

## ORIGINAL PAPER

# The correlation between postpartum stress disorder and maternal anxiety in different types of delivery (vaginal and cesarean section)

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## Abstract

**Aim:** Post-traumatic stress disorder refers to a person's experience of a traumatic event. Traumatic experiences during childbirth can cause postpartum stress in some women. The present study aimed to investigate the correlation between postpartum stress disorder in different types of delivery (normal vaginal delivery and cesarean section) and maternal anxiety. **Design:** This was a cross-sectional study. **Methods:** This cross-sectional study was performed on 714 pregnant mothers selected via cluster sampling six-eight weeks after their delivery in selected health centers. The data were collected using Post-Traumatic Stress Disorder Symptom Scale I and the Spielberger State-Trait Anxiety Inventory. The data were then entered into the SPSS 20 software and were analyzed using a chi-square test. The significance level was set as  $p < 0.05$ . **Results:** The results showed that most of the participants in the two groups had medium to low anxiety levels, and the two groups were homogeneous in this regard. However, the mean scores of obvious anxiety ( $p < 0.0001$ ) and hidden anxiety ( $p < 0.0001$ ) were significantly higher in the normal vaginal delivery group compared to the cesarean section group. Moreover, post-traumatic stress score was significantly correlated to both obvious anxiety and hidden anxiety in the two study groups. **Conclusion:** Postpartum stress disorder had a positive relationship with obvious anxiety and hidden anxiety in both study groups. Counseling may be effective in reducing post-traumatic stress disorder in women.

**Keywords:** anxiety, cesarean, delivery, disorder, postpartum stress, vaginal.

## Introduction

The postpartum period is considered a stressful period among women from different cultural backgrounds. In fact, mothers face many new problems and concerns during this period (Meltzer-Brody et al., 2018). Although the prevalence of postpartum grief and depression has been extensively investigated, it is becoming increasingly common in women exposed to further psychological harm as a result of delivery (Gamble et al., 2002). Anxiety disorders are some of the most common psychological disorders, occurring twice

more often in women than in men. Anxiety refers to a reaction to an uncertain, internal, and ambiguous threat, which has numerous side effects, attributed to stressors (Sadock & Sadock, 2008). During pregnancy, these disorders increase the risk of unplanned cesarean section.

Post-Traumatic Stress Disorder (PTSD) is another common mental disorder whose prevalence is twice as high in women. Various stressors such as hormonal imbalances during childbirth, stressful life events, natural disasters, family problems, and domestic violence may contribute to PTSD (Andersson et al., 2004; Sadock et al., 2009; Stein et al., 2002). PTSD occurs in almost 1%–5% of women during the postpartum period, as childbirth is considered a traumatic event (Andersen et al., 2012; Stramrood et al., 2011a). In a previous study, 2.3% of the participants satisfied the diagnostic

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criteria for PTSD and 5.8% satisfied B, C, and D criteria in late pregnancy (Soderquist et al., 2004). In another global study performed on 71,083 respondents over the age of 18 years, the prevalence of PTSD was 3.9% in the whole sample and 5.6% in the trauma-exposed individuals (Garthus-Niegel et al., 2013; Koenen et al., 2017).

An emergency Cesarean Section (CS) is more likely to cause PTSD than an elective CS, and an instrumental delivery is more likely to do so than a Normal Vaginal Delivery (NVD) (Modarres et al., 2012; Stramrood et al., 2011b). Maternal mortality and complications (e.g., uterine rupture, abnormal placenta, ectopic pregnancy, and preterm delivery) are also more prevalent after CS (Sandall et al., 2018). Pregnancy, delivery-related factors (e.g., type of delivery), gynecological interventions, unpleasant experiences during delivery, and other factors that occur during prenatal and postpartum periods predispose mothers to PTSD (Simpson et al., 2018). High trait anxiety, symptomatic depression, and need for counseling (psychological / psychiatric) in early pregnancy also increase the risk of PTSD in late pregnancy (Soderquist et al., 2004). Other factors include lack of social support, cultural factors such as baby's gender and social support after delivery (Ford & Ayers, 2011), experience of stressful events during pregnancy (such as death of loved ones, divorce, and loss of well-being), fear of childbirth, history of psychiatric disorders (especially postpartum depression), history of psychological problems, anxiety, negative experiences during contact with health staff, lack of support from partner (Olde et al., 2006), unwanted pregnancy, low economic status, infertility history (Beck et al., 2011), and history of childhood sexual abuse. Among these factors, those related to pregnancy and childbirth have been found to be most significant (Modarres et al., 2012).

PTSD may have negative effects on women, their relationships with their infants, and delivery outcome (Yildiz et al., 2017). This disorder is, in fact, an important public health problem during the postpartum period due to its long-term negative impact on infant development, including impaired mother-infant relationships, and its adverse effects on infants' development of knowledge, skills, problem solving, and disposition, eventually leading to delayed intellectual development and psychiatric disorders (Paykel, 2003; Soderquist et al., 2002). Therefore, it is vitally important for healthcare providers, especially midwives – who have the highest level of contact with mothers before, during, and after delivery – to be informed about the possibility of PTSD and its associated factors (Shaban et al., 2013). Most studies in Iran have been

conducted on the prevalence of this disorder and related factors. However, there is a paucity of studies comparing the frequency of PTSD, and the level of anxiety for different types of delivery.

## Aim

The study aimed to investigate the correlation between postpartum stress disorder and maternal anxiety in different types of delivery (NVD and CS).

## Methods

### Design

This cross-sectional, analytical study involved pregnant women referred to selected healthcare clinics affiliated to Shiraz University of Medical Sciences for prenatal care in 2018. These centers were selected since they provided better conditions for achieving the study objectives, including easy access to subjects and their medical records.

### Sample

The sample size was estimated based on type one error of 0.05, accuracy of 0.05, disorder prevalence of 0.28 in the NVD group and 0.40 in the CS group, and using the following formula:

$$\text{sample size} = N = Z_{(1-\alpha/2)}^2 P(1-P)/(d^2)$$

Accordingly, the size of the sample was estimated as 328 in the NVD group and 386 in the CS group. The participants were selected via cluster sampling. In doing so, Shiraz health centers were considered clusters and were selected randomly. All eligible samples in these clusters were assessed. The inclusion criteria were willingness to cooperate in the study, history of mental illnesses such as anxiety, depression, and schizophrenia (based on the mothers' medical records and self-report), delivery at a gestational age of more than 28 weeks, Iranian nationality, ability to understand the items in the questionnaires, and six-eight weeks after delivery. The exclusion criterion was unwillingness to complete the study questionnaires.

### Data collection

The study data were collected using the following tools.

*A personal information form* consisting of 35 questions divided into three sections of demographic characteristics, midwifery factors, and neonatal predisposing factors.

*The Post-traumatic Stress Symptom Scale I*, containing 17 questions that cover all the criteria of the fourth diagnostic and statistical book of mental disorders (DSM-IV) for the diagnosis of PTSD.

The severity of each criterion is graded using a Likert scale. These criteria are related to the symptoms associated with re-experiencing symptoms, avoidance symptoms, and motivational reactions. Post-traumatic stress disorder is diagnosed in cases of one or more re-experienced symptoms, three or more symptoms associated with avoidance, and two or more symptoms associated with motivational reactions. The questionnaire was developed and evaluated by Foa et al. (1993). In Iran, Mirzamani et al. (2006) reported a significant relationship between this scale and psychiatric interviews. The reliability of the scale was 74% according to the test-retest method and 88% according to Cronbach's alpha.

*The Spielberger State-Trait Anxiety Inventory (STAI)*, consisting of 40 questions. The first 20 questions assess the participants' feelings at "this moment and the time of response", while the second 20 questions measure hidden anxiety (general and normal feelings of people). Each question has four options, scored from one to four. Due to the reverse scoring of some questions, the score of each section can range from 20 to 80 (Spielberger et al., 1983). This questionnaire was validated by Mahram et al. in Iran in 1993 and its reliability was indicated by a Cronbach's alpha of 91% (Mahram, 1994).

After gaining the approval of the Vice-chancellor for Research Affairs of Shiraz University of Medical Sciences, a list of health centers in Shiraz was prepared and divided into four sections: north, south, east, and west. Half of the clinics in each section were selected randomly. After receiving an introduction letter from the University, a researcher was assigned to the relevant clinic and commenced purposive sampling. Nulliparous and multiparous women who were in the sixth-eighth weeks after delivery were involved in the research.

Maternal trauma in delivery was determined according to criterion A in DSM-IV (with four questions). The first two questions assessed the threat aspect, while the second two questions evaluated the mother's emotional response. Maternal trauma was assumed to be positive if the answer to one of the first two questions and one of the second two questions was positive. The scientific validity of the four-question form has been confirmed by several studies (Ryding et al., 1997; Taghizadeh et al., 2008). The four questions are as follows:

- 1) Were you worried about your life or that of your infant when you were in pain or delivery?
- 2) Did you think that you or your fetus would be seriously injured during labor and delivery and were you afraid of it?

- 3) Do you think that delivery was a difficult and sad experience for you?
- 4) Did you feel intense fear, helplessness, and panic during pain or delivery?

In this study, demographic information, pregnancy-related factors, levels of stress symptoms after postpartum trauma, and anxiety level were recorded for all the mothers, using the relevant questionnaires. The questionnaires were completed by the researcher during interviews.

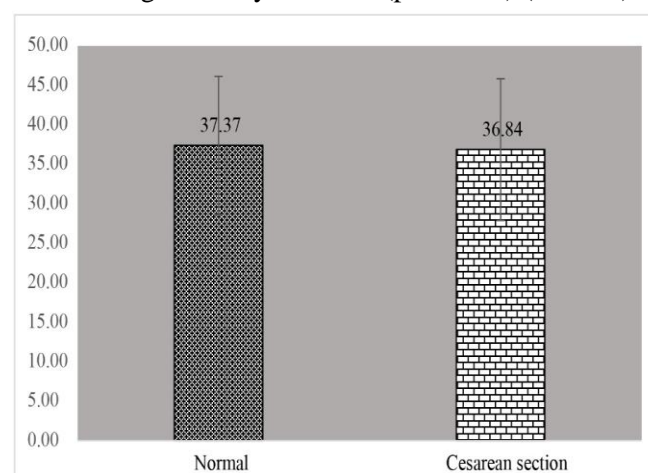
### Data analysis

The data were analyzed by means of a chi-square test and correlation test using the SPSS 20 software by an epidemiology consultant. The significance level was set as  $p < 0.05$ .

### Results

In the present study, 331 and 389 women delivered their infants through NVD and CS, respectively. The mean age of the participants was  $29.12 (\pm 5.13)$  years in the NVD group, which was significantly lower than that in the CS group ( $30.94 [\pm 4.6]$ ;  $p < 0.05$ ).

The mean score of obvious anxiety was significantly higher in the NVD group compared to the CS group ( $37.37 [\pm 8.77]$  vs.  $36.84 [\pm 8.98]$ ;  $p < 0.0001$ ) (Figure 1). With regard to obvious anxiety status, the participants were divided into six categories from mild to very severe anxiety. The results showed that most individuals in the two groups were in the moderate to low anxiety category, and the two groups were not significantly different ( $p = 0.622$ ) (Table 1).



**Figure 1** Comparison of the level of obvious anxiety of the two groups with normal delivery and cesarean section

The mean score of hidden anxiety was  $38.02 (\pm 0.88)$  in the NVD group, which was higher than that in the CS group ( $37.7 [\pm 7.79]$ ;  $p < 0.0001$ ) (Figure 2). With regard to hidden anxiety status,

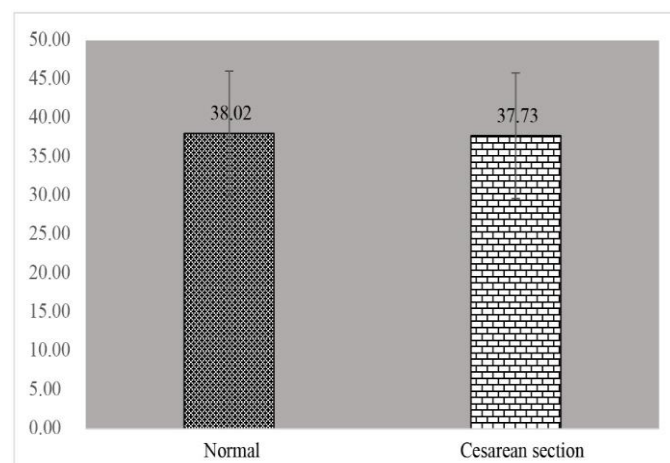


the participants were divided into six categories from mild to very severe anxiety. The results indicated that most individuals in the two groups were in the moderate to low anxiety category, and the two groups were not significantly different ( $p = 0.854$ ) (Table 2). The frequency of postpartum stress disorder was higher in the CS group (42 mothers) compared to the NVD group (38 mothers), but the difference was not statistically significant ( $p = 0.275$ ). The post-traumatic stress score showed a significant positive relationship with obvious and hidden anxiety (Table 3).

**Table 1** Comparison of the frequency of different levels of obvious anxiety in the two studied groups

Parameter	NVD n (%)	CS n (%)
Mild anxiety	100 (30.3)	119 (30.7)
Medium to low anxiety	157 (47.6)	192 (49.5)
Medium to high anxiety	44 (13.3)	49 (12.6)
Relatively severe anxiety	27 (8.2)	24 (6.2)
Severe anxiety	2 (0.6)	4 (1.0)
Extremely severe anxiety	0 (0.0)	0 (0.0)
<b>p-value</b>	0.662	

NVD – Normal Vaginal Delivery; CS – Cesarean Section



**Figure 2** Comparison of hidden anxiety levels of the two groups with normal delivery and cesarean section

**Table 2** Comparison of the frequency of different levels of hidden anxiety in the two studied groups

Parameter	NVD n (%)	CS n (%)
Mild anxiety	68 (17.5)	63 (19.1)
Medium to low anxiety	240 (61.7)	619 (59.4)
Medium to high anxiety	61 (15.7)	53 (16.1)
Relatively severe anxiety	15 (3.9)	15 (4.5)
Severe anxiety	5 (1.3)	3 (0.9)
Extremely severe anxiety	0 (0)	0 (0)
<b>p-value</b>	0.854	

NVD – Normal Vaginal Delivery; CS – Cesarean Section

**Table 3** Investigation of the correlation of post-traumatic stress disorder score with obvious and hidden maternal anxiety in two groups

Studied groups	Obvious anxiety	Hidden anxiety
Cesarean section	R = 0.341 p < 0.0001	R = 0.380 p < 0.0001
Vaginal	R = 0.382 p < 0.0001	R = 0.391 p < 0.0001

R – explain test, p – explain test

## Discussion

The results of this study demonstrated that the mean scores of obvious and hidden anxiety were significantly higher in the NVD group compared to the CS group. A previous study by Mahmoodi et al. also indicated that the rate of anxiety was significantly higher in the NVD group than in the CS group. Additionally, a significant relationship was observed between the occurrence of PTSD and the presence of anxiety in both types of delivery (Mahmoodi et al., 2016), which was consistent with the current study findings. Cheung et al. reported that the rate of maternal anxiety was 0–10 in the latent phase and 6.5–7.8 in the active phase of the first stage of delivery, and 7.7 during the entire delivery, which was high (Cheung et al., 2007). Such a high level of anxiety during delivery may have negative consequences and may necessitate measures to support mothers and reduce their anxiety. The supportive care (by Doula) in presence during delivery is one of the supportive measure methods. This care includes emotional support, physical support giving information about delivery process, respecting women's decision, and helping women build relationships with other healthcare members (Masoudi et al., 2022). Soderquist et al. (2002) found that most women undergoing NVD experienced PTSD. They argued that an emergency CS was not necessarily harmful, but that a normal delivery could be a traumatic experience for the mother due to the duration of labor, experience of intense labor pains, inappropriate treatment by the staff, and medical interventions (Andersen et al., 2012; Grekin & O'Hara, 2014; Shaban et al., 2013; Xie et al., 2011). Moreover, Verreault et al. (2012) found that high anxiety levels, history of sexual abuse, negative pregnancy experience, and lower social support predicted PTSD one month after delivery (Verreault et al., 2012). Shaban et al. (2013) performed a study on 600 postpartum women in Zahedan and reported that occupation was significantly correlated to mothers' anxiety levels and PTSD after delivery. Furthermore, higher levels of physical symptoms, obsessive-compulsive disorder, depression, and

anxiety were reported in the women undergoing CS or instrumental vaginal delivery. The women who underwent unexpected CS also had higher levels of delivery-related PTSD symptoms. In addition, the risk of confirmed psychiatric symptoms doubled after an unexpected CS and was probably three times higher for delivery-related PTSD (Dekel et al., 2019). These results were in keeping with those of our study. PTSD is often associated with major psychiatric disorders and complications such as depression and other anxiety disorders (Koenen et al., 2008). A meta-analysis suggested that PTSD had a negative effect on marital and parent-infant relationships. In other words, parental PTSD and depression could severely affect a baby's growth and behaviors. Thus, PTSD could have serious consequences for both individuals and communities (Andersen et al., 2012). In addition, PTSD has been found to be associated with other major psychiatric disorders such as depression and other anxiety disorders, indicating that PTSD often occurs in the context of other mental disorders (Andersen et al., 2012). Herguner et al. (2014) carried out a study in Turkey and reported that the level of anxiety did not differ significantly in NVD compared to CS. Fear of delivery and associated problems have been found to cause anxiety. Adverse postpartum responses are also believed to be mainly caused by fear of childbirth. When a woman experiences pain, anxiety, and fear during labor, endogenous catecholamines, such as epinephrine, norepinephrine, and dopamine, are released, which reduce the blood flow to the uterus and placenta, thereby lengthening the duration of labor (Campbell et al., 2006). Moreover, physical, emotional, cognitive, and behavioral manifestations have been observed due to internal or external stimuli caused by stress-induced anxiety (Beebe et al., 2007). Women with higher anxiety levels have been found to experience more severe labor pains (Bastani et al., 2006; Dick-Read, 2004). However, it is not clear whether the potential course and treatment of PTSD after delivery are similar to those of PTSD caused by other events (Gamble et al., 2002). Hence, more comparative studies are needed in this area (Anderson & Kim, 2015). Overall, the period of hospitalization after delivery is usually short due to psychiatric issues. However, medical consultants must have the necessary knowledge about postpartum physiology and the myriad forms of mental illnesses that may occur during this period in order to be able to quickly develop a treatment approach (Anderson & Kim, 2015).

Since motherhood is a period with pervasive emotions and feelings that affect mothers' mental

health in the postpartum period and their relationships with the child and those around them, addressing the issue of maternal mental health by practitioners, midwives, and medical doctors is of particular importance (Logsdon & Koniak-Griffin, 2005). It is recommended that healthcare providers be familiar with the risk factors of post-traumatic stress disorder and that they examine women for these risk factors during postpartum visits in order to reduce the progression of these problems to postpartum stress disorder. In other words, the medical team, especially midwives, should have sufficient knowledge of the possibility of occurrence of this disorder and its related factors, preventive measures, screening, and timely treatment to prevent long-term complications (Abedian et al., 2013).

### **Limitation of study**

One of the limitations of this study was that sampling was performed only in urban health centers, while other hospitals and private centers were not used in selecting the research population. However, one of the strengths of this study was the large number of participants, increasing its potential relevance.

### **Conclusion**

PTSD was positively related to obvious and hidden anxiety after delivery in both NVD and CS groups. Therefore, the immediate postpartum period is a time of acute vulnerability to mental illnesses, which can create specific challenges for psychiatric consultants. Counseling can be effective in reducing PTSD among women. Furthermore, high levels of PTSD have been found to be associated with an increased likelihood of not having additional children and delaying of subsequent pregnancy. A new pregnancy may have the potential to reactivate post-traumatic stress symptoms. Therefore, knowledge of the risk factors of postpartum traumatic stress may help identify the mothers who require intervention.

### **Ethical aspects and conflict of interest**

This research project was approved by the local Ethics Committee of Shiraz University of Medical Sciences (grant No. 1396-01-08-16557, ethics code: IR.SUMS.REC.1397.359). The protocol was also designed in accordance with the ethical principles of the Helsinki Declaration (World Medical Association, 2002). First, the patients attended a verbal lecture on the study goals and objectives. Depending on the mothers' referrals, face-to-face explanations were adapted from person to person. Finally, verbal and written consent to taking part in the research were provided by the mothers.

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## Author contributions

Concept and design (EEA, EBY), data collection (EEA), data analysis and interpretation (EEA), drafting of the manuscript (EEA, EBY), critical revision of the manuscript (EEA, EBY), final approval and accountability (EEA, EBY), supervision (EBY).

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