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Journal

Obstetrics and Gynecology, 116(5)

ISSN

1099-3630

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Publication Date

2010-11-01

DOI

10.1097/aog.0b013e3181f60b0a

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Peer reviewed



Published in final edited form as:

Obstet Gynecol. 2010 November ; 116(5): 1064–1070. doi:10.1097/AOG.0b013e3181f60b0a.

Depressive Disorders During Pregnancy:

Prevalence and Risk Factors in a Large Urban Sample

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Abstract

OBJECTIVE—To estimate the prevalence of major and minor depression, panic disorder, and suicidal ideation during pregnancy while also identifying factors independently associated with antenatal depressive disorders.

METHODS—In this prospective study, participants were 1,888 women receiving ongoing prenatal care at a university obstetric clinic from January 2004 through January 2009. Prevalence of psychiatric disorders was measured using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria based on the Patient Health Questionnaire. Multiple logistic regression identified factors associated with probable major depressive disorder and any depressive disorder.

RESULTS—Antenatal depressive disorders were present in 9.9% with 5.1% (97) meeting criteria for probable major depression and 4.8% (90) meeting criteria for probable minor depression. Panic disorder was present in 3.2% (61), and current suicidal ideation was reported by 2.6% (49). Among patients with probable major depression, 29.5% (28) reported current suicidal ideation. Psychosocial stress (odds ratio [OR], 1.29; 95% confidence interval [CI], 1.21–1.36), domestic violence (OR 3.45; 95% CI 1.46–8.12), chronic medical conditions (OR 3.05; 95% CI 1.63–5.69), and race (Asian: OR 5.81; 95% CI 2.55–13.23; or African American: OR 2.98; 95% CI 1.24–7.18) each significantly increased the odds of probable antepartum major depressive disorder, whereas older age (OR 0.92; 95% CI 0.88–0.97) decreased the odds. Factors associated with odds of any depression were similar overall except that Hispanic ethnicity (OR 2.50; 95% CI 1.09–5.72) also independently increased the odds of any depression.

CONCLUSION—Antenatal major and minor depressive disorders are common and significantly associated with clinically relevant and identifiable risk factors. By understanding the high point prevalence and associated factors, clinicians can potentially improve the diagnosis and treatment rates of serious depressive disorders in pregnant women.

Major depression, the leading cause of disease-related disability among women worldwide, has a median age of onset during the childbearing years.² Despite being a frequent medical disorder during pregnancy,^{3,4} major depression remains under-detected and undertreated during prenatal care^{5,6} with potential sequelae persisting well beyond the perinatal period.⁷ Although the American College of Obstetrics and Gynecology recommended in 2006 strongly considering screening pregnant women for depression,³ our

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Financial Disclosure

The authors did not report any potential conflicts of interest.

understanding of antenatal depressive disorders remains incomplete. Most U.S. studies have measured antenatal depressive symptoms,⁴ not disorders, an important distinction because major depressive disorder is unlikely to remit without treatment. Among recent studies using diagnostic criteria, 8–12% of pregnant women met criteria for antenatal major depression,^{5,8} further highlighting the importance of screening.

Although some clinicians may adopt universal screening during pregnancy, many will likely screen based on perceived risk factors. Providing clinicians with clinically relevant, identifiable risk factors will help them identify women with antenatal depression. Studies using diagnostic criteria for depressive disorders, however, have not assessed potentially associated factors using validated measures. Furthermore, although depression is highly comorbid with anxiety disorders in general populations,⁹ little is known about comorbid anxiety during pregnancy. Similarly, suicide is the fifth leading cause of death among perinatal women,¹⁰ but studies examining perinatal suicidal ideation have limited generalizability.^{11–17}

In this study, we use a large clinic-based sample to estimate the prevalence of probable major and minor depression, comorbid panic disorder, and suicidal ideation during pregnancy and to assess potential risk factors for antenatal depressive disorders. We hypothesize that antenatal major depression is prevalent and significantly associated with clinically relevant and identifiable risk factors.

MATERIALS AND METHODS

The participants of this study were patients receiving prenatal care at a single university academic medical center from January 2004 to January 2009. Questionnaires assessing mood and psychosocial factors were introduced in January 2004 and designed to be distributed by clinical staff as part of routine clinical care to all patients during pregnancy. All women receiving ongoing obstetric care and completing at least one clinical questionnaire from the second trimester onward during the study time period were eligible for inclusion in the study. Exclusion criteria included age younger than 15 years at the time of delivery and inability to complete the clinical questionnaire as a result of mental incapacitation or language difficulties (ie, no interpreter available). Clinic staff contacted and consented potentially eligible participants for study enrollment at the time of screen completion. Questionnaires were linked to automated medical records. All procedures were approved by the university's Institutional Review Board before beginning the study with initial approval September 12, 2003.

A questionnaire was developed to assess prevalence of probable antenatal depression, panic, and suicidal ideation¹⁸ along with factors determined a priori to have a high likelihood of predicting antenatal depression. The a priori factors chosen for inclusion in the questionnaire were: educational achievement (as proxy for socioeconomic status), race, ethnicity, marital status, chronic medical conditions, past obstetric complications, psychosocial stress,^{19,20} tobacco use,²¹ alcohol use,²² drug use,²³ and domestic violence.²⁴ Maternal age and parity were obtained from automated medical records.

Depression and panic disorder were assessed using the Patient Health Questionnaire short form (15 items), which yields diagnoses for major depression, minor depression, and panic disorder.¹⁸ In our study, women meeting Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for major or minor depression on the Patient Health Questionnaire were classified as experiencing current depression. The DSM-IV criteria for major depression on the Patient Health Questionnaire require the participant to have, for at least 2 weeks, five or more depressive symptoms present for more than half the

days, with at least one of these symptoms being depressed mood or anhedonia. The criteria for minor depression (or depression not otherwise specified) require the participant to have, for at least 2 weeks, two to four depressive symptoms present for more than half the days, with at least one of these symptoms being depressed mood or anhedonia. The criteria for panic disorder require affirmative answers to all five panic symptoms and follow the DSM-IV. In a study of 3,000 obstetric and gynecology patients, the Patient Health Questionnaire demonstrated high sensitivity (73%) and specificity (98%) for a diagnosis of major depression based on the Structured Clinical Interview for DSM-IV as well as for a diagnosis of panic disorder (sensitivity 81%, specificity 99%).²⁵ The high specificity rates demonstrate few false-positive diagnoses. Because structured psychiatric interviews were not conducted to confirm diagnoses in the current study, however, depressive disorders are reported as “probable major (and minor) depression.” Suicidal ideation was assessed by an item on the Patient Health Questionnaire, which asks “Over the last 2 weeks how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?” and gives response options of “not at all” (0), “several days” (1), “more than half the days” (2), and “nearly every day” (3). Suicidal ideation was considered positive for participants giving a response of several days (1) or higher. The results of the depression and suicidal ideation questions were reviewed by clinic staff and reported to the patient’s provider on the day of the screening. Depression was evaluated and managed by the provider in accordance with their usual practice (eg, referral to specialty mental health; initiation of antidepressants; watchful waiting). A strict suicidal ideation protocol was also followed with any patient reporting suicidal ideation of any level receiving immediate perinatal social worker evaluation and triage according to level of suicide risk.

Tobacco use was assessed using the Smoke-Free Families Prenatal Screen, which was specifically developed to maximize disclosure of smoking status during pregnancy.²¹ On this screen, any current smoking is classified as tobacco use. The T-ACE²² and Drug CAGE²³ were used to assess substance use during the current pregnancy as well as periconceptually (ie, in the 12 months before pregnancy) to identify all women at risk for use. The T-ACE was developed to identify at-risk drinkers, has been validated in a pregnant population, and has increased sensitivity compared with the Alcohol CAGE.²² Sensitivity and specificity of identifying at-risk drinkers are 69% and 89% when a cutoff score of 2 or greater is used.²² The Drug CAGE, developed from the original CAGE to identify problem illicit drug use, has been validated in pregnant women with a cutoff score of 3 or greater identifying problem drug use.²³ In this study, women were considered at-risk drinkers or problem drug users if they met criteria for risk drinking or problem drug use during pregnancy, periconceptually, or both.

Psychosocial stress was measured using the Pre-natal Psychosocial Profile Stress Scale, which has demonstrated high convergent validity, internal consistency, and test–retest reliability for use among ethnically diverse rural and urban pregnant populations.^{19,20} The scale’s 11 items were selected from the Daily Hassles Scale²⁶ for their sensitivity and appropriateness for use with pregnant women. They include two items related to financial worries and single items related to family, friends, recent moves, recent losses, problems with work, substance use, the current pregnancy, abuse, and feeling generally “overloaded.” Women indicate the extent to which each item is a current stressor or hassle on a 4-point Likert scale ranging from 1 (no stress) to 4 (severe stress) with a possible total score of 11–44. High stress in our population has previously been established as a score of 23 or greater.²⁷

The three-question Abuse Assessment Screen assesses physical and sexual violence during the past year and during pregnancy.²⁴ This screen has been used both as a clinical screening tool with established validity and test–retest reliability and for research purposes as a

dichotomous measure of abuse.^{28,29} This screen asks: 1) Within the last year, have you been hit, slapped, kicked, or otherwise physically hurt by someone? 2) Since you have been pregnant, have you been hit, slapped, kicked, or otherwise physically hurt by someone? 3) Within the last year, has anyone forced you to have sexual activities? Criterion validity has been established with the Conflict Tactics Scale,³⁰ the Index of Spouse Abuse,³¹ and the Danger Assessment Scale.³² Consistent with previous research, we classified women as positive for violence if they answered “yes” to any of the three abuse questions.

Women were considered as having high medical comorbidity if they self-reported two or more chronic medical problems outside of pregnancy from a list of 12 common disorders, which included: asthma, hypertension, arthritis, diabetes, thyroid disorders, migraines, gastrointestinal disorders, cancer, seizure disorders, heart failure, other heart disease, or a physical disability. A history of pregnancy complications was recorded for women self-reporting one or more significant complications in a prior pregnancy from a list of nine common complications, which included: gestational diabetes, hypertension or preeclampsia, eclampsia, preterm labor, preterm delivery, preterm rupture of membranes, placental abruption, oligohydramnios, or hemorrhage. Self-report of chronic disease has been shown to have high validity compared with physician report.³³ Other demographics, including employment, education, and marital status, were dichotomized as shown in Table 1.

Descriptive statistics were used to characterize the overall sample and participants with and without antenatal depressive disorders (ie, major depression, any depression). Comparisons of variables by antenatal depressive disorder status were conducted using chi square tests for categorical variables and *t* tests for continuous variables.

For each depressive disorder, we created a series of multivariable logistic regression models to estimate the odds of having an antenatal depressive disorder. In the first stage, factors determined a priori and significant factors from the univariable comparisons ($P < .05$) were jointly added to the model. In the second stage, model selection was performed and model fit was examined using deviance goodness of fit to identify the final model with the best fit. Adjusted odds ratios (ORs) were estimated for the probability of antenatal depression given the presence of specific covariates and controlling for other covariates. Questionnaire data for each participant were entered and stored using Filemaker Pro. All statistical analyses were performed using SAS.

RESULTS

During the study period, 2,616 women completed at least one psychosocial screen from 12.0 weeks estimated of gestational age onward as part of their routine antenatal care and were potentially eligible for study enrollment. Staff were present to approach 2,070 of the women (79.1% of the clinic population) for participation in the study. Of the 2,070 women whom staff approached for involvement in the study, 91.2% (1,888) consented for participation, whereas 8.8% (182) declined. The mean gestational age when the questionnaire was completed was 22.1 (± 6.1) weeks.

Among the 1,888 study participants, mean age was 30.4 \pm 6.2 years with a range of 15–51 years. Racial identification was 71.1% white, 11.2% Asian, 7.9% African American, 3.0% American Indian or Alaska Native, 1.4% Pacific Islander, 5.3% mixed race, and 6.7% undeclared. Ethnicity was 10.2% Hispanic. The majority of women reported living with a spouse or partner (86.7%) and had achieved education beyond high school (79.6%). All other maternal demographic, behavioral, and clinical characteristics are reported in Table 1.

The prevalence of probable antenatal depressive disorders was 9.9% (8.6–11.3%) with 5.1% ($n=97$) (4.2–6.2%) meeting criteria for probable major depression and 4.8% ($n=90$) (3.9–

5.8%) meeting criteria for probable minor depression. Probable panic disorder was present in 3.2% (n=61) (2.5–4.1%) of women antenatally. Among women with panic disorder, 52.5% (40.2–64.5%) had comorbid depression (31% major and 21% minor), whereas 47.5% (35.5–59.8%) were experiencing panic alone. Conversely, 19.6% (12.8–28.7%) of women with probable major depression and 14.4% (8.5–23.3%) of women with probable minor depression had comorbid panic disorder. Current suicidal ideation (ie, reporting several days or more of suicidal ideation in the preceding 2 weeks) was reported by 2.6% (n=49) (2.0–3.4%) of participants overall. Notably, among participants with probable major depression, 29.5% (n=28) (21.2–39.3%) reported current suicidal ideation. Suicidal ideation was far less frequent in women with probable minor depression (5.6% [n=5]; 2.1–12.7%).

Women with antenatal depression were younger, had less education, and were less likely to be partnered (Table 1). Depressed women also reported significantly more medical comorbidity, prior pregnancy complications, psychosocial stress, and domestic violence. Adjusted ORs for the relationship between maternal characteristics and antenatal probable major depression and any depression are shown in Tables 2 and 3, respectively. Psychosocial stress, domestic violence, chronic medical conditions, and race (Asian or African American) each significantly increased the odds of antepartum probable major depression, whereas older age decreased the odds (Table 2). Factors associated with odds of any depression were overall similar except that Hispanic ethnicity also independently increased the odds of depression (Table 3).

DISCUSSION

In this large, prospective study of diverse women receiving prenatal care, we found that 10% of women met criteria for a probable antenatal depressive disorder. Half of these women had a more serious disorder, probable major depression. Approximately one-third of the women with depression also met criteria for probable comorbid panic disorder, and another 1.5% of women had panic disorder alone. Perhaps most notably, nearly one-third of women with probable major depression reported current suicidal ideation.

A 2005 meta-analysis revealed that 12.7% of US pregnant women met diagnostic criteria for antenatal major depression.⁸ More recently, a large nationally representative study found the 12-month prevalence of major depressive disorder to be 8.4% among past-year pregnant, 9.3% among past-year postpartum, and 8.1% among nonpregnant women.⁵ Our study, which examines point prevalence (rather than 12-month prevalence) in a sample of nearly 2,000 pregnant women, further supports these estimates.

Our study also provides needed insight into clinically relevant, identifiable factors significantly associated with antenatal depressive disorders. The risk factors found in this study could help clinicians target depression screening to high-risk populations of pregnant women. Intimate partner violence emerged as one of the strongest independent predictors of antenatal major depression, conferring an odds of 3.45. Our study extends the relationship between intimate partner violence and antenatal depressive symptoms seen in previous studies^{34,35} to women meeting DSM-IV diagnostic criteria for depressive disorders. Psychosocial stress was another important factor with a 1.3 odds of antenatal depression per unit increase on the Prenatal Psychosocial Profile, which assesses financial, interpersonal, logistic, and other daily stressors. This finding supports and builds on prior work showing an association between stress and depressive symptoms.^{36–38} Two or more chronic medical conditions before pregnancy also conferred a strong risk (OR 3.05) for antenatal depression. The effect of chronic disease burden on depression has been documented outside of pregnancy^{39,40}; our study now suggests that chronic medical comorbidity has a similar effect on antenatal depression. Finally, in our population, race and ethnicity played a role

with those of Asian and African American race as well as those of Hispanic ethnicity experiencing increased risks of depressive disorders. This finding is consistent with recent reports showing higher depressive symptoms in samples of antenatal African American^{41,42} and postpartum Asian and Hispanic women⁴³ compared with whites. The reason for these differences is unknown, and future studies are needed to elucidate whether race or ethnicity is a consistent risk factor for antenatal depression.

In our sample, comorbid panic disorder was present in one-fifth of women with major depression. Prior studies have examined the relationship between antenatal depressive and anxiety symptoms^{44–47}; however, only one small study (n=100) included diagnostic assessments for depressive and anxiety disorders.⁴⁴ Our study supports high rates of comorbidity between these disorders and extends these findings to a larger, more generalizable population.

Suicide is the fifth leading cause of death among US women during the perinatal period,¹⁰ and major depression is among the strongest predictors of suicidal ideation.⁴⁸ Research on suicidal ideation during pregnancy is limited, however, by small sample sizes and distinct participant populations. In prior studies, suicidal ideation has been present in 35% of women seeking antenatal neuropsychiatric or epileptic treatment,¹² 35% of women seeking perinatal drug treatment,¹³ 4–40% of women in high-risk socioeconomic groups,^{15,16} and 2% of partnered, employed women.¹⁷ Our study establishes that suicidal ideation is present in 2.6% of pregnant women overall but, importantly, 30% of pregnant women with probable major depression. Further research into this potentially devastating consequence of antenatal depression clearly needs to be undertaken.

Strengths of our study include the large sample size, use of a routine screening protocol with high participant participation, and use of DSM-IV diagnostic criteria for depression and panic disorder. Our study is also unique in accurately assessing and adjusting for a large number of potential confounders to establish a more complete model for antenatal depressive disorders. Limitations include the lack of detailed information on prior mental health, medications, and income; lack of structured psychiatric interviews to confirm Patient Health Questionnaire-9 diagnoses; cross-sectional data, which prohibits assessment of causality; and demographics, which, although locally representative, may differ from and limit generalizability to other populations. Additionally, information on nonparticipants is not available, and despite our large sample size, the possibility of type II error exists.

In summary, antenatal depressive disorders are common and associated with clinically relevant, identifiable risk factors. Although universal screening for antenatal depression is an achievable goal, in many obstetric settings, it is not a current possibility. Therefore, clinicians need assistance in identifying which women are at greatest risk for antenatal major depression. This study's results can be immediately useful in helping clinicians identify such women. In particular, targeted efforts at screening pregnant women with chronic medical conditions, high psychosocial stress, intimate partner violence, nonwhite race, and young age may be useful in improving the detection of antenatal depression.

Acknowledgments

Supported in part by 1KL2RR025015-01 from the National Center for Research Resources of the National Institutes of Health.

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Table 1

Characteristics of Respondents and Univariate Analyses

Characteristic	Major Depression (n=97)	No Major Depression (n=1,790)	P	Any Depression* (n=187)	No Depression (n=1,700)	P
Age (y)	27.2±6.2	30.6±6.2	<.001	27.2±6.2	30.8±6.1	<.001
Education: less than high school degree	51.1 (n=46)	18.8 (n=314)	<.001	45.8 (n=81)	17.6 (n=279)	<.001
Living with partner	62.0 (n=57)	88.1 (n=1,474)	<.001	66.9 (n=119)	89.0 (n=1,412)	<.001
Psychosocial stress	21.4±6.0	14.6±3.6	<.001	19.9±5.8	14.3±3.3	<.001
Intimate partner violence	20.8 (n=20)	2.9 (n=51)	<.001	12.4 (n=23)	2.8 (n=48)	<.001
Current smoker	31.5 (n=29)	6.5 (n=112)	<.001	26.1 (n=46)	5.8 (n=95)	<.001
At-risk alcohol use	12.5 (n=12)	13.9 (n=247)	.690	10.8 (n=20)	14.2 (n=239)	.195
At-risk drug use	9.5 (n=9)	2.4 (n=42)	<.001	10.4 (n=19)	1.9 (n=32)	<.001
Chronic medical conditions (two or more)	47.3 (n=44)	17.7 (n=298)	<.001	41.1 (n=74)	16.7 (n=268)	<.001
Past pregnancy complications (one or more)	41.9 (n=39)	33.6 (n=570)	.097	44.4 (n=80)	32.8 (n=529)	.002
Parity	1.1±1.4	0.8±1.1	.054	1.0±1.2	0.8±1.1	.013
Ethnicity: Hispanic	19.3 (n=16)	9.8 (n=158)	.005	19.9 (n=32)	9.2 (n=142)	<.001
Race			<.001			<.001
White	45.3 (n=39)	72.4 (n=1,213)		53.3 (n=89)	73.0 (n=1,163)	
Asian	16.3 (n=14)	10.9 (n=183)		13.2 (n=22)	11.0 (n=175)	
African American	23.3 (n=20)	7.2 (n=142)		18.6 (n=31)	6.8 (n=109)	
Native American	4.7 (n=4)	2.9 (n=49)		4.8 (n=8)	2.8 (n=45)	
Pacific Islander	1.2 (n=1)	1.4 (n=24)		3.0 (n=5)	1.3 (n=20)	
Multiracial	9.3 (n=8)	5.1 (n=86)		7.2 (n=12)	5.1 (n=82)	

Data are mean±standard deviation or % (n).

* Any depression includes minor and major depression combined rates.

Table 2

Adjusted Odds of Antepartum Major Depression

Factor	Adjusted OR* (95% CI)
Maternal age (y)	0.92 (0.88–0.97)
Education (less than 12 y) [†]	1.15 (0.57–2.32)
Psychosocial stress [‡]	1.29 (1.21–1.36)
Intimate partner violence	3.45 (1.46–8.12)
Chronic medical condition (two or more) [§]	3.05 (1.63–5.69)
Race ^{//}	
Asian	5.81 (2.55–13.23)
African American	2.98 (1.24–7.18)
American Indian	0.98 (0.21–4.37)
Pacific Islander	3.08 (0.27–35.32)
Multiracial	0.71 (0.26–2.38)

OR, odds ratio; CI, confidence interval.

* Adjusting for listed covariates.

[†] High school degree or more.

[‡] Per-unit change in score.

[§] One or no chronic medical conditions.

^{//} White race.

Table 3

Adjusted Odds of Antepartum Any Depression (Major or Minor)

Factor	Adjusted OR* (95% CI)
Maternal age (y)	0.92 (0.88–0.97)
Education (less than 12 y) [†]	1.25 (0.72–2.19)
Psychosocial stress [‡]	1.29 (1.22–1.36)
Intimate partner violence	2.20 (1.002–4.84)
Chronic medical conditions (two or more) [§]	2.14 (1.31–3.51)
Race ^{//}	
Asian	3.47 (1.79–6.66)
African American	2.03 (0.98–4.20)
American Indian	0.33 (0.08–1.39)
Pacific Islander	2.43 (0.46–14.64)
Multiracial	0.56 (0.22–1.43)
Hispanic ethnicity	2.50 (1.09–5.72)

OR, odds ratio; CI, confidence interval.

* Adjusting for listed covariates.

[†] High school degree or more.

[‡] Per-unit change in score.

[§] One or no chronic medical conditions.

^{//} White race.