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The Association between Prenatal Anxiety and Spontaneous Preterm Birth and Low Birth Weight

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Abstract

Background: The effect of psychological factors on preterm delivery is still inconsistent. It was shown that psychological factors to increase maternal corticotrophin-releasing factor to play an important role in preterm delivery. This study was conducted to determine the effect of prenatal anxiety on spontaneous preterm delivery and low birth weight (LBW) in Babol, Northern Iran.

Methods: 682 women with singleton pregnancies who were consecutively recruited between 20 and 28 weeks of gestation in Babol Health Care centers for prenatal care were enrolled. Women who had history of psychological and chronic diseases, pregnancy complications and taking medicine were excluded from the study. The gestational age was based on last menstrual period or ultrasound examination in first half of pregnancy. Anxiety was assessed using self-administered questionnaires: the Spielberger State-Trait Anxiety Inventory. The women were considered as case group with anxiety score ≥45.

Results: The mean Spielberger state and trait anxiety in women with preterm delivery were respectively 42.7±10.8 and 52.9±3.9, but the mean Spielberger state and trait anxiety in women with term delivery were respectively 37.81±5.71 and 50.68±5.20. A significant association was found between scores for both Spielberger state anxiety and trait anxiety ≥45 and preterm and LBW. A high score state anxiety (≥45) was significantly associated with an increase in preterm delivery.

Conclusion: Screening for mental and psychological disorders among women in regular prenatal care is recommended.

Keywords: Anxiety; Preterm; Low birth weight; Outcome; Pregnancy; Iran

Introduction

Preterm delivery still represents a major obstetrics complication affecting 5-10% of disorders and is a potential hazard to the child's development.[1]75% of newborns who die in infancy are usually preterm.[2] For those who are preterm and then survive, there is an increased risk of developmental, cognitive and behavioral impairment later in life.[3] A major cause of preterm delivery is spontaneous preterm labor.[4] The early diagnosis, mechanism and management of preterm labor are still unresolved issues in obstetrics.[5] The study of physiology of parturition suggests that neuroendocrine and immune processes play important roles in the physiology and pathophysiology of normal and preterm parturition.[6] The incidence of anxiety during pregnancy is now more widely recognized[7] as 10-15% of women suffer from these disorders.[8] Maternal anxiety has been associated with preterm delivery in most[8-10] but not all studies.[11-13] The very different findings of these studies indicate that a prospective cohort study would be useful to determine the nature of this relationship. This study determines the association between anxiety during pregnancy and preterm delivery (<37 weeks gestational age) and low birth weight (<2500 g).

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Materials and Methods

From Sep 2004 to May 2006 in a prospective cohort study, 682 women with singleton pregnancies who

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were consecutively recruited between 20 and 28th weeks of gestation at Health centers affiliated to Babol University of Medical Sciences were enrolled. The inclusion criteria were to be Persian speaker and between 18 and 45 years of age. The exclusion criteria were chronic diseases, psychologist disorders, previous preterm birth, multiple gestation, placenta previa, cerclage for cervix incompetence and bad events during the last 3 months. Six hundred women who met the requirements from the data base systematically collected for obstetric records were included. A self administered questionnaire was used for psychological assessment and was completed at the time of enrollment. The widely used 20 item form of the spielberger state-trait anxiety inventory,[14] was used for assessment of state and trait anxiety. The questionnaires were previously validated in Mashad, northwestern Iran.[15] Items were rated on a four points Likert scale ranging from 1 (not anxious) to 4 (highly anxious) with overall scores varying from 20 to 80. In some studies, internal consistency was found to be high for both measures (Cronbach's α= 0.9 and 0.90, respectively).[16] For state anxiety, subjects were asked about their feelgin at the time of referral and for trait anxiety, about their general feeling. Before the study, a cut off point of score ≥45 was considered for both state and trait anxiety and the spontaneous preterm birth was defined as less than 37 completed weeks of pregnancy. To ascertain gestational age, each woman presented an ultra sonographic examination result before 20 weeks (usually at 12 to 18 weeks). Low birth weight (LBW) was defined as weights less than 2500 gr. Socio-demographic characteristics included age (three groups of <18, 18-45, ≥45 years), educational level (illiterate, primary, secondary and high school and university levels); occupation (unemployment, employment, student). The variables related to the current pregnancy were parity (0, 1 or 2, ≥3), pregnancy weight gain, antenatal care at first consultation (12 weeks or less, more than 12 weeks), conditions of conception (natural, medically assisted, contraception failure), vaginal bleeding, urinary tract, cervical or vaginal infection. All analyses were performed using SPSS software (version 14, Chicago, IL, USA) using Chi-Square and T tests and a logistic regression.

Results

The socio-demographic and medical characteristics of the 600 participants were shown in Table 1. Twelve percent of samples (n=82) were excluded from study. There was no correlation between state anxiety in pregnancy and demographic and medical variables except for educational level and occupation. All women were married, 94.7% were unemployed and 59.7% were nuliparous. A cut off value of 45 (75th percentile) was computed for both state anxiety and trait anxiety. State anxiety scores ranged from 20 to 76 and trait anxiety from 28 to 62.

The mean of state and trait anxiety scores in preterm delivery was more than term delivery. Also, the mean of state and trait anxiety scores in LBW was more than normal birth weight (Table 2). A significant association was noticed between both state and trait anxiety, preterm delivery and LBW (p<0.000) (Table 2). Pregnant women with high scores state anxiety demonstrated increase preterm delivery and LBW rates (Table 2). A high score state anxiety (≥45) was associated with an increased preterm delivery (RR=3.1, 95% CI: 2.05-4.7) and LBW (RR=2.6, CI %95: 1.6-4.2).

Discussion

In our study, state and trait maternal anxiety at 20-28 weeks of gestation were associated with preterm birth and LBW. Several authors have suggested that spontaneous preterm labor could be the reflection of a psychosomatic disorder.[17] Teixeira *et al.* reported a significant association between maternal anxiety in pregnancy and increased artery resistance index at 28-32 weeks of gestation in a sample of 100 pregnant women who were recruited from parent craft classes. Their finding denoted to one possible mechanism for the association between fetal growth restriction and premature delivery and high maternal anxiety during pregnancy.[18] But Kent and colleagues did not suggest any significant association between maternal anxiety and uterine artery at 20th weeks of gestation in healthy primigravid women with normally developing pregnancies.[19] Hobel *et al.* studies indicated a self-reported maternal stress at 18 to 20 weeks of gestation due to a rise in corticotrophin-releasing hormone (CRH) level at 28 to 30 weeks of gestation in Los Angeles.[20] CRH level increased in patients who reported a higher level of stress/anxiety or who experienced hassles on the day of the study.[21] In other studies, CRH level was correlated inversely with gestation length.[22]

Elevations in CRH can lead to higher levels of maternal adrenocorticotropin hormone (ACTH) and cortisol,

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Table 1: Demographic and medical characteristics of pregnant women, Iran, 2004-2006 (n=600).

Characteristics		State anxiety Score <45 No. (%)	State anxiety Score ≥45 No. (%)	*P* value
Age (years)	18>	9(6)	27 (5.8)	0.371
	18-45	139 (92.1)	419 (93.5)	
	45<	3 (2)	3 (0.7)	
Educational level	Illiterate	-	15 (3.3)	0.002
	Primary school	21 (13.9)	34 (7.6)	
	Secondary school	45 (29.8)	173 (38.5)	
	High school	64 (42.4)	163 (36.3)	
	Higher school	21 (13.9)	64 (14.2)	
Occupation	Housekeeper	140 (92.7)	426 (0.95)	0.045
	Student or Collegian	1 (0.7)	3 (0.5)	
	Practitioner	10 (6.6)	20 (4.5)	
Parity	Nulipara	97 (64.2)	289 (64.3)	0.938
	1-2	51 (31.1)	153 (34.0)	
	> 3	3 (1.98)	7 (1.5)	
Gestational age at the first consultation	<12	133 (88.1)	382 (85)	0.360
	>12	18 (11.9)	67 (15)	
Conception	Natural	141 (93.4)	422 (94)	0.528
	Medically assisted	4 (2.63)	12 (2.8)	
	Contraception failure	6 (3.97)	10 (2.2)	
Vaginal bleeding	No	139 (92.1)	422 (93.9)	0.404
	Yes	12 (7.9)	27 (6.1)	
Urinary tract infection	No	140 (92.7)	420 (93.5)	0.725
	Yes	11 (7.3)	29 (6.5)	
Cervical and vaginal infection	No	134 (88.7)	405 (90.2)	0.759
	Yes	16 (11.3)	44 (9.8)	

Table 2: The comparison of state anxiety scores in pregnant women (20-28 weeks of gestation) and preterm delivery and low birth weight and the mean of state and trait anxiety scores, Iran, 2004-2006 (n=600).

Criteria	State anxiety score			State anxiety score	Trait anxiety score	t- test
	Score <45	Score ≥45		Mean±SD	Mean±SD	
	No (%)	N (%)	X^2			
Preterm						
No	131 (86.80)	243 (58.4)	*P*<0.001	37.81±5.71	50.68±5.20	*P*<0.001
Yes	20 (13.20)	173 (41.60)		42.73±10.81	52.87±3.90	
LBW						
No	134 (88.7)	293 (70.4)	*P*<0.001	38.12±5.39	50.10±5.25	*P*<0.001
Yes	17 (11.3)	123 (29.6)		42.30±10.71	52.87±2.73	

which can increase placental levels in a feed forward fashion. Cortisol can cross the fetal circulation and later in pregnancy can activate the fetal adrenal gland to increase estriol production, a critical step in the sequence of events leading to delivery.[23] Maternal anxiety stimulates the sympathetic nervous system too and may result into tonically elevated levels of norepinephrine and epinephrine.[24] Pregnant women with anxiety were found to have increased uterine artery resistance which is likely mediated by the sympathetic vasoconstriction[18] and is associated with fetal growth restriction.[25] In our study, a high score state anxiety (≥45) was associated with LBW (RR=2.6, %95 CI: 1.6-4.2). In addition to the direct patho-physiologic effects of anxiety, secondary effects including sleep disruptions and appetite suppression created a

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non-optimal maternal environment.[26]

Rich-Edwards and Grizzard showed that chronic exposure to poverty, racism, and insecure neighborhoods may condition stress responses and physiological changes in ways that increase the risk of preterm delivery. Cumulative stressors may impact pregnancy outcome through several intersecting pathways including neuro-endocrine, behavioral, immune, and vascular mechanisms. Many of these pathways also lead to chronic diseases. It may be useful to consider preterm delivery as a chronic disease with roots in childhood, adolescence, and early adulthood.[27]

An advantage of this study was prospective data collection during the late second or early third trimester, thus eliminating the problem of reports being influenced by the outcome. Also anxiety was diagnosed through the use of standard questionnaires. The limitations of this study were the inability to control several variables including pre pregnancy BMI and the potential of residual confounding in category of substance use in pregnancy. This study indicates a need for research about whether delivering a preterm or low birth weight newborn in women with anxiety could be prevented by adequate therapeutic measures. Our findings denote to an association between state and trait anxiety and preterm delivery and LBW.

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