 / 2021

الى / دائرة صحة كربلاء / مركز التدريب و تطوير الملاكات /مستشفى الأطفال التعليمي

م/ تسهيل مهمة

تحية طيبة...

يرجى التفضل بالموافقة على تسهيل مهمة السيدة (اسراء فيصل عباس) لغرض جمع عينات لإنجاز رسالة الماجستير الموسومة (فاعلية البرنامج التعليمي على معارف الممرضين في ما يتعلق برعاية الألم لحديثي الولادة) وهي احدى طلبة الدراسات العليا / الماجستير في كليتنا / للعام الدراسي (2020-2021) و مستمرة في الدوام في الوقت الحاضر.

... مع التقدير ...

أ.م.د. سلمان حسين فارس الكريطي
معاون العميد للشؤون العلمية و الدراسات العليا
2021 / 11 / 14

نسخة منه الى :-
- مكتب السيد المعاون العلمي المحترم.
- شعبة الدراسات العليا.

العنوان : العراق - محافظة كربلاء المقدسة ـ حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq website: nursing.uokerbala.edu.iq

Appendix A-II

محافظ محافظة كربلاء المقدسة
دائرة صحة كربلاء المقدسة
قسم التدريب والتنمية البشرية
شعبة ادارة المعرفة
وحدة ادارة البحوث
العدد: ٢١٧٨
التاريخ / ١٥ / ١١ / ٢٠٢١

جمهورية العراق

Holy Karbala governorate
Karbala Health Department
General manager's office
Training and Human Development Center

إلى/ مستشفى كربلاء التعليمي للأطفال

الموضوع/ بيان راى

السلام عليكم...

كتاب جامعة كربلاء /كلية التمريض شعبة الدراسات العليا / ١٠٠ في ٢٠٢١/١١/١٤

يرجى بيان رأيكم حول إمكانية تسهيل مهمة الطالبة (اسراء فيصل عباس) لإنجاز بحثها الموسوم:-

(فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة) في مؤسستكم الصحية مع ترشيح .شرف عملي للبحث من قبل عضو نجنة البحوث على ان لا تتحمل دائرتنا اي نفقات مادية مع الاحترام.

الدكتورة
تقوى خضر عبد الكريم
ك. مدير قسم التدريب والتنمية البشرية
٢٠٢١/ ١١/ ١٥

نسخة منه الى:-
-مركز التدريب والتنمية البشرية شعبة ادارة المعرفة /وحدة ادارة البحوث مع الأوليات
مهدي /

Appendix A-III

جمهورية العراق

محافظة كربلاء المقدسة
دائرة صحة كربلاء المقدسة
مركز التدريب والتنمية البشرية
شعبة ادارة المعرفة
وحدة البحوث
العدد: ٢٨٠٥
التاريخ / / ٢٠٢١
١١/ ١٧

Holy Karbala governorate
Karbala Health Department
General manager's office
Training and Human Development
Center

دائرة صحة كربلاء المقدسة
مركز التدريب والتنمية البشرية

إلى/ جامعة كربلاء / كلية التمريض
الموضوع /تسهيل مهمة

تحيه طيبه....

كتابكم المرقم ١٠٠في١٤/١١/٢٠٢١

نود إعلامكم بأنه لا مانع لدينا من تسهيل مهمة الطالبة (اسراء فيصل عباس) دراسات عليا لإنجاز بحثه الموسوم حول: (فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة) **في مؤسستنا الصحية/ مستشفى كربلاء للاطفال التعليمي وباشراف/ الدكتور (احمد مهدي السعدي) على ان لا تتحمل دائرتنا اي نفقات مادية مع الاحترام .**

الطبيب الأستشاري
د. حيدر محمد حسن العطار

الدكتورة
تقوى خضر عبد الكريم
مدير مركز التدريب والتنمية البشرية
١٧/١١/٢٠٢١

نسخة منه الى
مركز التدريب والتنمية البشرية مع الأوليات/ شعبة ادارة المعرفة/ وحدة البحوث مع الاوليات
مهدي /

Ethical Considerations
Appendix B

Ministry of Higher Education and Scientific Research
University of Karbala / College of Nursing
Scientific Research Ethics Committee

وزارة التعليم العالي والبحث العلمي
جامعة كربلاء / كلية التمريض
لجنة اخلاقيات البحث العلمي

استمارة اخلاقيات البحث العلمي

عنوان مشروع البحث	
English	**باللغة العربية**
Effectiveness of Educational Program on Nurses' Knowledge Regarding Neonatal Pain Management	فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة

بيانات عن الباحث الرئيسي			
الاسم الثلاثي	اللقب العلمي او العنوان الوظيفي	رقم الهاتف/ الموبايل	الايميل
اسراء فيصل عباس	ممرضة جامعية	٠٧٨٠٢٦٠٠٤٧١	Israa.faisal@s.uokerbala.edu.iq

بيانات الباحث او الباحثين المشتركين			
الاسم الثلاثي	اللقب العلمي او العنوان الوظيفي	رقم الهاتف/ الموبايل	الايميل
د. خميس بندر عبيد	استاذ	٠٧٧٠٣٩٤٣٩٨٨	Khamees.b@uoKerbala.edu.iq

اهمية موضوع البحث واهدافه (Importance of the research and its objectives)

pain management prevent short and long-term problems that affect newborns suffering from untreated pain, and pain management include pharmacological and non-pharmacological method.
study aims to assess the effectiveness of the educational program on nurses' knowledge regarding neonatal pain management .

وقت ومكان اجراء البحث (الاماكن المقترحة لأجراء البحث فيها) Time and Setting of the Research

A quiz-experimental study design was carried out in the Kerbela teaching hospital for children at Holy Karbala City between the periods from 15th of October 2021 to 12th of July 2022.

منهجية البحث (Methodology)

A quiz-experimental study design was carried out of two groups of (25) study group nurses and (25) control group nurses were selected based on the study criteria. The data were analyzed by using the program of Statistical Package of Social Sciences (SPSS) Version 22.

عينة الدراسة Sample of the study

Nurses who caring of neonates in neonatal care units.

الاعتبارات الاخلاقية خلال اجراء البحث (Ethical consideration during research)

التعهد

- اني الموقع ادناه اسراء فيصل عباس حمود اتعهد بان اقوم باجراء البحث وفقا لما ذكر في البروتوكول اعلاه وان التزم باتباع القوانين والتعليمات فيما يخص اجراء البحوث والالتزام بأخلاقياتها ، كما واتعهد باخذ الموافقة من افراد العينة للمشاركة في الدراسة واخذ موافقة من ولي أمر المشارك الشرعي في حال كون عمر الشخص المشارك اقل من ١٨ سنة، او كونه غير قادر على الفهم ، وان اقدم الإيضاحات و المعلومات الخاصة بالدراسة لافراد العينة للمشاركين في حال طلبها. وان اتعامل بسرية تامة مع بيانات افراد العينة.

اسم وتوقيع الباحث

توصية لجنة اخلاقيات البحوث في الكلية

نحن اعضاء اللجنة الاخلاقية نوصي بان موضوع الباحث : ذو قيمة علمية ومهم للمجتمع والمريض

رئيس اللجنة | عضو | عضو | عضو | عضو

Assessment Need Scale
Appendix C - I
(اسئلة حول الم حديثي الولادة)

اخي الممرض / اختي الممرضة في ما يلي اسئلة تقيس معارفك حول الم حديثي الولادة يرجى قراءتها والاجابة على كل الاسئلة وذلك بوضع علامة (√) في المربع الذي يمثل اجابتك امام كل سؤال.

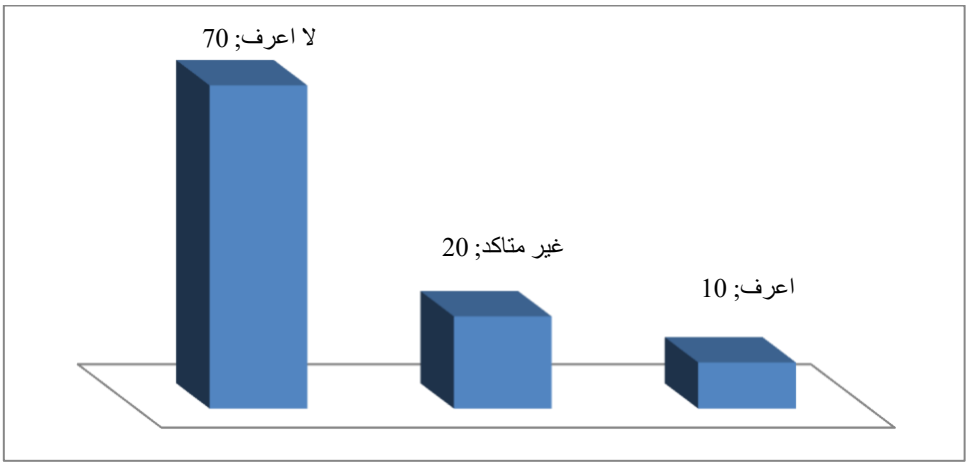
تسلسل الفقرات	الفقرات	اعرف	لا اعرف	غير متأكد من الإجابة
1	يعرف الألم على انه إحساس وتعبير عاطفي غير مرغوب فيه مرتبط مع ضرر حقيقي أو متوقع			
2	يمر الألم بأربع مراحل متسلسلة تبدأ بمرحلة الانتقال ثم التشكيل ثم النقل حيث ينتهي بمرحلة الإدراك			
3	يشمل الألم الجسمي الألم الناتج بسبب التضرر في الأعضاء الحيوية وطبقات الأغشية للتجاويف الجسمية			
4	كمثال للألم المزمن الألم الناتج بسبب إجراء تركيب القسطرة الوريدية			
5	يعتبر الخديج اقل تحسس للألم مقارنة مع حديث الولادة المولود في أوانه			
6	تعبيرات الوجه من الانزعاج تعتبر أكثر مؤشر على الشعور بالألم عند حديثي الولادة			
7	جميع المقاييس لتقيم ألم الأطفال حديثي الولادة غير مؤهلة للقياس لأنه لم يتم اختبار الصدق والثبات لها			
8	الرضاعة الطبيعية تقلل من شعور حديثي الولادة بالألم			
9	السكر الفموي يعتبر من أنواع الأدوية الحديثة التي توصف لرعاية الألم عند الأطفال حديثي الولادة			
10	حمل حديث الولادة بحضنك يقلل من شعوره بالألم			
11	لا تستخدم مضادات الالتهابات غير الستيرويدية لتقليل الم حديثي الولادة على الرغم من استخدام علاج الايبوبرفين لإغلاق القناة الشريانية السالكة			
12	لا ينصح باستخدام المسكنات لحديثي الولادة			

Result for the Assessment of Need

Appendix C- II
((نتائج اختبار اسئلة تقيم الحاجة

ت	الفقرات	المقياس	التكرار	%
1	يعرف الألم على انه إحساس وتعبير عاطفي غير مرغوب فيه مرتبط مع ضرر حقيقي أو متوقع	اعرف	2	20.0
		غير متاكد	1	10.0
		لا اعرف	7	70.0
2	يمر الألم بأربع مراحل متسلسلة تبدأ بمرحلة الانتقال ثم التشكيل ثم النقل حيث ينتهي بمرحلة الإدراك	اعرف	2	20.0
		غير متاكد	1	10.0
		لا اعرف	7	70.0
3	يشمل الألم الجسمي الألم الناتج بسبب التضرر في الأعضاء الحيوية وطبقات الأغشية للتجاويف الجسمية	اعرف	0	0.0
		غير متاكد	1	10.0
		لا اعرف	9	90.0
4	كمثال للألم المزمن الألم الناتج بسبب إجراء تركيب القسطرة الوريدية	اعرف	1	10.0
		غير متاكد	2	20.0
		لا اعرف	7	70.0
5	يعتبر الخديج اقل تحسس للألم مقارنة مع حديث الولادة المولود في أوانه	اعرف	0	0.0
		غير متاكد	1	10.0
		لا اعرف	9	90.0
6	تعبيرات الوجه من الانزعاج تعتبر أكثر مؤشر على الشعور بالألم عند حديثي الولادة	اعرف	2	20.0
		غير متاكد	1	10.0
		لا اعرف	7	70.0
7	جميع المقاييس لتقيم ألم الأطفال حديثي الولادة غير مؤهلة للقياس لأنه لم يتم اختبار الصدق والثبات لها	اعرف	0	0.0
		غير متاكد	0	0.0
		لا اعرف	10	100.0
8	الرضاعة الطبيعية تقلل من شعور حديثي الولادة بالألم	اعرف	0	0.0
		غير متاكد	1	10.0

		لا اعرف	9	90.0
9	السكر الفموي يعتبر من أنواع الأدوية الحديثة التي توصف لرعاية الألم عند الأطفال حديثي الولادة	اعرف	1	10.0
		غير متاكد	1	10.0
		لا اعرف	8	80.0
10	حمل حديث الولادة بحضنك يقلل من شعوره بالألم	اعرف	1	10.0
		غير متاكد	2	20.0
		لا اعرف	7	70.0
11	لا تستخدم مضادات الالتهابات غير الستيرويدية لتقليل الم حديثي الولادة على الرغم من استخدام علاج الايبوبرفين لإغلاق القناة الشريانية السالكة	اعرف	1	10.0
		غير متاكد	1	10.0
		لا اعرف	8	80.0
12	لا ينصح باستخدام المسكنات لحديثي الولادة	اعرف	1	10.0
		غير متاكد	2	20.0
		لا اعرف	7	70.0
المجموع		اعرف	1	10.0
		غير متأكد	2	20.0
		لا اعرف	7	**70.0**



Appendix D - I

“Research program”

"Neonatal pain management "

Prepared by

Israa Faisal Abbass

Supervised by

Professor. Dr. Khamees Bandar Obaid

Number	Content of the program
	First lecture
1	Introduction 1.1 General characteristic of newborns 1.2 Common health problems that newborns suffering of 1.3 Introduction about neonatal pain 1.3.1 Definition of neonatal pain 1.3.2 Type of neonatal pain 1.3.3 Processing newborns Pain **1.3.4 Effects of Pain on newborns**
	Second lecture
2	**2.**Neonatal pain assessment
	Third lecture
3	3.Non-pharmacological neonatal pain management 3.1 Non- nutritive sucking 3.2 Kangaroo mother care 3.3 Skin to skin contact 3.4 Oral sucrose 3.5 Breast feeding 3.6 Music therapy 3.7 Massage therapy

	3.8 Swaddling technique 3.9 Combination of care 3.10 Environmental control
Fourth lecture	
4	4. Pharmacological neonatal pain management 4.1 Topical anesthesia 4.2 Local anesthesia 4.3 Non-sedative drugs 4.3.1 Non - steroidal anti-inflammatory drugs (NSAIDS) 4.3.2 Paracetamol 4.3.3 Benzodiazepine 4.4 Sedative drugs 4.4 Sedative drugs

1- Introduction

1.1 General characteristic of newborns

:- newborns is the infant for first twenty eight days of human life. Including preterm newborns who born before the accomplishing of 37 weeks of gestation and post term newborns who born after the accomplishing of 42 weeks of gestation. If newborns was in state of good crying and body movement with pinkish color skin and nails that is mean they are in a good health. Normally newborns breath is fast (30-60) breath/minutes with heart rate of (120-140) beat/ minute, blood pressure 65/41 mmHg and body temperature of 36.5-37 centigrade degree.

Hearing abilities of newborns:- hearing abilities mature when the baby in uterus, so he can hear all voices after delivery and turns to the side of the voice and may be afraid from load voices

Seeing abilities of newborns:- newborns seeing abilities not fully formed, he can't seeing very well and can't distinguish things far of 30 centimeters.

Normal body weight and height of newborns :- after delivery normal newborns weight about (2,700 -40000) kilograms and his normal height of about (48-53) centimeters.

1.2 Common health problems that newborns suffering of

There are many disease that affect newborns lead them to admission to hospital like neonatal jaundice (bilirubin level elevated in newborns blood) , neonatal hypoglycemia (low level of glucose of newborns blood), infection and congenital anomalies so as ,during their hospital stay they suffering from many painful procedure for the purpose of diagnosis or treatment of the disease.

1.3 Introduction about neonatal pain

1.3.1 Definition of neonatal pain

The International Association for the Study of Pain (IASP) definition of pain as, “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”

Neonates unlike adults or older children they are unable to experience their sensing, while they have the same adult sensing of pain or more than adult, preterm neonates have more sensing of pain than term neonates.

Neonatal disease is defined as an inherent characteristic of life that appears early in the development phase to act as a signaling system for tissue damage.

1.3.2 Type of neonatal pain

Types of Pain that accruing for newborns including the following (Nociceptive, Neuropathic, Somatic, Visceral, Acute, Chronic)

Table 1 demonstrate type of newborns pain

According to its source		According to which tissue involved		According to duration	
Nociceptive pain	Neuropathic pain	Somatic	Visceral	Acute pain	Chronic pain
originate from several different locations and manifest in many different ways	pain caused by a lesion or disease of the somatosensory system	affects the skin, bone, muscle, blood vessels, and connective tissue	affects the vital organs and the linings of body cavities	temporary pain that is expected to last no longer than 6 months	pain that lasts or is expected to last longer than 6 months
perceive all potential risks to body tissues, including thermal, mechanical, and chemical risks	This is rare in neonates, but may occur with traumatic brain injury from delivery, meningitis, or some other encephalopathy condition	An example of somatic pain would be a venipuncture	An example of visceral pain would be insertion of a chest or gastroint estinal tube	Examples of this would be procedural pain or pain from an acute injury	Examples of chronic pain would be pain from incurable neurodegenerati ve diseases or cancer is rare in neonates

1.3.3 Processing newborns Pain

Transduction—When nociceptors are exposed to a noxious stimulus

Transmission—Path of the stimulus sent from the site of transduction to the dorsal horn of the spinal cord, then to the brain stem, finally to higher levels of the brain

Modulation—Painful stimuli may be inhibited or enhanced by neurotransmitters on the way to perception

Perception—Pain signals reach their final destination in the brain and are interpreted

1.3.4 Effects of Pain on newborns

Physiologic Response

- Heart rate increase or fluctuation
- Blood pressure increase or fluctuation
- Increased PO2 (partial pressure of oxygen), SaO2 oxygen saturation; initially Decreased PO2, SaO2
- prolonged stress
- Increased work of breathing
- Apnea
- Hypercapnia
- V/Q mismatch
- Increase in intracranial pressure
- Vomiting
- Diarrhea, which may result in diaper rash
- Diaphoresis
- Dilated pupils
- Slow weight gain, weight loss, failure to thrive
- Ileus
- Urinary retention

Behavioral Response

- Intense or high-pitched cry
- Difficult to console
- Constant need to be consoled
- Frowning, grimacing, brow furrow

- Eye closure or aversion
- Disorganized or frantic body movements
- Increased tone
- Decreased activity, “shutting down” (prolonged stress)
- Tremors
- Hyper alert state
- Erratic sleep pattern
- Feeding difficulties or increased feeds, which may result in vomiting

Long-Term Response

- Increased length of stay in the hospital
- Higher mortality
- Increased sensitivity to pain

https://www.google.com behavioral response appear in newborn face

2. Neonatal pain assessment

Pain assessment in the non-verbal child and neonate can be a very challenging task in an already subjective process. There are pain scales that have high reliability and validity used to assess pain; however, there are variations in the methods and scales used, and there is not a universal method to assess pain in this population. Objective measurements including heart rate, blood pressure, and salivary cortisol can be used, but most care providers usually rely on grimace, crying, and overall demeanor.

Table 2 demonstrate most important scales that used to assess neonatal pain

Pain scale	variables are included	it's used
PIPP (premature infant pain profile)	Heart rate, oxygen saturation, facial actions	Procedural, postoperative
NIPS (neonatal infant pain score)	Facial expression, crying, breathing patterns, arm and leg movements, arousal	Procedural
NFCS (neonatal facial coding system)	Facial actions	Procedural
N-PASS (neonatal pain, agitation and sedation scale)	Crying, irritability, facial expression, extremity tone, vital signs	Procedural, postoperative, mechanically ventilated patients
CRIES (cry, requires oxygen, increased vital signs, expression, sleeplessness)	Crying, facial expression, sleeplessness, requires oxygen to stay at >95 % saturation, increased vital signs	Postoperative
COMFORT scale	Movement, calmness, facial tension, alertness, respiration rate, muscle tone, heart rate, blood pressure	Postoperative, critical care
DAN (Douleur Aiguë du Nouveau-né)	Facial expression, limb movements, vocal expression	Procedural

Table 3 demonstrate scores of NIPS

Pain Assessment		Score
Facial Expression		
0-Relaxed Muscles	Restful Face, Neural Expression	
1- Grimes	Tight facial muscles; furrowed brow, chin, jaw (negative facial expression - nose, mouth brow)	
Cry		
0-No cry	Quiet, not crying	
1-Whimper	Mild moaning, intermittent	
2- Vigorous cry	Loud scream; rising, shrill, continuous (Note :silent cry may be scored if baby is intubated as evidenced kby obvious mouth and facial movement	
Breathing Pattern		
0- Relaxed	Usual pattern	
1-Change in breathing	Indrawing, irregular, faster than usual; gagging, breathing, breath holding	
Arms		
0-Relaxed	No Muscular rigidity; occasional random movement of arms	
	Tense, straight arms , flexion	
Legs		
0- Relaxed	No Muscular rigidity; occasional random movement of legs	

1-Flexed	Tense, straight legs , flexion	
State of Arousal		
0-Sleeping / Awake	Quiet, peaceful, sleeping or alert	
1- Fussy	Alert, restless and thrashing	

3.Non-pharmacological neonatal pain management

There are many non-pharmacological method for managing and treatment of neonatal pain this include

3.1 Non- nutritive sucking

They are frequent oral movements that are not for food purposes such as the use of comedy as they reduce the severity of crying and physiological responses to pain and are considered more effective if used with other non-pharmacological methods. There are several studies that point to the benefits of this method where it helps newborns, especially preterm infants who usually suffer from breastfeeding problems, to acquire breastfeeding skills in addition to reducing the pain of newborns as it is considered a safe and easy method and can be used at home and not only in health care places.

3.2 Kangaroo mother care

Benefits of kangaroo care for the infant:

• Help newborns adapt to the surrounding environment after birth, especially regulating their body temperature.

• Facilitate breastfeeding

• Help gain weight to reach a healthy weight, as keeping infants warm in this way makes them direct their energy towards the growth of their bodies rather than consuming them in heating the body.

• Regulating heartbeat, breathing pattern and oxygen saturation levels in infants to become normal. Helping children sleep, as well as reducing pain and anxiety in infants.

• Stimulate the child's mental development by improving brain development by providing blood supply and oxygen and food and improving sleep.

• Stimulating the immune system in infants, especially premature preterm infants who usually have weak immunity.

Kangaroo care includes the following steps:

- The mother or father sits comfortably in a quiet, noise-free and dimly lit room.
- Take off the mother or father for clothes covering the chest, or wear a wide shirt that can be opened from the front.
- Undress the baby except to keep only a cap to warm the head as soon as the weather is cold.
- Place the baby on the chest of the mother or father in a vertical position, ensuring direct skin contact between the child and a parent.
- The baby's back is covered with a blanket depending on the temperature of the room, or using the wide shirt worn by the mother or father. It is preferred to carry it for one hour more than 4 times a week.

3.3 Skin to skin contact

Skin-to-skin contact is effective in reducing pain and reducing its physiological response. In addition to the effectiveness of this method in improving and increasing the time of breastfeeding and regulating the bedtime of the infant and increasing the satisfaction of parents

(https://www.alarabiya.net) skin to skin contact between mother and her infant

3.4 Oral sucrose

Research suggests that less than 0.05 to 0.5 ml of oral sucrose solution 24% is effective in reducing pain in the full term. The effect is achieved when taking sucrose two minutes before pain using a lollipop or syringe and is repeatedly given in small quantities (i.e. 0.05 to 0.5 ml) with a two-minute interval throughout the painful procedure. The effect seems to start in two minutes and last about 4 minutes, so it is an analgesic that may diminish the effect if painful actions are prolonged. Oral sugar reduces physiological responses, such as changes in heart rate and oxygen saturation, a decrease in behavioral indicators of pain, such as crying and grimacing suggestions) during painful procedures.

3.5 Breast feeding

Breastfeeding reduces physiological responses to pain by reducing heart rate, total crying time and is considered more effective than other measures such as holding the skin, oral sugar or using wheat

There are warnings for breastfeeding including:

- the mother who uses chemotherapy and radiation therapy to treat cancer
- the mother with certain infectious diseases such as pulmonary tuberculosis and does not take antibiotics and HIV virus (which causes weakened immunity to the infected person to increase his exposure to infectious diseases) and cell-inflated virus infection that affects the eyes, brain, other internal organs and viruses of blood bleaching of immune type cells.
- Mother who takes drugs or sedatives.
- Calactozimia in children is a genetic disease caused by a deficiency of enzyme such as calcotos 1- eurydel transspheres phosphate, which leads to twice the conversion of calactose 1-phosphate to clocos 1-phosphate and balk builds up calactose in the liver, kidneys and brain leads to a defect in the function of these organs.

3.6 Music therapy

Listening to music by newborns can help them reduce their pain and reduce their stress. Neonatal music listening helps reduce the physiological response of newborns to pain as a result of painful procedures that reduce heart rate and increase oxygen saturation in the body.

(https://order.store.mayoclinic.com) newborns listening to music as a therapy for reducing pain and stress.

3.7 Massage therapy

This method can helps relieve the severity of pain for newborns in addition to other scientific benefits, including reducing the rate of jaundice for newborns, which is to do a simple massage of the body. This method is low-cost, easy, reduces neonatal stress and supports growth.

3.8 Swaddling technique

It works to calm newborns and help him to sleep for longer periods where he feels thanks to the wheat that in a small and warm environment such as the environment of the uterus so it can reduce his sensing of pain

and other benefits of this method include: -

- maintaining the warmth of the body of the baby in the few days after birth, i.e. until the system of regulating the heat in his body begins to work properly.
- Prevent unnecessary waking caused by sudden baby reactions in his arms and legs.
- Prevention of sudden infant death syndrome.

(https://salubit.com) swaddling method for newborns

3.9 Combination of care

This method reduces effort and time and is considered more effective as using more than one method such as using oral sugar with massage is more effective in reducing pain than using oral sugar alone. Like other methods, it has been scientifically proven that integrating these methods is more effective, such as using breastfeeding with kangaroo status, more effective in reducing pain than using these methods alone.

3.10 Environmental control

Newborns are affected by the environment around them, where they are affected by light and noise and the presence of parents nearby, and attention to this aspect of providing them with an appropriate environment is important in reducing the feeling of pain and stress of newborns and increasing their sense of relaxation and comfort.

4. Pharmacological neonatal pain management

4.1 Topical anesthesia :-

It inhibits sodium and thus prevents the transmission of the pain path from the beginning from the source of pain.

4.2 Local anesthesia :-

This type of analgesic is very important in reducing physiological responses to pain. Used before surgery where circumcision is not recommended without local anesthesia. But it should be noted that this type of analgesic usually causes serious complications resulting from overdose poisoning.

4.3 Non-sedative drugs

4.3.1 Non - steroidal anti-inflammatory drugs (NSAIDS): It inhibits cox 2 and thus reduces the pain that produces the enzyme thermoboxnes that inhibits platelet aggregation, so it can cause bleeding.

4.3.2 Paracetamol:- Reduces the temperature and is considered a safe drug with low side effect used after surgery to reduce pain instead of using sedatives.

4.3.3 Benzodiazepine: - Where it makes muscles loose during certain procedures such as radiation imaging and causes other complications such as epilepsy, respiratory inhibition and hypotension.

4.4 Sedative drugs:- Working on the central nervous system gives calming, decrease of pain sensing and soothing and given in the case of moderate and

strong pain and in the treatment of withdrawal syndrome of sedative drugs for newborns. Examples include the treatment of morphine, fentanyl and methadone.

Table 4 demonstrate most common medication used to treat neonatal pain with their dosing and side effect

Analgesic	**Dosing**	**side effect**
EMLA (2.5 % lidocaine +2.5 % procaine)	Topical: 0.5–1 g covered with occlusive dressing × 45–60 min Max dose = 1 g	Not recommended for heel lance; more painful, longer procedure duration SE: common: skin irritation
Acetaminophen	Oral: 10 mg/kg q6 h or 15 mg/kg q8 h Rectal: 20–25 mg/kg IV: loading dose: 20 mg/kg, then maintenance with TDD: 37–42 weeks = 50–60 mg/kg/day 1–3 months = 60–75 mg/kg/day	Neonates have slower clearance than older children Rare SE: Hepatotoxicity, Renal Toxicity
Lidocaine injection	SQ and IM: 3–5 mg/kg/dose of 0.5 % (5 mg/mL) or 1 % (10 mg/mL)	Toxicity: arrhythmias, seizures Avoid combination with epinephrine in neonates-to minimize risk of arrhythmia and tissue necrosis

Opiates	Morphine IV: 0.05– 0.1 mg/kg/dose	SE: Hypotension in preterm neonates.
	Fentanyl IM/IV: 0.5–1 µg/kg/dose Fentanyl intranasal: 1.5–2 µg/kg/dose	SE: bradycardia, chest wall rigidity, but less hypotension, GI dysmotility and urinary retention than morphine
Ketamine	IM/IV: 0.5– 2 mg/kg/dose	Bronchodilator: improves ventilation Minimal effects on respiratory drive, HR, BP Toxicity: >2 mg/kg/dose bradycardia >5 mg/kg/dose decreased BP

TDD total daily dosing; *SE* side effects

The summary of neonatal pain

care is very important where pain causes problems affecting the growth and development of newborns, including pain care for newborns non-pharmacological methods including non-nutritional feeding, breastfeeding, oral sugar, use of wheat, kangaroo status method in care, skin capture, music therapy and massage therapy, all of which aim to reduce the severity of pain and symptoms of pain for newborns in addition to providing the right health environment and other methods are pharmaceutical methods. These include sedatives, non-sedative medications as well as local analgesics. It is necessary to diagnose and evaluate the pain to know its severity and the type of appropriate treatment depending on the severity of the pain and there are several scales used for this purpose

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Appendix D - II

Questionnaire

صفحة موافقة المبحوث

اخي العزيز..

بين يديك استبانة لدراسة..

(فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة)

(Effectiveness of educational program on nurses' knowledge regarding neonatal pain management)

لذا يرجى التفضل ملئ المعلومات المتعلقة بالبحث اعلاه واود اعلامك بأن المعلومات التي ستدلي بها ستكون في غاية السرية فقط لغرض البحث العلمي خدمة لدراسة الماجستير..

هل توافق بالمشاركة..؟

نعم ☐

لا ☐

اسم الباحثة:

اسراء فيصل عباس حمود

طالبة الماجستير / تمريض الاطفال

"الاستبانة"

الجزء الاول: المعلومات الديمغرافية:

1. **العمر:** سنه (يرجى كتابة عمرك بالسنين) ☐
2. **الجنس:** ذكر ☐ انثى ☐
3. **مستوى التعليم (التحصيل الاكاديمي):**
   a. اعدادية تمريض: ☐
   b. معهد تمريض: ☐
   c. كلية تمريض: ☐
   d. شهادات عليا: ☐
4. **سنوات الخبرة في رعاية حديثي الولادة:** ☐
5. **هل اشتركت في دورات خاصة برعاية الالم لحديثي الولادة:**

   نعم ☐ لا ☐

الجزء الثاني: معرفة الممرضين المتعلقة بالخصائص العامة لألم حديثي الولادة:

الفقرات	لا اوافق	لا اوافق جزئيا	لا اعرف	اوافق جزئيا	اوافق
يشعر حديثي الولادة بالألم					
يؤثر الألم على العلامات الحيوية لحديثي الولادة					
لا يؤثر الالم على نسبة تشبع الاوكسجين بالدم لحديثي الولادة					
يؤثر الالم على تعابير الوجه لدى حديثي الولادة					
لا يؤثر الالم على حركة الاطراف لحديثي الولادة.					
يؤثر الالم على شدة البكاء لدى حديثي الولادة					
لا يؤثر الضوء والضوضاء على ردود افعال حديثي الولادة تجاه الالم					
لا يمكن تميز الم حديثي الولادة من قبل بعض الممرضين					
لا يتصرف حديثي الولادة بطريقة خاصة تجاه الالم					
لا يعتبر الالم احدى العلامات الحيوية لحديثي الولادة					
قد يكون تعرض حديثي الولادة					

للإجراءات المؤلمة المتكررة له نتائج مضرة على تطورهم					

الجزء الثالث: معرفة الممرضين المتعلقة بتقييم الألم لحديثي الولادة:

الفقرات	لا اوافق	لا اوافق جزئيا	لا اعرف	اوافق جزئيا	اوافق
يعتبر تقييم الالم جزء من الدور التمريضي					
يتطلب تقييم الالم لحديثي الولادة بشكل منتظم					
يمكن تقييم الالم لحديثي الولادة بدون استخدام المقاييس					
يعتبر استخدام المقاييس لتقييم الالم مهم في الممارسة التمريضية					
يعتبر من المهم تسجيل تقييم الالم في ملف					

حديثي الولادة					
يجب تقييم الم حديثي الولادة قبل رعايته					
يمتلك الممرضين خبرة كافية لتقييم الم حديثي الولادة					
لا يعتمد التحكم بالألم لحديثي الولادة على تقييم الالم					
لا يساعد تسجيل تقييم الم حديثي الولادة على التخفيف من شدة الالم					
يعتمد مقياس الراحة على قياس نسبة تشبع الاوكسجين بالدم لحديثي الولادة					
لا يستخدم مقياس الراحة					

لقياس الالم بعد العمليات الجراحية لحديثي الولادة					

الجزء الرابع: معرفة الممرضين المتعلقة برعاية الألم لحديثي الولادة:

الفقرات	لا اوافق	لا اوافق جزئيا	لا اعرف	اوافق جزئيا	اوافق
تساعد المعرفة بالرعاية الغير دوائية للألم على تخفيف الالم					
يعتبر من الضروري استخدام الاجراءات الغير دوائية لإزالة الالم					
لا يستطيع الوالدين المساعدة في رعاية الالم لحديثي الولادة					
لا يؤثر التشخيص السريري الطبي لحديثي الولادة على رعاية الالم					
تعتبر الحاجة ملحة الى قرارات الممرضين للرعاية بألم حديثي الولادة					
تعتبر وضعية الكنغر من الوسائل الفعالة للتخفيف من الم حديثي الولادة					
لا يقلل السكر الفموي من شعور حديثي الولادة بالألم					
يعتبر تقميط الرضيع احدى الوسائل الغير دوائية لتخفيف الالم عند حديثي الولادة					

لا يؤثر التدليك لحديثي الولادة في التخفيف من شعورهم بالألم					
تزيل المهدئات الم حديثي الولادة					
تكون المسكنات المخدرة ملائمة لإزالة الالم لحديثي الولادة					
تكون المسكنات المخدرة غير ملائمة لحديثي الولادة الذين يتنفسون على جهاز التنفس الاصطناعي					
تكون المسكنات غير المخدرة ملائمة لإزالة الالم لحديثي الولادة					

Appendix D - III
Questionnaire in English Language

.

First part: Demographic data:

1- Age: in years ☐

2- Gender: male ☐ **female** ☐

3- Educational levels:

a- Nursing school ☐

b- Diploma ☐

c- Bachelor's ☐

d- master and doctorate ☐

4- Years of experience: ☐

5- Having training courses about neonatal pain: yes ☐ **No** ☐

Second part : characteristic of neonatal pain

Items	Don't agree	Partially don't agree	Don't know	Partially agree	agree
Newborns feel pain					
Pain can affect newborn's vital signs					
Pain can't affect newborn's oxygen saturation					
Pain can affect newborn's facial expressions					
Pain can't affect newborn's limb movements					
Pain can affect newborn's crying					
Light and noise can't affect newborn's reactions to pain					
Newborn pain is not recognized by nurses					
newborns don't react to pain in a particular way					
Pain isn't considered as one of the Vital signs in newborns					
Newborns who are subjected to unpleasant procedures on a regular basis may experience developmental problems					

Third part: neonatal pain assessment

Items	Don't agree	Partially don't agree	Don't know	Partially agree	Agree
The nursing prescription should include a pain assessment					
Systematized pain evaluation in infants is required					

Without the use of scales, neonatal pain can be measured					
The use of scales to assess pain is critical in the practice					
kIt's critical to keep track of pain on the newborn's chart					
Pain assessment must be documented before it may be controlled					
Nurses are well-versed in assessing pain in neonates					
Pain management in newborns doesn't depend on its assessment					
Recording newborn’s pain assessment will not result in relief					
Comfort scale depends on newborns oxygen saturation					
Comfort scale doesn't assess newborns postoperative pain					

Fourth part: neonatal pain management

Items	**Don’t agree**	**Partially don’t Agree**	**Don’t know**	**Partially agree**	**Agree**
Having knowledge of Non pharmacological measures for pain relief helps its relief					
Using Non pharmacological measures for pain relief is necessary					
Parents cannot help pain management in newborn					
The medical/clinical diagnosis of newborns not influences pain management					
Nurses joint decisions are needed for pain management in					

newborns					
Kangaroo mother care is effective method for newborns pain relief					
Oral sucrose can't relief newborns pain					
Swaddling is one of the Non-pharmacological measures to relief newborns pain.					
Massage don't relief newborns pain					
Sedatives relieve pain in newborns					
Opioid analgesics are appropriate to relieve pain in newborns					
Opioid analgesics are not suitable for newborns undergoing mechanical ventilation					
Non-Opioid analgesics are suitable for pain relief in newborns					

Expert's Panel
Appendix E

ت	اسم الخبير	العنوان الوظيفي	الشهادة	الاختصاص العلمي	سنوات الخبرة	مكان العمل
1	نهاد محمد الدوري	استاذ	الدكتوراه	تمريض الاطفال	35	جامعة بابل / كلية التمريض
2	سحر ادهم علي	أستاذ	الدكتوراه	تمريض البالغين	27	جامعة بابل / كلية التمريض
3	فاطمة مكي محمود	استاذ مساعد	الدكتوراه	تمريض البالغين	27	جامعة كربلاء / كلية التمريض
4	وفاء احمد امين	استاذ مساعد	الدكتوراه	تمريض صحة الام والوليد	21	جامعة بابل / كلية التمريض
5	مهدي عبد نعمة الموسوي	استاذ مساعد	الدكتوراه	تمريض الاطفال	20	جامعة الكوت / كلية التمريض
6	حسن عبد الله عذبي	استاذ مساعد	الدكتوراه	تمريض البالغين	17	جامعة كربلاء / كلية التمريض
7	ساجدة سعدون عليوي	مدرس	الدكتوراه	تمريض الام والوليد	29	جامعة كربلاء / كلية التمريض
8	زكي صباح مصيحب	مدرس	الدكتوراه	تمريض الاطفال	21	جامعة كربلاء / كلية التمريض
9	غيث كاظم نصيف	استشاري	البورد	اختصاص طب الاطفال	31	وزارة الصحة والبيئة / مستشفى الهندية العام
10	احمد مهدي السعدي	استشاري	البورد	اختصاص طب باطني	30	وزارة الصحة والبيئة / مستشفى كربلاء التعليمي للأطفال
11	فرقد رسول حسون المحنا	استشاري	البورد	اختصاص طب الاطفال	15	وزارة الصحة والبيئة مستشفى الهندية العام

Appendix F

Authors Permission

Dear

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The statistician' opinion

Republic of Iraq
Ministry of higher education & scientific research
University of Kerbala
College of Nursing

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة كربلاء
كلية التمريض
الدراسات العليا

اقرار الخبير الاحصائي

اشهد بان الرسالة الموسومة :

(فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة)

(effectiveness of educational program on nurses knowledge regarding neonatal pain management)

قد تم الاطلاع على الاسلوب الاحصائي المتبع في تحليل البيانات واظهار النتائج الاحصائية وفق مضمون الدراسة ولأجله وقعت.

توقيع الخبير الاحصائي:
الاسم واللقب العلمي: ا.م.د. ايناس عبد كاظم
الاختصاص الدقيق: احصاء تطبيقي
مكان العمل: جامعة كربلاء / كلية التمريض
التاريخ: ١٥ / ٦ / 2022

The linguists' opinion

Republic of Iraq
Ministry of higher education & scientific research
University of Kerbala
College of Nursing

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة كربلاء
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(فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة)

(effectiveness of educational program on nurses knowledge regarding neonatal pain management)

قد جرى مراجعتها من الناحية اللغوية بحيث اصبحت بأسلوب علمي سليم خال من الاخطاء اللغوية ولأجله وقعت.

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الخلاصة

الخلفية العلمية: الالم هو تعبير عاطفي سلبي فترة حديثي الولادة هي الفترة من الولادة إلى أول ثمانية وعشرين يوما من حياة الإنسان ، إدارة الألم تمنع المشاكل قصيرة وطويلة الأمد التي تؤثر على حديثي الولادة الذين يعانون من الألم غير المعالج ، وتشمل إدارة الألم الطرق الدوائية وغير الدوائية

الاهداف: تهدف هذه الدراسة إلى تقييم فاعلية البرنامج التعليمي حول معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة.

المنهجية: تم إجراء دراسة تجريبية في مستشفى كربلاء التعليمي للأطفال في مدينة كربلاء المقدسة بين الفترة من 15 تشرين الأول 2021 إلى 12 يوليو 2022. تم اختيار مجموعتين من (25) ممرضا من مجموعة الدراسة و (25) ممرضا من المجموعة الضابطة. تم تحليل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS) الإصدار 22.

النتائج: أشارت نتائج الدراسة إلى وجود فروق ذات دلالة إحصائية عالية بين الفترات التي سبقت البرنامج وبعد تطبيق البرنامج التعليمي. في مجموعة الدراسة أعرب حوالي (64٪) من الممرضين عن مستوى ضعيف من المعرفة في فترة ما قبل الاختبار للقياس فيما يتعلق بإدارة الالم لحديثي الولادة. في حين أنه بعد تطبيق البرنامج التعليمي أعرب حوالي (72٪) منهم عن مستوى جيد من المعرفة في فترة ما بعد الاختبار للقياس. وأوجدت الدراسة عدم وجود فروق ذات دلالة إحصائية بين فاعلية البرنامج التعليمي وعمر الممرضين وجنسهم ومستواهم التعليمي وسنوات الخبرة وحصولهم على دورات تدريبية حول إدارة الالم لحديثي الولادة.

الاستنتاجات: وخلصت الدراسة، إلى أن غالبية الممرضين المشاركين كانوا من الإناث، والتمريض المدرسي، ولم يشاركوا في دورات تدريبية حول رعاية الالم لحديثي الولادة، وخبرتهم أقل من خمس سنوات، وكانت النسبة العالية من 20-29 سنة، وقد أدى البرنامج إلى تحسن واضح في معرفة الممرضين فيما يتعلق بكيفية إدارة الم حديثي الولادة بعد تطبيق البرنامج التعليمي.

التوصيات: يجب تضمين الم حديثي الولادة في مناهج التمريض لجميع المستويات التعليمية.

جامعة كربلاء / كلية التمريض

فاعلية البرنامج التعليمي على معرفة الممرضين فيما يتعلق برعاية الالم لحديثي الولادة

رسالة مقدمة الى مجلس كلية التمريض / جامعة كربلاء وهي جزء من متطلبات نيل درجة الماجستير في علوم التمريض

بواسطة

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بإشراف

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تموز – 2022 م **ذو الحجة – 1443هـ**