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Observational Study

Peripartum depression and its predictors: A longitudinal observational hospital-based study

Peripartum depression and its predictors

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Abstract

BACKGROUND

Depression is a common problem in women in child bearing years due to burdens of motherhood and building a family. Few studies estimated the prevalence of antepartum depression compared to those in the postpartum period.

AIM

Estimate the prevalence and the severities of peripartum depression and major depressive disorder and their predictors.

METHODS

This is a longitudinal observation study. It included 200 women with the Edinburgh postpartum depression scale (EPDS) scoring ≥13, indicating presence of symptoms of depression. They had gestational age of ≥6 wk and did follow-ups till the 10th to 12th weeks postpartum. Information of women's reactions to life circumstances and stressors during the current pregnancy were gathered from answers to questions of the designed unstructured clinical questionnaire. Severities of depression, anxiety and parenting stress were determined by Beck Depression Inventory (BDI-II), State-Trait Anxiety Inventory for adults (STAI-AD), and Parenting Stress Index-Short Form (PSI-SF), respectively. Psychiatric interviewing was done to confirm the diagnosis of major depression. Measuring the levels of triiodothronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) was done in both antepartum and postpartum periods.

RESULTS

Out of 968 (mean age= 27.35±6.42yrs), 20.66% (n = 200) of them had clinically significant symptoms of depression and 7.44% had major depression. Previous premenstrual dysphoria, post-abortive depression, depression unrelated to pregnancy and were reported in 43%, 8% and 4.5%, respectively. Psychosocial stressors were reported in 15.5%. Antepartum anxiety and parenting stress were reported in 90.5% and 65%,

respectively. Postpartum T3, T4 and TSH levels did not significantly differ from reference values. Regression analysis showed that anxiety trait was a predictor for antepartum (B**=0.514, t=8.507, P = 0.001) and postpartum (B**=0.573, t=0.040, P = 0.041) depression. Antepartum depression (B**: -0.086, t: -2.750, P = 0.007) and parenting stress (B**=0.080, t=14.34, P = 0.0001) were also predictors for postpartum depression.

CONCLUSION

Results showed that 20.66% had clinically significant symptoms of depression and 7.44% had major depression. Anxiety was a predictor for antepartum and postpartum depression. Antepartum depression and parenting stress were also predictors of postpartum depression.

Key Words: Peripartum depression; antepartum depression; postpartum depression; anxiety; Edinburgh postpartum depression scale (EPDS); parenting stress

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Core Tip: The prevalence rates of depression and anxiety are higher in pregnant women compared to non-pregnant because motherhood and family responsibilities represent additional burdens on pregnant woman. The prevalence rate of peripartum depression has been estimated to range from 5 to 58% or even higher in different nations, however, meta-analyses studies from different countries and populations reported similar approximated prevalence rate for postpartum as well as antepartum depression, which is 10 to 16.4%. A unified consensus has been made to use specific screening tools for determination of peripartum depression. Edinburgh postpartum depression scale (EPDS) is a commonly and widely used 10-item screening questionnaire with an estimated sensitivity of 75-100% and a specificity of 76-97%. Here, we estimated the

prevalence of antepartum and postpartum depression for Egyptian women and determined their independent risk predictors.

INTRODUCTION

Depression is a common among adults[1,2]. The estimated prevalence of depression among Americans aged 20 and over in a given 2-week period during the years 2013 to 2016 was 8.1% with twice folds higher rates in women than men[2] . During the childbearing years, women also are more susceptible to major stresses, depression and other psychiatric conditions and disorders due to superimposed children and family burdens[1]. There is a wide range of prevalence rates of antepartum and postpartum depression (i.e. peripartum depression) reported from different countries worldwide, with estimates ranged from 5% to 58% or even higher[3-19]. This is non-surprisingly attributed to different population characteristics, socioeconomic states and time and methods for evaluation. However, meta-analyses of large studies done in different areas of the world have shown that the approximate estimated prevalence is 10% to 15%[3] for antepartum depression and 10% to 16.4% for postpartum depression[20]. It has been indicated that the prevalence rates of postpartum depression seems closer or even similar to that of antepartum depression[21,22]. Studies have also have shown the greater risk for being admitted to a psychiatric hospital is at the 1st month after delivery than at any time of life[3-19]. The American Psychiatric Association uses the term "Peripartum depression" to define major depression in its Diagnostic and Statistical Manual of Mental Disorders version 5 (DSM-5) to characterize depression which occurs in the antepartum (during pregnancy) and postpartum (within the first 4 wk after delivery) periods[23].   However, it has been recommended expand the diagnostic criteria from 1 month to 6 months after delivery as it has been observed that this entire period carries a high-risk for developing depression[24].

Despite the large number of researches over decades which aimed to determine the prevalence, risks and causes of peripartum depression and find effective methods for its screening, prevention and treatment, still the risks and causes of peripartum depression

are poorly understood. Several experimental and clinical researches have suggested that the major risk for developing peripartum depression is the rapid fluctuation in reproductive hormones during pregnancy, delivery and postpartum periods[25]. Others suggested "alternative biological processing" as the cause of peripartum depression which is based on the finding of different peripartum depression phenotypes that reflect complex mechanisms which include an interplay between **(a)** fluctuations in reproductive[25], thyroid[26], hypothalamic pituitary adrenal axis (HPA) axis[27] and lactogenic hormones [prolactin and oxytocin][28]; **(b)** immunity[29]; **(c)** genetics[30]; and **(d)** social, obstetric and psychological factors[4-19,31].

Peripartum depression is a major cause of maternal and neonatal morbidity if untreated[32]. Therefore, the World health Organization (WHO) and U.S. Preventive Services Task Force recommend screening for peripartum depression. Interventions for mild/moderate symptoms include psychotherapy or treatment with antidepressants (e.g. selective serotonin reuptake inhibitors or SSRI) and combined psychotherapy and pharmacotherapy for moderate/severe symptoms[,33,34].

Studies which estimated the prevalence of antepartum depression are few compared to those in the postpartum period. Here, we aimed to estimate the prevalence of depression in women in the antepartum and postpartum periods and their demographic, social, obstetric, psychological and hormonal predictors.

MATERIALS AND METHODS

Study design, period, region

This is a longitudinal observational study completed over a period of three years (2017-2020). The initial sample size composed of 1100 women who were consequently recruited from the antenatal out-patient clinic of the department of Obstetrics and Gynecology, Mansoura University, Mansoura, Egypt. Inclusion criteria were: (a) gestational age of more than or equal 6 wk (i.e. antepartum period), (b) compliance to the study's follow-up schedule during pregnancy (i.e. antepartum period) and at least 10 to 12 wk after delivery (i.e. postpartum period)[24], (c) matched social, economic and

educational levels, and (d) Edinburgh postpartum depression scale (EPDS) screening questionnaire scoring of at least 13, indicating presence of clinically significant symptoms of depression[35,36] Exclusion criteria was: past history of significant medical or psychiatric diseases. The ethics Committees of Faculties of Medicine of Mansoura and Assiut Universities, Mansoura and Assiut Governorates, Egypt; approved the study protocol. Women gave their informed consents for participation in the study [ID#: AUFM_NP/OG_422/2016].

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Methods:

The social, economic and educational level evaluations:

They were done using the Socio-Economic Scale (SES)[37], a structured questionnaire which collects information about level of parents' education, month's income, sanitation and crowning index. Its total scoring is 30. The socioeconomic status is classified as high (scoring: more than 25 to at least 30), middle (scoring: more than 20 to at least 25), low (scoring: at least 15 to less than 20) or very low (scoring: less than 15).

Psychometric evaluations and testing:

They were done by the specialist psychiatrist (ME).

In the Antepartum period (gestational age of more than or equal six weeks):

Edinburgh postpartum depression scale (EPDS):

This is a widely used screening questionnaire for perinatal depression. It has ten questions which ask about the recent reaction (a week prior to its administration) of the woman to life stressors and conditions. EPDS scoring more than 13 indicates presence of symptoms of depression[35,36].

Clinical questionnaire:

We designated an unstructured clinical questionnaire to collect information about the woman's reactions to recent life circumstances, events and stresses related to the recent pregnancy. The questions asked about: **(1)** feeling of happiness, **(2)** husband's feeling towards his wife's recent pregnancy, **(3)** reaction of the husband towards baby's gender, **(4)** history of child loss (abortions or stillbirths), **(5)** postpartum complications, **(6)**

psychosocial stressors (e.g. divorce, loss of job, death of a husband, family arguments and financial problems), **(7)** husband's aggression against his wife (verbal, emotional or physical), **(8)** sexual abuse during childhood, **(9)** previous psychiatric problems, and **(10)** presence of family members with psychiatric problems.

Diagnostic and Statistical Manual of Mental Disorders (DSM-5):

Psychiatric interviewing was done for confirmation of the diagnosis of major depression according to the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders version five [Structured clinical interview for DSM-5 (SCID-5)][38].

Beck Depression Inventory (BDI-II):

The severity of symptoms of depression was determined using BDI-II[39,40] They were classified as minimal (scoring: 0-13), mild (scoring: 14-19), moderate (scoring: 20-28) or severe (scoring: 29-63).

State-Trait Anxiety Inventory for adults (STAI-AD) for adults:

The severity of manifestations of anxiety was determined using STAI-AD[41,42]. STAI helps to differentiate between state from trait anxiety. State anxiety is a temporary condition while trait anxiety is long-lasting and more general condition. It also differentiates between subjective feelings of anxiety from depression. The severity of anxiety symptoms was classified as absent (scoring: less than or equal 20), mild (scoring: 21-30), less than moderate (scoring: 31-36), moderate (scoring: 47-42), more than moderate (scoring: 44-57), severe (scoring: 58-63) or very severe (scoring: more than or equal 64).

Laboratory testing:

They were done at the early week of the third trimester. After an overnight fast (for 12 h), blood samples were withdrawn at 8:00 a.m. to measure serum levels of triiodothronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) using immunoenzymetric assay kits [IMMULITE reproductive hormone assays' kits [Diagnostic Products Corporation (DPC), Los Angeles, USA]. The reference levels are: T3 = 81-178 ng/dL, T4 = 4.5-12.5 ng/dL and TSH = 0.4-4 mIU/mL.

In the postpartum period (at least 10 to 12 wk after delivery):

Participants were evaluated in the postpartum period using:

Beck Depression Inventory BDI-II[39,40]

Parenting stress index - short form (PSI-SF)[43]**:** It is 36-item divided into three sets of questionnaires (or subscales of 12 items for each) to assess **(a) Parental Distress** due to the parental role (e.g. the new responsibility being a mother makes me as being locked down); **(b) Parent-Child Dysfunctional Interaction** (e.g. this new child put on me a greater demand compared to my other kids); and **(c) Difficult Child** (e.g. This child does not provide me with empathy as I expect from a child to a mother). Each subscale's set has score ranging from 12-60. PSI-SF score is the sum of three subscales' set scores (range: 36-180). The higher scoring indicates enhanced stress level. A raw score exceeding 90 indicates significant symptomatic stress.

Postpartum laboratory testing:

Measurement of the levels of T3, T4 and TSH were done in the 10th week postpartum.

Statistical analyses

Data were processed using SPSS for windows, version 20.0 (SPSS Inc., Chicago, IL, USA). Comparative statistics were carried out with *t*- and Chi. Square tests or ANOVA (if variables are more than two). Correlation analyses between antepartum score of BDI-II and the results of demographic, socio-economic status scoring and psychometric testing's scores were carried out with Spearman's rho correlation coefficient. Multiple logistic regression analysis was carried out to check for demographic, clinical and psychosocial factors which independently predict or associate with antepartum and postpartum depression. Significance was considered with probability value less than 0.05.

RESULTS

The number of women which who were screened for depression was 968, of them 200 (20.66%) had Edinburgh postpartum depression scale (EPDS) scoring more than 13 (i.e. had clinically significant symptoms of depression) **(figure 1)**. They had age range of 17

to 34 years (mean: 27.35 ± 6.42 years). The majority had age range of 23 to 34 years (n = 164, 82%). All were housewives, the majority were rural residents (n = 155, 77.5%), can't read (n = 145, 72.5%) and of middle socioeconomic status (n = 132, 66%). Nearly half were multipara. Past history of fetal losses (abortions and still births) was found in 40%. The majority had normal vaginal deliveries in their past pregnancies as well as the current pregnancy (n = 168, 84%). Only one did in-vitro fertilization in the current pregnancy. The majority (n = 156, 78%) did their first visit to the antenatal care unit (parallel to our first psychiatric evaluation) in the 3rd trimester, 13.5% (n = 27) in the 2nd and 8.5% (n = 17) in the 1st trimesters. Antenatal complications in the recent pregnancy which were indications for caesarian section (CS) were found in 16% (n = 32). Only 4% (n = 8) had postpartum problems **(table 1)**. Results of the unstructured clinical questionnaire showed that the majority (91%) was happy with their current pregnancy and none had past history of postpartum depression, however, 43% had history of premenstrual dysphoric disorder, 8% had history of post-abortive depression and 4.5% had history of depression unrelated to pregnancies. Only one had history of sexual abuse during childhood. Psychosocial stressors were found in 15.5% **(table 2)**.

During pregnancy, symptoms of severe depression were found in 36% (mean Beck Depression Inventory II or BDII scoring: 44.48 ± 6.55) while 27% (mean BDII scoring: 24.26 ± 3.32) and 20.5% (mean BDII scoring: 16.26 ± 2.86) had moderate and mild symptoms, respectively **(figure 1, table 3)**. Psychiatric interviewing also showed that 7.44% (72/968) had major depression (which was women with severe symptoms). When stratified according to demographic, social and obstetric variables, we observed no difference in severities of symptoms of depression in relation to age (P = 0.452), education levels (P = 0.326) or socioeconomic states levels (P = 0.482). When distributed according to the gestational age at presentation, the majority (n = 156, 78%) had symptoms of depression during the 3rd trimester, 13.5% (n = 27) during the 2nd while only 8.5% (n = 17) had depression during the 1st trimester (P = 0.0001).

The majority of women had symptoms of severe anxiety (n = 181, 90.5%) compared to less severe symptoms (P = 0.0001) [no anxiety = 1 (0.5%); mild = 6 (3%); less than

moderate = 12 (6%); moderate = 8 (4%); more than moderate = 70 (35%); severe = 67 (33.5%); and very severe = 36 (18%)]. They had State-Trait Anxiety Inventory for Adults (STAI-AD) scoring ranged between 21 and 78 (mean: 53.31 ± 11.82).

Compared to reference values, women in their 3rd trimester had higher levels of triiodothronine (T3) and thyroxine (T4) but not for thyroid stimulating hormone (TSH) **(table 4)**. No difference in levels of T3, T4 and TSH in the postpartum period compared to reference values.

Assessment of women in the postpartum period showed reduction in the severity of symptoms of depression (P = 0.0001). Approximately, two thirds (n = 130, 65%) had clinically significant parenting stress **(table 5)**.

Significant correlations were found between BDI-II scoring in the antepartum period and socioeconomic status scoring (r = -0.224, P = 0.001), STAI scoring (r = 0.600, P = 0.0001) and Parenting Stress Index - Short Form (PSI-SF) scoring (r = 0.141, 0.047) but not with age (r = -0.021; 0.763) and BDI-II scoring in the postpartum period (r = -0.110, P = 0.320). Significant correlation was found between BDI-II scoring in the postpartum period and PSI-SF scoring (r = 0.158, 0.052). Multiple regression analysis showed that in the antepartum period, only anxiety was the strong predictor of depression (B** = 0.514, t = 8.507, P = 0.001). In the postpartum period, antepartum depression (B**: -0.086, t: -2.750, P = 0.007), anxiety (B** = 0.573, t = 0.040, P = 0.041), and parenting stress (B** = 0.080, t = 14.34, P = 0.0001) were the predictors for postpartum depression **(table 6)**.

DISCUSSION

Out of 968 (mean age= 27.35±6.42yrs), 20.66% (n = 200) of them had clinically significant symptoms of depression and 7.44% had major depression. Previous premenstrual dysphoria, post-abortive depression, depression unrelated to pregnancy and were reported in 43%, 8% and 4.5%, respectively. Psychosocial stressors were reported in 15.5%. Antepartum anxiety and parenting stress were reported in 90.5% and 65%, respectively. Postpartum T3, T4 and TSH levels did not significantly differ from reference values. Regression analysis showed that anxiety trait was a predictor for

antepartum (B**=0.514, t=8.507, P = 0.001) and postpartum (B**=0.573, t=0.040, P = 0.041) depression. Antepartum depression (B**: -0.086, t: -2.750, P = 0.007) and parenting stress (B**=0.080, t=14.34, P = 0.0001) were also predictors for postpartum depression.

CONCLUSION

There is wide variation in prevalence rates of peripartum depression from different countries. Our results showed that 20.66% had clinically significant symptoms of depression and 7.44% had the diagnosis of major depression. Although the topic has already been addressed in other studies and the results of the study corroborate the data found in the literature as regards the prevalence, predictors and severity of depressive symptoms, however, the results of this study may contribute to improve knowledge, taking into account the prevalence of the disease is not always recognized and valued. Antepartum anxiety was the only variable found as predictor for antepartum depression and also for postpartum depression together with antepartum depression and parenting stress. Therefore, screening for peripartum depression and its risks is important.

ARTICLE HIGHLIGHTS

Research background

Depression is a common public health problem. It is an important cause of morbidity for mothers in their peripartum period with an estimated prevalence of 7-58% or even higher in some countries. A common prevalence of antepartum or postpartum depression reported in different studies is ~13%. The suggested mechanism(s) of peripartum depression include(s) complex interplay between biological factors (fluctuation in reproductive, thyroid and hypothalamic pituitary adrenal axis hormones), immune system activity, genetics and psychosocial stressors. Therefore, WHO and U.S. Preventive Services Task Force recommend screening for women in peripartum period looking for manifestations of depression and determine their risks.

Research motivation

The research hotspots include determination of **(1)** the prevalence of peripartum (antepartum and postpartum) depression. Because related studies are few for antepartum compared to postpartum depression, **(2)** the severities of depression in relation to different demographic, social, obstetric, hormonal and psychological variables, and **(3)** the predictors which are independently associated with each of antepartum or postpartum depression.

Research objectives

This study systematically assessed women in their peripartum period to estimate the prevalence and predictors of peripartum depression.

Research methods

Edinburgh postpartum depression scale (EPDS) screening questionnaire; designed unstructured clinical questionnaire to gather information about the women's reactions to recent life circumstances, events and stress in relation to the recent pregnancy; Beck Depression Inventory II (BDI-II), State-Trait Anxiety Inventory for Adults (STAI-AD) and Parenting Stress Index - Short Form (PSI-SF) for severity categorization of depression, anxiety and parenting stress respectively; psychiatric interviewing to confirm the diagnosis of major depressive disorder [according to Diagnostic and Statistical Manual of Mental Disorders version 5 or DSM-5]; and measurements of triiodothronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) levels in the antepartum and postpartum periods.

Research results

The prevalence of women with clinically significant symptoms of peripartum depression in our locality is 20.66%. Major depression was found in 7.44%. Symptoms of depression were less severe in postpartum period than antepartum. Antepartum anxiety was the only predictor for both antepartum and postpartum depression.

Antepartum anxiety and depression and parenting stress were the predictors for postpartum depression.

Research conclusions
Nearly one fifth of women developed clinically significant manifestations of depression in their peripartum period and mainly attributed to anxiety and parenting stress.

Research perspectives
In our locality, the importance of antepartum depression as a risk for postpartum depression and subsequently parenting stress has been largely under-recognized. Health care providers and insurance policies have to focus attention to the magnitude of the problem of peripartum depression to encourage education for obstetricians, mothers and families about its high prevalence and associated risks. Multidisciplinary team for screening and management of peripartum depression is required (e.g. prevention and expertise guidance related to the recommended treatment options, such as psychotherapy and/or pharmacotherapy).

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