Mod Care J. 2023 April; 20(2):e131902. https://doi.org/10.5812/modernc-131902.

Published online 2023 January 27. **Research Article**

Assessment of Stressors in Parents of Premature Neonates Hospitalized at NICU of Ali-Ibn-Abitaleb Hospital of Rafsanjan, Iran, in 2021: A Cross-sectional Study

Narjes Soltani [1], Reza Derakhshan [2], Azadeh Moghadam [3] and Tabandeh Sadeghi [1, 3, *]

[1] Non-communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran
[2] Department of Pediatrics, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
[3] Department of Pediatric Nursing, School of Nursing and Midwifery, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

[*] *Corresponding author*: Department of Pediatric Nursing, School of Nursing and Midwifery; Non-communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. Email: t.b_sadeghi@yahoo.com

Received 2022 September 20; **Revised** 2022 November 28; **Accepted** 2022 December 13.

Abstract

Background: The hospitalization of premature neonates in the neonatal intensive care unit (NICU) is very stressful for parents.
Objectives: This study aimed to assess the stressors in parents of premature neonates hospitalized at the NICU in Ali-Ibn-Abitaleb Hospital of Rafsanjan, Kerman, Iran, within November 2020 to September 2021.
Methods: This cross-sectional descriptive study was conducted at the NICU of Ali-Ibn-Abitaleb Hospital of Rafsanjan. A total of 204 parents with premature neonates admitted to the NICU were selected by the convenience sampling method. The data collection tool was a demographic data form and the Parental Stress Scale: Neonatal Intensive Care Unit. The data were analyzed using descriptive and analytic statistic tests, such as the one-sample *t*-test, by SPSS software (version 22).
Results: The most stressful item was in the "sights and sounds" domain belonging to "sudden alarm noises" for both parents, and "needles and tubes put in" in the "neonate's behavior" domain. The major causes of stress in "parental role alterations" subscales were relevant to "feeling helpless about how to help neonate" and "being separated from neonate" in fathers and mothers, respectively. The comparison of parental stress scores in the total scale for mothers and fathers showed that mothers had higher stress scores in "sights and sounds" and "neonate's behavior" domains; however, fathers' scores were higher in "parental role alterations" without any significant differences ($P > 0.05$).
Conclusions: Parents of premature neonates deal with NICU stress levels. Nurses' manners concerning parents play a major role in handling the stressed situation.

Keywords: NICU, Neonates, PSS, Stressors, Parents

1. Background

Most deaths in newborns without congenital disorders have been reported due to prematurity. Approximately 10 - 12% of neonates worldwide are born prematurely; however, the rate is gradually rising (1). The principal prematurity consequences are neonatal sepsis, pneumonia, bronchopulmonary dysplasia, perinatal death, cerebral palsy, and intraventricular hemorrhage (2). The hospitalization of premature neonates in the neonatal intensive care unit (NICU) reduces the mortality rate of neonates, although it can be a stressful and unanticipated event for parents (3).

The NICU is a site of medical treatment for premature and critically ill infants. Parents of infants admitted to this ward experience disruptions to parent-infant bonding (4-6). Admitting premature neonates to the NICU would be a traumatic stressor, especially for a long time (7, 8). Therefore, NICU admission impairs parents' ability to think (9-11). The lack of preparation for parenthood and hospitalization itself, along with grief and isolation, all contribute to a challenging emotional situation for parents. Parents are exposed to a mixture of emotions, such as anxiety, worry, fear, guilt, and helplessness, associated with premature birth (12, 13). The disruption of the parent-infant emotional attachment during hospitalization is the major factor in parents' distress (5). The barriers to parenting and reactions to the environment might negatively influence the parent-infant relationship (14, 15).

Previous studies have reported that disruption of parents' relationship with the treatment staff is common (16, 17). The therapeutic relationship between the treat-

ment staff and parents is crucial to ensure the health of neonates (17). Sometimes, neonates' appearance and unfamiliar technological devices and equipment attached to the neonates might adversely affect parents (18, 19). The stress level of parents will be reduced by providing the necessary information through nurses (17).

Parental stress has been reported in different ways. In a study, the negative effects (e.g., the level of stress) in mothers have been reported more than in fathers (20). Shaw et al. showed the levels of posttraumatic stress disorder at 33% and 9% in fathers and mothers, respectively (21). Parental stress due to hospitalizing neonates at the NICU has been widely investigated (22-27). In this regard, Lindberg and Ohrling demonstrated a significant level of anxiety and depression during prematurity and hospitalization in some parents who did not expect to have a premature neonate (28). The link between NICU hospitalization and anxiety has been described due to lack of parental control over the neonate health situation (29). Moreover, the main cause of anxiety in parents of premature neonates has described strange situations and loss of control over neonates in Iran (30).

2. Objectives

Parental stress might negatively influence neonates' social, behavioral, and functional development (31). Parental support is an integral part of family-centered care at the NICU. Nurses should recognize the stress-boosting factors in parents and remove their needs to improve the neonate's developmental outcome (27). For this reason and the lack of studies in this regard, this study aimed to assess the stressors in parents of premature neonates admitted to the NICU at Ali-Ibn-Abitaleb Hospital of Rafsanjan, Kerman, Iran, within November 2020 to September 2021.

3. Methods

This cross-sectional descriptive study was conducted on 204 parents aged 18 - 44 years with premature neonates admitted to the NICU of Ali-Ibn-Abitaleb Hospital of Rafsanjan, Kerman, located in the southeast of Iran, using convenience sampling. All parents met the inclusion criteria, including the gestational age under 37 weeks, parents' desire to participate, neonate hospitalization of more than 3 days without congenital disorders or abnormalities, and no need for neonate surgery. The parents who avoided filling in the questionnaires were excluded. The data collection tool was a demographic data form, including age, education, occupation, wealth status, number of children, gestational age, spending time with the neonate, and neonate's birth and health status, and the Parental Stress Scale: Neonatal Intensive Care Unit (PSS: NICU).

The Parental Stress Scale: Neonatal Intensive Care Unit, developed in 1993 by Miles et al. (32), with three domains, including "neonate's behavior and appearance" (13 items), "sights and sounds" (6 items), and "parental role alterations" (10 items), was used to measure sources of parents' stress. All the stress items were completed in a self-reported way through a Likert scale rating (0 = not exposed to sources of stress, 5 = extremely stressful). The participants marked only the part related to their experiences in each item. The Iranian validity and reliability of the PSS: NICU have been confirmed by the studies of Borimnejad et al. (33) and Valizadeh et al. (34). Cronbach's alpha coefficients were reported as 0.78 and 0.86, respectively, based on the assessment of the PSS: NICU in both studies. Cronbach's alpha coefficient in this study was 0.81.

The current study was approved by the Ethics Committee of Rafsanjan University of Medical Sciences (IR.RUMS.REC.1398.005). It should be noted that all parents were informed of the confidentiality of the data.

The data were analyzed using SPSS software (version 22). The frequency (percentage) and the mean ± standard deviation were applied for the categorical and quantitative variables, respectively. The one-sample *t*-test was utilized to compare the subscales' scores of mothers and fathers as common parents.

4. Results

Out of 204 parents, 99 mothers and 84 fathers responded to the demographic items. Tables 1 and 2 show the demographic characteristics of parents and neonates. The mean age of mothers and fathers were 29.88 ± 5.39 and 33.84 ± 4.69 years, respectively (Table 1). In this study, 57% and 18% of the mothers were within the age range of 26 - 35 and older than 35 years, respectively. Furthermore, 85.3% of the mothers were homemakers. A high level of education was reported for 78.4% of mothers. Moreover, 50% and 30.4% of the fathers were within the age range of 26 - 35 and older than 35 years, respectively; however, 82.4% of the fathers were self-employed. A high level of education (≥ diploma) was reported for 59.8% of the fathers.

Two-thirds of the parents' Social Wealth Index (SWI) (66.7%) were in the middle. Moreover, 80 responders (78.4%) had 1 or 2 children at home. Additionally, most parents (80.4%) had no dead neonate. The most frequent gestational age (87.3%) was 28 - 36 weeks at birth (Table 1); nevertheless, 52.9% of the neonates were female (Table 2). Regarding neonates, 43.1% were born as the first child. The mean of hospitalized days was reported as 10.52 ± 10.82 (range: 1 - 88 days), and almost half of the neonates (64.7%)

Table 1. Demographic Characteristics of Parents

Characteristics	Mothers (n = 99)	Fathers (n = 84)
Age (y)		
18 - 25	24 (23.5)	2 (2)
26 - 35	57 (55.9)	51 (50)
36 - 45	18 (17.61)	31 (30.4)
Mean ± standard deviation	29.88 ± 5.39	33.84 ± 4.69
Education		
< Diploma	22 (21.6)	36 (35.3)
Diploma	49 (48)	35 (34.3)
> Diploma	31 (30.4)	26 (25.5)
Occupation		
Homemaker	87 (85.3)	-
Employee	15 (14.7)	-
Self-employed	-	84 (82.4)
Governmental	-	17 (16.7)
Gestational age (week)		
< 28	2(2)	
28 - 36	89 (87.3)	
37 - 42	3 (2.9)	
Social Wealth Index	Common	
Low income	14 (13.7)	
Middle income	68 (66.7)	
High income	16 (15.7)	
Child number		
1 or 2	80 (78.4)	
3 or 4	22 (21.6)	
Dead child		
Yes	13 (12.7)	
No	82 (80.4)	

Table 2. Demographic Characteristics of Premature Neonates

Characteristics	Neonates (n = 102)
Gender	
Male	45 (44.1)
Female	54 (52.9)
Age (day)	
Mean ± standard deviation (min-max)	25.31 ± 49.91 (3 - 244)
Child number	
The first	44 (43.1)
The second	34 (33.3)
The third	15 (14.7)
The fourth	4 (3.9)
Connected to ventilator	
Yes	66 (64.7)
No	30 (29.4)
Weight (g)	
Mean ± standard deviation (min - max)	2019.02 ± 555.12 (880 - 2600)
Hospitalized days	
Mean ± standard deviation (min - max)	10.52 ± 10.82 (1 - 88)

Table 3. Comparison of Parental Stressors (n = 204) [a]

Subscales	Mean ± Standard Deviation	P-Value [a]
Sights and sounds		0.145
Fathers	2.40 ± 1.13	
Mothers	2.5 ± 0.97	
Neonate's behavior		0.923
Fathers	2.69 ± 1.11	
Mothers	2.95 ± 1.33	
Parental role alterations		0.145
Fathers	2.69 ± 1.32	
Mothers	2.67 ± 1.23	

[a] One-sample *t*-test.

were eligible to use the breathing support by a ventilator (Table 2).

The comparison of parental stress scores in the total scale for mothers and fathers was performed using the one-sample *t*-test as they had a common neonate. Table 3 shows the comparison for various subscales of the PSS: NICU. Mothers had higher stress scores in the "sights and sounds" and "neonate's behavior" domains; nevertheless, the stress score of the "parental role alterations" domain was higher in fathers. None of these items showed a significant difference.

Table 4 shows descriptive information for the subscales of PSS: NICU scores. The most stressful component in the "sights and sounds" domain was related to "sudden alarm noises" in fathers; however, "other sick neonates" was the least stressful component in the "sights and sounds" domain. "Sudden alarm noises" and "a large number of staff members" were reported as the most and least stressful items in mothers, respectively. Moreover, the highest score of stress in the "neonate's behavior" domain was reported in "needles and tubes put in" for both, followed by "the neonate seemed to be in pain" for fathers and "sadness" for mothers. The major causes of stress in "parental role alterations" subscales were relevant to "feeling helpless about

how to help neonate" and "being separated from neonate" in fathers and mothers, respectively. "Not being able to care for my neonate myself" and "feeling that staff is closer to my neonate" included the least stressful causes in fathers and mothers, respectively.

To determine the effect of independent variables on the variable of parental stressors, multivariate analysis was performed with multiple linear regression. The independent variables were entered into multivariate analysis using the backward method, and only the gestational age variable was significant in the regression model (P = 0.02, adjusted R-squared = 0.038).

5. Discussion

This study aimed to assess the stressors in parents of premature neonates hospitalized at the NICU in Ali-Ibn-Abitaleb Hospital of Rafsanjan within November 2020 to September 2021. Premature neonates are often admitted to the NICU as high-risk cases to decrease morbidity and mortality (3). Previous studies have identified the NICU experience as a traumatic stressor for parents. Turning the stressful environment of the NICU into a family-centered unit for parents with a hospitalized premature neonate is critical to promote the neonatal healthcare process (7, 35-37). At the NICU, the neonate's health status and the treatment protocols were the major causes of parental concern (25).

In this study, the parental stress scores were measured in both parents separately in each item and in total. Based on the results, the most stressful source at the NICU was the "neonate's behavior" followed by "parental role alterations" and "sights and sounds" in both parents. The current study's results are similar to the results of some previous that reported the "neonate's behavior" domain as the leading cause of stress (17, 38) and the "sights and sounds" domain as the least significant (5, 39). In contrast, some studies introduced "parental role alterations" as the major cause of stress in both mothers and fathers (21, 24, 40, 41). The appearance of premature neonates is smaller than mature neonates; therefore, their reaction decreases to physical stimulation. Studies have indicated a reduction in parental stress after the physical response of neonates (42). Otherwise, nurses and treatment groups are effective in the control of parental stress by providing information about the situation and behavior of neonates.

In parental role components, "feeling helpless about how to help neonate" and "being separated from neonate" for fathers and mothers were detected as the experienced stressors with the highest scores, respectively. Parents have no awareness of the treatment process and staff's behavior; they are not also able to care for their neonates by themselves. "Alarm noises" in the NICU atmosphere and "needles and tubes put in" in evaluating the "neonate's behavior" domain were the most stressful sources for both parents, which is consistent with the findings of Ashwani et al. (39). "Alarm noises" includes sound, light, and care activities of neonates. Nurses should inform parents about the used monitors and setting in the NICU environment to reduce stress.

The measurement of mean scores of the PSS: NICU subscales in both parents showed that mothers experienced higher levels of stress in the "neonate's behavior" and "sights and sounds" domains; nevertheless, in the "parental role alterations" domain, fathers were more stressed. In this study, there were no significant differences in total stress scores between mothers and fathers; however, mothers experienced much more stress than fathers, which is in line with the results of previous studies (5, 32, 38, 43-45).

The hospitalization of neonates at the NICU is stressful for both parents; nevertheless, fathers might adopt some strategies to reduce the stress level; however, mothers might have a negative evaluation of their neonates' difficulties (5). Mothers are more concerned about the neonates' future health and losing the neonate than fathers (25). Parents spend much time and cost to understand the NICU atmosphere, and naturally their feelings overcome after the neonate is hospitalized (46).

The limitation of the current study was the reluctance and the lack of mental and psychological readiness of parents due to their child's illness. Accordingly, it was tried to minimize this limitation by establishing appropriate communication and explaining the project's objectives. The convenience sampling method was another limitation that could limit the generalizability of the results. It is suggested to perform other studies similar to this study with a larger sample size.

5.1. Conclusions

Overall, parents are forced to scrimmage with many stressors during the hospitalization time of neonates at the NICU. Nurses are responsible for providing information and respond the parents' questions about the healthcare process of their neonates in understandable terms. This issue enables nurses to support parents in emotional aspects and encourage them to communicate with their neonates.

Acknowledgments

The authors would like to express their gratitude to all the authorities of the Research and Technology Deputy

Table 4. Level of Stress in Parents Measured by the Parental Stress Scale: Neonatal Intensive Care Unit (n = 102) [a]

Subscales and Components	Fathers						Mothers					
		Exposure (Stress Level)						Exposure (Stress Level)				
	No Exposure	1	2	3	4	5	No Exposure	1	2	3	4	5
Sights and Sounds												
Presence of monitors and equipment	10 (9.8)	18 (17.6)	22 (21.6)	19 (18.6)	23 (22.5)	10 (9.8)	11 (10.8)	6 (5.9)	22 (21.6)	32 (31.4)	24 (23.5)	7 (6.9)
Noise of monitors and equipment	16 (15.7)	13 (12.7)	19 (18.6)	21 (20.6)	21 (20.6)	12 (11.8)	11 (10.8)	8 (7.8)	17 (16.7)	31 (30.4)	26 (25.5)	9 (8.8)
Sudden alarm noises	20 (19.6)	8 (7.8)	17 (16.7)	11 (10.8)	28 (27.5)	18 (17.6)	12 (11.8)	1 (1)	14 (13.7)	21 (20.6)	33 (32.4)	21(20.6)
Other sick neonates	18 (17.6)	31 (30.4)	8 (7.8)	29 (28.4)	13 (12.7)	3 (2.9)	15 (14.7)	22 (21.6)	18 (17.6)	24 (23.5)	18 (17.6)	5 (4.9)
A large number of staff members	9 (8.8)	21 (20.6)	22 (21.6)	29 (28.4)	11 (10.8)	10 (9.8)	14 (13.7)	35 (34.3)	18 (17.6)	29 (28.4)	6 (5.9)	0 (0)
Connected to a ventilator to breathe	12 (11.8)	26 (25.5)	16 (15.7)	30 (29.4)	12 (11.8)	6 (5.9)	16 (15.7)	17 (16.7)	18 (17.6)	32 (31.4)	13 (12.7)	6 (5.9)
Neonate's Behavior												
Tubes and equipment	11 (10.8)	18 (17.6)	32 (31.4)	32 (31.4)	16 (15.7)	17 (16.7)	10 (9.8)	9 (8.8)	17 (16.7)	18 (17.6)	35 (34.3)	13 (12.7)
Bruises	19 (18.6)	3 (2.9)	17 (16.7)	21 (20.6)	17 (16.7)	25 (24.5)	12 (11.8)	11 (10.8)	14 (13.7)	12 (11.8)	33 (32.4)	20 (19.6)
Neonate's color	29 (28.4)	4 (3.9)	20 (19.6)	18 (17.6)	13 (12.7)	18 (17.6)	13 (12.7)	9 (8.8)	14 (13.7	24 (23.5)	19 (18.6)	23 (22.5)
Labored breathing	23 (22.5)	8 (7.8)	15 (14.7)	21 (20.6)	13 (12.7)	22 (21.6)	19 (18.6)	6 (5.9)	13 (12.7)	16 (15.7)	28 (27.5)	20 (19.6)
Size	17 (16.7)	20 (19.6)	17 (16.7)	15 (14.7)	19 (18.6)	14 (13.7)	12 (11.8)	10 (9.8)	20 (19.6)	22 (21.6)	18 (17.6)	20 (19.6)
Wrinkled appearance	27 (26.5)	13 (12.7)	12 (11.8)	21 (20.6)	15 (14.7)	14 (13.7)	22 (21.6)	11 (10.8)	24 (23.5)	15 (14.7)	11 (10.8)	19 (18.6)
Needles and tubes put in	10 (9.8)	4 (3.9)	6 (5.9)	21 (20.6)	21 (20.6)	40 (39.2)	9 (8.8)	5 (4.9)	8 (7.8)	22 (21.6)	22 (21.6)	36 (35.3)
Neonate fed by tube	20 (19.6)	7 (6.9)	9 (8.8)	18 (17.6)	19 (18.6)	29 (28.4)	21 (20.6)	10 (9.8)	7 (6.9)	10 (9.8)	31 (30.4)	23 (22.5)
Neonate seemed to be in pain	17 (16.7)	4 (3.9)	12 (11.8)	25 (24.5)	22 (21.6)	22 (21.6)	22 (21.6)	5 (4.9)	6 (5.9)	15 (14.7)	16 (15.7)	38 (37.3)
Sadness	16 (15.7)	4 (3.9)	18 (17.6)	19 (18.6)	20 (19.6)	25 (24.5)	14 (13.7)	4 (3.9)	6 (5.9)	13 (12.7)	26 (25.5)	39 (38.2)
Limp and weak	9 (8.8)	20 (19.6)	17 (16.7)	17 (16.7)	13 (12.7)	26 (25.5)	18 (17.6)	8 (7.8)	6 (5.9)	16 (15.7)	24 (23.5)	30 (29.4)
Movement	24 (23.5)	4 (3.9)	16 (15.7)	19 (18.6)	15 (14.7)	24 (23.5)	20 (19.6)	3 (2.9)	10 (9.8)	15 (14.7)	23 (22.5)	31 (30.4)
Cry	33 (32.4)	11 (10.8)	18 (17.6)	22 (21.6)	16 (15.7)	2 (2)	27 (26.5)	11 (10.8)	15 (14.7)	10 (9.8)	30 (29.4)	9 (8.8)
Parental Role Alterations												
Being separated from neonate	15 (14.7)	2 (2)	7 (6.9)	30 (29.4)	17 (16.7)	31 (30.4)	11 (10.8)	4 (3.9)	7 (6.9)	14 (13.7)	28 (27.5)	38 (37.3)
Not feeding my neonate myself	18 (17.6)	8 (7.8)	15 (14.7)	32 (31.4)	16 (15.7)	13 (12.7)	13 (12.7)	12 (11.8)	16 (15.7)	17 (16.7)	19 (18.6)	25 (24.5)
Not being able to care for my neonate myself	24 (23.5)	12 (11.8)	15 (14.7)	36 (35.3)	11 (10.8)	4 (3.9)	20 (19.6)	11 (10.8)	15 (14.7)	22 (21.6)	21 (20.6)	13 (12.7)
Not being able to hold my neonate when I want	19 (18.6)	14 (13.7)	7 (6.9)	38 (37.3)	14 (13.7)	10 (9.8)	22 (21.6)	11 (10.8)	14 (13.7)	19 (18.6)	20 (19.6)	16 (15.7)
Feeling helpless and unable to protect the neonate	12 (11.8)	4 (3.9)	11 (10.8)	37 (36.3)	18 (17.6)	20 (19.6)	18 (17.6)	6 (5.9)	14 (13.7)	14 (13.7)	19 (18.6)	31 (30.4)
Feeling helpless about how to help neonate	15 (14.7)	6 (5.9)	5 (4.9)	37 (36.3)	22 (21.6)	22 (16.7)	12 (11.8)	13 (12.7)	18 (17.6)	13 (12.7)	26 (25.5)	20 (19.6)
Not having time to be alone with neonate	12 (11.8)	3 (2.9)	25 (24.5)	30 (29.4)	15 (14.7)	17 (16.7)	22 (21.6)	12 (11.8)	22 (21.6)	19 (18.6)	17 (16.7)	10 (9.8)
Not being able to share neonate with other family members	12 (11.8)	10 (9.8)	20 (19.6)	36 (35.3)	12 (11.8)	12 (11.8)	10 (9.8)	8 (7.8)	20 (19.6)	21 (20.6)	29 (28.4)	14 (13.7)
Fear of touching or hugging my neonate	12 (11.8)	14 (13.7)	12 (11.8)	20 (19.6)	19 (18.6)	25 (24.5)	19 (18.6)	17 (16.7)	14 (13.7)	16 (15.7)	26 (25.5)	10 (9.8)
Feeling that the staff is closer to my neonate than I am	21 (20.6)	8 (7.8)	21 (20.6)	31 (30.4)	14 (13.7)	7 (6.9)	30 (29.4)	14 (13.7)	23 (22.5)	19 (18.6)	9 (8.8)	7 (6.9)

[a] Values are expressed as No. (%).

of Rafsanjan University of Medical Sciences for supporting this study and all the parents who participated in this study.

Footnotes

Authors' Contribution: T. S. conceived and designed the evaluation and drafted the manuscript. N. S. participated in designing the evaluation, performed parts of the statistical analysis, and helped draft the manuscript. R. D. reevaluated the clinical data, revised the manuscript, performed the statistical analysis, and revised the manuscript. A. M. collected the clinical data, interpreted them, and revised the manuscript. All the authors read and approved the final manuscript.

Conflict of Interests: The authors declare no conflict of interests.

Data Reproducibility: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to confidentiality.

Ethical Approval: The study was approved by the Ethics Committee of Rafsanjan University of Medical Sciences (IR.RUMS.REC.1398.005, link: ethics.research.ac.ir/EthicsProposalView.php?id = 59221).

Funding/Support: This study was supported by grant 98002 from Rafsanjan University of Medical Sciences.

References

1. Kliegman RM, Stanton BM, Geme JS. *Nelson textbook of pediatrics, 2-volume set*. Amsterdam, The Netherlands: Elsevier; 2015.
2. Moore TA, Berger AM, Wilson ME. A new way of thinking about complications of prematurity. *Biol Res Nurs*. 2014;**16**(1):72–82. [PubMed ID: 23034538]. https://doi.org/10.1177/1099800412461563.
3. Lim G, Tracey J, Boom N, Karmakar S, Wang J, Berthelot JM, et al. Hospital costs for preterm and small-for-gestational age babies in Canada. *Birth*. 2009;**750**(999):1–499.
4. Bregman J, Kimberlin LV. Developmental outcome in extremely premature infants. Impact of surfactant. *Pediatr Clin North Am*. 1993;**40**(5):937–53. [PubMed ID: 8414716]. https://doi.org/10.1016/s0031-3955(16)38617-5.
5. Agrawal R, Gaur A. Parent stress in neonatal intensive care unit: an unattended aspect in medical care. *Int J Contemp Pediatr*. 2016;**4**(1). https://doi.org/10.18203/2349-3291.ijcp20164596.
6. Perricone G, Morales MR, De Luca F, Carollo A, Maniscalco F, Caldas Luzeiro J, et al. Coping and parental role competence of mothers of preterm infant. *Minerva Pediatr*. 2014;**66**(3):177–86. [PubMed ID: 24826974].
7. Peebles-Kleiger MJ. Pediatric and neonatal intensive care hospitalization as traumatic stressor: implications for intervention. *Bull Menninger Clin*. 2000;**64**(2):257–80. [PubMed ID: 10842450].
8. Wigert H, Johansson R, Berg M, Hellstrom AL. Mothers' experiences of having their newborn child in a neonatal intensive care unit. *Scand J Caring Sci*. 2006;**20**(1):35–41. [PubMed ID: 16489958]. https://doi.org/10.1111/j.1471-6712.2006.00377.x.
9. Forcada-Guex M, Borghini A, Pierrehumbert B, Ansermet F, Muller-Nix C. Prematurity, maternal posttraumatic stress and consequences on the mother-infant relationship. *Early Hum Dev*. 2011;**87**(1):21–6. [PubMed ID: 20951514]. https://doi.org/10.1016/j.earlhumdev.2010.09.006.
10. Korja R, Latva R, Lehtonen L. The effects of preterm birth on mother-infant interaction and attachment during the infant's first two years. *Acta Obstet Gynecol Scand*. 2012;**91**(2):164–73. [PubMed ID: 22007730]. https://doi.org/10.1111/j.1600-0412.2011.01304.x.
11. Trombini E, Surcinelli P, Piccioni A, Alessandroni R, Faldella G. Environmental factors associated with stress in mothers of preterm newborns. *Acta Paediatr*. 2008;**97**(7):894–8. [PubMed ID: 18474070]. https://doi.org/10.1111/j.1651-2227.2008.00849.x.
12. Sloan K, Rowe J, Jones L. Stress and coping in fathers following the birth of a preterm infant. *Journal of Neonatal Nursing*. 2008;**14**(4):108–15. https://doi.org/10.1016/j.jnn.2007.12.009.
13. Hagen IH, Iversen VC, Svindseth MF. Differences and similarities between mothers and fathers of premature children: a qualitative study of parents' coping experiences in a neonatal intensive care unit. *BMC Pediatr*. 2016;**16**:92. [PubMed ID: 27422718]. [PubMed Central ID: PMC4946152]. https://doi.org/10.1186/s12887-016-0631-9.
14. Bouet KM, Claudio N, Ramirez V, Garcia-Fragoso L. Loss of parental role as a cause of stress in the neonatal intensive care unit. *Bol Asoc Med P R*. 2012;**104**(1):8–11. [PubMed ID: 22788072].
15. Treyvaud K, Lee KJ, Doyle LW, Anderson PJ. Very preterm birth influences parental mental health and family outcomes seven years after birth. *J Pediatr*. 2014;**164**(3):515–21. [PubMed ID: 24359937]. [PubMed Central ID: PMC3950307]. https://doi.org/10.1016/j.jpeds.2013.11.001.
16. Fowlie PW, McHaffie H. Supporting parents in the neonatal unit. *BMJ*. 2004;**329**(7478):1336–8. [PubMed ID: 15576746]. [PubMed Central ID: PMC534850]. https://doi.org/10.1136/bmj.329.7478.1336.
17. Cekin B, Turan T. The stress levels of parents of premature infants and related factors in Nenoatal Intensive Care Units. *Turk J Pediatr*. 2018;**60**(2):117–25. [PubMed ID: 30325116]. https://doi.org/10.24953/turkjped.2018.02.001.
18. Feeley N, Zelkowitz P, Cormier C, Charbonneau L, Lacroix A, Papageorgiou A. Posttraumatic stress among mothers of very low birthweight infants at 6 months after discharge from the neonatal intensive care unit. *Appl Nurs Res*. 2011;**24**(2):114–7. [PubMed ID: 20974070]. https://doi.org/10.1016/j.apnr.2009.04.004.
19. Finlayson K, Dixon A, Smith C, Dykes F, Flacking R. Mothers' perceptions of family centred care in neonatal intensive care units. *Sex Reprod Healthc*. 2014;**5**(3):119–24. [PubMed ID: 25200972]. https://doi.org/10.1016/j.srhc.2014.06.003.
20. Montirosso R, Fedeli C, Del Prete A, Calciolari G, Borgatti R, NeoAcqua Study Group. Maternal stress and depressive symptoms associated with quality of developmental care in 25 Italian Neonatal Intensive Care Units: a cross sectional observational study. *Int J Nurs Stud*. 2014;**51**(7):994–1002. [PubMed ID: 24315196]. https://doi.org/10.1016/j.ijnurstu.2013.11.001.
21. Shaw RJ, Bernard RS, Deblois T, Ikuta LM, Ginzburg K, Koopman C. The relationship between acute stress disorder and posttraumatic stress disorder in the neonatal intensive care unit. *Psychosomatics*. 2009;**50**(2):131–7. [PubMed ID: 19377021]. https://doi.org/10.1176/appi.psy.50.2.131.
22. Al Maghaireh DF, Abdullah KL, Chan CM, Piaw CY, Al Kawafha MM. Systematic review of qualitative studies exploring parental experiences in the Neonatal Intensive Care Unit. *J Clin Nurs*. 2016;**25**(19-20):2745–56. [PubMed ID: 27256250]. https://doi.org/10.1111/jocn.13259.
23. Baia I, Amorim M, Silva S, Kelly-Irving M, de Freitas C, Alves E. Parenting very preterm infants and stress in Neonatal Intensive Care Units. *Early Hum Dev*. 2016;**101**:3–9. [PubMed ID: 27393922]. https://doi.org/10.1016/j.earlhumdev.2016.04.001.
24. Busse M, Stromgren K, Thorngate L, Thomas KA. Parents' responses to stress in the neonatal intensive care unit. *Crit Care Nurse*. 2013;**33**(4):52–9. quiz 60. [PubMed ID: 23908169]. [PubMed Central ID: PMC4394856]. https://doi.org/10.4037/ccn2013715.

25. Heidari H, Hasanpour M, Fooladi M. The experiences of parents with infants in Neonatal Intensive Care Unit. *Iran J Nurs Midwifery Res*. 2013;**18**(3):208–13. [PubMed ID: 23983756]. [PubMed Central ID: PMC3748539].
26. Turan T, Baskale H, Oncel G. Determining the Psychometric Properties of the Turkish Version of the Nurse-Parent Support Tool and the Stress Levels of Parents of Premature Infants Hospitalized in the Neonatal Intensive Care Unit. *Clin Nurse Spec*. 2016;**30**(3):E1–10. [PubMed ID: 27055043]. https://doi.org/10.1097/NUR.0000000000000204.
27. Wormald F, Tapia JL, Torres G, Canepa P, Gonzalez MA, Rodriguez D, et al. Stress in parents of very low birth weight preterm infants hospitalized in neonatal intensive care units. A multicenter study. *Arch Argent Pediatr*. 2015;**113**(4):303–9. [PubMed ID: 26172004]. https://doi.org/10.5546/aap.2015.eng.303.
28. Lindberg B, Ohrling K. Experiences of having a prematurely born infant from the perspective of mothers in northern Sweden. *Int J Circumpolar Health*. 2008;**67**(5):461–71. [PubMed ID: 19186767]. https://doi.org/10.3402/ijch.v67i5.18353.
29. Cleveland LM. A Mexican American mother's experience in the neonatal intensive care unit. *J Perinat Neonatal Nurs*. 2009;**23**(2):178–85. [PubMed ID: 19474590]. https://doi.org/10.1097/JPN.0b013e3181a391fd.
30. Kohan M, Borhani F, Abbaszadeh A, Sultan Ahmadi J, Khajehpoor M. [Experience of mothers with premature infants in neonatal]. *Journal of Qualitative Research in Health Sciences*. 2020;**1**(1):41–51. Persian.
31. Huhtala M, Korja R, Lehtonen L, Haataja L, Lapinleimu H, Rautava P, et al. Associations between parental psychological well-being and socio-emotional development in 5-year-old preterm children. *Early Hum Dev*. 2014;**90**(3):119–24. [PubMed ID: 24418104]. https://doi.org/10.1016/j.earlhumdev.2013.12.009.
32. Miles MS, Funk SG, Carlson J. Parental Stressor Scale: neonatal intensive care unit. *Nurs Res*. 1993;**42**(3):148–52. [PubMed ID: 8506163].
33. Borimnejad L, Mehrnoush N, Seyedfatemi N, Haghani H. [Maternal stressor agents with premature infants in neonatal intensive care units]. *Iranian Journal of Critical Care Nursing*. 2011;**4**(1):39–44. Persian.
34. Valizadeh L, Akbarbegloo M, Asadollahi M. [Stressors affecting mothers with hospitalized premature newborn in NICUs of three teaching hospitals in Tabriz]. *Medical Journal of Tabriz University of Medical Sciences*. 2009;**31**(1):85–90. Persian.
35. Kersting A, Dorsch M, Wesselmann U, Ludorff K, Witthaut J, Ohrmann P, et al. Maternal posttraumatic stress response after the birth of a very low-birth-weight infant. *J Psychosom Res*. 2004;**57**(5):473–6. [PubMed ID: 15581651]. https://doi.org/10.1016/j.jpsychores.2004.03.011.
36. Shaw RJ, Deblois T, Ikuta L, Ginzburg K, Fleisher B, Koopman C. Acute stress disorder among parents of infants in the neonatal intensive care nursery. *Psychosomatics*. 2006;**47**(3):206–12. [PubMed ID: 16684937]. https://doi.org/10.1176/appi.psy.47.3.206.
37. Singer LT, Salvator A, Guo S, Collin M, Lilien L, Baley J. Maternal psychological distress and parenting stress after the birth of a very low-birthweight infant. *JAMA*. 1999;**281**(9):799–805. [PubMed ID: 10071000]. https://doi.org/10.1001/jama.281.9.799.
38. Shields-Poe D, Pinelli J. Variables associated with parental stress in neonatal intensive care units. *Neonatal Netw*. 1997;**16**(1):29–37. [PubMed ID: 9205278].
39. Ashwani N, Rekha NA, Kumar CS. Parental stress experiences with NICU admission in a tertiary care centre. *International Journal of Psychology and Behavioral Sciences*. 2017;**7**(1):27–31.
40. 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. [PubMed ID: 2021521]. https://doi.org/10.4037/15597768-1991-2022.
41. Paulson JF, Dauber S, Leiferman JA. Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*. 2006;**118**(2):659–68. [PubMed ID: 16882821]. https://doi.org/10.1542/peds.2005-2948.
42. Cooke RJ, Griffin I. Altered body composition in preterm infants at hospital discharge. *Acta Paediatr*. 2009;**98**(8):1269–73. [PubMed ID: 19594474]. https://doi.org/10.1111/j.1651-2227.2009.01354.x.
43. 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. [PubMed ID: 30659239]. [PubMed Central ID: PMC7067599]. https://doi.org/10.1038/s41372-018-0310-9.
44. Franck LS, Cox S, Allen A, Winter I. Measuring neonatal intensive care unit-related parental stress. *J Adv Nurs*. 2005;**49**(6):608–15. [PubMed ID: 15737221]. https://doi.org/10.1111/j.1365-2648.2004.03336.x.
45. Matricardi S, Agostino R, Fedeli C, Montirosso R. Mothers are not fathers: differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr*. 2013;**102**(1):8–14. [PubMed ID: 23072502]. https://doi.org/10.1111/apa.12058.
46. Sudia-Robinson TM, Freeman SB. Communication patterns and decision making among parents and health care providers in the neonatal intensive care unit: a case study. *Heart Lung*. 2000;**29**(2):143–8. [PubMed ID: 10739491].