

Exploring of Parental Stress and Anxiety and Its Influencing Factors in Parents of Premature Infants

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ABSTRACT

Background: Preterm infants, defined as those born between 20 and 36 weeks of gestation or weighing less than 2500 grams, present unique challenges for their parents. The increasing rate of preterm births in Taiwan, influenced by factors such as delayed childbearing and the use of assisted reproductive technologies, necessitates a deeper understanding of parental stress and anxiety during NICU hospitalization.

Objective: This study aimed to examine the levels of parental stress and anxiety experienced by parents of preterm infants during their hospitalization period in the NICU.

Methods: A cross-sectional study was conducted with 104 parents of preterm infants admitted to the NICU of a medical center in southern Taiwan. Data were collected using the Parental Stress Scale: Neonatal Intensive Care Unit (PSS: NICU) and the State-Trait Anxiety Inventory (STAI).

Results: The study found significant correlations between parental stress and complications in preterm infants, such as intraventricular hemorrhage ($t = 1.032, p = 0.000$) and infections ($t = 2.606, p = 0.010$). Marital status ($F = 3.975, p = 0.021$), education level ($F = 3.821, p = 0.006$), and occupation ($F = 2.298, p = 0.007$) were significantly associated with stress levels. Mothers exhibited higher trait anxiety than fathers, influenced by cultural and postpartum factors.

Conclusion: The findings highlight the need for healthcare providers to address both the medical and psychological needs of parents during their infant's NICU stay. By providing support, clear communication, and opportunities for parental involvement, healthcare professionals can help reduce parental stress and anxiety, improving outcomes for both parents and their preterm infants.

Keywords

Preterm infants, Parental stress, Parental anxiety, Neonatal intensive care unit.

Introduction

Preterm infants, defined as those born between 20 and 36 weeks of gestation, are classified as premature when delivery occurs prior to 37 weeks gestation [1]. From a weight perspective, neonates weighing less than 2500 grams are also categorized as preterm [2]. According to data released by the Department of Statistics of Taiwan's Ministry of the Interior, the incidence of preterm births

in Taiwan for 2023 was 10.56%, indicating that one in every 10 neonates was born prematurely. The escalating preterm birth rate in Taiwan may be attributed to several factors. These include the recent trend towards delayed marriage and childbearing, with advanced maternal age being associated with a higher risk of preterm delivery. Additionally, the stressors of modern lifestyles may contribute to an increased risk of preterm labor. Furthermore, advancements in assisted reproductive technologies have enabled conception for many couples experiencing infertility, but have also led to a higher incidence of multiple gestations, which are associated with an elevated risk of preterm delivery.

Previous studies have shown that due to the physiological immaturity of preterm infants and associated complications, these neonates require immediate separation from their parents for admission to intensive care units for close observation and care by medical professionals. This process subjects parents to significant stress and numerous challenges [3-5]. The unexpected arrival of a preterm infant often leaves parents unprepared, leading to psychological fear, anxiety, and apprehension about handling the infant. These uncertainties contribute to parental stress [6,7]. While the arrival of a new life is challenging for both first-time and experienced parents, facing an unexpected preterm birth can be particularly stressful. Poor adaptation to this stress, combined with factors such as being first-time parents, insufficient social support systems, and lack of confidence, can lead to severe anxiety [8].

The neonatal intensive care unit environment, particularly during the acute phase of illness when the infant is connected to multiple tubes and machines, accentuates the infant's vulnerability. This further increases parental stress and anxiety regarding their child's uncertain health status [9]. It is crucial for nursing staff to address not only the care of preterm infants but also the concerns and fears of their parents. Timely empathy can alleviate parental stress. By clarifying the sources of stress and correcting cognitive discrepancies, nurses can help reduce parental stress, anxiety, and depressive symptoms, thereby enhancing parental function. This approach assists parents in coping with the unexpected hospitalization of their preterm infant [10].

While past literature has primarily focused on the survival rates of preterm infants, there is a paucity of domestic research examining parental stress during their preterm infant's stay in intensive care units. Consequently, the investigation of anxiety and depression among parents of preterm infants has become increasingly significant [11]. Parents are particularly concerned about the follow-up care, potential complications, and ongoing observation of their preterm infants [5]. Numerous studies have indicated that negative parental emotions, such as parental stress and anxiety, indirectly affect the parent-child relationship, thereby influencing the development of preterm infants [6,12-16]. Therefore, the objective of this study is to examine the parental stress and anxiety experienced by parents of preterm infants during their infant's hospitalization period.

Literature Review

Parental Stress

Parental stress is defined as a significant experience encompassing worry, emotional tension or pressure, and separation anxiety. This includes concerns, nervous tension, imbalance, mother-infant separation, emotional reactions, mental responses, and behavioral reactions [17]. Ashwani, Rekha, and Kumar [18] found that parents of preterm infants experience parental stress. The sources of stress were significantly related to fathers' perceptions of sights and sounds in the intensive care unit and parental role behaviors, which varied with educational level. Baía et al. [5] reported that parents of preterm infants experience parental stress, with mothers

showing higher overall stress levels than fathers. Significant stress sources included the sights and sounds of the unit, the baby's appearance and behavior, and parental role behaviors, all of which varied with educational level. Ionio et al. [19] demonstrated significant parental stress among parents of preterm infants. The main sources of stress were parental role behaviors and the baby's appearance and behavior, with mothers experiencing higher stress levels than fathers. Wormald et al. [7] found significant parental stress in parents of preterm infants, with a notable difference in stress related to sights and sounds when the infant was on a ventilator. These findings align with previous research on parental stress in parents of preterm infants [6,14-16,20].

In Taiwan, Zhuang and Ye [21] reported significant parental stress in parents of preterm infants, with mothers experiencing higher levels than fathers. The highest scores were for "infant appearance and behavior," followed by "changes in parental role," consistent with Ge's [22] findings. However, some studies have shown no significant parental stress in parents of preterm infants. For instance, Palma, Von Wussow, Morales, Cifuentes, and Ambiado [23] found no significant parental stress. They attributed this to factors such as frequent encouragement for parental visits, good doctor-patient relationships, trust in nurses as effective surrogate mothers during hospitalization, and adequate support and health education effectively preventing and reducing stress.

Parental Anxiety During Preterm Infant Hospitalization

Wei, Zhao, Xia, and Lin [24] primarily investigated anxiety levels in mothers of hospitalized preterm infants. Their findings revealed significant anxiety among these mothers. The main sources of anxiety were related to the infant's feeding situation and weight. Cherry et al. [25] examined the impact of preterm infant hospitalization on maternal anxiety. The results showed that mothers of preterm infants experienced significant trait anxiety. The sources of trait anxiety were correlated with the duration of the infant's hospital stay. These findings align with previous research results [6,26]. However, Bowers [27] investigated stress, anxiety, and depressive symptoms in parents of preterm infants during hospitalization. Contrary to other studies, this research found no significant anxiety among parents of preterm infants.

Methods

Research Design

This study employed a cross-sectional research design. The study participants were parents of preterm infants in the neonatal intensive care unit (NICU) of a medical center in southern Taiwan, selected through convenience sampling. The primary subjects included parents of preterm infants admitted to the pediatric intensive care unit of this medical center. The inclusion criteria for preterm infants in this study were as follows: (1) Gestational age below 37 weeks, (2) Birth weight less than 2500 grams, (3) No congenital external malformations at birth, and (4) At least one form of respiratory support, such as mechanical ventilation or intubation.

Research Instruments

Parental Stress Scale: Neonatal Intensive Care Unit (PSS: NICU): This scale was developed by Miles et al. [9] Parental Stress Scale: Pediatric Intensive Care Unit (PSS: PICU). The PSS: NICU aims to measure parents' perceptions of stressors arising from the physical and psychosocial environment of the NICU. It consists of 26 items divided into three subscales: sights and sounds of the unit (5 items), infant appearance and behavior (14 items), and parental role alterations (7 items). Items are scored on a 6-point Likert scale, with NA for "not applicable," 1 for "not at all stressful," and 5 for "extremely stressful." The total score ranges from 1 to 4.73, with a mean of 2.67 (SD=0.92). Higher scores indicate greater parental stress. The Cronbach's alpha for this study was 0.96.

State-Trait Anxiety Inventory (STAI): Developed by Spielberger, Gorsuch, and Lushene in 1970, the STAI is widely used to measure anxiety in adults. Zhong and Long adapted it to Chinese in 1984. The scale consists of 20 items rated on a 4-point Likert scale. Scores range from 20 to 80, with a median of 50. Higher scores indicate higher anxiety levels. Scores of 20-39 indicate mild anxiety, 40-59 moderate anxiety, and 60-80 severe anxiety [28]. The test-retest reliability for STAI-T is 0.755, and Cronbach's alpha is 0.859. The reliability coefficients range from 0.85 to 0.92 for the State Anxiety scale and from 0.86 to 0.92 for the Trait Anxiety scale.

Data Collection Process

After obtaining IRB approval from the hospital, the researcher secured permission from the scale authors before proceeding with scale preparation (see Appendices F, G). For the Parental Stress Scale (PSS: NICU), with Dr. Miles' consent, the researcher translated it into Chinese and then back-translated it to English. Two NICU attending physicians and two pediatric allergy, asthma, immunology, and rheumatology specialists reviewed the translations. The head nurse of the neonatal intermediate care unit then assessed content validity. Five non-healthcare individuals and two sets of parents of preterm infants reviewed the questionnaire for comprehensibility. The researcher personally explained the study's motivation, methods, inclusion criteria, and collection timeline to the NICU nursing supervisor. A total of 104 questionnaires were distributed to parents of preterm infants in the NICU of a southern Taiwan medical center, with a 100% return rate.

Research Ethics

Following approval from the Institutional Review Board, recruitment began after announcement by the NICU head nurse. The researcher personally distributed questionnaires, explaining the study purpose, time required, and participants' rights, including voluntary participation and right to refuse, freedom to choose whether to answer and to stop at any time, anonymity, with data coded numerically and used only for academic research, right to ask questions at any time.

Questionnaires and consent forms were packaged with manila envelopes. After obtaining consent, participants were given approximately 15 minutes to complete the questionnaire, with the option to take it home and return within a day to avoid interfering

with clinical work. Completed questionnaires and consent forms were collected by the researcher, who then coded and entered the data for statistical analysis. The study prioritized respect for participants' rights. Personal data and questionnaire responses were used solely for this research, maintaining strict confidentiality. Only aggregated data was presented, never individual information. Physical data was stored in a locked cabinet accessible only to the researcher and will be kept for five years before destruction.

Results

This study focused on parents of preterm infants in the pediatric intensive care unit of a medical center in southern Taiwan. The research team successfully collected data from all 104 eligible parents, achieving a 100% response rate. The final sample included 109 parents, representing 121 preterm infants due to the inclusion of six sets of twins. The gender distribution was nearly balanced, with 62 fathers (51.2%) and 59 mothers (48.8%) participating.

Participant ages ranged from 20 to 47 years, with a mean age of 35 years. The majority of participants (92%) were married. Educational attainment was relatively high, with 49% holding university degrees. The sample was predominantly composed of native citizens (98%). The largest occupational group worked in the industrial sector (26.4%). The most common monthly income bracket was 20-40 thousand local currency (33.1%). Most parents did not have experience caring for premature infants (89.3%) (see Table 1).

Table 1: Attributes of Parents of Premature Infants (N=104).

Attribute	Count	Percentage
Marriage		
Married	112	92%
Unmarried	9	7%
Education Level		
Junior High School	8	7%
High School/Vocational	30	25%
College	59	49%
Master's Degree	22	18%
Nationality		
Domestic	118	98%
Foreign	3	2%
Occupation		
Military/Civil Service	17	14%
Industrial	32	26.40%
Commercial	16	13.20%
Service Industry	22	18.20%
Healthcare	11	9.10%
Freelance	5	4.10%
Homemaker	18	14.90%
Monthly Income		
No Income	17	14%
Below 20,000	7	5.80%
20,000 - 40,000	40	33.10%
40,000 - 60,000	35	28.90%
60,000 - 80,000	12	9.90%
80,000 - 100,000	2	1.70%
Above 100,000	8	6.60%

Care Experience		
Had Experience with Premature Infant	13	10.70%
No Experience with Premature Infant	108	89.30%
Had Experience with Full-term Infant	47	38.80%
No Experience with Full-term Infant	74	61.20%

Regarding the preterm infants, gestational ages ranged from 24 to 36 weeks, with an average of 32 weeks, which was also the most frequent gestational age. The mean birth weight was 1715 grams. Notably, 88.4% of deliveries were via cesarean section. Most pregnancies (72.7%) resulted from natural conception. First (43%) and second (41.3%) pregnancies were most common. The majority of births were singletons (59.5%). Most infants (89.3%) were born in the study hospital.

All infants in the study experienced respiratory distress (100%), and a significant proportion (26.4%) developed jaundice. These statistics provide a comprehensive overview of the demographic and clinical characteristics of the study population, offering valuable insights into the context of preterm births and parental experiences in this Taiwanese healthcare setting (see table 2).

Table 2: Attributes of Premature Infants (N=62).

Basic Information of Premature Infants	Count	Percentage
Gender		
Male	37	59.70%
Female	25	40.30%
Delivery Method		
Vaginal Delivery	14	11.60%
Cesarean Section	107	88.40%
Conception Method		
Natural Conception	88	72.70%
Assisted Reproductive Technology	33	27.30%
Gravidity		
First Pregnancy	52	43.00%
Second Pregnancy	50	41.30%
Third Pregnancy or More	19	15.70%
Multiplicity		
Singleton	72	59.50%
Twin	49	40.50%
Birthplace		
This Hospital's Delivery Room	108	89.30%
Other Hospitals	13	10.70%
Complications		
Hypothermia	12	9.90%
Respiratory Distress	121	100.00%
Apnea	6	5.00%
Bronchopulmonary Dysplasia	15	12.40%
Patent Ductus Arteriosus	26	21.50%
Hypotension	10	8.30%
Intraventricular Hemorrhage	4	3.30%
Infection	30	24.80%
Jaundice	32	26.40%

Parental Stress Levels During Preterm Infant Hospitalization

The study revealed a wide range of parental stress scores, from a minimum of 26 to a maximum of 123. The mean total score

was 69.36 (SD=23.9), corresponding to 2.65 on the stress scale. Interestingly, these stress levels were lower than those reported in Miles' previous research, suggesting potential cultural or contextual differences in parental experiences or coping mechanisms in this particular setting.

Factors Influencing Parental Stress During Preterm Infant Hospitalization

Several factors emerged as significant influences on parental stress levels. Notably, certain infant complications were strongly associated with increased parental stress. Intraventricular hemorrhage ($t=1.032$, $p=0.000$) and infections ($t=2.606$, $p=0.010$) in preterm infants were significantly correlated with higher parental stress levels. Additionally, parents with previous experience caring for full-term infants reported lower stress levels ($t=-1.998$, $p=0.048$), suggesting that familiarity with infant care may provide some psychological buffer for parents of preterm infants.

Parental characteristics also played a significant role in stress levels. Marital status ($F=3.975$, $p=0.021$), education level ($F=3.821$, $p=0.006$), and occupation ($F=2.298$, $p=0.007$) were all found to be significantly associated with stress levels. This indicates that social and economic factors may influence how parents cope with the NICU experience.

State Anxiety During Preterm Infant Hospitalization

The State Anxiety scale (STAI-S) scores in this study ranged from 21 to 67, with a mean score of 40.25 (SD=10.96). According to the interpretation guidelines [28], scores are categorized as follows: 20-39: Mild anxiety; 40-59: Moderate anxiety; 60-80: Severe anxiety. The mean score of 40.25 indicates that, on average, parents in this study experienced moderate levels of state anxiety during their preterm infant's hospitalization.

Trait Anxiety Among Parents of Preterm Infants

The Trait Anxiety scale (STAI-T) scores ranged from 26 to 72, with a mean score of 42.17 (SD=8.51). Using the same interpretation guidelines, this mean score also falls within the moderate anxiety range.

Factors Influencing Parental Anxiety During Preterm Infants' Hospitalization

During the hospitalization of preterm infants, factors such as intraventricular hemorrhage ($t = 5.083$, $p = 0.000$) and infections ($t = 3.129$, $p = 0.002$) significantly impacted parental anxiety at the 0.05 significance level. However, factors like the infant's gender, delivery method, conception method, birthplace, complications, parental gender, previous experience with preterm or full-term infants showed no significant differences in situational anxiety according to the t-test results. For complications in preterm infants, factors such as apnea ($t = 3.576$, $p = 0.003$), patent ductus arteriosus ($t = 3.918$, $p = 0.000$), intraventricular hemorrhage ($t = 2.921$, $p = 0.015$), infections ($t = 3.118$, $p = 0.002$), and jaundice ($t = 2.546$, $p = 0.013$), along with parental gender ($t = -2.970$, $p = 0.004$) and previous experience with full-term infants ($t = -2.970$, $p = 0.004$), were significantly associated with situational anxiety. Nonetheless,

the t-test indicated no significant differences in trait anxiety based on the infant's gender, delivery method, birthplace, complications, parental gender, marital status, or previous experience with preterm infants. The study found no significant differences (at the 0.05 level) in parental situational and trait anxiety based on factors such as the number of pregnancies, number of fetuses, parental blood type, education level, nationality, and monthly income during the hospitalization of preterm infants. There was a correlation between parental trait anxiety and gestational age ($r = -0.253$, $p = 0.003$) and birth weight ($r = -0.247$, $p = 0.003$), but no correlation with postnatal age or parental age. Similarly, there was no correlation between parental situational anxiety and postnatal age, gestational age, birth weight, or parental age.

In summary, preterm infants with complications like intraventricular hemorrhage and infections are associated with parental situational anxiety. Complications such as apnea, patent ductus arteriosus, intraventricular hemorrhage, infections, jaundice, parental gender, and previous experience with full-term infants are related to parental trait anxiety. Furthermore, gestational age and birth weight of preterm infants are correlated with parental trait anxiety.

Discussion

Parental Stress Levels

The findings of this study show relatively low levels of parental stress, consistent with previous research [19,29,30]. These studies were conducted in developed countries such as Italy, Australia, Finland, and Taiwan. These nations have comprehensive healthcare systems, which likely contribute to lower parental stress levels. In these regions, medical centers are equipped with advanced facilities and staffed with highly trained professionals. Preterm infants are immediately admitted to intensive care units (ICUs) and are cared for by specialists, which alleviates parental concerns since parents do not need to directly care for their sick infants at this stage.

According to Reva Rubin, postpartum psychological changes in women can be divided into three phases: the Taking-in phase, the Taking-hold phase, and the Letting-go phase. Primiparas typically experience these stages more distinctly, while multiparas may progress through them more quickly. The initial two days postpartum are characterized by the Taking-in phase, during which the mother's attention is focused on herself, displaying passive and dependent behavior. The Taking-hold phase occurs from the third to the tenth day postpartum, where the mother begins to pay more attention to her surroundings and learns about the newborn's needs. The Letting-go phase involves adapting to the newborn being a separate entity from the mother, with continuous learning and adjustment [31].

In this study, questionnaires were explained to parents during the Taking-in phase, but due to postpartum fatigue, most were completed on the third day. Some parents returned the questionnaires later. The attending physicians intervened early, informing parents about the disease progression and severity,

while nurses provided immediate ICU introductions and facilitated parent-infant bonding. They also encouraged parental involvement in care, boosting confidence and reducing stress and uncertainty. This supportive approach likely contributed to lower parental stress levels. The healthcare team designed flexible care plans with parents, increased interaction with the preterm infant, and, when feasible, practiced kangaroo care to enhance the parent-child relationship. Stable conditions led to discharge preparations. These comprehensive interventions likely resulted in the observed lower levels of parental stress.

Parental Anxiety Levels

Situational Anxiety (STAI-S)

The study found that parents experienced moderate levels of situational anxiety, aligning with past research findings [25,26,32]. Parents often cannot predict preterm birth symptoms in themselves or their partners. When a preterm baby is born unexpectedly, parents can become overwhelmed and unclear about the medical plan for their infant, fearing adverse outcomes. The preterm infant's stay in the ICU, coupled with fluctuating health conditions and continuous exposure to related information and environments, sustains parental anxiety. Additionally, the lack of emotional outlets and continuous anxiety, without consistent emotional support from professionals focusing solely on the infant's care, exacerbates this anxiety [13].

Trait Anxiety (STAI-T)

Moderate levels of trait anxiety were also observed, similar to previous studies [25,33]. The inability to recognize early signs of preterm labor, a more specialized knowledge area, leaves parents unprepared for the sudden birth of a preterm infant. The lack of understanding of the preterm infant's medical care plan leads to feelings of tension, anxiety, worry, fear, and concern. The immediate separation of parents from their newborns diminishes parent-child bonding, contributing to emotional detachment. As complications in preterm infants develop progressively, parents remain in a constant state of apprehension, leading to increased trait anxiety scores [32,25,26].

The Relationship Between Demographic Characteristics and Parental Stress in Preterm Infants

Parental Stress

The study found a significant relationship between parental stress and complications in preterm infants, specifically intraventricular hemorrhage and infections, consistent with previous research [28]. Parents are particularly concerned about brain development, given that the brain is one of the most critical organs and its development is crucial in a competitive society. Infections raise concerns about conditions like sepsis, meningitis, and pneumonia, which can be fatal.

Marital status also showed a significant relationship with parental stress. Unmarried parents experienced higher stress levels than married parents, indicating a negative correlation, in line with previous studies [12,15]. This could be due to the lack of

spousal and family support, placing all the stress on one parent. Economic and occupational pressures further exacerbate the stress in unmarried parents. However, some studies have found no significant differences in parental stress based on marital status [5]. The sample size in this study was small, suggesting that future research should include equal numbers of married and unmarried parents to minimize errors.

Education level was another significant factor, with lower education levels correlating with higher parental stress. This finding aligns with previous studies [5,7]. Parents with lower education levels may be less knowledgeable about the development and care of preterm infants, leading to greater anxiety. Some literature suggests that lower education levels in mothers are associated with unhealthy habits like smoking, contributing to preterm births [29]. However, other studies found no significant differences in parental stress based on education [20,30], possibly due to the higher education levels in their samples.

Having previously delivered a full-term baby also showed significant differences, as parents of healthy full-term babies might be more shocked and stressed when faced with the birth of a preterm infant needing special care. This aligns with previous findings [34]. However, other studies have found no significant differences in stress levels between parents of preterm and full-term infants [35].

The Relationship Between Demographic Characteristics and Parental Anxiety in Preterm Infants

Situational Anxiety (STAI-S)

The study found significant differences in situational anxiety related to complications such as intraventricular hemorrhage and infections. Parents are highly concerned about brain development, which can lead to cognitive impairments, cerebral palsy, or developmental delays. Infections, particularly bacterial ones, raise fears of sepsis, meningitis, and pneumonia, increasing anxiety about their child's future in a competitive society.

Trait Anxiety (STAI-T)

Mothers exhibited higher trait anxiety than fathers, showing a significant negative difference consistent with previous studies [33]. In many Asian cultures, childcare is often considered the mother's responsibility. Traditional postpartum practices, hormonal changes, and limited opportunities for mothers to visit the infant due to confinement practices may increase anxiety. Mothers with questions may have fewer opportunities to communicate with healthcare providers, leading to heightened anxiety.

Parents who had previously delivered a full-term baby also showed significant differences in trait anxiety. The birth of a preterm infant introduces mixed emotions, including joy, tension, anxiety, fear, and concern. While some studies found no significant differences based on previous full-term deliveries, this discrepancy may be related to individual traits and family support.

There were significant differences in anxiety related to complications such as patent ductus arteriosus, intraventricular hemorrhage, infections, and jaundice [35]. Seeing their infant undergo treatments for these conditions and hearing about the need for long-term monitoring of heart and brain issues can create uncertainty and anxiety. Some mothers might blame themselves for the preterm birth, leading to feelings of failure [36]. Pediatric and obstetric nurses should work together to help mothers understand the factors contributing to preterm birth to prevent family conflicts [37].

Trait anxiety was higher among parents when hearing about critical issues like heart disease, brain conditions, and infections. These concerns are particularly acute in the early postpartum days when parents see their infants undergoing treatments like phototherapy for jaundice, which can involve complete exposure and even blood exchange in severe cases. Such experiences can lead to feelings of sadness, anxiety, and loss of control. Although the healthcare system allows professionals to care for the infants, parents may feel excluded from caregiving, adding to their stress [38]. Allowing parents to participate in caregiving once the infant's condition stabilizes can boost their confidence and satisfaction in their parental role [39]. Parental age showed no significant correlation with anxiety, consistent with previous research [6,24,26,32].

Conclusion

The study identified significant factors influencing parental stress and anxiety during the hospitalization of preterm infants in the NICU. Complications such as intraventricular hemorrhage and infections were strongly correlated with increased parental stress and anxiety. Additionally, parental marital status, education level, occupation, and prior experience with full-term infants significantly impacted stress levels. Mothers exhibited higher trait anxiety than fathers, which was influenced by cultural expectations and postpartum practices. The findings suggest that healthcare providers should address both the medical needs of preterm infants and the psychological needs of their parents. By offering support, clear communication, and opportunities for parental involvement in care, healthcare professionals can help mitigate parental stress and anxiety, ultimately improving outcomes for both parents and their preterm infants.

References

1. Dimes Mo, Howson CP, Kinney MV, et al. Born too Soon The Global Action Report on Preterm Birth Geneva Switzerland. World Health Organization. 2012.
2. Mandy GT, Kim MS. Short-term complications of the preterm infant. UpToDate. Waltham MA UpToDate Inc. 2018b. <http://www.uptodate.com>.
3. Alouini S, Solange RB, Ramos A, et al. Short-term Survival and Morbidity of Extremely premature Infants Born between 20 Weeks and 24 Weeks+6 Days Gestation. J Preg Child Health. 2017; 4.
4. Arockiasamy V, Holsti L, Albersheim S. Fathers' experiences in the neonatal intensive care unit a search for control. Pediatrics. 2008; 121: e215-222.

5. Baía I, Amorim M, Silva S, et al. Parenting very preterm infants and stress in Neonatal Intensive Care Units. *Early Hum Dev.* 2016; 101: 3-9.
6. Alaradi MI. Predictors of uncertainty stress anxiety and depressive symptoms of parents of preterm infants in the neonatal intensive care unit. 2014.
7. Wormald F, Tapia JL, Torres G, 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: 303-309.
8. Vigod SN, Villegas L, Dennis CL, et al. Prevalence and risk factors for postpartum depression among women with preterm and low-birth-weight infants a systematic review. *BJOG.* 2010; 117: 540-550.
9. Miles MS, Funk SG, Carlson J. Parental Stressor Scale: neonatal intensive care unit. *Nurs Res.* 1993; 42: 148-152.
10. Zhuang XL, Wang ZQ, Huang XL. Concept Analysis of Parenting. *Chiayi Christian Hospital Nursing.* 2010; 10: 8-14.
11. Lin YJ. Exploration of the Relationship Between Parenting Roles Division of Labor Physical and Mental Health of Parents of Premature Infants, and the Development of Premature Infants. National Taipei University of Nursing and Health Sciences. Institute of Nursing Research. 2013.
12. Ballantyne M, Benzies KM, Trute, B. Depressive symptoms among immigrant and Canadian born mothers of preterm infants at neonatal intensive care discharge a cross sectional study. *BMC Pregnancy Childbirth.* 2013; 13: S11.
13. Holditch-Davis D, Miles MS, Weaver MA, et al. Patterns of distress in African-American mothers of preterm infants. *J Dev Behav Pediatr.* 2009; 30: 193-205.
14. Mackley AB, Locke RG, Spear ML, et al. Forgotten parent: NICU paternal emotional response. *Adv Neonatal Care.* 2010; 10: 200-203.
15. Miles MS, Holditch-Davis D, Schwartz TA, et al. Depressive symptoms in mothers of prematurely born infants. *J Dev Behav Pediatr.* 2007; 28: 36-44.
16. Parker KH. Parental Mental Health and Infant Outcomes in the NICU A Pilot Study. Loma Linda University. 2014.
17. Heidari H, Hasanpour M, Fooladi M. The experiences of parents with infants in Neonatal Intensive Care Unit. *Iran J Nurs Midwifery Res.* 2013; 18: 208-213.
18. 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: 5.
19. Ionio C, Colombo C, Brazzoduro V, et al. Mothers and Fathers in NICU The Impact of Preterm Birth on Parental Distress. *Eur J Psychol.* 2016; 12: 604-621.
20. Busse M, Stromgren K, Thorngate L, et al. Parents' responses to stress in the neonatal intensive care unit. *Crit Care Nurse.* 2013; 33: 52-59.
21. Zhuang XL, Ye ZX. A Study on the Relationship Between Personality Traits Social Support Perceived Stress and Physical and Mental Responses of Parents of Premature Infants in Intensive Care Units. *Chang Gung Nursing.* 2001; 12: 220-233.
22. Ge YL. Parental Stress in the Neonatal Intensive Care Unit. *Nursing Research.* 1998; 6: 417-435.
23. Palma IE, Von Wussow KF, Morales BI, et al. Stress in parents of hospitalized newborns in a neonatal intensive care unit. *Rev Chil Pediatr.* 2017; 88: 332-339.
24. Wei L, Zhao Y, Xia H, et al. Investigation and Analysis of Postpartum Anxiety in Mothers of Premature Infants. *Shanghai Nursing.* 2017; 49-51.
25. Cherry AS, Mignogna MR, Roddenberry Vaz A, et al. The contribution of maternal psychological functioning to infant length of stay in the Neonatal Intensive Care Unit. *Int J Womens Health.* 2016; 8: 233-242.
26. Holditch-Davis D, Santos H, Levy J, et al. Patterns of psychological distress in mothers of preterm infants. *Infant Behav Dev.* 2015; 41: 154-163.
27. Bowers LK. An Empowerment Program to Reduce Parental Distress and Neonatal Length of Stay. Doctor of Nursing Practice. University of Missouri Kansas City. 2018.
28. Weng MX, Zhou HJ. Parenting Issues and Nursing Care for Parents During the Hospitalization of Premature Infants. *Nursing Journal.* 2016; 63: 114-119.
29. Schappin R, Wijnroks L, Uniken Venema MM, et al. Rethinking stress in parents of preterm infants a meta-analysis. *PLoS One.* 2013; 8: e54992.
30. Turner. The Experience of the Neonatal Intensive Care Unit NICU and NICU Supportive Interventions. 2015.
31. Chen CH, Lin SW, Fang YW, et al. Practical Obstetric Nursing. Taichung City Hwagena. 2005.
32. Carvalho AE, Linhares MB, Padovani FH, et al. Anxiety and depression in mothers of preterm infants and psychological intervention during hospitalization in neonatal ICU. *Span J Psychol.* 2009; 12: 161-170.
33. Melnyk BM, Feinstein NF, Alpert-Gillis L, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment COPE neonatal intensive care unit program a randomized controlled trial. *Pediatrics.* 2006; 118: e1414-1427.
34. Lyndon A, Jacobson CH, Fagan KM, et al. Parents' perspectives on safety in neonatal intensive care a mixed-methods study. *BMJ Qual Saf.* 2014; 23: 902-909.
35. Ahn YM, Kim NH. Parental Perception of Neonates, Parental Stress and Education for NICU Parents. *Asian Nurs Res.* 2007; 1: 199-210.
36. Stefana A, Lavelli M. Parental engagement and early interactions with preterm infants during the stay in the neonatal intensive care unit protocol of a mixed-method and longitudinal study. *BMJ Open.* 2017; 7: e013824.

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37. Matricardi S, Agostino R, Fedeli C, et al. Mothers are not fathers differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr.* 2013; 102: 8-14.
 38. Buys LM. Stress Experienced by Mothers of Neonates in a Private Hospital NICU 575436 MSc Nursing 2013 Research report - Merged copy. 2013.
 39. Qiu XT, Wu PF, Zhang JR. Exploration of Parenting Stress and Early Intervention Service Needs Among Mothers of Premature Infants. *Early Childhood Education Yearbook.* 2017; 28: 123-136.