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Research Article



Association Between Parents' Perspective on Pain Management with Parents' Stressors of Newborns Hospitalized in Neonatal Intensive Care Units: A Cross-Sectional Study

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Abstract

Background: Infant pain is the most stressful experience for parents. Additionally, the changing role of parents in protecting the baby and their lack of knowledge on how to help their child in the intensive care unit (ICU(is another source of stress for parents.

Objectives: The present study aimed to investigate parents' perspectives on pain management and its association with the stressors experienced by parents of newborns hospitalized in neonatal intensive care units (NICUs).

Methods: This research is a descriptive correlational study. A convenience sampling method was used for the selection of 180 participants. Data collection tools included a demographic characteristics questionnaire, the Parental Stressor Scale (PSS), and the Pain Questionnaire for Neonatal Intensive Care. The validity of the questionnaires was confirmed by Khoy University of Medical Sciences, Khoy, Iran, and reliability was $\alpha = 0.83$. Pearson's correlation, chi-square, and analysis of variance tests were used for data analysis.

Results: Findings indicated a significant difference among subscales of parental stressors (P = 0.047). According to parents' views, the mean pain score felt by the infant was 3.74 ± 3.03 . There was a significant relationship between the maximum amount of pain during the admission of the newborn and parental stress (r = 0.43, P < 0.01). Also the findings show significant relationship between worrying about urgent medical problems when the baby has pain (P = 0.04), receiving information about pain (P = 0.04), use pain relief methods (P = 0.05), reducing the baby's pain with medication (P = 0.003), supporting the staff (P = 0.05), and being next to baby when it is in pain (P = 0.03) with parental stressors in NICU.

Conclusions: The results of this study indicated that pain is one of the sources of parental stress in NICUs. Educating parents on the symptoms of infant pain and involving them in pain management can help reduce parental stress.

Keywords: Pain Management, Parents, Stress, Neonatal Intensive Care Unit

1. Background

Having a newborn in the intensive care unit (ICU) is a frightening experience for parents, with each infant undergoing an average of 10 to 16 painful procedures per day (1, 2). Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, and it is always a subjective concept (3). Pain is a destructive and distressing experience for newborns and can remain in the memory of the baby (4). Painful therapeutic procedures in the

neonatal intensive care unit (NICU) can lead to a series of physiological, learning, and behavioral disorders, attention problems, and hormonal imbalances in newborns, causing neurodevelopmental changes in premature infants who are hospitalized for extended periods (5, 6). The neurobiological vulnerability of premature babies to pain is attributed to their low pain threshold, sensitivity to repeated and continuous pain, and the presence of underdeveloped systems to maintain body balance (7-9). Therefore, special attention to pain control and developmental care is crucial (10).

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As premature newborns are born and hospitalized in the NICU, parents require guidance from health care providers to mitigate their initial shock of seeing the NICU environment and to alleviate concerns about the department's specific policies (11, 12). The involvement of family in the pain management of infants is limited compared to other aspects of care, and few studies have investigated this area (13). Studies in the NICU indicate that insufficient information on painful procedures, inadequate pain management, long waits for pain relief, lack of parental involvement in pain care, and staff's failure to address parents' concerns are significant stressors for parents (14, 15). Effective pain management in the NICU cannot be achieved without a thorough understanding of parents' expectations, awareness, involvement, and consent regarding neonatal pain management (11). It is essential for health professionals to understand parents' perspectives on infant pain before designing interventions to enhance their participation in this area (9).

2. Objectives

Considering that no information was found about the relationship between parents' perceptions of pain management and parental stress in Iran, this study aims to clarify the association between parents' perspectives on pain management and the stressors experienced by parents of newborns hospitalized in NICUs.

3. Methods

A cross-sectional descriptive study design was used in this study. Sampling was conducted using the convenience sampling method among the parents of hospitalized newborns in the NICUs of Emam Khomeini and Amir-Al-Momenin hospitals of Khoy University of Medical Sciences in 2023, with a sample size of 180. The inclusion criteria were a minimum of one visit to the NICU and reading and writing literacy. Exclusion criteria included a previous history of a hospitalized child in the NICU and a history of experiencing stressful factors during the past year.

The data collection tool consisted of three parts:

1. Demographic characteristics: Information about the newborns and parents.

2. Parental Stressor Scale (PSS): Neonatal intensive care unit: Developed by Miles et al. in 1993, this tool has 45 items and four subscales, including sights and sounds, infant appearance, parent-infant relationship, and staff. Each item is scored on a 6-point Likert scale, with scores ranging from 0 (not applicable) to 5 (extremely stressful). A higher score indicates more stress (16, 17).

3. Pain Questionnaire Neonatal Intensive Care: Designed by Franck in 2005, this instrument contains 28 questions based on pain assessment and management, satisfaction with the performance of the treatment staff, satisfaction with providing information to parents of newborns, and how parents participate in pain management. It has both quantitative and qualitative parts. The scores of parents' opinions about their baby's pain (quantitative part) range from 0 (minimum pain) to 10 (maximum pain). The qualitative part includes yes/no questions and Likert scale questions (18).

To collect data, after obtaining permission from the ethics committee of Khoy University of Medical Sciences (Iran), the researchers were present at the hospital to explain the study's objectives and provide informed consent forms to participants. The questionnaires were then given to the parents to complete, taking approximately 20 minutes.

The content validity of the PSS: Neonatal intensive care unit was confirmed by Akbarbegloo et al. in Tabriz, Iran, with reliability assessed using Cronbach's alpha coefficient ($\alpha = 0.86$) (19). The validity of the Pain Questionnaire Neonatal Intensive Care was confirmed by Mehrnoush et al., with a Cronbach's alpha coefficient for reliability of 0.84 (20).

Descriptive statistics, including mean and standard deviation, were used to analyze quantitative data, and frequency (%) was used for qualitative variables. Pearson's correlation test and chi-square test were used to evaluate the relationship between parents' views on pain management and parental stressors. Analysis of covariance (ANCOVA) was used to control the effect of confounders. Data analysis was conducted using SPSS version 19, with a significance level of P < 0.05.

4. Results

The findings indicated that the mean age of mothers was 25.57 ± 5.6 years, and the mean age of fathers was 27.63 ± 4.1 years. Approximately 60.49% of deliveries were cesarean. A total of 85.64% of parents had no previous NICU experience. The majority of neonates (55.2%) were the first child. The mean birth weight was 1685 ± 614 grams, and the average NICU hospitalization was 18 days (Table 1).

The results of the PSS showed that "Presence of monitors and equipment" (64.5%) and "Sudden noises of monitor alarm" (55.7%) were the most significant stressors caused by the sights and sounds of the NICU. There was a difference between the stressful domains

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Abbreviation: NICU, neonatal intensive care unit.

for parents (P = 0.047), with the mean of the parentinfant relationship stressors being higher than other areas (Table 2).

According to the parents, the mean pain score felt by the baby was 3.74 ± 3.03 . The maximum amount of pain felt by newborns was 6.44 ± 3.5 . There was a significant relationship between the maximum amount of pain and parental stress (r = 0.43, P < 0.01) (Table 3).

The majority of parents (78.4%) stated that if their baby feels pain, they may have immediate medical problems. Additionally, 55.1% of parents did not receive any information about pain control, but in most cases, nurses explained how to pat or rock the baby (58.4%). Nearly 64.4% of parents reported that during painful procedures, no one asked them if they wanted to be with the baby. There was a significant relationship between worrying about urgent medical problems when the baby has pain ($\chi^2 = 163.7$, df = 138, P = 0.04), receiving information about pain ($\chi^2 = 163.7$, df = 92, P = 0.04), using pain relief methods ($\chi^2 = 130.4$, df = 92, P = 0.05), reducing the baby's pain with medication ($\chi^2 = 159.4$, df = 124, P = 0.003), supporting the staff ($\chi^2 = 192.8$, df = 128, P = 0.05), and being next to the baby when it is in pain ($\chi^2 = 195.2$, df = 173, P = 0.03) with parental stressors in the NICU (Table 4).

5. Discussion

The findings of the present study showed that the most significant stressors for parents were the sights

Table 2. Comparison of Domains Stressors of Parents with Hospitalized Baby in Neonatal Intensive Care Unit					
PSS: NICU	Mean ± SD	Analysis of Variance			
Sights and sounds stressors	3.12 ± 0.62				
Infant appearance stressors	2.81 ± 0.68	df = 21; $P = 0.047$			
Parent-infant relationship stressors	2.95 ± 0.88	dI = 2.1; P = 0.047			
Staff stressors	1.73 ± 0.56				

Abbreviations: PSS, Parental Stressor Scale; NICU, neonatal intensive care unit.

Variables	Mean ± SD	Parental Stressor
How much pain you think your baby is feeling at this moment?	3.74 ± 3.03	r = 0.01; P = 0.91
The worst pain you think your baby has felt since admission to the NICU.	6.44 ± 3.5	r = 0.43; P = 0.01
The least pain you think your baby has felt since admission to the NICU.	2.24 ± 2.03	r = 0.23; P = 0.89
How much pain you expected your baby would have while in the NICU?	2.39 ± 2.79	r = 0.13; P = 0.34
How much did you expect your baby's pain to be relieved in NICU?	1.83 ± 2.05	r = 0.33; P = 0.57

and sounds of the NICU, followed by the parent-infant relationship. These findings are consistent with the study by Ganguly et al., which confirmed that the most significant stressors were the sights and sounds of the NICU, such as alarms, monitors, and other hospitalized infants (21, 22). This environment not only directly affects the premature infant but also indirectly affects the child through the caregiver's stress and their ability to provide adequate care (21, 23). These factors impact the ability of parents to care for and communicate with their baby, potentially leading to a loss of the parenting role (24).

This study demonstrates a significant relationship between parental stressors and parents' views on pain management in many cases (Table 3). Research also indicates that among many stressful factors, such as hunger, excessive stimulation through noise and light, or separation from parents, pain is the main cause of physical and psychological discomfort that affects the quality of life of parents (25). There was a statistical relationship between parents' stress and their views on creating urgent medical problems when the newborn is in pain. A preliminary study conducted by Petteys indicated no significant difference in stress levels between the palliative care and usual care groups. However, it is important to note that infants referred to palliative care are more critically ill and have higher mortality than other NICU infants, leading to higher stress scores among their parents (26).

The use of methods to calm the infant during pain had a significant relationship with parental stress.

Research has determined that the most effective ways for parents to reduce the pain of premature infants are skin-to-skin care (27) and facilitated tucking (8). According to the results, parents' satisfaction when the infant's pain was controlled by the care team had a significant relationship with parental stress, with greater satisfaction reducing stress. In the Petteys et al.'s study, all parents whose infants received palliative care to reduce pain reported high satisfaction with the care, suggesting that palliative care may reduce stress in parents of the most vulnerable infants (26).

The findings revealed that from the parents' perspective, receiving information and support during the infant's pain, as well as the use of pain relievers, were related to parental stress. Consistent with the results of the present study, Alburaey presented that increasing parents' information about infant pain encourages cooperation in pain control and reduces stress (28). In other studies, more than half of the nurses allowed parents to relieve the baby's pain and taught them about the signs of pain on the infant's face (28-31). Based on the parents' perspective, a quick response to relieve the infant's pain and parents staying with the infant during pain were associated with reduced parental stress. According to the results, the presence of parents with babies, the availability of nurses to answer questions and concerns, honesty in caregiving, and education during discharge had a positive effect on reducing stress and providing non-pharmacological methods of pain control (32, 33).

5.1. Conclusions

Considering that the pain of newborns has negative effects on the healing process of infants and can increase hospitalization duration as well as parental stress, it is recommended that the Department of Newborn Health take basic measures to improve performance in this area. Additionally, a guideline should be formulated for evaluating pain as a fifth vital sign. More attention should be given to the role of parents as the best pain relievers for infants. As infant pain control is an interdisciplinary task, the training of all members of the treatment team should be prioritized. Special attention should be given to infant pain control methods in the curriculum for nurses, neonatologists, and pediatricians.

5.2. Limitations

One limitation that could introduce bias or imprecision was the participant selection limited to hospitals in Khoy city, which may not generalize to the broader population. To mitigate this limitation, sampling was done with maximum variety to increase generalizability. The data were self-reported, which may introduce recall bias or social desirability bias. Participants may not accurately remember past events (recall bias) or may answer in a way they believe is socially acceptable rather than truthful (social desirability bias). To reduce this bias, the researcher was present with the participants while completing the questionnaires and answered their questions.

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Footnotes

Authors' Contribution: M. A. and S. D. developed the original idea and the protocol, abstracted and analyzed data, wrote the manuscript, and is a guarantor. L. G. and A. K. contributed to the development of the protocol, abstracted data, and prepared the manuscript. All authors contributed equally the same in this article.

Conflict of Interests Statement: The authors declare no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: This study is approved under the ethical approval code of IR.KHOY.REC.1402.047.

Funding/Support: The study was supported by Khoy University of Medical Sciences.

Informed Consent: All parents of hospitalized newborns in NICU willing to participate in the study were enrolled after signing informed consent forms.

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Table	4. Association between Parents' stressors and Parents' views on Hospitalized Newborns Pain Management in Neonatal Inte	nsive care onit (Quan	tative variables)
Pain	Questionnaire-NIC	No. (%)	Parental Stressor
If you	ı believe that your baby has felt pain while in the neonatal unit, were you worried that your baby might? ^a		X ² = 163.7; df = 138; P = 0.04
	Have immediate medical problems	141.12 (78.4)	
	Have later medical problems	38 (21.2)	
	React to pain differently when helshe is older	8(4.3)	
	I was not worried about any of these things.	6(3.5)	
How	r monter normation about nain control for your baby have you received?	0 (515)	V ² - 15 4 71 df - 1201 B - 0.15
now	Alor	80 (447)	X = 154.7; 01 = 138; P = 0.15
	Some	50 (27.5)	
	Alittle	30 (16.5)	
	None	20 (11.3)	
How	much written information about pain control for your baby have you received?		$X^2 = 163.7$ df = 92 P = 0.04
	Alot	53 (29.2)	n = 105.7, di = 52,1 = 0.04
	Some	18 (10.2)	
	Alittle	10 (5.5)	
	None	99 (55.1)	
Ifyou	i have received either verbal or written information about pain control for your baby, please tell us when you received this information. ^a		X ² = 158.6; df = 163; P = 0.110
	On admission	61 (34.1)	
	Daily	31 (17.3)	
	Before procedures	3.6 (2)	
	Occasionally	82 (45.9)	
	I did not receive any information.	17 (9.4)	
Who	have you received information from about pain control for your baby? ^a		$X^2 = 121.9; df = 92; P = 0.02$
	Nurse	146 (81.2)	
	Doctor	24 (13.7)	
	Family/Iriends	5 (2.7)	
	Internet	17 (9.4)	
	Under neatticare person	7(4.3)	
**		1/(9.4)	
HOW	satisfied nave you been with the amount of information you have received about pain control for your baby?		$X^2 = 102.9$; df = 92; P = 0.2
	Very satisfied	36 (20.2)	
	Satistied Somewhat satisfied	54 (29.8)	
	Somewhat unsatisfied	8(4.4)	
	Unsatisfied	15 (8.3)	
	Very unsatisfied	11(6)	
The n	urses have shown me how to look for signs of pain in my baby.		$X^2 = 144.2$; df = 163; P = 0.34
	Yes	33 (18.1)	
	No	147 (81.9)	
The n	urses have shown me how to make my haby more comfortable by a		$X^2 = 130.4$ df = 92 P = 0.05
	Positioning	82(45.9)	x = 150.1, di = 52, i = 0.05
	Pacifier	53 (29.4)	
	Swaddling	24 (13.7)	
	Feeding	89 (49.4)	
	Patting or rocking	105 (58.4)	
	Music/toys	0(0)	
	The nurses did not show me.	20 (11)	
How	do you think these ways of comforting your baby have helped your baby's pain?		X ² = 124.8; df = 163; P = 0.03
	Went away	20 (11.3)	
	Decreased a lot	83 (46)	
	Decreased a little	71 (39.5)	
	Made no difference	2 (1.2)	
		2(0.8)	
	Made it a lot worse	2(12)	
I fool	Don i Kulow con fident i that the staff can tell when my babylic in pain	2 (1.2)	2
Tieer	Chandlein chat the start can ten when my baby is in pain.	10 (05 5)	X = 163.7; dI = 92; P = 0.09
	autorigy agree	48 (26.6)	
	Agree Somewhat.agree	31 (17.3) 42 (23.1)	
	Somewhat disagree	11 (6.3)	
	Disagree	31 (17.3)	
	Strongly disagree	17 (9.4)	
Have	you ever disagreed with either the nurses or doctors about whether your baby was feeling pain?		$x^2 = 073$; df = 56; P = 0.30
	Yes	45 (25)	11 575141 5011 055
	No	135 (75)	
Iam	satisfied that the nurses make my baby more comfortable.		X ² = 181.4; df = 150; P = 0.05
	Strongly agree	118 (65.7)	
	Agree	26 (14.2)	
	Somewhat agree	30 (16.9)	
	Somewhat disagree	2 (0.8)	
	Disagree	3(2)	
	Strongly disagree	1(0.4)	
My ba	nby has received medicine for pain.		X ² =159.8; df = 46; P = 0.09
	Yes	46 (25.8)	
	No	58 (32.2)	
	Don't know	76 (42)	
Some	times my baby didn't have pain, but received other medications to make him/her calm.		X ² = 173.8; df = 45; P = 0.35
	Yes	18 (10.3)	
	No	96 (53.2)	

Pain Questionnaire-NIC	No. (%)	Parental Stressor
Don't know	66 (36.5)	
If your baby has received medicine for pain, in what way do you think the medicine has helped your baby's pain?		X ² = 173.8; df = 45; P = 0.35
Went away	35 (19.6)	
Decreased a lot	75 (41.9)	
Decreased a little	50 (28)	
Made no difference	2 (0.8)	
Made little worse	0(0)	
Made lot worse	0(0)	
Don't know	18 (9.7)	
No	155(86.1)	
Very unsatisfied	1(0.4)	
If you felt like the medication did not help your baby's pain, did you tell anyone?		X ² = 191; df = 130; P = 0.42
Yes	25 (13.88)	
No	155 (86.11)	
If you did tell someone, how long did it take before a member of staff did something to help relieve your baby's pain?		X ² =130.4; df=128; P=0.05
Less than 10 minutes	144 (79.9)	
11 - 20 minutes	18 (10.2)	
21-30 minutes	3 (2)	
31-60 minutes	0(0)	
More than 1 hour	2 (0.8)	
I asked but my baby didn't receive it.	1(0.4)	
I never asked for help.	12 (6.7)	
When my baby received pain medication, I was worried that he/she would: ^a		$X^2 = 186.2; df = 128; P = 0.04$
Become addicted	60 (33.3)	
Stop breathing	33 (18.4)	
Be very sleepy	46 (25.9)	
Was terminally ill	24 (13.7)	
Not get enough	12 (6.7)	
I was not worried.	40 (22.4)	
The staff have been supportive with my concerns about my baby's pain.		$X^2 = 192.8$; df = 128; P = 0.05
Strongly agree	96 (53.1)	
Agree	32 (17.7)	
Somewhat agree	37(20.9)	
Somewhat disagree	2 (1.2)	
Disagree	10 (5.5)	
Strongly disagree	3 (1.6)	
Have you been present with your baby while they were undergoing a painful procedure?		X ² = 178.3; df = 92; P = 0.96
Never	75 (41.6)	
Sometimes	68 (38)	
Often	31 (17.3)	
Always	6 (3.2)	
Have you been present with your baby while they were undergoing a painful procedure?		X ² = 177.4; df = 86; P = 0.39
Never	116 (64.4)	
Sometimes	35 (19.4)	
Often	13 (7.5)	
Always	16 (8.7)	
When a painful procedure was being done on my baby I would most often prefer to:	X ² =195.2; df=173; P=0.03	
Stay at my baby's bedside	9 (5.1)	
Stay and assist by providing comfort	93 (51.4)	
Leave the room	78 (43.5)	

Abbreviation: NICU, neonatal intensive care unit.

^a Selecting more than one option was allowed.