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RESEARCH ARTICLE

ASSESSMENT OF NEWBORN PAIN RELATED TO CARE

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Abstract

Pain in newborns is an issue we cannot ignore any longer. The health care providers should confirm that the baby is comfortable during any procedures as it is not only that it is ethically right for them to treat in pain the patients but can also have serious after-effects in newborns and can also lead to other diseases. This study aimed to evaluate pain induced by medical procedures, describe pain management practices, and improve pain management. Two surveys were conducted: the first one on the patients through the prospective descriptive observational study. This was carried out in the NICU in the department of neonatology in the CHU MOHAMED VI of Oujda over a period of 4 months, starting from February 26, 2024 until June 26, 2024. Pain was assessed by using the DAN scale in 98 newborns (female: 56%, sex ratio: 1.27, premature: 42%, and mean weight: 2538g). The median DAN score duringmedical procedures was 4.5, which dropped to 1 three minutes after the painful procedure. The second survey was conducted among a sample of 45 medical and paramedical workers of the neonatology department of the CHU MOHAMED VI Oujda. Eighteen percent of the medical and paramedical staff indicated that they had taken specific training in pain and palliative care. A specific training session was organized for enhancing pain management. Before the training, 44% of caregivers had never assessed the pain level of their patient whereas after the training 78% of them will always assess the pain, this improved significantly post training. Regarding pain management, before training, it was not done routinely, fifty-eight percent of caregivers reported that they rarely or never used any preventive strategies, whereas after training, 84% reported always or often using preventive measures. The majority of caregivers were against the presence of parents during invasive procedures.

Introduction:-

Neonatal intensive care unit admissions afford neonates continual exposure to painful stimuli [1,2]. Premature infants are reported to be even more sensitive to pain compared to older children [3-5]. It has been shown that if painful procedures are performed shortly after birth, newborns behave differently than older subjects when exposed to the same painful stimulus [6–8]. These early painful experiences are associated with acute and chronic sequelae

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[9,10], though appropriate use of pain management can ameliorate many of these [11,12]. Standardized pain assessment tools exist that can objectively measure pain intensity using either direct observations (e.g., crying, facial expression, movements) to infer level pain or indirectly infer state level pain via physiological variables. The aim of this study is to evaluate pain in newborns during their stay in NICU at the Mohammed VI university hospital in Oujda, to analyse the practices for pain management, and to enhance pain management associated with medical care.

Materials and Methods:-

The first survey is a prospective descriptive observational study conducted over a four-month period from February 26, 2024, to June 26, 2024. the fieldwork concerned overall 98 babies, either full-term and preterm, hospitalized in the neonatal intensive care unit within the neonatology department of CHU MOHAMED VI in Oujda. We studied the most frequent procedures (venous catheterization, blood sampling, lumbar puncture, and tracheal intubation) by using DAN grids (acute pain assessment scale for newborns). We observed facial expression, vocal expression, and body movements for 2 minutes before, during, and 3 minutes after the procedure. This scale includes three behavioral items: facial responses, limb movements, and vocal expression of pain, with scores ranging from 0 to 10. A summary sheet was compiled for each newborn to analyze initial parameters, ongoing hospitalization parameters, and parameters related to the procedure. The collected data were analyzed using Excel software. We included newborns hospitalized in the neonatal intensive care unit who either fell asleep or were awake without crying before the start of the procedure. Also, those with severe conditions or neurological disorders were included in the list of exclusions.

The second survey was conducted among 45 medical and paramedical staff members of the neonatology and neonatal intensive care unit at CHU MOHAMMED VI in Oujda.This study was designed to appraise the knowledge, beliefs and practices of the medical and nursing staff regarding the techniques used in newborn pain assessment and management. The data were collected using a questionnaire. A workshop session was conducted in the neonatology and neonatal intensive care unit at CHU Mohammed VI in Oujda for medical and paramedical staff. The course addressed topics such as the impact of painful procedures, tools for pain assessment in newborns, and different non-pharmacologic and pharmacologic interventions that could be utilized to provide analgesia while caring for these patients. Its objective is to improve the management of pain after procedures in newborns.

Results:-

Among the 98 newborns included in the study, 56% were female and 44% were male. 58% of the newborns were born at term and 42% were premature. newborns weight distribution is shown in figure 1. Vaginal deliveries accounted for 60% of the study population, while 40% were delivered by cesarean section. 40% of the newborns were hospitalized for respiratory distress due to prematurity, 28% for hypotonia with feeding refusal, 14% for fever, 4% for febrile convulsions, and 14% for other reasons (Figure 2). The main diagnosis included early neonatal bacterial infection with urinary focus in 42% of cases, neonatal meningitis in 30%, esophageal atresia in 4%, neonatal jaundice in 10%, and other pathologies in 14% (Figure 3). All newborns received antibiotic therapy, with 18% also receiving analgesics, 14% caffeine citrate, and 6% phenobarbital (Figure 4). The most common medical procedures performed were: blood sampling, accounting for 42% of procedures, venous catheterization in 30%, lumbar puncture in 14%, and tracheal intubation also found in 14% (Figure 5).

Condition of the newborns before the procedure was considered, to excludethose who were crying. This state would not allow for the DAN score because it includes in punctuation the vocal expression. The median of all DAN scores collected was 0 prior to the start of the procedure. Thus, no newborn had experienced pain before the procedure began. Table 1 provides means, medians and minimums-maximums of DAN scores (pain scores) obtained during and after the procedures.

Regarding the survey conducted among healthcare providers, out of the 45 medical and paramedical personnel interviewed, all responded to the study. 64% were doctors and 36% were paramedical staff. 18% of the caregivers reported having received specific training in pain and palliative care previously.

Pain assessment was consistently performed by 11% of the caregivers, often by 16%, rarely by 29%, and never by 44%. Pain was systematically assessed upon admission by 27% of the staff, often by 20%, rarely by 22%, and never by 31%. During hospitalization, pain was systematically assessed by 27% of the staff, on demand by 62%, and never by 11% (Table 2, 3).

The Neonatal Acute Pain Scale (DAN) was known to 31% of the caregivers, while the Neonatal Pain and Discomfort Scale (EDIN) was known to 15%. 54% of the caregivers were unfamiliar with any pain assessment scale (Figure 6, Table 3).

Among the surveyed caregivers, 42% often used methods to prevent induced pain, 38% rarely used such methods, and 20% used no methods at all. Methods to prevent induced pain included sweet solutions used in 64% of cases, non-nutritive sucking in 35% of cases, swaddling in 22%, Fentanyl in 13% of cases, and touch-massage in 11% (Figure 7, Table 3). The vast majority of caregivers believed that parental presence during invasive procedures was unnecessary (84%), while only 16% encouraged parents to be present during procedures.

Following the training conducted within the department, the results collected from the questionnaire sheets were as follows: pain will be consistently assessed by 78% of caregivers, often by 18%, and rarely by 4%. Pain will be systematically assessed upon admission by 51% of the staff, often by 40%, and rarely by 9%. Pain will be systematically assessed during hospitalization by 67% of the staff, with 33% assessing it upon request (Table 2, 3).

The pain assessment scales acquired by the staff during training are detailed in Figure 6 and Table 3. The Neonatal Acute Pain Scale (DAN) was preferred by 84% of caregivers, while 16% preferred the Neonatal Facial Coding System (NFCS).Among the surveyed caregivers, 49% will always use methods to prevent induced pain, 35% will often use these methods, and 16% will use them rarely. The methods for preventing induced pain that will be used by medical and paramedical staff after the training are detailed in Figure 7 and Table 3.60% of the staff believed that parental presence is not necessary during invasive procedures (Table 3).

Recommendations made by medical and paramedical staff in relation to their department to enhance the management of induced pain in newborns include the conducting of a continuous training on pain management in the newborn, development of written guidelines, involving every caregiver in the management of the child's pain, beginning the involvement of parents in the care strategy, strengthening caregiving measures, and ensuring availability of sufficient numbers of tools and EMLA cream in the ward.

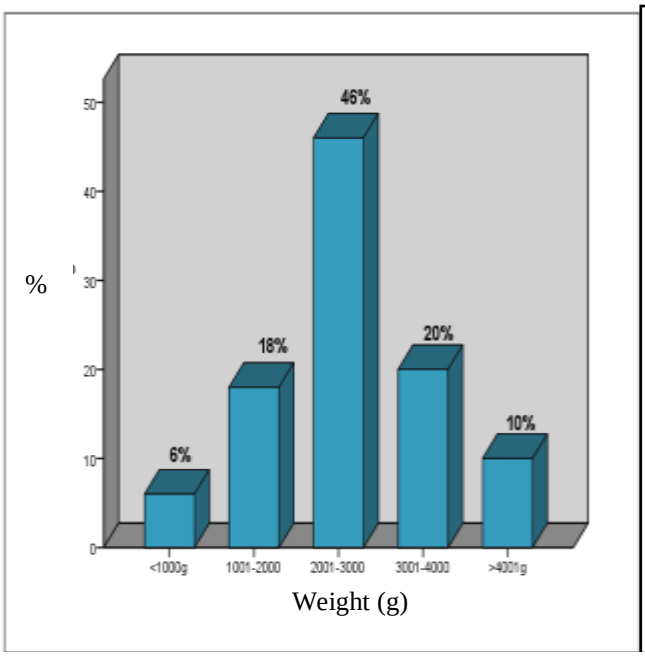


Figure 1:-Distribution by weight.

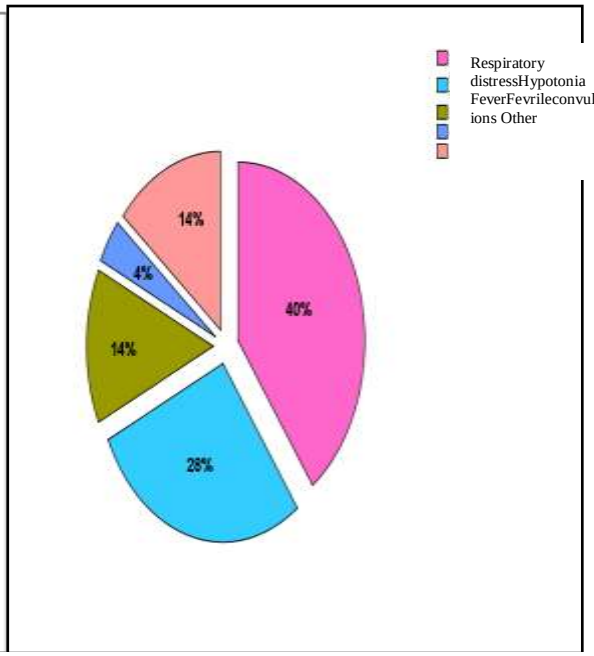


Figure2:-Distribution according to the reason for hospitalization.

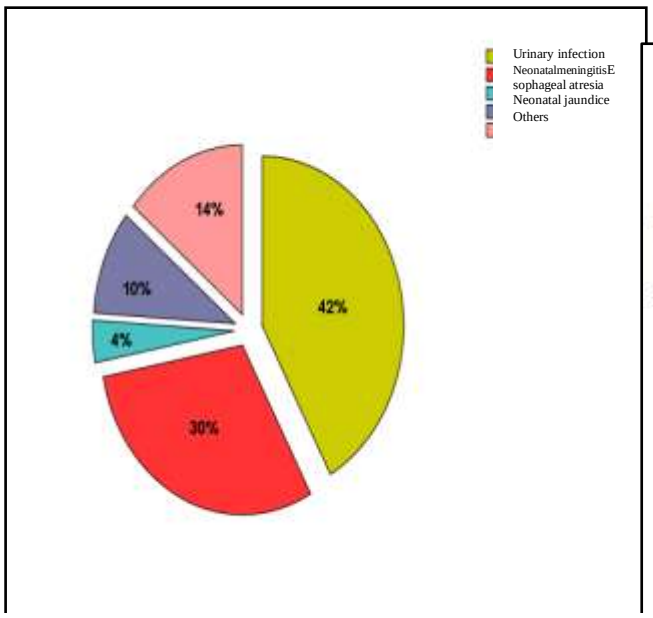


Figure3:-The distribution of newborns according to the diagnosed reason for hospitalization.

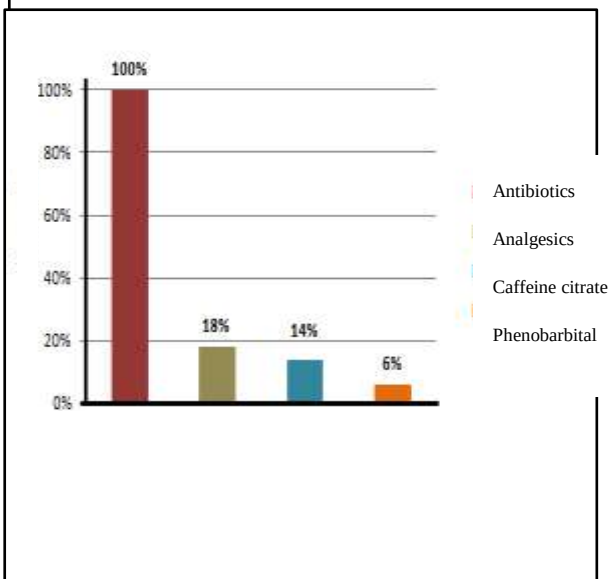


Figure 4 : Received treatments.

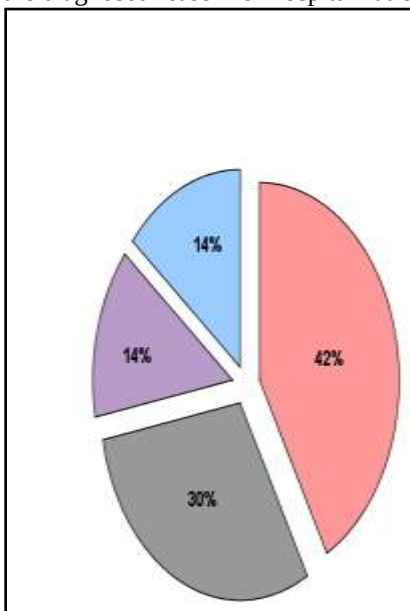
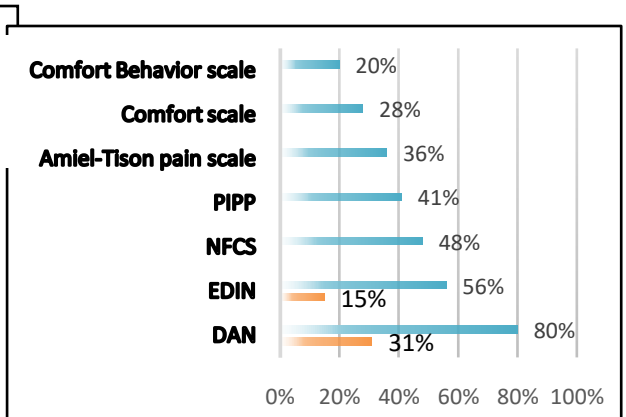


Figure 5:-Medical procedures performed



	DAN	EDIN	NFCS	PIPP	Amiel-Tison pain scale	Comfort scale	Comfort Behavior scale
After	80%	56%	48%	41%	36%	28%	20%
Before	31%	15%	0%	0%	0%	0%	0%

Figure 6:- Distribution of caregivers according to the scale known before training and acquired after training.

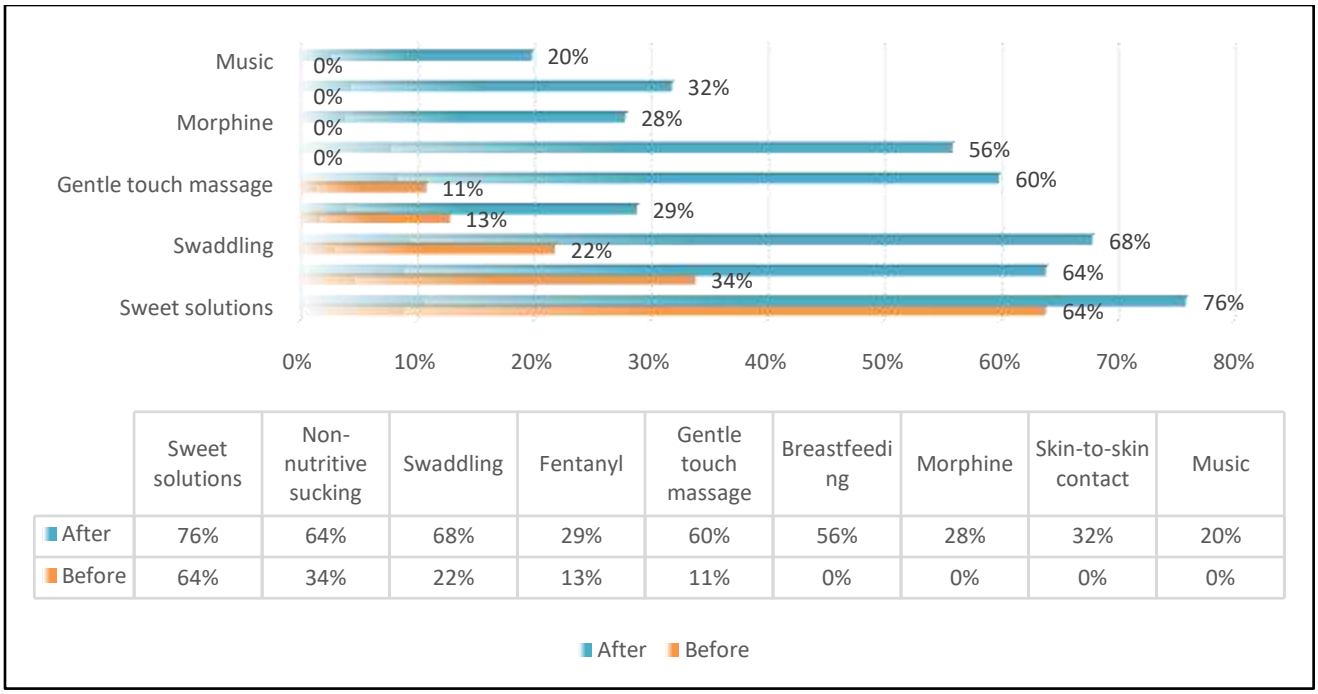


Figure 7:-Methods of preventing induced pain chosen before and after training.

Table 1:-Pain assessment using the DAN scale during and after the procedure.

	Average	**Median**	**Minimum**	**Maximum**
During	4.64	4.50	2	8
After	0.85	1.00	0	3

Table2:-Frequency of pain assessment by medical and paramedical staff before and after training.

		Before (%)	**After (%)**
General assessment	Always	11%	78%
	Often	16%	18%
	Rarely	29%	4%
	Never	44%	-
Upon admission	Systematically	27%	51%
	Often	20%	40%
	Rarely	22%	9%
	Never	31%	-
Duringhospitalization	Systematically	27%	67%
	On demand	62%	33%
	Never	11%	-

Table 3:-The results of the questionnaire before and after the training.

	Before the workshop	**After the workshop**
Number of staff.	45	45
Pain assessment of the newborn.	Never	Always
Pain assessment of the newborn upon admission to the service.	Never	Systematically
Pain assessment of the newborn during hospitalization.	On demand	Systematically
Knownscales	DAN EDIN	DAN EDIN NFCS

		PIPP Amiel-Tison pain scale Comfortscale ComfortBehaviorscale
Management of procedure-related pain	Never	Often
Use of preventive measures.	Sugar solutions Non-nutritive sucking Swaddling Fentanyl Massage	Sugar solutions Swaddling Non-nutritive sucking Massage Breastfeeding Fentanyl Morphine Skin-to-skin contact Music
Encouragement of parental participation in procedures.	No	No

Discussion:-

The assessment and management of pain are considered an important aspect in newborn care [13-19]. There is evidence that people's pain repetition and duration can change the further development of the pain system and negative behavior changes in the baby [7-19]. Besides, most of the international organizations, including the American Pain Society, support this standard and encourage frequent pain monitoring and teaching opportunities in managing pain [14-17, 20-23].

Cross-sectional study in September 2005 – January 2006 in tertiary centers in the Paris area including 430 newborns. Male infants were 55 percent and this presented a sex ration of 1/19. 22 with seventy two percent of them being preterm and with an average birth weight of 1962grams. We had a study sample of 98 new-borns and among them 56 percent were females and male to female ratio was 1:1. 27. The low-birth-weight infants were 42%, with mean weight of 2538 grams (Table 4).

According to a French study conducted from December 1, 2012, to December 31, 2013, at the UHCof Amiens, a two-week training program was implemented consisting of short, repeated sessions held in four units: The units that exist in the newborn facility include the neonatal intensive care unit, neonatology unit, kangaroo care unit, and maternity unit. Ibid fact, from Table 5, shows that they trained 88 (53. 7%) neonatology staff.

According to the study by E. Carpentier et al. [24], following the training program, pain assessment by healthcare providers "at least once daily" increased by 39.0%, and assessment "at least once per shift" increased by 21.5% one week after the training. In our series, we found that 44% of caregivers never performed pain assessments, while only 11% always conducted them. After the training, 78% of our caregivers report that they will always assess pain, while 4% will rarely conduct these assessments

According to the study by E. Carpentier et al. [24], the pain assessment rate "upon admission to the unit" before and one week after the training program increased by 7.7% in the neonatal intensive care unit (81.2% to 88.9%), by 20.7% in the neonatology unit (46.1% to 76.9%), by 9.0% in the kangaroo care unit (90.9% to 100%), and remained unchanged at 100% in the maternity unit (100% to 100%).

In our pre-training self- survey, 31 percent indicated that they never assessed the patients for pain on admission Contrary to this, only 27 percent reported that they always assessed the patients on pain. At the end of the training, more than half of the caregivers responded that they will assess pain on admission systematically though 9% said they will rarely do it. A small but significant portion of the staff never assessed for the patient's pain during hospitalization before having undergone the training: 27 percent systematically assessed for pain before the training, while 11 percent never did. The training increases children's awareness of pain assessment and response. There is an observed improvement, as 67% of the caregivers answering that they will assess pain systematically during hospitalization, and 33% will assess pain on demand.

A randomized trial carried out in 2014 on five university Neonatal Units in Madrid, Spain, pointed to breastfeeding as a sufficiently potent non-drug analgesic for premature children, born at a gestational age of over 28 weeks, and compared it to sucrose. Breastfeeding may also be convenient and preferred for other reasons that include the better absorption of bioavailability, safety, cheaper than buying medicines, and natural happiness that a mother feels when producing a pain reliever for her baby.

A cross-sectional study was carried out in 2014 among newborns who received intramuscular hepatitis B vaccination at Maternity Santa Isabel in Aracaju, Sergipe, Brazil. The identified findings indicated that the 25% glucose solution used on the client two minutes before the painful procedures provided more relief compared to non-nutritive sucking.

Randomized trial in 2015 at Shahid Motahhari Hospital, Marvdasht, Shiraz Province, Iran was done to compare the efficacy and safe use of the breastfeeding, sucrose solution, kangaroo care, EMLA cream. When analyzed by study intervention, breastfeeding was the only method which was found to be effective in the reduction of pain in neonates receiving painful procedures.

A study done in 2016 at Level 3 Neonatal Intensive Care Unit of Shree Krishna Hospital, affiliated to Anand University, Anand, Gujarat, India showed that Kangaroo care along with breast feeding was effective in reducing the pain produced by heel lance compared to breast feeding only.

It highlighted that 58% of caregivers in our series never employed any strategies to prevent induced pain, although 42% of them applied these strategies frequently. Among the employed techniques the usage of sweet solutions was reported in 64% of cases followed by non-nutritive sucking in 35%, swaddling in 22%, Fentanyl in 13%, and massage in 11 % of cases.
Following the training, about 84% of our caregivers reported their plan to often employ the measures of avoiding pain and 16% reported using them seldom.

Firstly, regarding the sweet solutions, 76 percent will employ use of sweet solutions, 68 percent will use swaddling, 64 percent will use non-nutritive sucking, 60 percent will use massage, 56 percent will use breastfeeding, 28 percent will use the morphine and Fentanyl, and 32 percent will use the kangaroo care, while only 20 percent will prefer using music.

Training implications in our study were that, regardless of training, most caregiver's perceptions of IPT and parental presence are that parental presence is not necessary during invasive procedures.

Table4:-Comparative study of epidemiological characteristics.

Series	Headcount	Female (%)	Preterm (%)	Averageweight (g)
Ourseries	98	56	42	2538
Carbajaland al. [25].	430	45	72	1962

Table 5:-Comparative Study of Staff Training on Pain.

Series	Unit	Staff numbers
Our series	The neonatal intensive care unit The neonatology unit	45
E. Carpentier and al.[24]	The neonatal intensive care unit The neonatology unit The kangaroo care unit The maternity unit	88

Table 6:-The most effective method against induced pain in newborns according to studies.

Series	Breastfeeding	Skin-to-skin and breastfeeding	Sugar solutions
Our series			+

L. Collados-Gómez and al. [26]	+		
A.G.C.F. Lima and al. [27]			+
SorooshSoltaniand al. [28]	+		
VIVEK V SHUKLA and al.[29]		+	

Conclusion:-

Medically related procedural pain is cited as one of the major sources of pain in neonates. Crying is an important sign of vital activity; therefore, pain prevention is a significant goal in neonatal care. Procedures that are less invasive but can cause almost unbearable discomfort in children include venous or arterial punctations and heel sticks, and many more. It is, therefore, not possible perform these small gestures without analgesia. One of the possibilities is the application of non-drug interventions including the administration of concentrated sucrose solutions with pacifier sucking and breastfeeding. This is why it is important that the neonatology services must have made written policies that guarantee that all newborn patients will be given adequate analgesic care based on their clinical status. The most effective way to minimize newborn pain is by combining non-pharmacological strategies with medication treatments.

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