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Original article

Stress levels in parents of neonates: an underrated aspect of neonatal intensive care?

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Abstract

Aim: A neonate requiring admission to the Neonatal Intensive Care Unit (NICU) can cause significant stress and anxiety for parents. To evaluate this, a validated questionnaire was used to assess parents' perceptions of stressors within the physical and psychosocial environment of the NICU. Furthermore, the questionnaire aimed to identify socio-demographic factors that play a role in influencing stress levels.

Methods: A validated questionnaire known as the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU), developed by Miles et al., was employed to evaluate parents' stress levels across 4 domains encompassing a total of 34 items. Parental stress levels were classified based on Likert scale points as low (1-2.9), medium (3-3.9), and high (4-5).

Results: The study involved a total of 55 participating parents, with the majority (54.5%) experiencing a medium level of stress. Analysis of socio-demographic factors revealed that mothers with lower levels of education, as well as parents of term neonates and female neonates, exhibited higher stress levels. However, no significant correlations were observed between parental stress levels and factors such as the father's education, parental age, family income, birth order, weight of the neonate, and mode of delivery.

Conclusion: The use of the PSS:NICU in every NICU can aid in identifying parental stress levels and relevant socio-demographic and neonatal factors. This valuable information can be used to provide optimal care for the parents of neonates. By incorporating this approach, we can effectively promote Family-Centered Developmental Care (FCDC) in the NICU setting.

Keywords

Parental stress level, Neonatal Intensive Care Unit, stressor scale, neonatal care, parental response.

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Introduction

The transition from pregnancy to parenthood marks a significant developmental milestone for parents. Typically, parents navigate this transition successfully when their newborn is in good health. However, the birth of a neonate requiring intensive care introduces a considerable amount of stress and anxiety for parents, further complicating the journey from pregnancy to motherhood [1, 2]. Preterm neonates present parents with numerous stressors stemming from their appearance, the Neonatal Intensive Care Unit (NICU) environment, and the perceived helplessness of their newborn [3].

Assisting parents in managing the stress associated with the birth of such neonates is one of the most challenging yet rewarding aspects of healthcare professionals' work. Parents experience feelings of grief and concern regarding their neonate's small size, underdeveloped responses, and overall survival. The separation from their critically ill infant and their inability to care for them intensify these emotions, ultimately impacting the development of the parent-neonate relationship [4-6].

Effective interaction and co-association between parents and healthcare professionals rely on the professionals' understanding of the parents' experiences and their ability to respond with empathy [7]. However, neonatal healthcare workers often have limited opportunities to directly hear the parents' stories. Due to the nature of their work, interactions with parents primarily revolve around the needs of the neonate and are typically brief. Additionally, parents may hesitate to openly express their feelings while their neonate is still hospitalized. To address this, a validated questionnaire called the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU), developed by Miles et al., was created to assess parents' perceptions of stressors within the physical and psychosocial environment of the NICU [8]. This questionnaire serves as a valuable research or therapeutic tool for identifying stressors experienced by parents of babies in the NICU. Identifying these factors can assist healthcare professionals in improving the quality of care and making the challenging role of parents more manageable [7]. Sensitizing parents about the role of NICU doctors and staff nurses, as well as providing information about the anticipated physical appearance and treatment plan for their neonate, may be necessary for healthcare workers. While the stressful nature of the NICU environment, particularly for mothers of ill newborns, has been extensively documented in Western literature, it is crucial for us to study and understand parental stress in NICU admissions within our local setting. It is important to recognize that responses to various stressors can vary socio-demographically and across different locations, emphasizing the need for localized research and understanding [9, 10].

Therefore, the objectives of our study were to quantify the stress levels of parents with neonates admitted to the NICU, identify the primary source of stress, and determine the socio-demographic factors that influence parental stress levels.

Materials and methods

Study design

This was a hospital-based descriptive cross-sectional study conducted from December 2019 to November 2021 in the NICU of a 900-bed tertiary care teaching institute. The NICU consisted of 10 beds and served a rural and semi-urban population in Puducherry, located in the southern part of India.

Sample size

A total of 55 neonates' parents were enrolled in the study. Continuous sampling was employed to include parents of all neonates admitted to the NICU for a duration of more than 3 days within the study period. Parents who provided their consent

and met the inclusion criteria were included in the study.

Sampling method

The study utilized a self-administered questionnaire that was given to the parents to complete.

Inclusion criteria

1. Parents of both term and preterm neonates admitted to the NICU for a duration of more than 3 days.
2. Parents who provided their consent to participate in the study.

Exclusion criteria

1. Parents who refused to participate in the study.
2. Parents of neonates born with major congenital anomalies (as this could be a confounding factor, contributing to additional stress for parents).
3. Parents of neonates who stayed in the NICU for less than 72 hours.
4. Parents with known psychiatric illness.
5. Orphaned babies or babies involved in medico-legal cases.

Study procedure

The study commenced after receiving clearance from the Ethics Committee of the Institution (SMVMCH-ECO/AL/321/2019). Prior to participation, written informed consent was obtained from both the mother and father. Demographic information of the parents, including age, educational qualification, occupation, monthly family income, birth order of the neonate, as well as hospitalization details such as gestational age, birth weight, sex of the neonate, and mode of delivery, were collected. To assess parental stress among neonates admitted to the NICU, the PSS:NICU (a preformed validated questionnaire) was used. The questionnaire was administered in the language that the parents understood, allowing for an accurate measurement of parental stress [8].

The PSS:NICU consists of 4 subscales designed to measure stress in different areas. These subscales include:

a. sights and sounds of the unit (6 items);
b. appearance and behaviors of the infant (11 items);
c. impact on parents' role alteration (10 items);
d. staff behavior (7 items).

In total, there are 34 items in the scale. During the study, each component of these 4 domains was presented to the parents in their preferred language. The interviewer recorded the parents' responses using a Likert scale, where: 0 indicated no experience with the described situation or phenomenon, 1 indicated no stress response, 2 indicated little stress, 3 indicated moderate stress, 4 indicated very stressful, 5 indicated extreme stress in a given situation. Based on the points on the Likert scale, parental stress levels were classified as follows:

- low: 1-2.9;
- medium: 3-3.9;
- high: 4-5.

Statistical analysis

The collected data was entered into Microsoft® Excel®, and statistical analysis was performed using SPSS® software version 17.0. Qualitative variables such as gender, mode of delivery, birth order, and parent's occupation were presented as frequencies and percentages. Maternal age, gestational age, parent's education, income, and birth weights were categorized and summarized as percentages. The scores obtained in each component of the scale (sights and sounds, looks and behavior, parental role alteration, and staff behavior) were presented as mean and standard deviations. To compare the mean scores of each component with demographic and clinical characteristics, independent t-tests or student's t-tests were used. A p-value of less than 0.05 was considered statistically significant, indicating a significant association between the variables being compared.

Results

A total of 55 parents of neonates were included in the study. The distribution of various socio-demographic and neonatal factors is presented in **Tab. 1**. The indications for admission to the NICU are displayed in **Tab. 2**. Among the parents, 54.5% experienced a medium level of stress, 25.5% had a low level of stress, and 20% had a high level of stress. The mean scores for the different domains were as follows: sights and sounds (3.3), looks and behavior (3.4), parental role alteration (3.4), and staff behavior (3.5). The mean scores and standard deviations for each of the 34 items are presented in **Tab. 3**. The highest score (3.7) was observed for

Table 1. Socio-demographic and neonatal factors distribution.

Characteristic		Number	Percentage
Gender of the neonate	Male	33	60
	Female	22	40
Mother's age	< 25 years	12	21.8
	25-30 years	34	61.8
	> 30 years	9	16.4
Parity of mother	Primi	23	41.8
	Multi	32	58.2
Education of mother	Up to 12th standard	51	92.7
	Bachelor's degree	4	7.3
Education of father	Up to 12th standard	12	21.8
	Bachelor's degree	37	67.3
	Master's degree	6	10.9
Mother's occupation	Homemaker	54	98.2
	Working	1	1.8
Father's occupation	Business	17	31
	Organized sector	19	34.5
	Unorganized sector	19	34.5
Monthly family income	< 10,000 INR	4	7.3
	10,000-15,000 INR	29	52.7
	15,000-20,000 INR	13	23.6
	> 20,000 INR	9	16.4
Gestation of the neonate	Early preterm	3	5.5
	Moderate preterm	4	7.3
	Late preterm	28	50.9
	Term	20	36.4
Mode of delivery	Lower segment Cesarean section	45	81.8
	Vaginal	10	18.2
Birth weight of neonate	1-1.5 kg	2	3.6
	1.51-2.5 kg	25	45.5
	> 2.5 kg	28	50.9

Table 2. Cause for Neonatal Intensive Care Unit (NICU) admission.

Reasons for admission	Number	Percentage
TTN	12	21.8
RDS	9	16.4
Pre-term care	6	10.9
Hypoglycaemia	4	7.3
UTI	1	1.8
Cellulitis	1	1.8
Dehydration fever	1	1.8
Neonatal jaundice	11	20.0
Sepsis	10	18.2
Total	55	100.0

RDS: respiratory distress syndrome; TTN: transient tachypnea of the newborn; UTI: urinary tract infection.

Table 3. Mean stress scores for all items in 4 domains.

Item		Mean score	SD
Sights and sound	Presence of monitors and equipment	2.9	0.9
	Constant noises of monitors and equipment	3.2	0.9
	Sudden noises of monitor alarms	3.4	0.8
	Other sick babies in the room	3.6	1.1
	Large number of nurses and doctors in NICU	3.5	1.0
	Having a ventilator to breathe for baby	3.3	1.0
Looks and behavior	Presence of tubes and equipment's on or near my baby	3.4	1.0
	Seeing needles and tubes being put on my baby	3.3	1.0
	Unusual colour of my baby (yellow/pale)	3.3	1.1
	Small size of my baby	3.1	1.0
	Wrinkled appearance of my baby	3.4	0.9
	Baby fed by tube or intravenous line	3.5	1.1
	The limp or weak appearance of my baby	3.7	1.0
	Baby not crying like other babies	3.3	1.1
	Jerky movements of my baby	3.5	1.1
	Seeing my baby in pain	3.3	0.8
	Seeing my baby looking sick	3.3	1.0
Parental role alteration	Being separated from my baby	3.1	1.0
	Not feeding my baby myself	3.4	1.0
	Not being able to care for my baby myself	3.4	1.0
	Not being able to hold my baby when I want	3.1	0.9
	Feeling helpless and unable to protect my baby from painful procedures	3.4	0.9
	Feeling helpless about how to help my baby during this time	3.5	1.0
	Not having time to be alone with my baby	3.4	1.1
	Sometimes forgetting what my baby looks like	3.4	1.0
	Not being able to share my baby with other family members	3.6	0.9
	Feeling that staff is closer to my baby than I am	3.3	0.9
Staff behavior	Using big words	3.3	0.9
	Tell different things	3.4	1.0
	Many different people	3.6	0.8
	Staff worried about baby	3.4	0.8
	Fear staff won't call	3.5	1.0
	Not told enough	3.5	0.9
	Not talk enough	3.5	0.9

NICU: Neonatal Intensive Care Unit; SD: standard deviation.

the item "limp or weak appearance of my baby", while the lowest score (2.9) was noted for the item "presence of monitors and equipment".

Regarding the association between various factors and parental stress levels, a significant difference was found in the sights and sounds domain (p = 0.04) for female neonates (mean = 3.5) compared to males (mean = 3.2). Additionally, significantly higher stress levels were observed for mothers with only school education in the sights and sounds (p = 0.009), looks and behavior (p = 0.03), and parental role alteration (p = 0.02) domains, with mean scores of 3.4 in each domain compared to 2.8, 2.7, and 3.1 in college-educated mothers, respectively. Furthermore, the level of stress was significantly lower (p = 0.01) in the staff behavior domain for parents of preterm neonates (mean = 3.3) compared to term neonates (mean = 3.7). The detailed values can be found in **Tab. 4**.

No statistically significant variations in stress levels were observed in the 4 domains for factors such as father's education and occupation, mother's parity, age, and occupation, family income, mode of delivery, and birth weight of the neonate.

Discussion

A neonate requiring intensive care can significantly impact parents and cause considerable stress [11, 12]. The objective of our study was to identify specific stressors that parents experience, which can aid in developing strategies and protocols for effective communication with families and provide support to healthcare professionals.

Out of the 55 participants in our study, 54.5% reported a medium level of stress, 25.5% had a low level of stress, and 20% had a high level of stress based on the Likert scale responses to the questionnaire. The majority of the neonates admitted to our NICU during the study period were preterm, and the fragile appearance of these neonates contributed to the highest mean stress score of 3.7 for the item "limp or weak appearance of my baby." The second-highest mean stress level of 3.6 was observed for the items "other sick babies in the room" and "not being able to share my baby with other family members." These factors can be addressed by sensitizing parents about their baby's condition, providing reassurance about the level of care provided, and offering psychological support.

Another significant stressor for parents in the study (also with mean stress score of 3.6) was the presence of multiple individuals involved in the care of the baby in the NICU, as observed in the staff behavior domain. This can be attributed to the rotational work shifts of doctors and nurses in the NICU. While this situation may be unavoidable, it is important to inform parents that this system ensures round-the-clock care by trained professionals without compromising their efficiency due to overwork. To address this issue, it could be beneficial to assign a consistent counselor to provide information and support to parents, except in emergency situations.

Similar findings have been reported in studies conducted by Chourasia et al., Dudek-Shriber,

Table 4. Factors with significant association with parental stress levels.

Characteristic	Number	Sights and sound		Looks and behavior		Parental role alteration		Staff behavior		Average score
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Baby gender										
Female	22	3.5	0.6	3.4	0.7	3.6	0.6	3.5	0.6	3.5
Male	33	3.2	0.6	3.3	0.6	3.3	0.6	3.4	0.6	3.3
p-value	-	**0.04**		0.6		0.08		0.4		-
Mother's education										
Up to 12th standard	51	3.4	0.6	3.4	0.6	3.4	0.6	3.5	0.6	3.4
Bachelor's degree	4	2.8	0.2	2.7	0.4	3.1	0.2	3.1	0.5	2.9
p-value	-	**0.009**		**0.03**		**0.02**		0.2		-
Gestational age										
Preterm	35	3.2	0.6	3.3	0.7	3.3	0.5	3.3	0.5	3.3
Term	20	3.5	0.6	3.6	0.6	3.6	0.8	3.7	0.6	3.6
p-value	-	0.2		0.06		0.1		**0.01**		-

SD: standard deviation.

Agrawal and Gaur, and Miles et al., where parental role alteration and looks and behaviors were identified as major contributors to parental stress levels in neonates admitted to the NICU [1, 4, 5, 13]. In our study, although staff behavior had a slightly higher contribution to stress levels, all 4 domains (sights and sounds, looks and behaviors, parental role alteration, and staff behavior) showed comparable stress levels. No single domain could be identified as the primary contributor to stress. Regarding socio-demographic characteristics, parents of female neonates exhibited higher levels of stress compared to parents of male neonates, particularly in the domains of sights and sounds (statistically significant) and parental role alteration (not statistically significant). This shift in stress levels may indicate a change in societal and cultural preferences, as traditionally, male infants have been favored, leading to a significant incidence of female infanticide in our country for many decades. However, the study did not find a statistically significant difference in stress levels based on income, suggesting that lower-income families may not experience additional stress adapting to the responsibilities of parenthood due to financial constraints compared to families with better financial status.

Gestational age at birth and its impact on parental stress levels were examined in our study, with a majority of the neonates being born preterm. Surprisingly, parents of term neonates reported higher levels of stress compared to those of preterm neonates. This finding contradicts a study conducted by Chourasia et al., which indicated that mothers of preterm neonates experienced higher levels of stress [13]. One possible explanation could be that parents of preterm neonates receive more sensitization about the neonate's condition, prognosis, and potential outcomes from healthcare professionals compared to parents of term neonates. Parents of term neonates may also harbor concerns that their neonates might receive less attention and care from doctors and nurses when surrounded by preterm or sicker neonates. These discrepancies can be minimized by providing appropriate and comprehensive counseling to all parents, regardless of whether the neonate is born preterm or at term, addressing the neonate's condition, potential complications, care plan, and expected outcomes.

In the study conducted by Chourasia et al., there was a significant increase in stress levels as the age of the mothers increased, which contrasts with our findings where younger mothers experienced higher stress levels and stress levels decreased with increasing maternal age (although our results were not statistically significant) [13]. Additionally, our study did not assess stress levels at different points during the NICU stay, unlike the study by Agrawal and Gaur [4]. Agrawal and Gaur's study explored stress levels separately for mothers and fathers, revealing that mothers experience more stress than fathers across all subscales and the total scale, with parental role alteration being the most stressful aspect for both mothers and fathers. Mothers had significantly higher stress scores in each subscale and the total scale compared to fathers [4].

Therefore, it is crucial to address all aspects related to the management of neonates in the NICU to create a caring and supportive environment for parents as they navigate through this stressful and challenging situation [14, 15]. This should also be incorporated into the training of healthcare professionals to ensure optimal care within this setting. The findings from studies such as ours can contribute to the implementation of Family-Centered Developmental Care (FCDC) for neonates, aiming to enhance their long-term outcomes [16, 17]. By identifying risk factors for parental stress, healthcare providers can adopt a personalized approach that caters to the unique needs of each family [18-20].

Study limitations

In our study, we assessed the stress levels perceived by parents of neonates by obtaining a combined response from both the mother and father, rather than assessing them individually as done in some other studies. It is important to note that stress responses can vary on a day-to-day basis, depending on the condition, prognosis, and anticipated outcome of the sick neonate receiving intensive care. Additionally, a larger sample size would enable more robust analysis of the results.

Conclusion

In conclusion, our study highlighted that a significant proportion of parents experienced medium levels of stress, with specific stressors related to the appearance of the baby, presence of other sick neonates, and limited sharing of the baby with family members. These findings led us to modify and optimize our parental counseling sessions, considering the socio-demographic

and neonatal factors that showed statistical significance. Staff behavior emerged as an area requiring further attention and training, particularly in communication skills. The current shift towards holistic care emphasizes the importance of considering parental well-being alongside neonatal care in the NICU. Incorporating parental psychological support as part of NICU care can lead to higher satisfaction and trust in the healthcare being provided. Each institution can conduct their own study using standardized questionnaires to identify stress levels and associated factors, allowing them to tailor their protocols for parental care and effective communication.

Ethical clearance

Ethical clearance was obtained from Institutional Ethics Committee.

Declaration of interest

The Authors declare that there is no conflict of interest. Funding: none.

References

1. Miles MS, Funk SG, Kasper MA. The neonatal intensive care unit environment: sources of stress for parents. AACN Clin Issues Crit Care Nurs. 1991;2(2):346-54.
2. Don BP, Chong A, Biehle SN, Gordon A, Mickelson KD. Anxiety across the transition to parenthood: change trajectories among low-risk parents. Anxiety Stress Coping. 2014;27(6):633-49.
3. Meyer EC, Garcia Coll CT, Seifer R, Ramos A, Kilis E, Oh W. Psychological distress in mothers of preterm infants. J Dev Behav Pediatr. 1995;16(6):412-7.
4. Agrawal R, Gaur A. Parent stress in neonatal intensive care unit: an unattended aspect in medical care. Int J Contemp Pediatr. 2016;4(1):148-53.
5. Dudek-Shriber L. Parent stress in the neonatal intensive care unit and the influence of parent and infant characteristics. Am J Occup Ther. 2004;58(5):509-20.
6. Shields-Poë D, Pinelli J. Variables associated with parental stress in neonatal intensive care units. Neonatal Netw. 1997;16(1): 29-37.
7. Bernardo J, Rent S, Arias-Shah A, Hoge MK, Shaw RJ. Parental Stress and Mental Health Symptoms in the NICU: Recognition and Interventions. Neoreviews. 2021;22(8):e496-505.
8. Miles MS, Funk SG, Carlson J. Parental Stressor Scale: neonatal intensive care unit. Nurs Res. 1993;42(3):148-52.
9. Roque ATF, Lasiuk GC, Radünz V, Hegadoren K. Scoping Review of the Mental Health of Parents of Infants in the NICU. J Obstet Gynecol Neonatal Nurs. 2017;46(4):576-87.
10. Kristensson-Hallström I, Elander G. Parents' experience of hospitalization: different strategies for feeling secure. Pediatr Nurs. 1997;23(4):361-7.
11. Benefield DG, Leib SA, Reuter J. Grief response of parents after referral of the critically ill newborn to a regional center. N Engl J Med. 1976;294(18):975-8.
12. Miles MS, Funk SG, Kasper MA. The stress response of mothers and fathers of preterm infants. Res Nurs Health. 1992;15(4):261-9.
13. Chourasia N, Surianarayanan P, Adhisivam B, Vishnu Bhat B. NICU admissions and maternal stress levels. Indian J Pediatr. 2013;80(5):380-4.
14. Treyvaud K, Spittle A, Anderson PJ, O'Brien K. A multilayered approach is needed in the NICU to support parents after the preterm birth of their infant. Early Hum Dev. 2019;139:104838.
15. Sabnis A, Fojo S, Nayak SS, Lopez E, Tarn DM, Zeltzer L. Reducing parental trauma and stress in neonatal intensive care: systematic review and meta-analysis of hospital interventions. J Perinatol. 2019;39(3):375-86.
16. Carter BS, Willis T, Knackstedt A. Neonatal family-centered care in a pandemic. J Perinatol. 2021;41(5):1177-9.
17. Reiter A, De Meulemeester J, Kenya-Mugisha N, Tagoola A, Kabajaasi O, Wiens MO, Duby J. Parental participation in the care of hospitalized neonates in low- and middle-income countries: A systematic review and meta-analysis. Front Pediatr. 2022;10:987228.
18. Hames JL, Gasteiger C, McKenzie MR, Rowley S, Serlachius AS, Juth V, Petrie KJ. Predictors of parental stress from admission to discharge in the neonatal special care unit. Child Care Health Dev. 2021;47(2):243-51.
19. Caporali C, Pisoni C, Gasparini L, Ballante E, Zecca M, Orcesi S, Provenzi L. A global perspective on parental stress in the neonatal intensive care unit: a meta-analytic study. J Perinatol. 2020;40(12):1739-52.
20. Smith VC, Steelfisher GK, Salhi C, Shen LY. Coping with the neonatal intensive care unit experience: parents' strategies and views of staff support. J Perinat Neonatal Nurs. 2012;26(4):343-52.