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ORIGINAL RESEARCH

Anxiety and depression during pregnancy in women attending clinics in a University Hospital in Eastern province of Saudi Arabia: prevalence and associated factors

Abdullah H Alqahtani[1]
Kholoud Al Khedair[2]
Reem Al-Jeheiman[2]
Haifa A Al-Turki[2]
Nourah H Al Qahtani[2]

[1]Department of Psychiatry, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, [2]Department of Obstetrics and Gynaecology, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Background: Anxiety and depression during the antenatal period is a growing problem with major effects on the mother, the developing fetus, and the neonate.
Objectives: To assess the prevalence of anxiety and depression during pregnancy in women attending the hospital for antenatal care and assess the associated factors.
Methods: This is a prospective cohort study conducted in the University Hospital of Imam Abdulrahman Bin Faisal University. Anxiety was evaluated using State Trait Anxiety Inventory. Depression was assessed using Edinburgh Postnatal Depression Scale (EPDS).
Results: Complete data were available for 575 women. The mean EPDS score was 10.5 (SD 5.5). The prevalence of depression was 26.8%. The mean state-anxiety score was 38.4 (SD 11.4) and mean trait-anxiety score was 38.2 (SD 9.5). The prevalence of anxiety using state-anxiety scale was 23.6%, while using the trait scale it was 23.9%. The risk is higher among unemployed women with history of miscarriage and unplanned pregnancy.
Conclusion: Anxiety and depression are common during pregnancy.
Keywords: anxiety, depression, pregnancy

Introduction

Traditionally, research on psychological morbidity in the perinatal period has focused on postpartum depression. However, in recent years, increased attention has been paid to the antenatal period. Accumulating evidence indicates that many women experience psychological distress during pregnancy. For example, a large population-based study in Sweden has estimated that 14% of pregnant women had one or more psychiatric disorder.[1] Mood disorders are common with prevalence rates for depression reported to be 7.4% in the first trimester, 12.8% in the second trimester, and 12.0% in the third trimester.[2] The body of literature on psychological morbidity during pregnancy comes from Western countries with relatively few studies from other regions of the world. Nasreen et al studied a large sample of pregnant women in Bangladesh and found rates of antenatal depression and anxiety to be 18% and 29%, respectively.[3] In Pakistan, a study has established that 18% of pregnant women were anxious and/or depressed.[4] A recent study in neighboring Oman has estimated a prevalence rate of antenatal depression of 24.3%.[5] In this study, antenatal depression was associated with unplanned pregnancies, family history of depression, and marital discord. The presence of psychiatric disorders during pregnancy imposes a significant burden on women

Correspondence: Nourah H Al Qahtani
Department of Obstetrics and Gynecology, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam 32222-4669, 7356 Alhusam, Saudi Arabia
Tel +966 50 483 0142
Email nhqahtani@iau.edu.sa

and has the potential to adversely affect obstetric, fetal, and neonatal outcomes.[6] Evidence for this comes from several studies including meta-analytic reviews that have established that anxiety and depression during pregnancy are associated with preterm birth and low birth weight.[7–9]

Little is known about the epidemiology of psychiatric disorders during pregnancy in Saudi Arabia with prior research focusing on the postpartum period.[10] In this study, we sought to assess the prevalence of anxiety and depression during pregnancy in women attending antenatal clinics in a university hospital in the Eastern region of Saudi Arabia and to find if there are associated factors with anxiety and depression.

Materials and methods
Setting
The study was conducted at King Fahd University Hospital, Imam Abdulrahman Bin Faisal University. This is the main provider for secondary care services to the residents of the city of Al-Khobar in the Eastern province of Saudi Arabia with ~1,800–2,500 births per year. King Fahd Hospital is also considered as a tertiary referral center for high-risk pregnancies for the entire Eastern province.

Participants
Subjects were pregnant women attending the outpatient department for antenatal care. Inclusion criteria included age 18–45 and ability to speak Arabic or English. The exclusion criteria were refusal to give consent and women who did not speak Arabic or English, as the questionnaires were available in these two languages.

Measurements
Sociodemographic and clinical data were collected using a questionnaire sheet. Anxiety was measured by the State Trait Anxiety Inventory (STAI),[11] which is the most widely used measure of anxiety during pregnancy.[12] Permission to use the STAI was obtained from Mind Garden publishing Inc. on November 30, 2013. The STAI is a self-administered questionnaire that is composed of two scales: state-anxiety scale that measures current anxiety and trait-anxiety scale that measures general feelings of anxiety. The Arabic translation of the STAI was adapted to the Saudi dialect by consensus meeting of consultant psychiatrists and clinical psychologists with extensive knowledge of the local culture. In accordance with prior research,[13–15] the 75th percentile (state ≥46; trait ≥45) was used to determine the cutoff point for state- and trait-anxiety scales. This test has been used

extensively in clinical research and also in clinical practice to assess anxiety. The test has two separate self-report scales measuring state and trait anxiety. The state-anxiety scale (STAI form Y-1) evaluates how the participant feels "right now at this moment". The trait-anxiety scale (STAI Form Y-2) assesses how the participant feels in general. Both scales consist of 20 statements.

Depression was measured by the Edinburgh Postnatal Depression Scale (EPDS).[16] This is a 10-item scale with each item scored from 0 to 3 (minimum score 0, maximum 30). While the EPDS was primarily designed to detect postnatal depression, it has been shown to be an accurate tool for measuring depression during pregnancy.[17] We used the Arabic version of the EPDS that has been previously validated in a sample of Emirati women.[18] A cutoff score of ≥14 was considered positive for depression.

Statistical analysis
Data from the three assessment tools were given codes and organized in data Excel sheet. Descriptive data were presented as numbers and percentages. Online calculator was used for calculation (http://www.socscistatistics.com). Odds ratio and confidence interval were calculated using online calculators at http://www.vassarstats.net. A p-value of ≤0.05 was chosen as the level of statistical significance.

Results
During the study period, January 2015 to February 2016, 679 women were recruited to the study. Seventy-five women refused to participate in the study because they did not have the time or were not interested. Twenty-nine participants did not fill all the forms and were excluded. Those who had filled all the questions as well as the sociodemographic data were included (575 women). The characteristics of the study subjects are shown in Table 1. The majority (77.7%) of our study subjects were Saudi nationals. Sixty percent of the study subjects had a university degree and over half of all participants were homemakers. Twenty-nine percent were pregnant for the first time with 58% stating that it was a planned pregnancy. Forty-seven percent of women were in the third trimester with a mean gestational age of 29.2 (SD 8.3). Over one third of women in our study had a history of miscarriage.

Prevalence of anxiety and depression during pregnancy
The mean EPDS score was 10.5 (SD 5.5). The prevalence of depression was 26.8%. The mean state-anxiety score was 38.4 (SD 11.4) and mean trait-anxiety score was 38.2 (SD 9.5).

Table 1 Characteristics of the participants

Women's characteristics	N (%)
Age, years	
18–20	22 (3.8)
21–30	300 (52.2)
31–40	230 (40)
41–45	23 (4)
Trimester	
First	90 (15.7)
Second	214 (37.2)
Third	271 (47.1)
Gravidity	
1	168 (29.2)
2–17	407 (70.8)
Number of abortions	
0	371 (64.5)
1–13	204 (35.5)
Education in years	
<6	32 (5.7)
6–12	165 (28.7)
>12	349 (60.7)
Unknown	28 (4.9)
Employment	
Employed	196 (34.1)
Non-employed	316 (54.9)
Student	63 (11)
Income in Saudi Riyals	
<5,000	83 (14.4)
5,000–10,000	216 (37.6)
>10,000	275 (47.8)
Medical problems	
Present	151 (26.3)
Absent	424 (73.7)
Planned pregnancy	
Yes	332 (58)
No	243 (42)
Negative impact of pregnancy	
Yes	287 (49.9)
No	288 (50.1)
Living arrangement	
With spouse	468 (81.4)
Without spouse	107 (18.6)
Housing type	
Owned	182 (31.7)
Rented	393 (68.3)
Nationality	
Saudi	447 (77.7)
Non-Saudi	128 (22.3)

The prevalence of anxiety using state-anxiety scale was 23.6%, while using the trait scale it was 23.9%.

Association with sociodemographic and clinical factors

Antenatal depression and anxiety were not associated with gestational age, maternal age, number of pregnancies, living arrangement, family income, housing type, nationality, or presence of medical problems (Tables 2–4).

History of previous miscarriages increased the odds ratio of depression (*p*-value 0.00001). Non-employed women were more likely to have depression compared to employed women and students (*p*-value 0.03). Another significant finding was the higher depression rate among women who had unplanned pregnancy (*p*-value 0.00001) and thought that the pregnancy would negatively impact their life and work (*p*-value 0.0002).

Anxiety-trait score was also higher among women with recurrent miscarriage (*p*-value 0.004). Students and employed women had a lower anxiety-trait score compared with unemployed women (*p*-value 0.003). Unplanned pregnancy was associated with higher score (*p*-value 0.00001).

Anxiety-state score was higher among women who had unplanned pregnancy and thought that their pregnancy will have negative impact on their life (*p*-value 0.00001 for both).

Discussion

The past two decades have witnessed increased interest in promoting awareness, diagnosis, treatment, and prevention of mental health problems. In 2001, the World Health Organization published its annual world health report under the title "mental health: new understanding new hope".[19] This signaled a focus on efforts to draw attention to this neglected field. For instance, unipolar depressive disorders ranked fourth among the top five leading contributors to the global burden of disease in 2000.[20] Moreover, projections suggest that by 2020, unipolar depression will be the second most common cause of morbidity in the world. This is as measured by disability-adjusted life years.[21]

Anxiety and depression contribute to the increased burden of health risks to the mothers and their babies. Furthermore, pregnancy is considered to be "a period of psychological change and challenge".[22] Therefore, it is not unusual for pregnant women to experience anxiety about their physical health, the development and health of the baby, and fears of inability to cope.[23] However, such normal emotional changes are to be distinguished from psychiatric disorders; of these, depression and anxiety are among the most common disorders to be reported.[6,23] Untreated perinatal mental disorders may have severe psychiatric and obstetric short- and long-term consequences, for the woman, her family, and mostly for the newborn baby. As such, there is a mixed literature on the association between psychological morbidity during pregnancy and adverse pregnancy outcomes. For example, a study by Andersson has

Table 2 Characteristics of the participants, total number and percentage of depression (D), odds ratio (OR), 95% CI, *p*-values, and order of entrance in the logistic regression model

Women's characteristics	N	D cases (%)	OR (95% CI)	*p*-value	Entrance order
Age, years				0.097	
18–20	22	3 (13.6)	1		
21–30	300	70 (23.3)	1.9 (0.55–6.71)		
31–40	230	72 (31.3)	2.88 (0.83–10.06)		
41–45	23	7 (30.4)	2.77 (0.61–12.5)		
Trimester				0.13	
First	90	16 (17.8)	1		
Second	214	61 (28.6)	1.84 (0.99–3.42)		
Third	271	74 (27.3)	1.73 (0.95–3.17)		
Gravidity				0.21	
1	168	37 (22)	1		
2–17	407	110 (27)	1.31 (0.86–2.00)		
Number of abortions				0.00001	
0	371	95 (25.6)	1		1
1–13	204	98 (48)	2.69 (1.87–3.85)		
Education in years				0.03	
<6	32	7 (21)	1		5
6–12	165	58 (35.2)	1.94 (0.79–4.75)		
>12	349	81 (23.2)	1.08 (0.45–2.59)		
Unknown	28	7 (25)	1.19 (0.36–3.94)		
Employment				0.03	
Employed	196	49 (25)	1		4
Non-employed	316	94 (29.7)	1.27 (0.85–1.90)		
Student	63	9 (14.3)	0.5 (0.23–1.09)		
Income in Saudi Riyals				0.9	
<5,000	83	23 (27.7)	1		
5,000–10,000	216	58 (26.9)	0.96 (0.54–1.68)		
>10,000	275	70 (25.5)	0.89 (0.51–1.54)		
Medical problems				0.15	
Present	151	47 (31)	1		
Absent	424	106 (25)	0.74 (0.49–1.11)		
Planned pregnancy				0.00001	
Yes	332	64 (19)	1		2
No	243	89 (36.8)	2.42 (1.66–3.53)		
Negative impact of pregnancy				0.0002	
Yes	287	91 (31.7)	1		3
No	288	52 (18)	0.47 (0.32–0.70)		
Living arrangement				0.65	
With spouse	468	121 (26)	1		
Without spouse	107	30 (28)	1.1 (0.70–1.78)		
Housing type				0.9	
Owned	182	49 (26.9)	1		
Rented	393	104 (26.5)	0.98 (0.66–1.45)		
Nationality				0.17	
Saudi	447	125 (28)	1		
Non-Saudi	128	28 (22)	0.72 (0.45–1.15)		

found no association between antenatal depression and anxiety and neonatal outcome.[24] Conversely, a recent meta-analysis has shown a modest association between depression during pregnancy and low birth weight and preterm birth.[7]

During the last two decades, the main emphasis of research has been concerned about women experiencing symptoms of anxiety and depression in the postpartum period. Many other studies addressed the clinical management of postpartum depression or the use of antidepressant drugs on the mother and their fetuses.[25]

The concept of pregnancy anxiety has been introduced recently.[26] Now, pregnancy anxiety is recognized as an

Table 3 Characteristics of the participants, total number and percentage of trait anxiety (AT), odds ratio (OR), 95% CI, *p*-values, and order of entrance in the logistic regression model

Women's characteristics	N	AT cases (%)	OR (95% CI)	*p*-value	Entrance order
Age, years				0.66	
18–20	22	6 (27.3)	1		
21–30	300	105 (35)	1.44 (0.55–3.78)		
31–40	230	89 (38.7)	1.68 (0.63–4.46)		
41–45	23	8 (34.8)	1.42 (0.40–5.07)		
Trimester				0.009	
First	90	21 (23.3)	1		2
Second	214	89 (41)	2.36 (1.35–4.13)		
Third	271	98 (36)	1.86 (1.08–3.22)		
Gravidity				0.004	
1	168	46 (27.4)	1		4
2–17	407	163 (40)	1.77 (1.20–2.62)		
Number of abortions				0.97	
0	371	132 (35.6)	1		
1–13	204	77 (37.7)	1.01 (0.70–1.44)		
Education in years				0.13	
<6	32	10 (31.3)	1		
6–12	165	72 (43.6)	1.7 (0.76–3.80)		
>12	349	116 (33.2)	1.1 (0.50–2.39)		
Unknown	28	11 (39.3)	1.42 (0.49–4.12)		
Employment				0.003	
Employed	196	65 (33.2)	1		3
Non-employed	316	135 (42.7)	1.5 (1.04–2.18)		
Student	63	14 (22.2)	0.58 (0.3–1.12)		
Income in Saudi Riyals				0.07	
<5,000	83	33 (39.8)	1		
5,000–10,000	216	88 (40.7)	1.04 (0.62–1.75)		
>10,000	275	86 (31.3)	0.69 (0.41–1.15)		
Medical problems				0.84	
Present	151	56 (37)	1		
Absent	424	153 (36)	0.96 (0.65–1.43)		
Planned pregnancy				0.00001	
Yes	332	101 (30.4)	1		1
No	243	108 (44.6)	1.84 (1.31–2.60)		
Negative impact of pregnancy				0.11	
Yes	287	115 (40.1)	1		
No	288	97 (33.7)	0.76 (0.54–1.07)		
Living arrangement				0.23	
With spouse	468	182 (39)	1		
Without spouse	107	35 (32.7)	0.76 (0.49–1.19)		
Housing type				0.29	
Owned	182	76 (41.8)	1		
Rented	393	146 (37.2)	0.82 (0.58–1.18)		
Nationality				0.49	
Saudi	447	161 (36)	1		
Non-Saudi	128	50 (39.4)	1.15 (0.77–1.73)		

independent risk factor for spontaneous preterm birth. There is a great emphasis also on the multilevel mechanism of the negative affective state (anxiety and depression) on neonatal birth weight. Birth weight has been linked to adverse outcome in the neonatal, childhood, and adult life. This is known as Baker hypothesis, which states that many adult diseases (coronary artery disease, diabetes, hypertension, and stroke) have fetal origin. The most widely accepted mechanism for this effect is fetal programming by nutritional stimuli or excess fetal glucocorticoid exposure.[27] Hormonal challenge tests, such as the dexamethasone/corticotropin-releasing hormone test, have revealed elevated

Table 4 Characteristics of the participants, total number and percentage of state anxiety (AS), odds ratio (OR), 95% CI, *p*-values, and order of entrance in the logistic regression model

Women's characteristics	N	AS cases (%)	OR (95% CI)	*p*-value	Entrance order
Age, years				0.89	
18–20	22	9 (41)	I		
21–30	300	114 (38)	0.89 (0.37–2.14)		
31–40	230	95 (41.3)	1.02 (0.42–2.47)		
41–45	23	9 (39)	0.93 (0.28–3.06)		
Trimester				0.58	
First	90	31 (34.4)	I		
Second	214	87 (40.8)	1.31 (0.79–2.2)		
Third	271	107 (39.5)	1.24 (0.75–2.04)		
Gravidity				0.8	
I	168	65 (38.7)	I		
2–17	407	162 (39.8)	1.05 (0.72–1.51)		
Number of abortions				0.38	
0	371	152 (41)	I		
1–13	204	76 (37.3)	0.86 (0.60–1.21)		
Education in years				0.39	
<6	32	9 (28)	I		
6–12	165	70 (42.4)	1.88 (0.82–4.32)		
>12	349	135 (38.7)	1.61 (0.72–3.59)		
Unknown	28	13 (46.4)	2.21 (0.76–6.46)		
Employment				0.04	
Employed	196	85 (43)	I		
Non-employed	316	125 (40)	0.85 (0.60–1.22)		
Student	63	16 (25.4)	0.44 (0.24–0.84)		
Income in Saudi Riyals				0.91	
<5,000	83	31 (37)	I		
5,000–10,000	216	85 (39)	1.09 (0.65–1.83)		
>10,000	275	110 (40)	1.12 (0.67–1.85)		
Medical problems				0.8	
Present	151	61 (40)	I		
Absent	424	166 (39)	0.95 (0.65–1.39)		
Planned pregnancy				0.00001	
Yes	332	103 (31)	I		2
No	243	124 (51)	2.34 (1.66–3.29)		
Negative impact of pregnancy				0.00001	
Yes	287	129 (45)	I		I
No	288	98 (34)	0.33 (0.23–0.48)		
Living arrangement				0.61	
With spouse	468	187 (40)	I		
Without spouse	107	40 (37.4)	0.89 (0.58–1.38)		
Housing type				0.45	
Owned	182	76 (41.6)	I		
Rented	393	151 (38.4)	0.87 (0.61–1.24)		
Nationality				0.58	
Saudi	447	181 (40.5)	I		
Non-Saudi	128	48 (37.8)	0.89 (0.59–1.34)		

hypothalamic–pituitary–adrenal activity (hypercortisolism) in at least a portion of women with depression. Glucocorticoids readily cross the placental barrier, and this may play a role in the development of growth restriction in women with negative affective states.

Little is known about the epidemiology of psychiatric disorders during pregnancy in Saudi Arabia. On the other hand, many countries have well established prevalence of these conditions.[28–33] Prior research in Saudi Arabia has focused on the postpartum period,[10] and to the best of our

knowledge the present study is the first to examine this issue. The prevalence of depression varies from 5% to 36% in various studies. The EPDS has to be interpreted carefully as it is only a screening test. If only women scoring more than 14 on EPDS were considered as likely to have depression, then the prevalence in this study is 26.8%.

The high prevalence of state and trait anxiety in this study is consistent with other studies.[22] This is mainly because pregnancy is considered to be a period of psychological change and challenge. The other reason for the high prevalence is that many of the somatic manifestations (for example, feeling tired) of anxiety are sometimes part of the normal physiological changes of pregnancy. This is again emphasizing the screening nature of the STAI tests. It should not replace the proper psychiatric evaluation for definitive diagnosis.

Limitations of this study include the absence of a proper psychiatric evaluation for those women who scored high (positive) in the study.

Based on this study, it is recommended to perform larger study with further psychiatric evaluation following the positive screen test for anxiety and depression to assess the actual prevalence of anxiety and depression in Saudi Arabia.

Ethical approval and informed consent

Ethical approval for the study was obtained from the Deanship of Scientific Research, Imam Abdulrahman Bin Faisal University (ethical approval number 2013190), after complete description of the study and the expected benefits from the study. The study protocol was reviewed by the Institutional Review Board of Imam Abdulrahman Bin Faisal University. All subjects signed an informed consent before taking part in the study.

Data sharing statement

The full dataset has not been stored in a public repository because it contains identifiers that may lead to identification of individual participants. The data presented in the article will not lead to identification of women because it only contains summarized results. The full dataset is freely available upon a reasonable written request to the corresponding author.

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Author contributions

AA and NHQ conceived and designed the study. All authors implemented the study and supervised data collection. NHQ was responsible for database management and analysis. AA and NHQ supervised the analysis process, interpreted the findings, and drafted the manuscript. All authors contributed toward data analysis, drafting and revising the paper and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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