

Relationship between Maternal General and Specific-Pregnancy Stress, Anxiety, and Depression Symptoms and Pregnancy Outcome

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ABSTRACT

Introduction: Despite scientific advances in the field of physical problems during pregnancy, the effect of mental problems on the health of pregnant women is still an important issue that needs further research.

Aim: To determine the association of symptoms of stress, anxiety and depression during pregnancy and their effect on the pregnancy outcome.

Materials and Methods: This was a descriptive correlational study. The population included 200 pregnant women of the urban and rural health centers affiliated with Babol University of Medical Sciences. There were 100 each in second and third trimester. Convenience multi stage cluster sampling was performed. Data collection was received through the Hospital Anxiety Depression Scale (HADS), Pregnancy Distress

Questionnaire (PDQ), and Perceived Stress Scale (PSS-14) questionnaires.

Results: The correlation results showed a significant difference between variables of depression, stress, and anxiety with birth weight, birth height and head circumference and infants' APGAR score ($p < 0.05$). Multiple regression analysis showed that interpersonal relationships on prediction of infant weight ($B = -0.324$), anxiety on prediction of infant height ($B = -0.197$), stress on prediction of head circumference ($B = -0.350$) and depression on prediction of APGAR score ($B = -0.323$) are effective ($p < 0.001$).

Conclusion: The findings emphasize the need to identify women with depression, anxiety and stress in pregnancy, and scheduling to avoid adverse consequences of the pregnancy outcome.

Keywords: Hospital anxiety depression scale, Low birth weight, Preterm labour

INTRODUCTION

Anxiety, depression and stress during pregnancy are commonly seen in women [1]. Anxiety and stress have a huge negative impact on both mother and baby [2]. Anxiety pregnancy symptoms are associated with increased heart rate of the fetus, preterm labour, low birth weight, fetal distress, and congenital malformations. High levels of anxiety during pregnancy enhance the risk of severe depression and anxiety symptoms following birth as well [3,4]. In addition to anxiety, researchers have revealed that pregnancy can unfold or exacerbate a tendency to develop depression [5].

Skouteris H et al., assessed depression and anxiety in pregnancy and showed that depressive symptoms in early pregnancy predict higher levels of anxiety in late pregnancy. Anxiety in late pregnancy predicts higher levels of postpartum depression [6]. Anxiety in pregnancy may be associated with an unfavourable impact on fetuses [7]. Mishra et al., revealed a significant relationship between psychological stressors and preterm labour [8]. The evidence confirms that there is a relationship between psychosocial status and gestational stress in pregnant women [9]. Moreover, psychological interventions improve pregnancy complications and reduce the symptoms of depression or anxiety during pregnancy [10].

Depression during pregnancy could adversely affect the mother and fetus [11]. Higher scores on anxiety scales are associated with a high probability of cesarean delivery and a reduction in the period of breast feeding [12]. Women who have severe concern and stress during pregnancy are more likely to give birth to premature babies. These babies can have some problems, such as irregular feeding, bloating and stomach ache, insomnia at night, extended crying, and an urgent need to be hugged [13].

Stuart A et al., and colleagues reported that a low Apgar score five minutes following birth was associated with mild cognitive impairment in educational performance [14]. Huizink AC revealed that women with stress and anxiety give birth to babies with lower scores in psychomotor skills and more behavioural difficulties [15]. However, favourable expectations and experiences during pregnancy and labour are associated with more maternal satisfaction [16].

Little research is available regarding the impact of maternal depression and anxiety on neonatal outcome. This study is the first to assess the relationship of both general stress and pregnancy-specific stress on pregnancy outcome (weight, height, and head circumference at birth, as well as the first minute APGAR score).

MATERIALS AND METHODS

The methods employed in the study drew correlations from descriptive data. The population included pregnant women, admitted in rural and urban health centers affiliated with Babol University of Medical Sciences. Convenient multi stage cluster sampling was used. Sampling was carried out from the pregnant women in the second and third trimester of pregnancy who were admitted to the health centers from December 2014 to June 2015. Hundred pregnant women in the third trimester of pregnancy and 100 women in the second trimester were enrolled.

All pregnant women were selected because they had reading and writing skills to answer the questions satisfactorily. Exclusion criteria were preterm labour and intrauterine fetal death. Distribution of questionnaires among the health centers was done following permission from the health vice-chancellor in Babol.

The data form included demographic questions and maternal medical history (approved by the Ministry of Health for Maternal

Health Care). All data were received through the recorded prenatal information of the mothers and investigation from the study centers. Health indicators of infants, including weight, height, and head circumference at birth and the first minute APGAR scores, were extracted from the medical records of mothers and newborns.

To collect data regarding the stress of pregnancy, the gestational distress questionnaire (PDQ) and Perceived Stress Scale (questionnaire PSS-14) were used. Subjects filled PDQ and PSS-14. The questionnaire included 12 items, including three features of concerns; concern about birth, concern about weight and body image (physical appearance), and concerns about emotions and interpersonal relationships. The patients respond to each item through a Likert 5-point scale survey; no stress to very high stress. Each answer was assigned a point value from 0 to 4, and these values were summed for an overall score of 0 to 48 [17]. Also, PDQ is widely used in obstetrics research [18].

Perceived Stress Scale (PSS-14) contains 14 items to assess the public perceived stress in the past month. It measures thoughts and feelings about stressful happening, control, mastery of stress, coping with pressure, and experienced stress. The scale examines risk factors of behavioural disorders and shows stressful relationships processing. Scoring method is according to the Likert scale survey; never=0, almost never=1, only occasionally= 2, often= 3 and 4 almost. Questions 5 to 10 and 13 are inversely scored (from never=4 to almost=0). The lowest point is 0 and the highest is 56, which indicates elevated perceived stress [19].

To collect data of depression and anxiety, Hospital Anxiety Depression Scale (HADS) was used. This 14 item self report tool was conducted for screening the presence and severity of depression and anxiety in patients within the past week. This tool has seven subsets on depression and seven subsets on anxiety, for which the physical symptoms have been removed to preclude a potential false positive diagnosis. HADS subscales focus on assessing the lack of happiness [20].

STATISTICAL ANALYSIS

SPSS software version 21 was used to analyse the data of this study. In order to prove or disprove the hypothesis, Pearson correlation test and multiple regression analyses were applied.

RESULTS

[Table/Fig-1] shows the descriptive criteria and psychological description of the sample size. [Table/Fig-2] compares the maternal stress and neonatal outcome between women in second and third trimester of pregnancy. There was no difference between two groups in pregnancy specific and general stress and neonatal outcome, except head circumference of the neonate.

According to [Table/Fig-3], a significant relationship was found between concern about feeling and interpersonal relationships and infant weight.

Infant weight = $65.78 - 1.751 \times$ concern about feeling and interpersonal relationships.

According to [Table/Fig-4], anxiety has a negative coefficient, which means that by reducing the anxiety score, height of the baby is increased.

predicted height = $51.476 - 0.101 \times$ anxiety.

According to [Table/Fig-5], the perceived stress concern has a negative coefficient, which means that the lower score in concern about feeling and interpersonal relationship is associated with a higher head circumference of an infant: Head circumference = $37.480 - 0.107 \times$ perceived stress.

According to [Table/Fig-6], perceived stress, concern about feeling, and interpersonal relationship have a negative coefficient, which means that the lower score in the perceived stress, concern about feeling and interpersonal relationship are associated with greater infant APGAR score:

Variables	
Place of living	Number (%)
Urban	108 (54)
Rural	92 (46)
Age (years)	Number (%)
<18	4 (2)
19-35	181 (90.5)
≥36	15 (7.5)
Job	Number (%)
Employed	16 (8)
Housewife	184 (92)
Education	Number (%)
Primary school	38 (19)
High school	101 (50.5)
University	61 (30.5)
BMI	Number (%)
<18.5	1 (0.5)
18.5-24.9	88 (44)
25-29.9	73 (36.5)
>30	38 (19)
HADS	Mean (SD)
Anxiety	6.7 (3.5)
Depression	7.0 (3.5)
Total HADS	13.8 (6.6)
PDQ	
Concerns about birth and the baby	10.6 (5.2)
Concerns about weight/body image	5.03 (2.6)
Concerns about emotions and relationships	2.7 (2.3)
Total PDQ	18.3 (8.5)
Total general stress (PSS-14)	22.4 (7.7)

[Table/Fig-1]: Demographic characteristics and variables descriptions of the population study.

BMI: Body Mass Index, HADS: Hospital Anxiety Depression Scale: depression:0-21, anxiety, 0-21, Total HADS:0-42; PDQ: Pregnancy Distress Questionnaire, concern about birth: 0-24, concern about weight and body image : 0-12, concerns about emotions and interpersonal relationships: 0-12, Total PDQ: 0-48; PSS-14; Perceived Stress Scale:0-56.

Variables	Second trimester Mean (SD)	Third trimester Mean (SD)	p-value
Maternal stress			
General perceived stress	23.05 (6.62)	21.81 (8.77)	0.261
Anxiety	6.89 (3.34)	6.64 (3.64)	0.614
Depression	7.18 (3.38)	7.01 (3.68)	0.734
Concern about birth	10.39 (5.19)	10.83 (5.36)	0.557
Concern about weight and body image	4.92 (2.57)	5.14 (2.60)	0.549
Concerns about emotions and interpersonal relationships	2.76 (1.98)	2.65 (2.64)	0.740
Neonatal outcome			
Weight of the neonate	3362.50(395.13)	3456.00(339.80)	0.074
Height of the neonate	49.76(1.62)	50.13(1.94)	0.145
Head circumference of the neonate	34.58(1.25)	35.46(3.46)	0.018
APGAR score of the neonate	9.78(0.44)	9.82 (0.411)	0.548

[Table/Fig-2]: Comparison of maternal stress and neonatal outcome between women in second and third trimester of pregnancy.

Average: Depression:0-21, anxiety, 0-21, concern about birth: 0-24, concern about weight and body image: 0-12, concerns about emotions and interpersonal relationships: 0-12, Perceived Stress Scale:0-56.

Infant APGAR = $9.112 - 0.017 \times$ perceived stress - $0.052 \times$ concern about feeling and interpersonal relationships - $0.055 \times$ depression.

Variables	B unstandardized	Standard error	B Standardized	F	Significant
Constant	65.78	3.069		21.435	0.000
General perceived stress	0.001	0.170	0.001	0.005	0.996
Concern about birth	0.003	0.223	0.001	0.014	0.986
Concern about weight and body image	0.653	0.422	0.128	1.547	1.123
Concerns about emotions and interpersonal relationships	-1.751	0.493	-0.324	-3.549	0.000
Depression	0.663	0.437	0.178	1.520	0.130
Anxiety	0.160	0.367	0.043	-0.435	0.664

[Table/Fig-3]: Prediction of weight of the neonate based on maternal general and specific-pregnancy stress, depression, and anxiety.

Variables	B unstandardized	Standard error	B Standardized	F	Significant
Constant	51.476	0.423		12.665	0.000
General perceived stress	-0.026	0.023	-0.114	-1.10	0.273
Concern about birth	-0.022	0.031	-0.065	-0.717	0.475
Concern about weight and body image	-0.054	0.058	-0.076	-0.936	0.350
Concerns about emotions and interpersonal relationships	-0.104	0.068	0.138	-1.531	0.128
Depression	0.090	0.060	0.172	1.493	0.137
Anxiety	-0.101	0.051	-0.197	-2.005	0.046

[Table/Fig-4]: Prediction height of the neonate based on maternal general and specific-pregnancy stress, depression, and anxiety.

Variables	B unstandardized	Standard error	B Standardized	F	Significant
Constant	37.480	0.569		65.86	0.000
General perceived stress	-0.107	0.032	-0.350	-3.37	0.001
Concern about birth	-0.003	0.041	-0.007	-0.075	0.940
Concern about weight and body image	0.074	0.078	-0.077	-0.945	0.346
Concerns about emotions and interpersonal relationships	-0.012	0.091	-0.021	-0.135	0.893
Depression	0.033	0.081	0.046	-0.402	0.688
Anxiety	-0.026	0.068	0.037	-0.378	0.706

[Table/Fig-5]: Prediction head circumference of the neonate based on maternal general and specific-pregnancy stress, depression, and anxiety.

Variables	B unstandardized	Standard error	B Standardized	F	Significant
Constant	9.112	0.126		72.043	0.000
General perceived stress	-0.017	0.007	0.243	-2.452	0.015
Concern about birth	0.001	0.009	0.01	0.123	0.902
Concern about weight and body image	-0.028	0.017	0.118	-1.590	1.114
Concerns about emotions and interpersonal relationships	-0.052	0.020	0.210	0.553	0.011
Depression	-0.055	0.018	-0.323	-3.066	0.002
Anxiety	-0.006	0.015	-0.038	-0.426	0.671

[Table/Fig-6]: Prediction of the APGAR score of the neonate based on maternal general and specific-pregnancy stress, depression, and anxiety.

DISCUSSION

In general, the findings of the present study emphasize the relationship between symptoms of general and pregnancy specific

stress, anxiety, and depression during pregnancy and neonatal outcome. The statistical analysis demonstrated that correlation between birth weight and the study variables (stress, anxiety, and depression) is negative; however the association between birth weight and concerns of pregnant women about their weight is not significant. Infants of mothers with high anxiety had significantly lower weight versus the infants of mothers without anxiety. We did not find any previous study that is consistent with our findings. However, a correlation between birth weight and the study variables (depression, stress, and anxiety) is consistent with previous studies [5]. However, Keenan K et al., reported that birth weight and APGAR score was not associated with mothers' depression [21].

Our findings showed that correlation coefficient between variables of height, head circumference at birth, and symptoms of stress, anxiety, and depression during pregnancy are negative. Results are consistent with a previous study [22]. As mothers who are depressed have reduced appetite and take lesser nutrients compared to those not suffering from depression, the growth of fetuses gets affected.

There was a negative correlation between variables of Apgar score at birth and symptoms of stress, anxiety, and depression during pregnancy, while the association between Apgar score at birth, with emotions and interpersonal relationships was not significant. Another study revealed the relationship between maternal mental health problems and APGAR score of infants [23]. However, in the study by Keenan K et al., this relationship was not significant [21].

Findings about birth weight indicated a negative coefficient between feeling and interpersonal relationships; hence birth weight can be improved by reducing the concern score about emotions and interpersonal relationships. A recent finding emphasized the inverse association between prenatal maternal stress, depressive symptoms, and infant neurodevelopment scores in six-month-old infants [24].

Stress results in the secretion of catecholamine. These hormones are produced to cope with stress, causing high blood pressure and elevated heart rate in the mother. These changes influence the uterus and lead to preterm labour. That's why a stressful pregnancy can lead to preterm labour and decrease the baby's head circumference and brain growth, resulting in negative consequences at birth. Anxiety in the late pregnancy has an adverse impact on a child's future mood through the augmentation of the secretion of cortisol (a stress hormone). This hormone normally helps the body to cope with stressful situations; however, its prolonged exposure cause depression, anxiety, and severe fatigue. Others have suggested that exposure of fetuses to stress during pregnancy can lead to behavioural and psychological disorders, such as hyperactivity and inattention [25].

LIMITATION

The present study has some limitations, as it was restricted to hospital patients only. A limited population was assessed; hence, the findings of the present study cannot be generalized to the entire population. Lack of matching in the demographic characteristics increases the possibility of bias.

CONCLUSION

In general, the results of the present study emphasize a relationship between symptoms of stress, anxiety, and depression during pregnancy with poor neonatal outcome. According to the results, we suggest that health care providers pay attention to the mental status of pregnant women. Training and support scheduling during pregnancy for mothers, in order to identify risk factors and achieve skills and knowledge for mothers' support, could provide a soothing atmosphere to ensure a peaceful environment for pregnant women. In addition, we suggest that researchers across the world need to

design, develop, and implement special training programs to reduce anxiety during pregnancy.

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