ORIGINAL RESEARCH

Health Science Reports _Open Access_ WILEY

Prevalence and risk factors of prenatal anxiety disorders: A cross-sectional study

Mojgan Shariatpanahi[1] | Mahbobeh Faramarzi[2] | Shahnaz Barat[3] |
Azadeh Farghadani[4] | Hoda Shirafkan[5]

[1]Department of Psychology, Saveh Branch, Islamic Azad University, Science and Research Branch, Saveh, Iran

[2]Department of General Courses, Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

[3]Department of Obstetrics and Gynecology, Infertility and Health Reproductive Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

[4]Department of Psychology, Saveh Branch, Islamic Azad University, Saveh, Iran

[5]Department of Statistic and Epidemiology, Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

Correspondence
Mahbobeh Faramarzi, Department of General Courses, Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran.
Email: mahbob330@yahoo.com

Funding information
Islamic Azad University, Grant/Award Number: 162397152

Abstract

Background and Aims: Studies regarding the risk factors of prenatal anxiety disorders are inconclusive and sometimes contradictory. The current study aimed to define the prevalence and risk factors for anxiety disorders in women during pregnancy.

Methods: This is a cross-sectional and hospital-based survey of two public hospitals (Ayatollah Rohani and Yahyanejad) of inpatients/outpatients, obstetric wards/clinics, and four private outpatient obstetric clinics in the city of Babol. Convenience sampling was utilized to recruit 432 pregnant women. A trained clinical psychologist conducted the Structured Clinical Interview for DSM-5 (SCID-5) to diagnose anxiety disorders. In addition, the Brief Symptom Inventory 18 (BSI-18) was completed by the participants to assess the severity of psychological distress.

Results: Of 432 pregnant women, 132 (30.5%) were diagnosed with anxiety disorders. Anxiety disorders included 61 cases of pregnancy adjustment disorder (47.7%), 52 cases of generalized anxiety disorder (40.6%), and 15 cases of specific phobia (to delivery) (11.7%). The logistic regression results showed that the age, pregnancy, education, parity, and high-risk pregnancy variables predicted 28% of the variance of anxiety disorders. Furthermore, as the age ($\beta = 0.94$, $p = 0.003$) and gestational age ($\beta = 0.9$, $p < 0.001$) increased, the probability of anxiety disorders in pregnancy decreased. Moreover, university education ($\beta = 1.65$, $p = 0.049$) and high-risk pregnancy ($\beta = 1.72$, $p = 0.02$) were recognized as risk factors for developing anxiety disorders during pregnancy.

Conclusion: The high incidence of anxiety disorders in pregnant women suggests that obstetricians should pay more attention to identifying and treating anxiety disorders in all pregnant women, especially in high-risk pregnancies.

KEYWORDS
anxiety disorders, high-risk, pregnancy, prevalence, risk factors

1 | INTRODUCTION

Anxiety disorders (ADs), such as panic, generalized anxiety disorder (GAD), specific phobias, social anxiety disorder, and separation anxiety disorder, are among the most prevalent mental illnesses related to high healthcare costs and disease burden. ADs affect up to 33.7% of the population during their lifetime.[1] Prenatal anxiety disorders (PADs) are a prevalent problem among women, with one in five pregnant women meeting diagnostic criteria for at least one AD.[2] According to tertiary hospital data, more than half of the women with high-risk pregnancies were diagnosed with at least one AD.[3]

Unfortunately, studies using standard evaluation methods still report widely different prevalence estimates. A recent meta-analysis (2019) estimated that the prevalence of PAD ranged between 3% and 6%.[4] However, a previous meta-analysis has estimated that the overall prevalence for a clinical diagnosis of any AD was 15.2% in prenatal period.[5] Another meta-analysis found that the prevalence of individual PAD ranged from 1.1% for posttraumatic stress disorder (PTSD) to 4.8% for specific phobias.[2] Notably, existing meta-analyses on this topic aggregated incompatible prevalence estimates due to the different number of disorders assessed and subsets of AD included. Evidence confirmed that prevalence rates of some mental disorders, such as panic disorders and obsession-compulsive disorder (OCD), during pregnancy were higher than their lifetime prevalence rates in the general population.[4] An Iranian study conducted on 155 pregnant women with high-risk pregnancies reported a rate of adjustment disorders at 26.1%, phobia at 14.1%, and GAD at 4.3%.[3] Another study revealed that the prevalence of anxiety symptoms among Iranian pregnant women with low-risk pregnancies was 25.8%.[6]

PADs are related to negative pregnancy outcomes for mothers, fetuses, and children. PAD increases the risk of miscarriage, preterm birth, hypertension, and low birth weight.[7,8] Results of a study in a tertiary medical center showed that women with ADs are at more risk of adverse perinatal outcomes, such as preterm delivery, hypertensive disorders, and cesarean delivery.[9] In addition, women with prenatal anxiety are at increased risk for postpartum anxiety and depression.[4,10]

Furthermore, offspring born to moms with ADs had a greater prevalence of neuropsychiatric-related hospitalization.[9] Prospective studies of mother–child pairs indicate that children of mothers with an anxiety disorder (AD) have a higher rate of ADs and attention deficit hyperactivity disorder than children of mothers without AD.[11,12] Finally, adolescents of mothers with elevated levels of anxiety during pregnancy also demonstrate deficits in cognitive control.[13]

Several risk factors for anxiety in pregnant women have been described thus far. Some risk factors reported in previous studies included ethnic minority status, poor educational level, history of abuse, violence, adverse life events, high perceived stress, single status, and unplanned or unwanted pregnancy.[14–16] A review with inclusion criteria for maternal anxiety symptoms or maternal ADs identified four risk factors for anxiety, including low socioeconomic status, poor mental health, adverse pregnancy and childbirth circumstances, and poor-quality partner relationships.[17]

Social criteria and cultural context profoundly affect anxiety risk factors and their treatment.[18] Additionally, it is believed that factors related to mental health during pregnancy are associated with specific cultural norms.[19] Effati-Daryani et al. (2020)[20] reported that spouse's education level, spouse's support, marital life satisfaction, and the number of pregnancies were the predictive factors of anxiety symptoms among Iranian pregnant women during the outbreak of COVID-19. Another study introduced the number of children, marital satisfaction, and the desirability of fetal gender as the predisposing factor of anxiety symptoms in Iranian women.[21] Nevertheless, these factors have not been tested in the Iranian population with ADs.

Studies regarding the risk factors of ADs are inconclusive and sometimes contradictory. In addition, few studies reported the incidence and risk factors of perinatal ADs with gold-standard assessment procedures (i.e., diagnostic interviews by trained interviewers).

This is the first report to our knowledge of the incidence of ADs among Iranian pregnant women. Previous studies have failed to report PADs' prevalence and risk factors using gold-standard assessment procedures (diagnostic interviews) in the pregnant Iranian population. To determine the extent of the problem and to support the recommendation of routine perinatal anxiety screening, educator education, and referral for treatment in neonatal cases, it is essential to know the prevalence and risk factors for perinatal AD.[22] The present research aims to determine ADs' incidence and risk factors in Iranian pregnant women.

2 | METHODS

2.1 | Study design

The present research was a hospital-based cross-sectional survey of two public teaching hospitals (Ayatollah Rohani and Yahyanejad) of inpatients/outpatients, obstetric wards/clinics, and four private outpatients obstetric clinics in the city of Babol (north of Iran) between March and July 2022. The two teaching hospitals provide specialized maternity services to patients at low financial costs. Therefore, the patients who are referred to these two teaching hospitals are mostly from the low/middle socioeconomic classes of the society. Pregnant women with high socioeconomic classes are mainly referred to the personal offices of the obstetricians. In this study, to include pregnant women of all socioeconomic classes, four private obstetrics offices in four parts of the city were included.

The Ethics Committee of Babol University of Medical Sciences approved the study (IR.MUBABOL.REC.1400.164). Written informed consent was obtained from participants before entering the study. The report was provided based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

2.2 | Data collection

Two trained midwives clarified the objective of the research to pregnant women seeking routine prenatal care in outpatient clinics or the obstetrics ward. They conducted a preliminary interview with patients to assess the inclusion and exclusion criteria.

The former included a minimum age of 18, an education above elementary school, and informed consent. Excluded were pregnant women receiving pharmacotherapy or psychotherapy for treating mental disorders. If the patients met the inclusion criteria, the midwives invited them to participate in the study and instructed them on the questionnaire completion.

Qualified women who agreed to participate in the research were requested to complete the demographic characteristics and BSI-18 questionnaires before being referred to a clinical psychologist for a clinical interview in a private room in the clinic. The Structured Clinical Interview for the DSM-5 (SCID-5)[23] was conducted by the first author (M. S.), who received continuing supervision from an expert psychologist of the research team (M. F.). Women diagnosed with mental disorders, AD or OCD, and PTSD were invited for an appointment with a psychologist/psychiatrist and a referral to a mental clinic to receive suitable treatment after the interview.

To eliminate interviewer bias and ensure diagnostic reliability, the psychologist had no prior knowledge of the participant and was blinded to the BSI-18 scores. A midwife who was not part of the research team and was blind to the scores of both questionnaires and the psychologist's diagnoses collected data from the staff and a resident.

Four hundred thirty-two pregnant women joined the study. Overall, 174 pregnant women (40.2%) were diagnosed with one mental disorder according to the criteria. Of 174 women with mental disorders, 132 persons had ADs, OCD, or PTSD. Furthermore, 52 participants were diagnosed with other mental disorders (bipolar, depressive, and substance abuse disorders). Finally, 258 women with no mental disorders on the basis of the DSM-5 (SCID-5) were considered healthy control groups.

2.3 | Measurements

2.3.1 | Demographic information

This included the patient's age, education, place of residence, number of pregnancies, gestational age, pregnancy risk (low risk/high risk), and history of mental health problems.

2.3.2 | Structured Clinical Interview for the DSM-5 (SCID-5)

To diagnose any prenatal mental issues, all subjects were examined using the individual SCID-5. The SCID has emerged as the gold standard for assessing mental disorders in a variety of cultural contexts and countries.[24]

2.3.3 | The Brief Symptom Inventory 18 (BSI-18)

This is a short form of BSI-53, which consists of 18 of the BSI-53 items; it has three subscales of depression, somatization, and anxiety, alongside the Global Severity Index (GSI). On the BSI-18, higher scores indicate more psychiatric symptoms. Psychometric characteristics of the BSI-18 have been employed in a variety of languages and countries.[25] Patients completed the BSI-53, and the BSI-18 score was obtained by extracting the answers to the 18 BSI-18 questions. The Persian version of the BSI-18 has high validity and reliability. Persian BSI-18 test–retest reliability was formerly claimed to be 0.81.[26]

2.4 | Statistical analysis

SPSS software was used to analyze the data (SPSS 21, SPSS Inc.). To assess the normal distribution of continuous variables, the Kolmogorov–Smirnov test was utilized. Descriptive statistics were utilized to check the frequency distribution, mean, and standard errors of the mean. To compare psychological distress in women with and without ADs and scores according to the desired characteristics, an independent t-test was used for within- and between-group mean differences. Finally, multiple logistic regressions were employed to determine the risk factors of ADs with anxiety (yes/no) as the dependent variable and five factors as independent variables (age, gestational age, education, pregnancy risk, and residential status). A $p < 0.05$ (two-sided) was regarded as statistically significant.

Convenience sampling was employed to select the pregnant women available to the researchers. The sample size was determined to be 432 according to a method described for sample selection for the prevalence of ADs in a previous study ($p = 0.5$, $d = 0.048$, $\alpha = 0.05$).[20]

3 | RESULTS

Of 432 pregnant women, 132 people (30.5%) were diagnosed with ADs during pregnancy. ADs included 61 cases of pregnancy adjustment disorder (47.7%), 52 cases of generalized AD (40.6%), and 15 cases of specific phobia (to pregnancy) (11.7%). The average age of mothers was 30.21 (6.41) and the average gestational age was 24.81 (10.32). More than two-thirds of the samples had completed elementary/high school. About half of the women had no history of delivery. In addition, pregnancy was high-risk in approximately half of the cases.

Table 1 shows statistically significant differences in age, education, gestational age, parity, and high-risk pregnancy between pregnant women with AD and healthy pregnant women. The number

Variable	Without AD (N = 300)	With AD (N = 132)	p Value	Total population (N = 432)
Age (years)				
Mean (SD)	30.76 (6.47)	28.91 (6.13)	0.006	30.21 (6.41)
≤30 years, n (%)	140 (46.7)	78 (59.1)	0.02	218 (50.5)
>30 years, n (%)	160 (53.3)	54 (40.9)		214 (49.5)
Education				
Primary/High school, n (%)	218 (72.7)	79 (59.8)	0.01	297 (68.8)
University, n (%)	82 (27.3)	53 (40.2)		135 (31.2)
Gestational age (weeks)				
Mean (SD)	27.61 (9.86)	18.39 (7.86)	<0.001	24.81 (10.32)
≤20, n (%)	75 (25)	81 (61.4)	<0.001	156 (36.1)
>20, n (%)	225 (75)	51 (38.6)		276 (63.9)
Parity				
0, n (%)	132 (44)	72 (54.5)	0.04	204 (47.2)
1, n (%)	80 (26.7)	40 (30.3)		120 (27.8)
2, n (%)	68 (22.7)	15 (11.4)		83 (19.2)
≥3, n (%)	20 (6.6)	5 (3.8)		25 (5.8)
Risk of pregnancy				
Low risk, n (%)	185 (61.7)	68 (51.5)	0.04	253 (58.6)
High risk, n (%)	115 (38.3)	64 (48.5)		179 (41.4)
History of psychological problems in previous pregnancy				
No, n (%)	232 (77.4)	102 (77.3)	0.11	334 (77.3)
Yes, n (%)	68 (22.6)	30 (22.7)		98 (22.7)
History of medical problems in previous pregnancy				
No, n (%)	242 (80.7)	102 (77.3)	0.25	344 (79.6)
Yes, n (%)	58 (19.3)	30 (22.7)		88 (20.4)
Treatment with psychiatric medicine prior pregnancy				
No, n (%)	257 (85.6)	117 (88.7)	0.07	374 (86.6)
Yes, n (%)	43 (14.4)	15 (11.3)		58 (13.4)
History of psychological problems in first-degree relative				
No, n (%)	268 (89.3)	111 (84.1)	0.05	379 (87.7)
Yes, n (%)	32 (10.7)	21 (15.9)		53 (12.2)
History of anxiety disorders in prior pregnancy				
No, n (%)	265 (88.3)	113 (85.6)	0.30	378 (87.5)
Yes, n (%)	35 (11.6)	19 (14.4)		54 (12.5)

Abbreviations: AD, anxiety disorder; n, number.

of pregnant women with AD was considerably less than women without AD (p = 0.006). Furthermore, 40.2% of women with AD had a university education, while this rate was 27.3% in pregnant women without an AD. Gestational age was more than 27 weeks in individuals without AD and 18 weeks in those with AD. Moreover, while approximately half of the women with AD experienced a high-risk pregnancy, this rate was less than 40% among women without the disorder.

TABLE 2 Comparison of psychological distress in women with and without anxiety disorders.

Variable	Healthy women (N = 232)				Anxiety disorders (N = 132)				Between-group comparison			
	Sᵃ	Dᵇ	Aᶜ	Tᵈ	Sᵃ	Dᵇ	Aᶜ	Tᵈ	Sᵃ MD, p value	Dᵇ MD, p value	Aᶜ MD, p value	Tᵈ MD, p value
Age												
≤30 years	3.5 (2.8)	1.5 (1.9)	2.4 (1.1)	7.3 (4.1)	6.1 (4.3)	6.05 (6.4)	6 (5.3)	18.1 (14.1)	−2.6, <0.001	−4.6, <0.001	−3.6, <0.001	−10.8, <0.001
>30 years	3.5 (2.6)	1.7 (2.1)	2.2 (1.1)	7.4 (4.2)	6.6 (4.2)	6.5 (5.9)	7.5 (5.6)	20.6 (13.7)	−3.1, <0.001	−4.8, <0.001	−5.2, <0.001	−13.2, <0.001
p Value	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99				
Education												
Primary/High school	3.3 (2.5)	1.6 (2.1)	2.4 (1.1)	7.2 (4.1)	6.1 (4.1)	6.1 (6.3)	5.6 (4.7)	17.8 (13.5)	−2.8, <0.001	−4.5, <0.001	−3.3, <0.001	−10.6, <0.001
University	4.1 (3.3)	1.6 (1.8)	2.2 (1)	7.8 (4.2)	6.7 (4.2)	6.4 (6.01)	8.06 (6.2)	21.1 (14.5)	−2.6, <0.001	−4.8, <0.001	−5.9, <0.001	−13.3, <0.001
p Value	0.03	>0.99	>0.99	>0.99	>0.99	>0.99	0.01	>0.99				
GA												
≤20	4.3 (2.9)	1.9 (2.3)	2.3 (1)	8.6 (4.6)	6.6 (4.1)	6.2 (5.8)	6.4 (5.4)	19.2 (12.8)	−2.3, <0.001	−4.3, <0.001	−4.2, <0.001	−10.6, <0.001
>20	3.2 (2.6)	1.5 (1.9)	2.3 (1.07)	7 (3.9)	5.8 (4.5)	6.3 (6.7)	6.9 (5.6)	19.1 (15.6)	−2.6, <0.001	−4.8, <0.001	−4.5, <0.001	−12.01, <0.001
p Value	0.002	0.07	>0.99	0.003	>0.99	>0.99	>0.99	>0.99				
Parity												
0	3.4 (2.8)	1.3 (1.6)	2.4 (1)	7.1 (4.1)	6.1 (4.8)	5.7 (5.9)	6.6 (5.6)	18.3 (14.3)	−2.7, <0.001	−4.3, <0.001	−4.3, <0.001	−11.2, <0.001
≥1	3.6 (2.7)	1.8 (2.3)	2.3 (1)	7.6 (4.2)	6.6 (3.5)	6.9 (6.3)	6.6 (5.3)	20.1 (13.5)	−3.1, <0.001	−5.1, <0.001	−4.4, <0.001	−12.5, <0.001
p Value	>0.99	0.046	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99				
Risk of pregnancy												
Low risk	3.1 (2.5)	1.3 (1.7)	2.2 (1)	6.5 (3.7)	4.3 (2.9)	3.3 (3.8)	3.9 (3.5)	11.5 (8.1)	−1.3, 0.001	−2, <0.001	−1.8, <0.001	−5, <0.001
High risk	4.2 (2.9)	2.1 (2.5)	2.5 (1.1)	8.8 (4.3)	8.5 (4.4)	9.4 (6.6)	9.4 (5.9)	27.3 (14.3)	−4.3, <0.001	−7.3, <0.001	−6.9, <0.001	−18.4, <0.001
p Value	<0.001	0.001	0.02	<0.001	<0.001	<0.001	<0.001	<0.001				

Abbreviations: GA, gestational age; MF, mean differences.

ᵃSomatization 0–24.

ᵇDepression 0–24.

ᶜAnxiety 0–24.

ᵈTotal BSI: Brief Symptom Inventory 0–72.

About 98 women (22.7%) had a history of psychological problems in previous pregnancy. Also, 57 women (12.5%) experienced ADs prior pregnancy. Fifty-seven women (13.4%) experienced treatment with psychiatric medicine prior pregnancy. Also, 53 women (12.3%) had a history of psychological problems in first-degree relatives. Moreover, 88 women (20.4%) reported the history of medical problems in previous pregnancy. However, there was no significant difference between women with AD and without AD regarding history of psychological problems/medical problems, history of ADs prior pregnancy, treatment with psychiatric medicine prior pregnancy, and history of psychological problems in first-degree relative ($p > 0.5$).

Table 2 demonstrates that the BSI score and its dimensions were considerably higher in the group with AD than that without AD across all age, education, gestational age, parity, and high-risk pregnancy categories. Comparing the BSI score and its dimensions within the classes of the investigated variables yielded different results. Although age less than or greater than 30 years did not affect the psychological distress score and its dimensions, high-risk pregnancy was associated with a significant increase in the BSI score and all of its dimensions in both groups with and without AD. Furthermore, in the group without AD, gestational age greater than 20 weeks was related to a significant reduction in somatization score and BSI total score, a significant increase in somatization score was associated with university education, and delivery experience was associated with an increase in depression score. In the group with AD, university education was associated with a significant increase in anxiety scores.

According to the logistic regression results, 28% of the variance of ADs was predicted by the variables of age, pregnancy, education, parity, and high-risk pregnancy. Thus, as the age ($\beta = 0.94$, $p = 0.003$) and gestational age ($\beta = 0.9$, $p < 0.001\beta$) increased, the probability of ADs in pregnancy decreased. At the same time, university education ($\beta = 1.65$, $p = 0.049$) and high-risk pregnancy ($\beta = 1.72$, $p = 0.02$) were considered risk factors for developing ADs during pregnancy. However, a history of delivery was not associated with the development of this disorder (Table 3).

TABLE 3 Results of multivariate analysis regression for risk factor of anxiety disorders in pregnant women ($n = 432$).

Independent variables	B (95% CI)	p Value
Age (years)	0.94 (0.90–0.98)	0.003
Gestational age (weeks)	0.90 (0.88–0.93)	<0.001
Education: Primary/High school versus University	1.65 (1.01–2.74)	0.049
Parity: 0 versus ≥1	0.97 (0.57–1.65)	>0.99
Risk of pregnancy: low risk versus high risk	1.72 (1.07–2.77)	0.02

Note: Dependent variable: anxiety (yes/no); independent variables: age, gestational age, education, pregnancy risk, and residential status.

4 | DISCUSSION

According to this study, the incidence of ADs in pregnant women was 30.5%. These findings are comparable to those of a 2019 review study, which observed that one in five pregnant women worldwide meets diagnostic criteria for at least one AD.[2] In a review study conducted in countries with low and middle income in 2022, the prevalence of anxiety symptoms was estimated to be 30%, and the prevalence of ADs was estimated to be 8%.[27] However, another study reported that the prevalence of prenatal AD was 15.8%. In addition, according to a cross-sectional study conducted in Iran on 176 pregnant women, the incidence of anxiety symptoms in women with a low-risk pregnancy was 26%.[6]

In another study among 155 Iranian pregnant women, at least one AD was identified in 50% of high-risk pregnant women. That study used the BSI-18 and BSI-53 to assess anxiety symptoms.[28] Various factors, such as differences between the investigated populations, variations in the use of diagnostic criteria (e.g., different versions of the DSM), and variations in the use of diagnostic interview tools or type of interviewer, can explain the discrepancy in the incidence of mental disorders across studies.

In the present research, the most prevalent types of AD were pregnancy adjustment disorder, generalized AD, and phobia. Pregnant women expressed several factors as the cause of their anxiety, including medical problems, physical symptoms, infant health status, and fear of labor and delivery. A recent meta-analysis (2019) estimated that the prevalence of PAD was between 3% and 6%.[4] This study in Mexico reported that the prevalence of pregnancy adjustment disorder was 5%.[29] A previous Iranian study indicated that 26.1% of pregnant women are diagnosed with adjustment disorders.[28] Another meta-analysis reported that the prevalence of individual PAD was 1.1% for PTSD and 4.8% for specific phobia.[2] Differences in prevalence may be related to study type, variability in assessment tools, and sociocultural heterogeneity across countries.

Another research found that OCD and generalized AD are more common in postpartum women than in the general population.[30] A further study conducted in Turkey reported that obsessive-compulsive, generalized anxiety, panic, and comorbidity disorders were more prevalent in pregnant women than in the control group.[31] In addition, the American Association of Obstetricians and Gynecologists reported that generalized anxiety, panic, and social phobia or social anxiety are the most common types of anxiety in pregnancy.[32] Evidence indicates that the prevalence of certain mental disorders, including panic and OCD, during pregnancy is generally higher than their prevalence throughout life and in the general population.[2]

Given that adjustment disorder is a set of conditions related to significant stress or distress that occurs in response to exposure to a distressing event and that phobia is a pathological fear of something that can lead to dysfunction,[33] it appears that the anxiety response of pregnant mothers stems from their knowledge, attitude, and prior experiences. This demonstrates the importance of preventative measures before pregnancy. Identifying mothers' fears and concerns before and during the early stages of pregnancy and assisting them in

resolving these concerns make it possible to prevent the occurrence of a substantial proportion of ADs in pregnancy and their maternal and fetal complications.[34] In contrast, generalized AD is typically observed before pregnancy, and it is preferable to identify and treat it before conception.[35]

Based on this study, the most significant risk factors for ADs were a high-risk pregnancy and a university education, respectively. Age and gestational age, on the other hand, were protective factors against ADs. There are contradictory findings concerning the factors that influence ADs during pregnancy. Previous research has identified ethnic minority status, low education level, history of violent abuse, adverse life events, high perceived stress, being single, and unwanted pregnancy as risk factors.[14–16] A review article with inclusion criteria for maternal anxiety symptoms or maternal ADs identified four risk factors for anxiety: low socioeconomic status, history of poor mental health, adverse pregnancy and childbirth circumstances, and poor partner relationship quality.[17]

Differences in risk factors of prenatal AD may be associated with cultural factors. According to our results, university education is a risk factor for developing ADs during pregnancy. Other studies conducted in Iran revealed the same result, reporting that women with higher levels of education tend to get a lot of information about pregnancy, especially through invalid sources like the Internet. As a result, they obtain a wide range of conflicting information that can be reasons for increased anxiety,[36,37] whereas a recent study in Finland showed less anxiety symptoms among more educated pregnant women.[38] They pointed out that education improves economic security and reduces negative life events, which both lead to better mental health during pregnancy. Highly educated women have a sense of control, knowledge, and skills, which are significant for taking care of their health and can reduce anxiety symptoms.

In the current study, high-risk pregnancy was another risk factor for prenatal AD. Mohammadi et al. (2022) found several psychosocial factors that may cause psychological disorders in women with high-risk pregnancies. One of the causes of distress in pregnant women was related to their relationship with their spouse. Unfortunately, despite the many sexual problems during pregnancy, most women do not receive sexual counseling. Occupation-related stress was another cause of distress among mothers. Lack of financial security to achieve the needs of family and children has a significant impact on the development of mood disorders such as anxiety.[39] However, another study in Germany reported that anxiety has no significant relationship with economic factors among pregnant women.[40] Also, concerns about the parenting process were identified as a cause of maternal anxiety.[39,41] There is no prenatal training in Iran to facilitate the appropriate transition to the parental phase and improve the sense of self-efficacy for mothers.[39]

It appears that women's initial awareness of pregnancy risks increases as their level of education rises, which may contribute to the occurrence of these disorders. Therefore, special attention should be paid to the concerns of these mothers during prenatal and pre-pregnancy care. On the other hand, worry and anxiety are more prevalent at earlier gestational ages, highlighting the need to address the concerns of pregnant mothers.

This study's findings have significant clinical implications for maternity care facilities. Because of the high incidence of ADs and their specific effects on the outcomes of pregnancy and newborn care, as well as the long-term mental health of women, it is essential to identify these disorders as early as possible and provide a variety of treatments and support options. Although it may not be possible to conduct a clinical interview with every pregnant woman to accurately identify disorders, using appropriate screening tools in routine prenatal care allows women at risk of anxiety to be identified and referred for further treatment. Besides, it is necessary to improve psychoeducation for pregnant women and their partners. Also, promote access to appropriate psychosocial treatments for anxiety.

These findings suggest that all maternity healthcare professionals, including obstetricians, midwives, and nurses, should pay close attention to identifying and referring high-risk pregnant women to treat ADs. All healthcare professionals who treat pregnant patients should consider AD risk factors during pregnancy and after delivery. Identifying and treating pregnant women with high-risk pregnancies and ADs may improve pregnancy outcomes.

The present study had several limitations. First, this was a cross-sectional study; therefore, prospective cohort studies with a large sample size in a large population are recommended. Second, the study was a hospital-based survey; extra caution should be exercised when extrapolating to the general population. Due to the high rate of high-risk pregnancy patients, surveying two hospitals, especially among hospitalized pregnant women, may increase the prevalence of ADs. Future research should evaluate AD's prevalence and risk factors in pregnant women in healthcare facilities and private clinical settings.

5 | CONCLUSION

The high incidence of ADs in pregnant women (30%) emphasizes the need for continued research to screen, identify the risk factors, and develop effective treatments for pregnant women with mental disorders. High-educated women and pregnant women with high-risk pregnancies are more likely at risk of AD. The study suggests that obstetricians should pay more attention to identifying and treating AD in all pregnant women, especially in high-risk pregnancies. Developing and testing safe treatments for pregnant women may increase the treatment-seeking rates of those diagnosed with AD.

AUTHOR CONTRIBUTIONS

Mojgan Shariatpanahi: Conceptualization; data curation; investigation. **Mahbobeh Faramarzi**: Conceptualization; methodology; writing—original draft. **Shahnaz Barat**: Project administration; supervision. **Azadeh Farghadani**: Conceptualization; writing—review & editing. **Hoda Shirafkan**: Formal analysis; methodology.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Supporting datasets cannot be made publicly available due to ethical concerns but are accessible from the corresponding author upon reasonable request and after clearance from the ethics committee.

ETHICS STATEMENT

The present study was approved by the Ethics Committee of Babol University of Medical Sciences (IR.MUBABOL.REC.1400.164). Written informed consent was received from all participants for study participation. Participants' anonymity and confidentiality were assured.

TRANSPARENCY STATEMENT

The lead author Mahbobeh Faramarzi affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Mojgan Shariatpanahi http://orcid.org/0000-0003-1834-9959
Mahbobeh Faramarzi http://orcid.org/0000-0002-3568-7039
Shahnaz Barat http://orcid.org/0000-0002-7536-7267
Hoda Shirafkan http://orcid.org/0000-0002-5682-1153

REFERENCES

1. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. *Dialogues Clin Neurosci*. 2015;17(3):327-335. doi:10.31887/DCNS.2015.17.3/bbandelow
2. Fawcett EJ, Fairbrother N, Cox ML, White IR, Fawcett JM. The prevalence of anxiety disorders during pregnancy and the postpartum period: a multivariate Bayesian meta-analysis. *J Clin Psychiatry*. 2019;80(4):1181. doi:10.4088/JCP.18r12527
3. Hamidia A, Kheirkhah F, Chehrazi M, et al. Screening of psychiatric disorders in women with high-risk pregnancy: accuracy of three psychological tools. *Health Sci Rep*. 2022;5(2):e518.
4. Viswasam K, Eslick GD, Starcevic V. Prevalence, onset and course of anxiety disorders during pregnancy: a systematic review and meta analysis. *J Affect Disord*. 2019;255:27-40. doi:10.1016/j.jad.2019.05.016
5. Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *Br J Psychiatry*. 2017;210(5):315-323. doi:10.1192/bjp.bp.116.187179
6. Faramarzi M, Kheirkhah F, Barat S, et al. Prevalence and factors related to psychiatric symptoms in low risk pregnancy. *Caspian J Intern Med*. 2020;11(2):211211-218. doi:10.22088/cjim.11.2.211
7. Faramarzi M, Hassanjanzadeh P, Khafri S. Maternal mid-and late-pregnancy distress and birth outcome: a causal model of the mediatory role of pregnancy-specific distress. *Int J Reprod Biomed*. 2019;17(8):585-590. doi:10.18502/ijrm.v17i8.4824
8. Ding X-X, Wu Y-L, Xu S-J, et al. Maternal anxiety during pregnancy and adverse birth outcomes: a systematic review and meta-analysis of prospective cohort studies. *J Affect Disord*. 2014;159:103-110. doi:10.1016/j.jad.2014.02.027
9. Avraham L, Tamar W, Eyal S, Gali P. Perinatal outcomes and offspring long-term neuropsychiatric hospitalizations of mothers with anxiety disorder. *Arch Womens Ment Health*. 2020;23(5):681-688. doi:10.1007/s00737-020-01018-y
10. Sutter-Dallay AL, Giaconne-Marcesche V, Glatigny-Dallay E, Verdoux H. Women with anxiety disorders during pregnancy are at increased risk of intense postnatal depressive symptoms: a prospective survey of the MATQUID cohort. *Eur Psychiatry*. 2004;19(8):459-463. doi:10.1016/j.eurpsy.2004.09.025
11. Schreier A, Wittchen H-U, Höfler M, Lieb R. Anxiety disorders in mothers and their children: prospective longitudinal community study. *Br J Psychiatry*. 2008;192(4):308-309. doi:10.1192/bjp.bp.106.033589
12. O'Connor TG, Heron J, Golding J, Glover V. Maternal antenatal anxiety and behavioural/emotional problems in children: a test of a programming hypothesis. *J Child Psychol Psychiatry*. 2003;44(7):1025-1036. doi:10.1111/1469-7610.00187
13. Mennes M, Stiers P, Lagae L, Van den Bergh B. Long-term cognitive sequelae of antenatal maternal anxiety: involvement of the orbitofrontal cortex. *Neurosci Biobehav Rev*. 2006;30(8):1078-1086. doi:10.1016/j.neubiorev.2006.04.003
14. Robinson AM, Benzies KM, Cairns SL, Fung T, Tough SC. Who is distressed? A comparison of psychosocial stress in pregnancy across seven ethnicities. *BMC Pregnancy Childbirth*. 2016;16(1):215. doi:10.1186/s12884-016-1015-8
15. Furtado M, Chow CHT, Owais S, Frey BN, Van Lieshout RJ. Risk factors of new onset anxiety and anxiety exacerbation in the perinatal period: a systematic review and meta-analysis. *J Affect Disord*. 2018;238:626-635. doi:10.1016/j.jad.2018.05.073
16. Biaggi A, Conroy S, Pawlby S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: a systematic review. *J Affect Disord*. 2016;191:62-77. doi:10.1016/j.jad.2015.11.014
17. Leach LS, Poyser C, Fairweather-Schmidt K. Maternal perinatal anxiety: a review of prevalence and correlates. *Clin Psychol*. 2017;21(1):4-19. doi:10.1111/cp.12058
18. Bagheri H, Mashhadi A, Salehi Fadardi J, Fayyazi Bordbar MR. Cultural correlates of social anxiety disorder in the Iranian population: a qualitative study. *J Fundam Ment Health*. 2019;21(4):203-219. doi:10.22038/JFMH.2019.14396
19. Alipour Z, Kheirabadi GR, Eslami AA, Kazemi A. Psychological profiles of risk for antenatal depression and anxiety in Iranian sociocultural context. *J Educ Health Promot*. 2018;7:160. doi:10.4103/jehp.jehp_201_17
20. Effati-Daryani F, Zarei S, Mohammadi A, Hemmati E, Ghasemi Yngyknd S, Mirghafourvand M. Depression, stress, anxiety and their predictors in Iranian pregnant women during the outbreak of COVID-19. *BMC Psychol*. 2020;8(1):99. doi:10.1186/s40359-020-00464-8
21. Norozi E, Sharifzadeh G, Torshizi M, et al. Predictors of pregnancy anxiety and its subscales in pregnant women in Birjand, Iran, in 2016. *Health Syst Res*. 2017;13(3):373-380. doi:10.22122/jhsr.v13i3.3172
22. Accortt EE, Wong MS. It is time for routine screening for perinatal mood and anxiety disorders in obstetrics and gynecology settings. *Obstet Gynecol Surv*. 2017;72(9):553-568. doi:10.1097/OGX.0000000000000477
23. Gorman LL, O'Hara MW, Figueiredo B, et al. Adaptation of the structured clinical interview for DSM-IV disorders for assessing depression in women during pregnancy and post-partum across

countries and cultures. *Br J Psychiatry Suppl.* 2004;46:s17-s23. doi:10.1192/bjp.184.46.s17

24. Mamaghani J, Javanmar GH. Standardization of a brief symptom inventory (bsi) for diagnostic aims in consultant and therapeutic situations. *J Psychol (Tabriz University).* 2008;2(8):129-144.

25. Grassi L, Caruso R, Mitchell AJ, Sabato S, Nanni MG. Screening for emotional disorders in patients with cancer using the Brief Symptom Inventory (BSI) and the BSI-18 versus a standardized psychiatric interview (the World Health Organization Composite International Diagnostic Interview): psychiatric morbidity in cancer. *Cancer.* 2018;124(11):2415-2426. doi:10.1002/cncr.31340

26. Akhavan Abiri F, Shairi MR. Short forms of symptom checklist (SCL): investigation of validity & reliability. *CPAP.* 2020;18(1):137-162. doi:10.22070/CPAP.2020.2929

27. Nielsen-Scott M, Fellmeth G, Opondo C, Alderdice F. Prevalence of perinatal anxiety in low-and middle-income countries: a systematic review and meta-analysis. *J Affect Disord.* 2022;306:71-79. doi:10.1016/j.jad.2022.03.032

28. Hamidia A, Kheirkhah F, Chehrazi M, et al. Screening of psychiatric disorders in women with high-risk pregnancy: accuracy of three psychological tools. *Health Sci Rep.* 2022;5(2):e518. doi:10.1002/hsr2.518

29. Alvarado-Esquivel C, Sifuentes-Alvarez A, Salas-Martinez C. Adjustment disorder in pregnant women: prevalence and correlates in a northern Mexican city. *J Clin Med Res.* 2015;7(10):775-780. doi:10.14740/jocmr2275w

30. Ross LE, McLean LM. Anxiety disorders during pregnancy and the postpartum period: a systematic review. *J Clin Psychiatry.* 2006;67(8):1285-1298. doi:10.4088/jcp.v67n0818

31. Uguz F, Yakut E, Aydogan S, Bayman MG, Gezginc K. Prevalence of mood and anxiety disorders during pregnancy: a case-control study with a large sample size. *Psychiatry Res.* 2019;272:316-318. doi:10.1016/j.psychres.2018.12.129

32. *Anxiety and Pregnancy.* ACOG. 2021. https://www.acog.org/womens-health/faqs/anxiety-and-pregnancy

33. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®): American Psychiatric Pub; 2013. *J Physiother Res, Salvador.* 2019;9(2):155-158.

34. Atif N, Nazir H, Zafar S, et al. Development of a psychological intervention to address anxiety during pregnancy in a low-income country. *Front Psychiatry.* 2020;10:927. doi:10.3389/fpsyt.2019.00927

35. Buist A, Gotman N, Yonkers KA. Generalized anxiety disorder: course and risk factors in pregnancy. *J Affect Disord.* 2011;131(1-3): 277-283. doi:10.1016/j.jad.2011.01.003

36. Khazaeian S, Fathnezhad-Kazemi A. Perceived stress and its predictors in pregnant women with gestational hypertension: a cross-sectional study. *J Prev Med.* 2022;9(2):168-181. (in Persian). doi:10.32598/JPM.9.2.6

37. Barjasteh S, Moghaddam Tabrizi F. Antenatal anxiety and pregnancy worries in association with marital and social support. *Nurs Midwifery J.* 2016;14(6):504-515. (in Persian).

38. Kotimäki S, Härkönen J, Karlsson L, Karlsson H, Scheinin NM. Educational differences in prenatal anxiety and depressive symptoms and the role of childhood circumstances. *SSM Popul Health.* 2020;12:100690. doi:10.1016/j.ssmph.2020.100690

39. Mohammadi S, Shojaei K, Maraghi E, Motaghi Z. Explaining the psychological distress of women with high-risk pregnancies in Iran: a qualitative study. *Iran J Nurs Midwifery Res.* 2022;27(6):560-566. doi:10.4103/ijnmr.ijnmr_321_21

40. Martini J, Petzoldt J, Einsle F, Beesdo-Baum K, Höfler M, Wittchen H-U. Risk factors and course patterns of anxiety and depressive disorders during pregnancy and after delivery: a prospective-longitudinal study. *J Affect Disord.* 2015;175:385-395. doi:10.1016/j.jad.2015.01.012

41. Arfaie K, Nahidi F, Simbar M. Understanding mothers' perceptions of pregnancy anxiety: a qualitative study. *Electron Physician.* 2019;11: 7620-7628. doi:10.19082/7620