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Preterm infant, Parental stress, infant clinical conditions

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Material and methods
Ninety parents of middle to late preterm infants filled out the parent distress subscale of the Parenting Stress Index-short form when their children were 1 month old. The scores were compared based on five clinical conditions of preterm infants: Condition 1: infants whose disease occurred before or during delivery; Condition 2: infants whose disease occurred after delivery; Condition 3: infants whose mother had a disease that might induce preterm birth or infant morbidity; Condition 4: infants with infectious disease; Condition 5: infants with respiratory distress. Parental distress scores in different demographic and clinical conditions was compared.

Results
The stress of parents worsen when preterm infants had a disease occurred before and during delivery. In contrast, there was no impact when infant had a disease occurred after delivery. The stress of parents worsened when the preterm infants had respiratory distress. In contrast, there was no impact when infant had an infectious disease. When there was a maternal disease that may induce preterm birth or disease in infants, parental stress would worsen.

Conclusions
The risk factors mentioned above increased parental stress as early as 1 month after delivery. Finding the risk factor as early as possible, and then performing a nursing intervention is crucial to decrease parents' stress when they had preterm infants.

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Introduction

Due to underdeveloped organs, preterm infants have critical medical problems, which increase the morbidity and mortality rates among them. Medical problems may occur before or during the course of delivery [**1,2**], after birth, or during admission [**1,2**]. Moreover, certain diseases of the mother may induce preterm birth or induce morbidity in neonates [**3**]. There are various types of diseases that may occur in preterm infants [**2**].

Although the mortality of preterm infants has decreased in the recent decades, morbidity during admission and other problems still troubled the parents and could induce their stress. To understand the cause of parents' stress in the early days, and then performing nursing interventions to prevent its occurrence is crucial. Most studies investigating the risk factors for parental stress of preterm infants were focused on demographic data, such as father versus mother, education, age of parents, and number of siblings [**4**]. Social support, mother-child interaction [**5**], gestational age, or birth weight were also studied [**6**]. Clinical conditions of the preterm infants were barely studied.

When an infant's disease occurs before or after admission, when mother's disease influences preterm birth or infant morbidity, or when different disease was diagnosed, the impact of parental stress could be different. In this study, we compared parental stress in different clinical conditions of preterm infants during the early days to determine its impact.

Materials and Methods

Design and Participants

This was a single-center cross-sectional study. From April 1, 2020 to May 31, 2021, parents of preterm infants from a teaching hospital in Taichung, Taiwan were randomly recruited using-computer software. The criteria for preterm infants were as follows: single preterm neonate, gestational age 30-37 weeks (middle to late preterm), and birth weight 1500-2500 grams. Preterm infants with heart anomalies, such as congenital heart disease; those with central nervous system diseases, such as intraventricular hemorrhage or epilepsy; and those on mechanical ventilation were excluded. Parents who were younger than 18 years old, those with mental illness or who used psychological medications previously, those with drug abuse, and those who were not married were excluded. The institutional review board of Chung Shan Medical University Hospital, Taichung, Taiwan, approved this study (ethics approval number: CS19135). Written informed consent was obtained from the guardians. This study was prospectively registered at ClinicalTrials.gov, ID: NCT04255797.

Instrument

The Parenting Stress Index-short form (PSI-SF) (Abidin 2012) [**7**], a self-report questionnaire, was used to evaluate parent stress. The Chinese version developed by Weng (2019) [**8**] was used in this study. The questionnaire consists of 36 items rated on a five-point Likert scale. The index contains three subclasses: parental distress, parent child dysfunctional interaction, and difficult child.

The parent distress subscale score represents the stress experienced by parents. The subscales contain 12 items, wherein a higher score correlated to a greater parental stress. In the study, the other two subscales were not used because the questionnaire was arranged when their children were 1 month old, and it was difficult to evaluate parent-child interactions and infant behavior at this age.

Clinical conditions of infant and demographic condition

The clinical conditions of infants in the study included: (1) disease before admission (occurred before or during the course of delivery), including fetal anomalies, complications due to premature rupture of membranes, and meconium aspiration syndrome; (2) disease after admission (that is, occurred during admission), including neonatal infection or pneumonia and necrotizing enterocolitis; (3) maternal disease that may induce preterm birth or disease in infants (noted during the prepartum or intrapartum period), including pre-eclampsia, systemic disease of mother, and gestational diabetes; (4). infectious disease (diagnosed during birth and during admission); and (5) respiratory distress (diagnosed during birth and during admission). The sum of the parent distress subscale scores in the different clinical conditions was evaluated and compared. Parental stress in different demographic conditions (father, mother, high income, low income, male newborn, female newborn) were compared. The criteria of high or low family income were: more or less than 35,000 US dollars per year.

Procedure

The questionnaire was administered to parents who had infants aged 30 days, and after discharge.

Written consent, including the purpose of the study, the study procedure, and other items, was obtained from all the participants. The questionnaire was filled out by the parents at home and then mailed back to the authors.

Statistical analyses

All analyses were performed using PASW (Predictive Analytics Soft Ware) Statistics 18 (IBM, Armonk, NY, USA). The independent t-test was used to compare the mean scores of the "parental distress subscale" of two groups. This included different demographic data and different clinical conditions of infants. The mean scores in different clinical condition, between father and mother; male and female infant; high or low incomes of family were also compared using the independent t-test. If the scores were not normally distributed, we used the log transformed scores for calculation. Multivariate regression analyses were used to adjust for the confounding factors such as father or mother, parental education, family income, infant sex, siblings or not, birth type, and parental age. Two-sided p values < 0.05 were considered statistically significant.

Results

Demographic data

A total of 120 questionnaires were sent out, but only 90 questionnaires were returned (response rate = 75%). The results of the demographic data and total scores of parental distress are presented in Table 1. Ninety parents (44 fathers and 46 mothers) and 90 preterm infants (48 males and 42 females)

participated in the study. There was no statistical difference in the parental distress scores between the different demographic conditions.

Parental stress in different clinical conditions in preterm newborns

The parental distress subscale scores of the different clinical conditions of infants are presented in Table 2. Parental distress scores were higher in those who had infants with a disease before admission (32.1±5.9) than those without (27.0±6.9) ($p = 0.016$, 95% confidence interval (CI) 0.98–9.18). Additionally, parental distress scores were higher when maternal disease was noted than in those without ($p = 0.018$, 95% CI = 0.65–6.73). Parental distress scores of those who had infants diagnosed with respiratory distress were higher than those without ($p = 0.015$, 95% CI 0.90–7.95). However, parental distress scores were not significantly different between infants with and without infection and those with and without disease after admission.

Father and mother's stress in different clinical conditions of infants

The father and mother's distress scores are presented in Table 3. The father's distress scores were high when infants had a disease before admission and when maternal disease was present. In contrast, no obvious difference in maternal distress scores were noted when infants had different clinical conditions.

Comparison of parental stress in different clinical conditions, in male infant and female infant

Parental distress scores in those with male and female newborns is presented in Table 4. In female infants, the parental distress scores were higher when they had respiratory distress and when maternal

disease was present. In male infants, the parental distress scores were higher when preterm infant had a disease before admission.

Comparison of family income and parental stress in different clinical conditions

The parental distress scores in different family incomes is presented in Table 5. In those with higher family income, parental distress scores were higher when infants had a disease before admission and when maternal disease was present. In the high-income group, when comparing the influence of maternal disease, the scores were not normally distributed. Therefore, the scores in this comparison were log-transformed. Then the independent t-test and multiple regression analysis used the log-transformed data for calculations.

Discussion

In this cross-sectional study, we found that the stress of parents would worsen when preterm infants had a disease occurred before or during the course of delivery. In contrast, there was no impact on parental stress when the infant had a disease occurred after delivery, during admission. When there was a maternal disease that may induce preterm birth or disease in infants, parental stress would worsen. The stress of parents worsened when the preterm infants had respiratory distress. In contrast, there was no impact on parental stress when the infant had an infectious disease.

Parental stress was also different in different demographic conditions. When preterm infants had a disease occurred before or during the course of delivery, the stress of fathers, parents with male infants, and parents with high family income would worsen. When there was a maternal disease, the

stress of fathers, parents with female infants, and parents with high family income would worsen. Additionally, when the infants had respiratory distress, the stress of parents with female infants worsened.

Preterm birth often induces parental stress, anxiety, or depression [**9,10**]. Within 1 month of delivery, 52% of the mothers experienced increased stress and 38% had significant depressive symptoms. Higher stress levels were associated with higher depressive scores [**9**]. In very low birth weight infants, the maternal stress declines over time, but post-traumatic stress symptoms remain stable [**10**]. Post-traumatic stress symptoms may cause flashbacks, nightmares, and severe anxiety and have a significant impact on the parental day-to-day life. Depression is a serious medical illness. A previous study indicated that early intervention could reduce stress in parents of preterm babies [**11**]. In addition, determining the factors that increase parental stress is useful in performing nursing intervention to decrease parental stress.

In our study, we found several clinical conditions of preterm infants that might increase parental stress when the infants were 1 month old. Thus, nursing intervention is important to avoid these conditions. In preterm infants, morbidity and mortality most often occurred within 1 month after delivery [**12**]. Therefore, in our study, evaluating the parental stress when the preterm infant was at 1 month old was reasonable. Medical conditions and admission of premature infants prevents parents from taking care of their newborns immediately after birth, interfering with the transition to parenthood [**13**]. It is important for medical and nursing professionals to provide parents with

emotional support, help, and opportunities to discuss problems early to avoid these conditions.

There are a lot of instruments used to evaluate the impact of preterm birth on parental distress, such as the Impact of Event Scale, Parental Stressor Scale: Neonatal Intensive Care Unit [**13**], and Parenting Stress Index. The PSI-SF is widely used in Taiwan [**14**], and the Chinese version of the PSI-SF is well-developed. Therefore, we used PSI-SF to determine the impact of preterm birth on parental stress [**8**]. The parental distress subscale of PSI-SF yields a score that indicates a level of stress resulting from personal factors, such as depression or conflict with a partner, and from life restrictions due to the demands of child-rearing [**15**]. It directly assessed personal factors related to parenting independent of the association with child interaction and behaviors. It is difficult to evaluate parent-child interactions and infant behavior when preterm infants are 1 month old. Therefore, the other two subscales of the PSI-SF were not used in our study.

There are a lot of studies investigating the impact of preterm birth on parental stress. Most studies have investigated the influence of demographic data or social support [**4,5**]. The impact of current medical complications of infants on parental stress is controversial. Allison et al. did not find an association between preterm clinical conditions and parental stress [**16**], but another study found an association [**4**]. In our study, we found that respiratory distress in preterm infants had an impact on parental stress. Ionio et al. found that the baby's need for respiratory support was a significant predictor of maternal stress [**17**]. In our study, although those requiring intubation were excluded, the use of an O_2 tent or O_2 mask might induce parental stress.

The presence of disease before admission and maternal disease means that the morbidity of neonates may result from maternal factors, such as preeclampsia or premature rupture of membrane, and paternal factors, such as hereditary disease. Under these conditions, the parents may blame themselves. Parental self-blame has an impact on parental anxiety and stress [**18**]. In contrast, the diagnosis of disease after admission means that the morbidity of neonates may come from the infant itself, environmental factors, or lack of medical care. Thus, parental self-blame is less. Stoeber et al. found that perfectionistic concerns predicted more frequent self-blame and stress [**19**]. Lee et al. indicated that for fathers, parenting perfectionism was associated with high parenting stress after birth. [**20**]. Those with higher income often showed more perfectionistic strivings. Therefore, parental distress increases in cases of infants with disease before admission or with maternal disease, fathers, or high-income parents. The association between self-blame, perfectionism, fathers, and high-income parents might explain our findings. However, future studies are necessary to confirm this speculation.

Nursing interventions can be implemented to decrease levels of parental stress when they had preterm infants. A 30-minute educational program within the first week of admission could decrease parental stress [**21**]. Educational parental support-group meetings or individual parent-to-parent support was reported to decrease maternal stress 4 weeks after intervention [**22**]. Other nursing interventions, such as learning function of equipment and its role in keeping their infant alive were also be helpful for the decrease of parental stress [**23**]. In our study, we found different clinical conditions that could increase parental stress. Through the nursing interventions mentioned above,

we may be able to decrease parental stress.

There were some limitations to our study. First, the preterm infants were middle to late preterm infants (gestational age 30-37 weeks). Second, unstable preterm infants (with heart anomalies, neurologic anomalies, or intubation) were excluded from our study. Recruiting early or extremely early preterm infants and unstable preterm infants to study the impact on parents' stress is necessary. Third, only the parent distress subscales of the PSI-SF were used for evaluation because the infants in this study were 1 month old. Fourth, parent's cognitive ability is associated with psychological stress responses [**24**]. Fifth, parental smoking and alcohol abuse might influence neonatal health and parental stress [**25**]. We did not evaluate influence of parental cognitive ability, smoking or alcohol abuse in the study. A longer time to follow up in children of different ages, and adding two other subscales of the PSI-SF is recommended. Including unstable preterm infants, including parents with mental illness or who used psychological medications previously, evaluating the effect of parental cognitive ability, alcohol abuse or smoking is also recommended for future studies.

Conclusion

Preterm birth has a negative impact on parental stress. In this study, we found three clinical conditions of preterm infants that might worsen parental stress when the infant was 1 month old. These are: (1) preterm infants with disease that occurred before or during delivery, (2) when the mother had a disease that might induce preterm birth or morbidity, and (3) preterm infants with

respiratory disease. Finding the risk factor first, and then performing a nursing intervention is crucial to decrease parents' stress.

References

1. Khoshnood Shariati M, Karimi Z, Rezaienejad M, Basiri A, Torkestani F, Saleh Gargari S. Perinatal complications associated with preterm deliveries at 24 to 33 weeks and 6 days gestation (2011-2012): A hospital-based retrospective study. Iran J Reprod Med 2015;13:697-702.

2. . Gouyon JB, Iacobelli S, Ferdynus C, Bonsante F. Neonatal problems of late and moderate preterm infants. Semin Fetal Neonatal Med 2012;17:146-52.

3. 3. Halimi Asl AA, Safari S, Parvareshi Hamrah M. Epidemiology and related risk factors of preterm labor as an obstetrics emergency. Emerg (Tehran) 2017;5:e3.

4. Schappin R, Wijnroks L, Uniken Venema MM, Jongmans MJ. Rethinking stress in parents of preterm infants: A meta-analysis. PLoS One 2013;8:e54992.

5. Lutz KF, Burnson C, Hane A, Samuelson A, Maleck S, Poehlmann J. Parenting stress, social support, and mother–child interactions in families of multiple and singleton preterm toddlers. Fam Relat 2012;61:642-56.

6. Ong LC, Chandran V, Boo NY. Comparison of parenting stress between Malaysian mothers of four-year-old very low birthweight and normal birthweight children. Acta Paediatr 2001;90:1464-9.

7. Abidin RR. Parenting Stress Index. Lutz, FL: PAR, 4th ed. 2012

8. Weng YS. Parental stress index fourth edition short form Chinese version instruction. Manual. Psychology, 2019

9. Alkozei A, McMahon E, Lahav A. Stress levels and depressive symptoms in NICU mothers in the early postpartum period. J Matern Fetal Neonatal Med 2014;27:1738-43.

10. Greene MM, Rossman B, Patra K, Kratovil AL, Janes JE, Meier PP. Depressive, anxious and perinatal post-traumatic distress in mothers of very low birth weight infants in the NICU. J Dev Behav Pediatr 2015;36:362-70.

11. Girabent-Farrés M, Jimenez-Gónzalez A, Romero-Galisteo RP, Amor-Barbosa M, Bagur-Calafat C. Effects of early intervention on parenting stress after preterm birth: A meta-analysis. Child Care Health Dev 2021;47:400-10.

12. Mukosha M, Kaonga P, Kapembwa KM, et al. Modelling mortality within 28 days among preterm infants at a tertiary hospital in Lusaka, Zambia: A retrospective review of hospital-based records. Pan Afr Med J 2021;25;39:69.

13. 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;12:604-21.

14. Yeh CH, Chen ML, Li W, Chuang HL. The Chinese version of the Parenting Stress Index: A psychometric study. Acta Paediatr 2001;90:1470-7.

15. Haskett ME, Ahern LS, Ward CS, Allaire JC. Factor structure and validity of the parenting stress index-short form. J Clin Child Adolesc Psychol 2006;35:302-12.

16. Dempsey AG, Keller-Margulis MA. Developmental and medical factors associated with parenting stress in mothers of toddlers born very preterm in a neonatal follow-up clinic. Infant

Ment Health J 2020;41:651-61.

17. Ionio C, Mascheroni E, Colombo C, Castoldi F, Lista G. Stress and feelings in mothers and fathers in NICU: Identifying risk factors for early interventions. Prim Health Care Res Dev 2019;20:e81.

18. Wray J, Lee K, Dearmun N, Franck L. Parental anxiety and stress during children's hospitalisation: The StayClose study. J Child Health Care 2011;15:163-74.

19. Stoeber J, Janssen DP. Perfectionism and coping with daily failures: Positive reframing helps achieve satisfaction at the end of the day. Anxiety Stress Coping 2011;24:477-97.

20. Lee MA, Schoppe-Sullivan SJ, Kamp Dush CM. Parenting perfectionism and parental adjustment. Pers Individ Dif 2012;52:454-7.

21. Turan T, Basbakkal Z, Ozbek S. Effect of nursing interventions on stressors of parents of premature infants in neonatal intensive care unit. J Clin Nurs 2008; 17:2856-66.

22. Preyde M, Ardal F. Effectiveness of a parent "buddy" program for mothers of very preterm infants in a neonatal intensive care unit. CMAJ 2003;168: 969–73.

23. Miles MS, Holditch-Davis D. Parenting the prematurely born child: pathways of influence. Semin Perinatol 1997;21:254-66.

24. Koksal B. Is cognitive ability a factor in explaining differences in physiological and psychological stress responses? Arch Med Sci 2022;23:553-8.

25. Wojtyla C, Wojtyla-Buciora P, Ciebiera M, Orzechowski S, Wojtyla A. The effect of active and passive maternal smoking before and during pregnancy on neonatal weight at birth.

Arch Med Sci 2018;15:352-60.

Table 1. Parental distress subscale scores in different demographic data

	Number	Scores	p-value	Adjusted p-value*
Father	44	28.8±7.4	0.210	0.276
Mother	46	26.9±6.5		
Education				
High school or lower	15	28.3±7.4	0.779	0.565
College or higher	75	27.7±7.0		
Income (US dollar year)				
Less than 35,000	58	28.4±7.2	0.239	0.197
More than 35,000	32	26.6±6.5		
Parents' age				
Less than 34 years	59	27.2±7.7	0.228	0.180
Equal to or more than 35 years	31	29.0±7.4		
Infant sex				
Male	48	27.1±6.7	0.302	0.388
Female	42	28.3±7.4		
Birth type				
Cesarean delivery	34	27.1±6.7	0.455	0.353
Vaginal delivery	56	28.2±7.4		
Siblings				
No	73	27.4±6.7	0.277	0.347
Yes	17	29.5±7.6		

* Adjusted by father or mother, parental education, family income, infant sex, siblings or not, birth type, and parental age.

Table 2. Parental distress subscale scores in preterm infants with different clinical conditions.

	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n = 14)	32.1±5.9	**0.011**	**0.016**	**0.98 ~ 9.18**
No (n= 76)	27.0±6.9			
Disease after admission				
Yes (n = 55)	27.4±7.3	0.500	0.554	-4.22 ~2.28
No (n= 35)	28.4±6.6			
Maternal disease				
Yes (n = 31)	30.4±5.3	0.011	**0.018**	**0.65 ~ 6.73**
No (n= 59)	26.4±7.4			
Infectious disease				
Yes (n = 21)	28.6±5.5	0.543	0.354	-1.99 ~ 5.50
No (n= 69)	27.6±7.4			
Respiratory distress				
Yes (n = 56)	29.1±7.1	0.022	**0.015**	**0.90 ~ 7.95**
No (n= 34)	25.6±6.4			

* Adjusted by father or mother, parental education, family income, infant sex, siblings or not, birth type, and parental age.

Table 3. Parental distress subscale scores of father and mother when preterm infants had different clinical conditions.

Father				
	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n = 7)	34.7±5.6	**0.019**	**0.041**	**0.29 ~ 12.55**
No (n= 37)	27.6±7.3			
Maternal disease				
Yes (n = 15)	32.0±5.9	**0.035**	**0.046**	**0.08 ~ 9.27**
No (n= 29)	27.1±7.7			
Respiratory distress				
Yes (n = 27)	30.2±8.1	0.098	0.086	-0.69 ~ 9.97
No (n= 17)	26.4±5.7			
Mother				
	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n = 7)	29.6±5.4	0.241	0.215	-2.24 ~ 9.63
No (n= 39)	26.4±6.6			
Maternal disease				
Yes (n = 16)	28.8±4.3	0.146	0.199	-1.54 ~ 7.17
No (n= 30)	25.9±7.3			
Respiratory distress				
Yes (n = 29)	28.1±5.9	0.110	0.101	-0.90 ~ 9.70
No (n= 17)	24.9±7.1			

* Adjusted for parental education, family income, infant sex, siblings, birth type, and parental age.

Table 4. Parental distress subscale scores of parents based of sex of the preterm infants, who had different clinical conditions.

Male infant				
	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n =6)	33.2±5.5	**0.015**	**0.025**	**1.02 ~ 14.80**
No (n=42)	26.2±6.4			
Maternal disease				
Yes (n = 15)	28.1±4.5	0.467	0.744	-3.94 ~ 5.46
No (n=33)	26.6±7.4			
Respiratory distress				
Yes (n =34)	26.8±6.9	0.678	0.500	-4.48 ~ 9.03
No (n=14)	27.7±6.2			
Female infant				
	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n =8)	31.4±6.5	0.245	0.183	-2.12~ 10.67
No (n=34)	28.0±7.5			
Maternal disease				
Yes (n =16)	32.4±5.3	**0.007**	**0.019**	**0.93 ~ 9.88**
No (n=26)	26.3±7.6			
Respiratory distress				
Yes (n =22)	32.6±5.9	**0.000**	**0.001**	**3.35 ~ 11.81**
No (n=20)	24.2±6.3			

* Adjusted by father or mother, parent education, family income, siblings or not, birth type, and parent age.

Table 5. Parental distress subscale scores of parents with different family incomes

Family high income				
	Scores	p-value	p-value*	95% CI*
Disease before admission				
Yes (n =4)	33.0±5.7	**0.034**	**0.000**	**8.81 ~ 21.64**
No (n=28)	25.7±6.2			
Maternal disease				
Yes (n =8)	32.8±2.1	**0.002**#	**0.012**#	**0.03 ~ 0.22**
No (n=24)	24.6±6.2			
Respiratory distress				
Yes (n =22)	27.3±6.8	0.414	0.075	-0.77~ 14.80
No (n=10)	25.2±6.1			
Family low income				
	Scores	p-value	p-value*	
Disease before admission				
Yes (n =10)	31.8±6.3	0.107	0.191	-1.83 ~ 8.93
No (n=48)	27.8±7.2			
Maternal disease				
Yes (n = 23)	29.5±5.8	0.364	0.461	-2.48 ~ 5.40
No (n=35)	27.7±8.0			
Respiratory distress				
Yes (n =34)	30.3±7.1	**0.019**	0.060	-0.19 ~ 8.71
No (n=24)	25.8±6.7			

Low family income: Less than 35,000 US dollars per year.

High family income: More than 35,000 US dollars per year.

* Adjusted by father or mother, parental education, infant sex, siblings or not, birth type, and parental age.

To compare the influence of maternal disease on parental distress subscale scores, the scores were not normal distributed. Therefore, the scores were log transformed.