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CLINICAL & BASIC RESEARCH

# The Effect of Antepartum Depression on the Outcomes of Pregnancy and Development of Postpartum Depression

## A prospective cohort study of Omani women

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# تأثير إكتئاب ما قبل الولادة على نتائج الحمل وحدوث إكتئاب ما بعد الولادة

## دراسة استقصائية أترابية للنساء العمانيات

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**ABSTRACT:** ***Objectives:*** This study aimed to identify the relationship between antenatal depression and pregnancy outcomes, including the risk of developing postpartum depression in Oman. ***Methods:*** This follow-up prospective longitudinal cohort study included pregnant women attending primary healthcare institutions in Muscat, Oman from January to November 2014. The Edinburgh Postnatal Depression Scale (EPDS) was used to screen for antenatal and postnatal depression. Pregnant Omani women with a gestational age ≥32 weeks attending 12 local health centres for antenatal care in Muscat were invited to participate. Recruited women were followed-up at 6–8 weeks after delivery. The following pregnancy outcomes were assessed: mode of delivery (normal or Caesarean section [CS]), gestational age at delivery (preterm or full-term), baby's birth weight and development of postnatal depression. ***Results:*** A total of 959 women participated in this study (response rate: 97.3%). In total, 233 women (24.4%) had antenatal depression with a score of ≥13 on the EPDS. Of the 592 participants (61.7%) who attended postnatal clinics at 6–8 weeks post-delivery, 126 (21.3%) were positive for postnatal depression. Logistic multivariate regression analysis showed that antenatal depression was associated with increased risk of CS (odds ratio [OR] = 1.79; 95% confidence interval [CI]: 1.20–2.66) and postnatal depression (OR = 8.63; 95% CI: 5.56–13.39). ***Conclusion:*** Screening women for antenatal depression and providing appropriate management may reduce adverse pregnancy outcomes and the risk of developing postnatal depression.

***Keywords:*** Depression; Postnatal depression; Women Health Services; Maternal Health Services; Pregnancy; Primary Health Care; Oman.

**الملخص: الهدف:** هدفت هذه الدراسة لتحديد العلاقة بين إكتئاب ما قبل الولادة ونتائج الحمل، بما في ذلك خطر الإصابة بإكتئاب ما بعد الولادة في سلطنة عُمان. **الطريقة:** شملت هذه الدراسة المتابعة الاستقصائية الطولية الأترابية النساء الحوامل اللاتي يترددن على مؤسسات الرعاية الصحية الأولية في مسقط، سلطنة عُمان من يناير إلى نوفمبر 2014. تم استخدام مقياس إدنبره لإكتئاب ما بعد الولادة للكشف عن إكتئاب ما قبل الولادة وما بعدها. تمت دعوة النساء العُمانيات الحوامل اللاتي يبلغ عمر حملهن 32≤ أسبوعًا ويترددن على 12 مركزًا صحيًا محليًا للرعاية السابقة للولادة في مسقط للمشاركة في هذه الدراسة. كما تمت متابعة النساء المتطوعات عند 6–8 أسابيع بعد الولادة. تم تقييم نتائج الحمل التالية: طريقة الولادة (طبيعية أو قيصرية) وعمر الحمل عند الولادة (حمل مُبْتَسَر أو كامل المدة) و وزن الطفل عند الولادة وحدوث إكتئاب ما بعد الولادة. **النتائج:** شارك ما مجموعه 959 امرأة في هذه الدراسة (معدل الاستجابة: 97.3%). في المجموع كان لدى 233 امرأة (24.4%) إكتئاب ما قبل الولادة بمجموع نقاط 13≤ على مقياس إدنبره للاكتئاب ما بعد الولادة، مما يؤكد وجود الاكتئاب. من بين 592 مشاركة (61.7%) ممن تردن على عيادات ما بعد الولادة عند 6–8 أسابيع بعد الولادة كانت نتائج 126 مشاركة (21.3%) إيجابيًة بالنسبة لإكتئاب ما بعد الولادة. أظهر تحليل الانحدار اللوجستي متعدد المتغيرات أن الإكتئاب ماقبل الولادة ارتبط بزيادة خطر الولادة القيصرية (نسبة الأرجحية = 1.79؛ 95% من مجال الثقة: 1.20–2.66) والإصابة بإكتئاب ما بعد الولادة (نسبة الأرجحية = 8.63؛ 95% من مجال الثقة: 5.56–13.39). **الخلاصة:** فحص النساء للكشف عن إكتئاب ما قبل الولادة وتوفير العلاج الملائم قد يقلل من نتائج الحمل السلبية وخطر الإصابة باكتئاب ما بعد الولادة.

**الكلمات المفتاحية:** الإكتئاب؛ إكتئاب ما بعد الولادة؛ خدمات صحة المرأة؛ خدمات صحة الأم؛ الحمل؛ الرعاية الصحية الأولية؛ سلطنة عُمان.

### Advances in Knowledge

- *This cohort study was the first conducted in Oman to examine the relationship between antenatal depression and pregnancy outcomes, including the development of postnatal depression.*
- *Understanding the relationship between antepartum and postpartum depression should help identify women who are at greater risk of developing postpartum depression, resulting in early detection and treatment.*
- *Identifying the effects of antenatal depression on the outcomes of pregnancy, such as birth weight and mode of delivery, should help health practitioners understand the relationship of such associations.*

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**Application to Patient Care**

- *A screening programme for pregnant women should be considered at the primary care level. Women found to be depressed during pregnancy might be offered treatment, including referrals to psychology or psychiatry outpatient clinics depending on the severity of depression, resulting in the attenuation of the detrimental effects of depression by early detection and treatment.*
- *Women with antepartum depression should be followed-up during the postnatal period and rescreened as screening all women during the postpartum period might not always be feasible.*
- *Women with adverse pregnancy outcomes might have had antenatal depression. Thus, targeting women by screening for antenatal depression and treating or referring them for further care may help reduce pregnancy-related complications and improve maternal and infant well-being.*

Antenatal depression is considered a major cause of disability among women worldwide, particularly in low-income countries; both antenatal and postnatal depression are associated with detrimental effects on child development.[1,2] Several risk factors for antenatal depression have been reported, including low socioeconomic status and educational level, a lack or unavailability of social support, experiencing physical violence from a spouse, poor partner relationships, alcohol abuse and a history of psychiatric morbidities such as depression, anxiety and stress.[3–5] A recent study conducted in Oman revealed that unplanned pregnancy and marital conflicts were significant predictors of antenatal depression.[6]

Antenatal depression is frequently undetected by doctors and therefore left untreated, which may lead to adverse effects on both mother and baby.[7] For the mother, antenatal depression increases the risk of preeclampsia, Caesarean section (CS), assisted vaginal delivery, epidural analgaesia use during delivery, suicidal ideation and the development of postnatal depression.[8,9] For the baby, antenatal depression has been found to increase the risk of spontaneous preterm delivery, low birth weight (LBW), intensive neonatal care admission and sudden death.[8] In addition, babies of women with antenatal depression are more at risk of receiving suboptimal care from their mothers after birth and during their growth.[10]

Antenatal depression has been reported as the strongest predictor of postnatal depression.[3] Several consequences are associated with postnatal depression including marital conflict, self-harm, suicidal thoughts and the development of depressive symptoms in fathers.[11] Indeed, it has been found that children of mothers who had postnatal depression were more likely to have impairment of cognitive and emotional functioning, receive less psychological care and suffer neglect and experience a disturbance in the ability to breastfeed.[12] Thus, it has been suggested that early detection and treatment of maternal depression could have a positive impact on preventing offspring depression, especially during adulthood.[13]

Currently, in Oman the risk for depression is not included as part of routine antenatal or postnatal screening or assessments. Oman is an Arabian Gulf country with an estimated population of 4.6 million, of which 2.5 million are Omani and 2.1 million are expatriates.[14] Almost one-third of Omanis (35%) are below 15 years old, and only 3.5% of the population are above 65 years old.[14] In Oman, primary health centres are the portal to accessing secondary and tertiary healthcare services. Primary healthcare facilities are funded by the government and all Omanis and non-Omanis who are sponsored by the government have access to these services at all levels. Private institutions providing healthcare services are also present.

Standard antenatal care services are provided in local health centres (LHCs) as soon as a woman becomes pregnant. Each pregnant woman is issued an antenatal 'green card' that includes personal details, medical history, family history, details of previous pregnancies and the results of routine antenatal investigations. The card also includes information about the current pregnancy, including type and time of delivery and baby's birth weight and Apgar score.

Women with low-risk pregnancies make six antenatal visits to LHCs during their pregnancy. Pregnancies rated as high-risk are referred through specific protocols to secondary or tertiary hospitals and receive care appropriate to their condition. Women usually deliver in local secondary or tertiary hospitals and are followed-up in their LHCs at 6–8 weeks for postnatal care.[15] During their postnatal visit, women are examined and investigated medically as required and counselled regarding birth spacing. Antenatal and postnatal clinics are mainly staffed by female general practitioners with the help of a specialised nurse.

To the best of the authors' knowledge, no previously published cohort-based studies on antenatal and postnatal depression have been undertaken in Oman. Therefore, this study aimed to identify the relationship between antenatal depression and pregnancy outcomes, including the development of postnatal depression, in Oman.

## Methods

This prospective longitudinal cohort study included pregnant women attending primary healthcare institutions from January to November 2014 in Muscat,

Oman. This study is an extension of a previous study that assessed the prevalence and risks of antenatal depression among Omani women attending primary healthcare centres.[6] Women who had medical conditions such as gestational diabetes (GDM), hypertension, pregnancy-induced hypertension or who were receiving treatment for depression were excluded as were non-Omani women.[6]

In total, 12 out of 32 LHCs in Muscat were randomly selected to conduct the current study. Three nurses from each LHC were trained on how to administer the questionnaire to women and to collect data on pregnancy outcomes. All pregnant Omani women at a gestational age of ≥32 weeks who attended their LHCs for routine antenatal care visits were identified and invited by nurses to participate in the study.[6]

Sample size was calculated based on a presumed prevalence rate of 20%, 95% confidence interval (CI) and an error rate of 2%. The required sample size was 1,000.

The Arabic version of the self-administered Edinburgh Postnatal Depression Scale (EPDS) was used as a screening tool to identify both antenatal and postnatal depression in the current study. This validated, reliable questionnaire comprises 10 questions where each question is scored from 0–3 for a total score ranging from 0–30. A score of ≥13 is indicative of probable antenatal or postnatal depression.[3,16] The Arabic version of the EPDS was validated and used in a study conducted in an Arabic-speaking country.[3] Permission to use the Arabic version of the EPDS was obtained from the corresponding author. This questionnaire was administered twice, once during the antenatal visit and again during a postnatal follow-up appointment.

Social, demographic and medical characteristics of women were recorded in a separate section and were attached to the EPDS questionnaire. These characteristics include age, education level, occupation, gestational age, gravidity and whether the pregnancy was planned or not.

The recruited women were followed-up postnatally at 6–8 weeks and were given the EPDS questionnaire to complete for a second time. Women who did not attend the postnatal visit were reminded to do so via telephone.[6] The pregnancy outcomes were collected 6–8 weeks after delivery during the routine postnatal visit, with data collected from the 'green card' and the birth register available in the LHCs. The collected data included type of delivery (i.e. normal vaginal delivery or CS), gestational age at time of delivery and baby's birth weight.

Preterm birth was defined as delivery at <37 weeks of gestation. Birth weight of less than 2.5 kg was

**Table 1:** Baseline sociodemographic and antenatal and postnatal characteristics of pregnant Omani women (N = 959)

| Characteristic* | n (%) |
|---|---|
| Age in years (n = 957) | |
| <24 | 261 (27.3) |
| 25–30 | 451 (47.1) |
| >30 | 245 (25.6) |
| Occupation (n = 959) | |
| Housewife | 609 (63.5) |
| Employed | 350 (36.5) |
| Highest level of education (n = 957) | |
| Basic education | 519 (54.2) |
| University & higher education | 438 (45.8) |
| Planned pregnancy (n = 958) | |
| Yes | 560 (58.5) |
| No | 398 (41.5) |
| Gravidity (n = 959) | |
| Primigravida (1 pregnancy) | 373 (38.9) |
| Multigravida (2–4 pregnancies) | 465 (48.5) |
| Grand multigravida (5+ pregnancies) | 121 (12.6) |
| Gestational age in weeks (n = 959) | |
| 32–34 | 399 (41.6) |
| 35–37 | 376 (39.2) |
| >37 | 184 (19.2) |
| History of miscarriage (n = 959) | |
| Yes | 170 (17.7) |
| No | 789 (82.3) |
| Antenatal depression (n = 959) | |
| Depressed | 233 (24.3) |
| Not depressed | 726 (75.7) |
| Gestational age at delivery in weeks (n = 953) | |
| <37 | 59 (6.2) |
| ≥37 | 894 (93.8) |
| Type of delivery (n = 953) | |
| Normal vaginal delivery | 822 (86.3) |
| CS | 131 (13.7) |
| Type of CS (n = 131) | |
| Emergency | 108 (82.4) |
| Elective | 23 (17.6) |
| Birth weight of infant in kg (n = 952) | |
| <2.5 | 64 (6.7) |
| ≥2.5 | 888 (93.3) |
| Postnatal depression† (n = 592) | |
| Depressed | 126 (21.3) |
| Not depressed | 466 (78.7) |

*CS = Caesarean section; kg = kilogram.*

**As the current study is a continuation of a previous study, some data are the same.[6] The total of each variable corresponds to the number of respondents for each question. †A score of ≥13 on the Edinburgh Postnatal Depression Scale was indicative of probable antenatal or postnatal depression.*

**Table 2:** Associations between antenatal depression and outcomes of pregnancy and postnatal depression among pregnant Omani women (N = 959)

| Variables | n (%) | | *P* value |
|---|---|---|---|
| | Antenatal depression* | | |
| | Depressed (n = 233) | Not depressed (n = 726) | |
| Birth weight of infant in kg | | | 0.177 |
| <2.5 | 20 (8.6) | 44 (6.1) | |
| ≥2.5 | 213 (91.4) | 682 (93.9) | |
| Gestational age at delivery in weeks | | | 0.300 |
| <37 | 11 (4.7) | 48 (6.6) | |
| ≥37 | 222 (95.3) | 678 (93.4) | |
| Type of delivery | | | 0.004† |
| Normal vaginal delivery | 188 (80.7) | 640 (88.2) | |
| CS | 45 (19.3) | 86 (11.8) | |
| Postnatal depression‡ | | | <0.001† |
| Depressed (n = 126) | 74 (58.7) | 52 (41.3) | |
| Not depressed (n = 466) | 66 (14.2) | 400 (85.8) | |

*CS = Caesarean section.*

** As the current study is a continuation of a previous study, some data are the same.[6] The total of each variable corresponds to the number of respondents for each question. † Statistically significant at P ≤0.05. ‡ A score of ≥13 on the Edinburgh Postnatal Depression Scale was indicative of probable antenatal or postnatal depression.*

defined as LBW. Women who delivered at ≥37 weeks of gestation were categorised as having had a full-term delivery.[17,18]

A pilot study was conducted with the first 50 women to assess the clarity of the questions as well as the reliability of the Arabic version of the EPDS. The participants included in the pilot study were included in the final analysis of the current study. A Cronbach's alpha was calculated to test the reliability of the EPDS and it was found to be 0.766.

Statistical analysis was conducted using Statistical Package for Social Sciences (SPSS), Version 23 (IBM Corp., Armonk, New York, USA). Descriptive analysis for sociodemographic variables and participants' responses were recorded. Relationships between antenatal depression, pregnancy outcomes and postnatal depression were assessed using a Chi-squared test. A *P* value of <0.05 was considered statistically significant. Multivariate regression analysis was conducted to attenuate the effects of possible confounding factors. On multivariate regression analysis, the independent variables included gravidity (*primigravida*) and antenatal depression with CS delivery as the dependent variable. A second regression analysis was done for postnatal depression development (the dependent variable) and antenatal depression, with mother's age and unplanned pregnancy as the independent variables.

All participants provided informed consent and were given a form to read that explained the purpose of the study. This study was approved by the Medical Research and Ethics Committee (MREC) of the College of Medicine and Health Sciences at Sultan Qaboos University, Muscat, Oman (MREC #572).

## Results

A total of 959 pregnant women were included in this study (response rate: 97.3%). The ages of participants ages ranged from 17–43 years with a mean of 27 ± 4.79 years. The majority of participants were housewives (63.5%) and the remaining participants (36.5%) were employed. Regarding gravidity, 48.5% were multigravida (2–4 pregnancies), 38.9% were *primigravida* and 12.6% were grand multigravida (5+ pregnancies). Most women (58.4%) were at ≥35 weeks of gestation and the remaining participants (41.6%) were between 32–34 weeks. More than 40% of participants reported that their pregnancy had been unplanned [Table 1].

The majority of participants (93.2%) delivered at or after 37 weeks of gestation. Most (86.3%) had normal vaginal deliveries and the remainder (13.7%) had a CS. Of the CS deliveries, 82.4% were due to emergencies (i.e. non-progression of labour and/or fetal distress) and 17.6% were elective. In the majority of women (93.3%), babies' birth weights were 2.5 kg or more [Table 1].

The EPDS scores ranged from 0–23, with a mean score of 9 ± 4.785. Of the 959 participants, 233 (24.4%) had scores that suggested antenatal depression at a cut point of ≥13.

More than half of participants (61.7%) attended a postnatal follow-up at 6–8 weeks. Of these participants, 126 (21.3%) had EPDS scores suggestive of postnatal depression using a cut point of ≥13, of which, 58.7% had also had antenatal depression [Table 2]. A total of 367 (38.3%) women were lost to follow-up as they did not attend postnatal follow-ups. Of these, 94 (25.6%) had antenatal depression, which might have affected the results. However, such a percentage is not sufficiently high to substantially affect the outcome of this study.

A bivariate analysis revealed that depression during pregnancy was significantly associated with CS delivery (*P* = 0.004) and developing postnatal depression (*P* <0.001). No significant associations were found between antenatal depression and LBW or preterm labour (*P* = 0.177 and 0.300, respectively) [Table 2].

Gravidity (*primigravida*) and antenatal depression were found to be significantly associated with CS delivery (*P* <0.001 and 0.034, respectively). Furthermore,

**Table 3:** Associations between baseline variables and mode of delivery and postnatal depression among pregnant Omani women (N = 959)

| Variables | n (%) | | | | | |
|---|---|---|---|---|---|---|
| | Mode of delivery* | | | Postnatal depression† | | |
| | NVD (n = 822) | CS (n = 131) | *P* value | Depressed (n = 126) | Not depressed (n = 466) | *P* value |
| **Age in years** | | | | | | |
| <24 | 233(28.3) | 29 (22.1) | 0.190 | 45 (35.7) | 124 (26.6) | 0.033‡ |
| 25–30 | 378 (46.0) | 71 (54.2) | | 59 (46.8) | 213 (45.7) | |
| >30 | 211 (25.7) | 31 (23.7) | | 22 (17.5) | 129 (27.7) | |
| **History of miscarriage** | | | | | | |
| Yes | 145 (17.6) | 23 (17.6) | 0.982 | 108 (85.7) | 382 (82.0) | 0.355 |
| No | 677 (82.4) | 108 (82.4) | | 18 (14.3) | 84 (18.0) | |
| **Gravidity** | | | | | | |
| Primigravida (1 pregnancy) | 300 (36.5) | 72 (55.0) | <0.001‡ | 50 (39.7) | 187 (40.1) | 0.400 |
| Multigravida (2–4 pregnancies) | 412 (50.1) | 50 (38.2) | | 64 (50.8) | 215 (46.1) | |
| Grand multigravida (5+ pregnancies) | 110 (13.4) | 9 (6.9) | | 12 (9.5) | 64 (13.7) | |
| **Highest level of education** | | | | | | |
| Basic education | 446 (54.3) | 73 (55.7) | 0.756 | 73 (57.9) | 245 (52.6) | 0.314 |
| University & higher education | 376 (45.7) | 58 (44.3) | | 53 (42.1) | 221 (47.4) | |
| **Occupation** | | | | | | |
| Housewife | 518 (63.0) | 85 (64.9) | 0.680 | 85 (67.5) | 311 (66.7) | 0.915 |
| Employed | 304 (37.0) | 46 (35.1) | | 41 (32.5) | 155 (33.3) | |
| **History of depression** | | | | | | |
| Yes | 8 (1.0) | 1 (0.8) | 0.818 | 2 (1.6) | 3 (0.6) | 0.289 |
| No | 814 (99.0) | 130 (99.2) | | 124 (98.4) | 463 (99.4) | |
| **Family history of depression** | | | | | | |
| Yes | 18 (2.2) | 0 (0.0) | 0.087 | 4 (3.2) | 6 (1.3) | 0.232 |
| No | 804 (97.8) | 131 (100.0) | | 122 (96.8) | 460 (98.7) | |
| **Planned pregnancy** | | | | | | |
| Yes | 478 (58.2) | 80 (61.1) | 0.529 | 63 (50.0) | 285 (61.2) | 0.025‡ |
| No | 344 (41.8) | 51 (38.9) | | 63 (50.0) | 181 (38.8) | |
| **Antenatal depression** | | | | | | |
| Depressed | 153 (18.6) | 35 (26.7 | 0.034‡ | 52 (41.3) | 400 (85.8) | <0.001‡ |
| Not depressed | 669 (81.4) | 96 (73.3) | | 74 (58.7) | 66 (14.2) | |

*NVD = normal vaginal delivery; CS = Caesarean section; EPDS = Edinburgh Postnatal Depression Scale.*

**The total corresponds to the number of respondents for the question. †A score of ≥13 on the Edinburgh Postnatal Depression Scale was indicative of probable antenatal or postnatal depression. A total of 367 participants were lost to follow-up. ‡Statistically significant at P ≤0.05.*

**Table 4:** Logistic regression analysis of the effects of antenatal depression on birth outcomes and development of postnatal depression (N = 959)

| Variables | OR | 95% CI | P value |
|---|---|---|---|
| CS* | 1.79 | 1.20–2.66 | 0.004† |
| Postnatal depression‡ | 8.63 | 5.56–13.39 | <0.001† |

*OR = odds ratio; CI = confidence interval; CS = Caesarean section.*
**Independent variables include gravidity and antenatal depression. †Statistically significant at P ≤0.05. ‡ Independent variables include mother's age, unplanned pregnancy and antenatal depression.*

antenatal depression, mother's age and unplanned pregnancies were deemed significant predictors of postnatal depression development (*P* <0.001, 0.033 and 0.025, respectively) [Table 3].

The multivariate regression analysis revealed that women who had antenatal depression were 1.79 times more likely to undergo CS delivery (95% CI: 1.20–2.66) and 8.63 times more likely to develop postpartum depression (95% CI: 5.56–13.39) [Table 4].

## Discussion

To the best of the author's knowledge, this study is the first in Oman to explore the association between antenatal depression and the outcomes of pregnancy, including postnatal depression development. It showed that antenatal depression is significantly associated with CS delivery and development of postnatal depression. However, effects of antenatal depression on gestational age at delivery and baby's birth weight were not significant.

This study found an antenatal depression prevalence among Omani women of 24.3% which was determined using a cut point of ≥13 on the EPDS.[6] This prevalence is similar to that of women in Brazil (24.3%) but is higher than what has been reported in other Arabic-speaking countries such as Jordan (19%) and Morocco (19.2%).[3,5,19] The prevalence of antenatal depression in Oman is higher than rates found in Bangladesh (18%), Australia (16.9%), Italy (14.9%) and Turkey (21.6%).[20–23]

The finding of a significant association between antenatal depression and CS delivery is consistent with other studies.[24,25] The reason for the increased risk of CS in Omani women with antenatal depression is unclear. However, women who experience antenatal depression may have greater anxiety and fear of childbirth leading to a lower pain threshold and increased demand for epidural analgaesia and incidence of CS.[8] Furthermore, it has been found that psychological distress can impair uterine contractility leading to prolonged labour, failure to progress and eventually fetal distress, all of which could increase CS risk.[26,27]

The current study revealed that Omani women who had antenatal depression were at a greater risk of developing postnatal depression than women without antenatal depression. Similar results were reported in a study from the USA which showed that women who reported poor mental health at antenatal period were found to be 11 times as likely to develop poor mental health at postnatal period.[28] In another study, 23% of women with postnatal depression reported that symptoms of depression had started during pregnancy.[29] It was also found that women who had experienced postnatal depression have an increased risk of suffering from further episodes of postnatal depression following subsequent deliveries.[30]

The current study found that antenatal depression had no effect on birth weight or gestational age at delivery (i.e. preterm birth), which was both consistent and inconsistent with previous studies.[31–33] The reasons for these contradictory studies are most likely related to differences in study design, type of antenatal depression measurement tool used, the influence of confounders such as ethnicity, smoking and substance abuse and previous obstetric complications such as LBW or preterm labour.[31] The absence of a positive association between antenatal depression and preterm birth might be related to the fact that in this study women were recruited from 32 weeks of gestation onward, resulting in an artificially low number of women in the study who had had preterm births.

This study was subjected to some limitations. First, the screening tool for depression was self-reported, resulting in a possible over- or underestimating of the true prevalence of depression. Moreover, choosing a cut-off value of ≥13 to diagnose antenatal and postnatal depression was based on a Jordanian study as no previous validation study was conducted in Oman.[3] Second, while EPDS is a valid and reliable screening tool for probable depression, it should be followed by more objective assessments to confirm the presence of depression. This study lacked such an objective assessment. Third, other confounding obstetric variables such as previous history of LBW and CS were not included in the current analysis and may have affected the findings. This study also did not identify the proportion of women with antenatal depression who developed obstetric and labour complications such as pre-eclampsia or obstructed labour, both of which might have had an impact on the mode of delivery. Fourth, this study did not determine whether women diagnosed with antenatal depression, based on the EPDS, had sought treatment from healthcare services. Moreover, types of treatment (e.g. cognitive behavioural therapy, medications or referral to a psychiatrist) those women might

have received were not identified. Fifth, recruiting pregnant women at 32 weeks or more gestation might have resulted in the exclusion of women who delivered earlier, affecting the study's results. Finally, although telephone calls were used to remind women about the 6–8-week postnatal EPDS questionnaire, 38.3% of the women were lost to follow-up.

## Conclusion

This study showed that antenatal depression has detrimental effects on both the mother and baby's health and is associated with several adverse outcomes in women, including the risk of postnatal depression. Screening women for the presence of antenatal depression and managing them appropriately may help reduce pregnancy and delivery complications. While no positive relationships were found between antenatal depression and a baby's gestational age or birth weight, additional research is needed to investigate this finding further.

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### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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