

# The Incidence and Risk Factors Associated with Posttraumatic Stress Disorders among Parents of NICU Hospitalized Preterm Neonates

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## ABSTRACT

**Background:** Parents of preterm neonates are exposed to great stress that can lead to posttraumatic stress disorder. The current study aimed to assess the incidence of posttraumatic stress disorders (PTSD) in both mothers and fathers of preterm infants.

**Methods:** A prospective cohort study was done at two Iranian hospitals in 2016. One hundred and sixty parents of preterm neonates entered the study. A questionnaire related to acute stress disorder (ASD) was completed for parents at days 3-5 after birth. One month later, the parents were asked for the second interview. Prenatal posttraumatic stress questionnaire (PPQ) for mothers and posttraumatic stress disorder checklist (PCL) for fathers were completed. Prevalence of PTSD among the mothers and fathers was compared.

**Results:** According to the results, 32.5% of all mothers and 4% of all fathers showed ASD. After a month, 40% of the mothers and 21.5% of the fathers showed PTSD. A significant correlation was seen between PPQ and PCL scores ( $P < 0.001$ ). There were also significant correlations between both father's and mother's ASD scores with mother's PPQ score ( $P = 0.019$ ,  $P < 0.001$ ). The PPQ scores among employed mothers and mothers with unemployed husbands were significantly higher than others ( $P = 0.038$ ,  $OR = 2.46$ ;  $P = 0.02$ ,  $OR = 0.436$ ). A history of an accident during recent years for mother could change both mother's ASD and PPQ scores ( $P = 0.002$ ,  $OR = 0.133$ ;  $P = 0.002$ ,  $OR = 0.15$ ). Both PPQ and PCL scores also increased by father's history of an accident during recent years ( $P = 0.02$ ,  $OR = 0.541$ ;  $P = 0.01$ ,  $OR = 0.325$ ).

**Conclusion:** The ASD and PTSD among mothers were more frequent than in fathers. Fathers indicated delayed onset of PTSD in comparison with mothers.

**Keywords:** Acute, Intensive care units, Neonatal, Parents, Premature birth, Stress disorders, Traumatic

## Introduction

Preterm birth with a prevalence of 5-13% is defined as the birth of an infant at 20 to 37 weeks of gestation (1, 2). This condition is the main cause of neonatal mortalities and morbidities, such as cerebral palsy, neurodevelopmental impairment, sensory deficits, learning disabilities, respiratory illnesses, as well as behavioral and psychological problems (3, 4).

Parents of preterm neonates are exposed to lots of stress associated with their infant's survival, immaturity, physical appearance, their separation

due to neonatal hospitalization, parenting problems, and financial burdens. All these conditions may lead parents to lots of psychological distress, depression, anxiety, and posttraumatic stress disorders (PTSD). The PTSD is defined as a mental disorder in which a person after experiencing a traumatic situation shows a set of signs and symptoms, such as flashbacks, nightmares, severe anxiety, intrusiveness, avoidance, hyperarousal, as well as uncontrollable thoughts about the event (Diagnostic and

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Statistical Manual of Mental Disorders, 5th Edition [DSM-5]) (2, 5, 6).

Prevalence of PTSD was reported as 23-35% among the mothers of preterm neonates and 1.7-9% among the mothers of term infants (7-9). Although the exact causes of posttraumatic symptoms among the mothers of preterm infants are unclear, several studies have demonstrated a correlation between posttraumatic stress with the alteration of parental role and past history of anxiety or cortisol dysregulation (10, 11). Delivery of a preterm infant not only constrains a traumatic and stressful situation on parent but also influences on parent-infant relationships (12).

Although former findings claimed a declining rate of PTSD over time, some researches have shown the persistence of such symptoms for a long time (13, 6). To reduce psychological distress and PTSD syndrome during the time, some interventions, such as early social and religious supportive therapies were suggested (14-16).

The PTSD may influence both parents and their infant behavior, such as parental disability to interact with infant, child maltreatment, poorer child regulation, problems associated externalizing and internalizing, sleep complication, and so on (17). Several studies have shown the prevalence of PTSD in mothers following the birth of a preterm neonate (5-10). To the best of our knowledge, PTSD and its associated factors were being neglected among fathers; however, fathers like mothers have critical roles in growth and development of their infants. Therefore, the current study aimed to compare PTSD and its related risk factors in both mothers and fathers of preterm infants. We suppose that such investigations would be of value in implementing some strategies to decrease the frequency of PTSD and its correlated complications.

## Methods

A prospective cohort study was done at the neonatal intensive care units (NICUs) of Moheb-e-Yas and Vali-e Asr hospitals (affiliated to Tehran University of Medical Sciences, Tehran, Iran) in 2016. Parents of NICU hospitalized (24-36 weeks) preterm neonates entered the study by convenience sampling. The study population lived in relatively equal economic social and cultural levels in the downtown of Tehran. Exclusion criteria were a history of psychological or psychotic problems with the experience of hospitalization, medication or psychiatric consultation, underlying diseases, and drug abuse.

All the parents signed a written informed

consent before entering the study and accepted well-timed attendance for interviews. The parents were also asked to answer some questions related to sociodemographic and clinical data, including gender, age, level of education, occupation, place of settlement (i.e., city or suburb), history of any accident during recent years, experience of recent stressful events leading to hospitalization, visiting a psychiatrist and drug prescription (yes/no), hospital care satisfaction (yes/no), and ability to pay hospital fees (yes/no).

Maternal obstetric history and neonatal demographic and clinical data were also recorded in some checklists. The parents were invited for an interview at days 3-5 after neonate's birth by an expert psychologist. The structured diagnostic interview sessions were established based on "Structured diagnostic psychiatric interview for DSM-IV and International Statistical Classification of Diseases and Related Health Problems, 10th Revision" (18). The Clinician-Administered PTSD Scale was used to diagnose and assess PTSD.

To determine the status of anxiety disorder in the first month following a traumatic event, the questionnaire related to acute stress disorder (ASD) was completed for both mothers and fathers at days 3-5 after neonate's birth. The ASD refers to the symptoms between 2 days and 1 month following a traumatic event. An ASD questionnaire composed of 19 questions for determining the severity of symptoms with the score of 1-5 (not at all: 1, very much: 5). Based on the results of ASD scores (cut-off: 56), the participants were assigned into two groups of positive and negative ASD (19, 13).

After a month, the parents were asked for the second interview to determine the status of chorionic anxiety disorder following a traumatic event. All the parents accepted to participate in the second interview. The questionnaire related to PTSD was completed for both mothers and fathers. Moreover, prenatal posttraumatic stress questionnaire (PPQ) for mothers and posttraumatic stress disorder checklist (PCL) for fathers were completed. The PCL as a useful self-report screening measurement is widely used to assess both the frequency and severity of the 17 DSM-IV PTSD symptoms (20).

The PCL questionnaire composed of 17 questions for each domain ranging from 1: Not at all to 5: Extremely. A score of 30 is considered as the diagnostic cut-off (2, 13). The PPQ composed of 14 yes/no questions for each domain of intrusive memories, avoidance, and arousal

symptoms. Total score higher than 30 was considered as PTSD (21). All questionnaires have been translated to Persian (Mirzamani, 2006) and validated (validity:  $r=0.79$ ,  $P<0.001$ ; reliability:  $0.74$  and Cronbach's alpha:  $0.88$ ) for Iranian PTSD patients (1, 22). Based on the use of  $n \approx (Z_{(\alpha/2)} \cdot 2 \cdot p \cdot (1-p) / d^2 = 80$  formula and investigation by Goutaudier et al. study, 80% of mothers had experienced PTSD after the delivery of a preterm neonate (23). With the proposed sample size of 80, the study had a power of 95% and an alpha error of 0.05.

### Statistical analysis

All the recorded data were analyzed to identify and compare the incidence of ASD and PTSD among mothers and fathers, as well as assessing the related risk factors. All statistical analyses were conducted using SPSS software (version 19). Data were presented as mean±standard deviation for continuous variables and n (%) for categorical variables. The analysis of variance (ANOVA), Chi-square test, and independent samples t-test were used for analyzing the differences between variables with normal distributions. The Mann-Whitney U test and Spearman analysis were also used for analyzing variables without normal distributions. P-value less than 0.05 was considered statistically significant.

Our data were confidential and no extra cost was constrained on our participants. The subjects were also assured of their right to discontinue the study course whenever they wished. Our study

was approved by the Ethics Committee of Tehran University of Medical Sciences with the ethical number of 310609104-94.

### Results

One hundred and sixty parents of 80 preterm neonates entered the study and completed the questionnaires. Mean values of age of the mothers and fathers were  $33.78 \pm 1.03$  and  $37.14 \pm 1.17$  years, respectively. Level of education in 64.6% of the fathers was diploma and higher. Furthermore, 92.4% of the fathers were employed. A history of an accident during recent years was reported in 27.8% of the fathers. About 85% of the fathers were satisfied with hospital care, and 58% of them were able to pay hospital charge. Detailed demographic data related to the parents are shown in Table 1.

No significant differences were observed between infants' parents regarding their age, level of education, occupation, place of settlement, ability to pay hospital charge, and satisfaction with the hospital care ( $P>0.05$ ). Mean scores of ASD in mothers and fathers were  $53.7 \pm 13.55$  and  $31.4 \pm 1.06$ , respectively. In addition, 63 (32.5%) cases in all the mothers and 7 (4%) cases in all the fathers showed ASD.

After a month, 63 mothers (40%) and 34 fathers (21.5%) showed PTSD. The mean PCL score in fathers was  $31.5 \pm 14.9$ , and the mean PPQ score in mothers was  $31.6 \pm 11.8$ . Positive ASD mothers had higher PPQ scores in comparison with negative ASD mothers ( $P<0.0001$ ). On the other hand, PCL scores were not significantly

**Table 1.** Demographic data related to parents

Variables	Fathers n=80	Mothers n=80
Age: (year; mean±standard deviation)	37.14±1.17	33.78±1.03
Education: n (%)		
≤high school	28 (35.4)	22 (27.8)
>high school	51 (64.6)	57 (72.2)
Occupation: n (%)		
Employed	73 (92.4)	12 (15.2)
Unemployed	6 (7.6%)	67 (84.8)
History of an accident during recent years: n (%)		
Yes	22 (27.8)	15 (19)
No	57 (72.2)	64 (81.0)
Satisfaction with hospital care: n (%)		
Yes	67 (84.8)	60 (75.9)
No	12 (15.2)	19 (24.1)
Ability to pay hospital charge: n (%)		
Yes	46 (58.2)	
No	33 (41.8)	
Settlement area: n (%)		
City	76 (96.2)	
Suburb	3 (3.8)	

**Table 2.** Comparison of posttraumatic stress disorders scores in positive and negative acute stress disorder groups

Variables	Positive ASD group	Negative ASD group	P-value
PPQ score	34.6±11.3	27.1±9	P<0.0001
PCL score	26.8±8.4	26.4±12.5	0.925

ASD: Acute stress disorder

PPQ: Prenatal posttraumatic stress questionnaire

PCL: Posttraumatic stress disorder checklist

**Table 3.** Influence of different factors on posttraumatic stress disorders scores

Variables	ASD in mother	ASD in father	PPQ	PCL
	P-value OR*	P-value OR*	P-value OR*	P-value OR*
Father unemployment	0.22	0.22	0.02 0.436*	0.23
History of an accident during recent years for father	0.10	0.73	0.02 0.541*	0.01 0.325*
Mother employment	0.82	0.46	0.03 2.46*	0.46
History of an accident during recent years for mother	0.002 0.133*	0.50	0.002 0.15*	0.09

\*only for significant relationships

ASD: Acute stress disorder

PPQ: Prenatal posttraumatic stress questionnaire

PCL: Posttraumatic stress disorder checklist

different in positive and negative ASD fathers (P=0.925) (Table 2).

Spearman analysis showed a significant association between the father's and mother's ASD scores (P=0.01). There were also significant correlations between both father's and mothers' ASD scores with mother's PPQ scores (P=0.019, P<0.001). The PPQ scores among employed mothers were significantly higher than those in unemployed mothers (38.16±13.48 vs. 30.50±11.25; P=0.03). Correlation between PPQ and PCL scores was also statistically significant (P<0.001).

The obtained results showed no significant associations between father's ASD score with PCL score (P=0.05), number of parity (P=0.45), both parent's age (P=0.11, P=0.43), occupation (P=0.29), level of education (P=0.81), place of settlement (P=0.33), or ability to pay hospital charge (P=0.57). Satisfaction with hospital care was not also a significant factor in father's PCL (P=0.49) or ASD scores (P=0.13).

The ANOVA analysis was also used to determine the influence of each variable on PTSD scores. As shown in Table 3, the father's unemployment could significantly increase the PPQ score in mothers (P=0.02). Both PPQ and PCL scores were also increased by father's history of an accident during recent years (P=0.02, P=0.01). Mother's occupation could significantly increase PPQ score (P=0.038). A history of an accident during recent years for the mother not only could change mother's ASD score but also increase PPQ

score (P=0.002, P=0.002).

## Discussion

In the present study, we evaluated and compared the diagnosis of ASD and PTSD among the mothers and fathers of preterm hospitalized newborns. Results of this study showed that the delivery of a preterm infant can directly affect a parent's mental health. For PTSD diagnosis, we used perinatal PTSD questionnaire. A systematic review study has shown that using PTSD questionnaire is beneficial because of its validity, reliability, and highly positive correlation with the impact of events scale applied in several investigations (6).

Strength of our study was the inclusion of both mothers and fathers, while most other investigations assessed PTSD just in mothers (5-10). According to the results of the present study, the frequency rates of ASD and PTSD in mothers and fathers were 32.5% and 4% at the first days of neonates' birth that developed to 40% and 21.5% after a month, respectively.

Results of another study revealed that at 4 months after birth, 9% of preterm neonates' mothers and 32.22% of their fathers were affected by PTSD (24). The PTSD was also reported in 45% of mothers and 20% of fathers (25). It seems that the differences in the method section, such as inclusion criteria, time of data collection, and measurement tools, could influence the prevalence ranges.

During the first days of neonate's life, ASD was

more frequent among mothers than that in fathers. It is supposed that mothers spend lots of time with their newborns and get involved in the healthcare of the neonates more than fathers during the hospitalization. Mothers of preterm infants experience anxiety, stress, helplessness, lack of self-esteem, and problems related to not enough sleeping and eating. These factors may cause more risks of PTSD in mothers than fathers (2, 6, 25). In addition, other studies have reported that fathers prefer to relieve their emotional response, minimize their infant's medical complications, and use more instrumental coping strategies to decrease related distresses (26, 27).

Consistent to our result, it was indicated that based on ASD diagnostic criteria, the incidence of PTS symptoms in mothers of NICU admitted infants (during 3-5 days after birth) was significantly higher than that in fathers (25). It was also demonstrated that higher levels of mental complications, such as stress, as well as depressive and anxiety symptoms, in mothers of hospitalized preterm infants within the age range of 10-20 days (using Edinburgh Postnatal Depression Scale, State-Trait Anxiety Inventory, and Clinical Interview for Parents of High-Risk Infants were compared with those in infants' fathers ( $P < 0.01$ ) (28).

At the beginning of the study, 4% of the fathers had shown ASD; however, after a month, PTSD was diagnosed in about 21.5% of the fathers. Other studies also demonstrated that preterm birth and subsequent NICU admission caused an emotional impact on fathers (28). Another study reported that among 18 parents of hospitalized neonates who completed a self-report measurement of ASD, the fathers had more delayed onset of PTSD symptoms in comparison to mothers (24). On the other hand, an investigation showed a decrease in the number of fathers who met PTSD diagnostic criteria after 30 days in comparison with that at the first days of hospitalization (8% vs. 24%) (25).

Analysis of our data showed a significant relationship between father's and mother's ASD scores, as well as PTSD scores (PPQ and PCL) after a month. In accordance with our results, Carter et al. indicated that the mothers and fathers of preterm infants showed higher levels of depression and anxiety symptoms. There was a significant clinical relevance between the symptom scores of the mothers and fathers of NICU hospitalized neonate ( $P = 0.045$ ) (29).

According to the results of the present study, there was a significant association between parent's ASD scores with mother's PPQ score

after a month. In accordance with our results, Brandon et al. showed significantly higher PTSD measurements after a month in the mothers of preterm infants with a high level of PTSD scores following delivery (30).

Results of the present study also demonstrated that a history of an accident during recent years for each parent could increase mother's ASD and parent's PTSD scores. Other studies also pointed to some factors, such as prior trauma exposure, number of concurrent stressors, previous history of mental disorder, and presence of pre-existing psychopathology, as potential risk factors for higher rates of psychological distress in preterm infants' mothers (6, 7, 9, 31). A positive correlation was reported between previous mental health problems and trait anxiety score among mothers with preterm infants. It was also shown that previous mental problems may be a significant predictor of posttraumatic stress symptoms (8).

We also found that parental occupational status was a significant risk factor for PTSD. Mother's employment and father's unemployment could increase mother's PPQ scores. Compatible to our results, a positive correlation was shown between mother's occupation and PTSD following childbirth (32). On the other hand, another investigation could not find any relationship between PTSD score and employment status among the parents of complicated children ( $P = 0.06$ ) (26).

There were some limitations in the present study. Firstly, we did not consider and compare the frequency of different symptoms related to PTSD among mothers and fathers. Secondly, the influence of PTSD on parent-infant relationship was not assessed. Thirdly, we did not follow our participants for a long time to find the probability of persistence of symptoms after the birth of a preterm neonate.

## Conclusion

Results of the present study revealed that the frequency of ASD and PTSD in the mothers of preterm infants were higher than that in fathers. Moreover, the fathers indicated delayed onset of PTSD symptoms in comparison with mothers. During the first days of a neonate's life, a significant correlation was observed between the father's and mother's ASD scores. One month after neonate's birth, other factors, such as parental occupational status and history of an accident during recent years were also significant risk factors for increasing PTSD scores in both mothers



and fathers.

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## Conflicts of interests

The authors declare that there is no conflict of interest.

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