Depressive symptoms during pregnancy and their risk factors – a cross-sectional study

1 Student Scientific Association at the 1st Department of Obstetrics and Gynecology, Medical University of Warsaw, Poland
2 1st Department of Obstetrics and Gynecology, Medical University of Warsaw, Poland

ABSTRACT

Introduction. It was established that intragestational depression is a common disease, with the estimated average prevalence of 10–25% in all expectant mothers worldwide.

Aim of the study. The aim of the study was to evaluate the frequency of depressive symptoms in pregnant women in Poland and to identify which factors may be related to a higher risk of depressive symptoms during pregnancy.

Material and methods. A prospective cross-sectional study was performed. Depressive symptoms were assessed with the validated Edinburgh Postnatal Depression Scale (EPDS). 346 women were enrolled in the study.

Results. 130 women (37.6%) scored 13 or more points and were considered as presenting with depressive symptoms. Independent risk factors of depressive symptoms during pregnancy including mood disorders diagnosed before the current pregnancy (aOR=2.68, 95%CI 1.37-5.22), mental disorders confirmed in family members (aOR=2.72, 95%CI 1.24-5.98), unhappiness in their current relationship (aOR=4.0, 95%CI 1.77-9.01), lack of support from family members (aOR=2.73, 95%CI 1.51-4.96) increased the risk of DS and good financial status decreased the risk of DS occurrence (aOR=0.45, 95%CI: 0.25-0.80).

Conclusions. Pregnant women commonly report depressive symptoms. The evaluation of relations with the family members, socio-economic status, former depressive symptoms and possible prenatal depression are essential for proper screening of depression in pregnant women.

Keywords. depression risk factors, depressive symptoms, Edinburgh Postnatal Depression Scale, perinatal depression, pregnancy

Corresponding author: Katarzyna Kosińska-Kaczyńska, e-mail: kkaczynska@wum.edu.pl

Feđuniv S, Plaza O, Paździor D, Kosińska-Kaczyńska K, Szymusik I, Wielgoś M. Depressive symptoms during pregnancy and their risk factors – a cross-sectional study. Eur J Clin Exp Med. 2020;18(1):10–15. doi: 10.15584/ejcem.2020.1.2
Introduction
It was established that intragestational depression is a common disease, with an estimated average prevalence of 10–25% in all expectant mothers worldwide.\textsuperscript{1,2} Selective serotonin re-uptake inhibitors (SSRIs) According to a frequently cited hypothesis, hormonal changes occurring physiologically during gestation are related to decreased mood, which may further evolve into perinatal depression (PD).\textsuperscript{3,4} However, other factors may increase the risk of PD occurrence among pregnant women, with mood and anxiety disorders in a patient’s medical history, lack of support from a partner and other family members, significant stress and addictions being mentioned the most commonly. Gestation-related complications or ambivalent feelings towards the pregnancy itself may also raise the risk of PD occurrence.\textsuperscript{5} But the burden of MDD attributable to perinatal depression is not yet known. There has been little effort to date to systematically review available literature and produce global estimates of prevalence and incidence of perinatal depression. Enhanced understanding will help to guide resource allocation for screening and treatment. Methods A systematic literature review using the databases PsycINFO and PubMed returned 140 usable prevalence estimates from 96 studies. A random-effects meta-regression was performed to determine sources of heterogeneity in prevalence estimates between studies and to guide a subsequent random-effects meta-analysis. Results The meta-regression explained 31.1% of the variance in prevalence reported between studies. Adjusting for the effects of all other variables in the model, prevalence derived using symptom scales was significantly higher than prevalence derived using diagnostic instruments (odds ratio [OR] 1.6, 95% confidence interval [CI] 1.3–2.0) A general tendency towards a higher frequency of possible PD cases in lower-income countries is observed, which may suggest a significant role of socio-economic factors in its development.

According to a regulation by the Polish Ministry of Health, each pregnant woman should undergo screening for perinatal depression twice during pregnancy - in the first and the third trimester, with two recommended questionnaires being EPDS and Beck’s Depression Inventory.\textsuperscript{7} A positive screening test or the presence of risk factors should be followed by a more detailed examination of a patient’s mental state by either a psychologist or a psychiatrist.

If left untreated, intragestational depression may contribute to a number of complications which may affect the mother, fetus and later the neonate, both during the pregnancy and the postpartum period. Severe postpartum depression is cited most often as a possible complication. However, a higher risk of spontaneous abortion, preterm birth, urgent operative delivery, pre-eclampsia or restricted fetal growth may also be associated with untreated prenatal depression.\textsuperscript{4} Delayed child development was also reported more often in children of mothers who suffered from PD.\textsuperscript{6} The aforementioned and other complications may be caused not only by depression itself, but by substance abuse as well, as it is more common among expectant mothers with perinatal depression.\textsuperscript{9}

The knowledge of PD risk factors is essential in conducting the proper screening of pregnant women.

Aim of the study
The aim of the study was to evaluate the frequency of depressive symptoms (DS) among pregnant women and to identify which factors may be related to a higher risk of depressive symptoms during pregnancy.

Material and Methods
A cross-sectional study was performed. Polish language version of the questionnaire was distributed via internet between November 2017 and March 2018. A total of 346 pregnant women were enrolled in the study.

We used the validated Edinburgh Postnatal Depression Scale (EPDS). The questionnaire consisted of 46 questions regarding maternal characteristics, sociodemographic status, obstetric and psychiatric history and current pregnancy. It contained a Polish translation of Edinburgh Postnatal Depression Scale (EPDS) - a 10-question scale with each answer scored between 0 and 3 points (minimum total score 0, maximum 30), which is commonly used in screening for possible de-
pression after delivery. EPDS was primarily designed to detect postnatal depression, but it was proved to be an accurate tool for assessing the likelihood of intragestational, with a score of 13 and more points being directly related to a high risk of depression.

The respondents were asked to answer questions concerning their wellbeing over the past 2 weeks. The study protocol obtained the approval of the Ethics Committee of the Medical University of Warsaw. The committee waived the obligation to gain a written consent to participate in the study as completing the questionnaire was tantamount to giving the consent.

Statistica 13.3 software was used for statistical analysis, with Mann-Whitney U-test being used for continuous variables and chi-squared test for categorical variables. P-values <0.05 were considered significant and all tests were two-tailed.

Results
A total of 386 pregnant women participated in the survey 40 of them were excluded as their questionnaires were completed incorrectly (missing data). Consequently 346 women were enrolled in the study: 182 being in the first trimester of pregnancy (52.6%), 82 in the second (23.7%) and 82 (23.7%) in the third.

216 women (62.4%) scored below 13 points in EPDS. Therefore, they were classified as having no depressive symptoms. 130 women (37.6%) had a score of 13 or more points and were considered as presenting with DS. Basic characteristics of the study group are presented in Table 1.

Lower income was related to a higher occurrence of DS, regardless of the type of the mother’s occupation. The highest incidence of DS was reported by women in the first trimester of pregnancy (40.8%), with the rates declining with the progression of pregnancy. Hence, the lowest incidence was observed in the third trimester (27.7%; second trimester - 31.5%).

Women with DS more frequently admitted the current pregnancy had been unplanned (21.5% vs 12.5% in the group without DS, p=0.03). The respondents scoring above 13 points at EPDS significantly more often reported the lack of support from their partners (49.2% vs 17.6%, p<0.001) and family members (44.6% vs 16.2%, p=0.001) as well as unhappiness in their current relationship (28.5% vs 5.1%, p<0.001). Moreover, a larger proportion of those women admitted to having smoked during gestation compared to women with a score below 13 points in the EPDS (31.5% vs 18.1%, p<0.01).

Patients’ medical history of mood disorders (49.2% vs 25%, p<0.001) and a history of mental disorders in family members (55.8% vs 44.1%, p<0.001) were more common in the group of women with DS. Except for cervical insufficiency none of the analyzed pregnancy complications were related to the occurrence of DS in our study group. Cervical insufficiency was reported significantly more often in women presenting with DS. However, the rates were very low in both groups (3.9% vs 0.5%, p=0.02). Women with DS used sedatives (16% vs 5%, p<0.001), antidepressants or psychotherapy (12% vs 5%, p<0.01) more often during pregnancy.

Possible risk factors of DS were evaluated with logistic regression analysis. Only five of the analyzed factors were found to have a statistically significant impact on DS occurrence. They are presented in Table 2.

Mood disorders diagnosed before the current pregnancy, confirmed mental disorders in a family member, unhappiness in the current relationship and lack of support from family members increased the risk of DS while good financial status decreased the risk of DS occurrence.

23.8% of women with DS admitted to having reported them to medical staff, with 17.7% subsequently getting diagnosed with prenatal depression. However, only 2.9% of the respondents stated they had undergone any form of depression treatment (either pharmacotherapy or psychotherapy) recommended by a doctor.

Discussion
Lack of family members support and unhappiness in the relationship seem to be the most relevant risk factors of PD occurrence, because of being relatively indiscernible and removable risk factors. A systematic review conducted by Fisher et al. revealed that difficulties in a romantic relationship (a partner who rejected paternity, was unsupportive, uninvolved, critical and quarrelsome or presented unhealthy alcohol drinking behaviors, was violent or unfaithful) had a significant impact on PD occurrence. A higher incidence of PD in women whose partner did not want the pregnancy was also reported by Mukherjee et al. Lack of support from family members was related to PD in a systematic review by Fisher et al. Interestingly the lack of support in the relationship and seems to play a role in DS occurrence rather than the presence of relationship itself. Relationship status was found statistically insignificant. Therefore, we suggested estimating the relations of pregnant women with their family members and attitude to their family situation during every medical examination.

Moreover the present study showed the highest incidence of DS to occur in the first trimester and its decline with the progression of pregnancy, reaching with the lowest numbers reached in the third trimester. Precise percentages of PD occurrence differ between populations. However, most authors report the general numbers to be high. According to the majority of authors the percentage of women suffering from PD during the first trimester of pregnancy oscillated around 25-30%. However, occurrences as low as 7.4% or as high as 40.5% were also reported.
### Table 1. Characteristics of the study group

| Study group | Women scoring <13 points N=216 | % | Women scoring ≥13 points N=130 | % | OR (95% CI) | p-value |
|-------------|---------------------------------|---|---------------------------------|---|-------------|---------|
| Age (years) | 26.8±3.8* | 26.8±5.1* | 1.0 (0.95-1.05) | 0.99 |
| 17-24 years old | 115 | 62 | 28.7 | 53 | 40.8 | 1.9 (1.2-3.0) | 0.007 |
| Education | | | | | | |
| junior high school | 11 | 5 | 23.1 | 6 | 4.6 | 2.40 (0.71-8.15) | 0.11 |
| secondary/vocational school | 134 | 77 | 35.6 | 57 | 43.9 | 1.48 (0.94-2.32) | |
| university | 201 | 134 | 62.0 | 67 | 51.5 | 1.0 | |
| Place of residence | | | | | | |
| village | 87 | 57 | 26.4 | 30 | 23.1 | 0.92 (0.48-1.75) | |
| town <20 000 | 43 | 26 | 12.0 | 17 | 13.1 | 1.14 (0.53-2.47) | 0.93 |
| town 20000-100000 | 73 | 43 | 19.9 | 30 | 23.1 | 1.21 (0.62-2.36) | |
| city 100000-500000 | 69 | 43 | 19.9 | 26 | 20.0 | 1.05 (0.53-2.08) | |
| city >500 000 | 74 | 47 | 21.8 | 27 | 20.8 | 1.0 | |
| Occupation | | | | | | |
| unemployed | 71 | 41 | 19.0 | 30 | 23.1 | 1.0 | |
| mental | 152 | 92 | 42.6 | 60 | 46.1 | 0.89 (0.50-1.58) | 0.39 |
| physical | 28 | 17 | 7.9 | 11 | 8.5 | 0.88 (0.36-2.16) | |
| partly mental and partly physical | 95 | 66 | 30.6 | 29 | 22.3 | 0.60 (0.32-1.14) | |
| Marital status | | | | | | |
| single | 22 | 10 | 4.6 | 12 | 9.2 | 1.75 (0.64-4.77) | 0.89 |
| in a relationship | 324 | 206 | 95.4 | 118 | 90.8 | 1.0 | |
| Household income | | | | | | |
| poor | 15 | 2 | 0.9 | 13 | 10.0 | 5.55 (1.18-26.05) | |
| average | 89 | 41 | 19.0 | 48 | 36.9 | 1.0 | <0.001 |
| good | 202 | 147 | 68.0 | 55 | 42.3 | 0.32 (0.19-0.54) | |
| very good | 40 | 26 | 12.0 | 14 | 10.8 | 0.46 (0.21-1.00) | |
| Primiparity | 247 | 160 | 74.1 | 87 | 66.9 | 1.41 (0.88-2.27) | 0.15 |
| Previous vaginal delivery | 84 | 45 | 20.8 | 39 | 30.0 | 0.61 (0.37-1.01) | 0.06 |
| Assisted reproductive techniques | 43 | 29 | 13.4 | 14 | 10.7 | 0.78 (0.39-1.53) | 0.46 |
| Smoking during pregnancy | 80 | 39 | 18.1 | 41 | 31.5 | 2.09 (1.26-3.47) | <0.01 |
| Alcohol consumption during pregnancy | 37 | 20 | 9.3 | 17 | 13.1 | 1.47 (0.74-2.93) | 0.27 |
| Trimester of pregnancy | | | | | | |
| 1st | 182 | 129 | 59.7 | 53 | 40.8 | 1.0 | <0.01 |
| 2nd | 82 | 41 | 19.0 | 41 | 31.5 | 0.18 (0.09-0.35) | |
| 3rd | 82 | 46 | 21.3 | 36 | 27.7 | 0.08 (0.04-0.16) | |
| Unplanned pregnancy | 55 | 27 | 12.5 | 28 | 21.5 | 2.10 (1.16-3.82) | 0.03 |
| Infertility | 73 | 45 | 20.8 | 28 | 21.5 | 1.44 (1.08-1.92) | 0.04 |
| Mood disorders before the current pregnancy | 116 | 52 | 25 | 64 | 49.2 | 3.06 (1.92-4.87) | <0.001 |
| Mental disorders in family members | 86 | 38 | 44.1 | 48 | 55.8 | 2.74 (1.66-4.52) | <0.001 |
| Lack of partner support | 102 | 38 | 17.6 | 64 | 49.2 | 4.54 (2.78-7.42) | <0.001 |
| Lack of other family member support | 93 | 35 | 16.2 | 58 | 44.6 | 4.16 (2.53-6.87) | <0.001 |
| Unhappiness in relationship | 48 | 11 | 5.1 | 37 | 28.5 | 7.94 (3.87-16.29) | <0.001 |
| Pregnancy complications: | | | | | | |
| Gestational diabetes | 22 | 13 | 6.0 | 9 | 6.9 | 0.86 (0.36-2.07) | 0.74 |
| Gestational hypertension | 14 | 7 | 3.2 | 7 | 5.4 | 0.59 (0.20-1.72) | 0.33 |
| Cholestasis of pregnancy | 4 | 2 | 0.9 | 2 | 1.4 | 0.60 (0.08-4.30) | 0.61 |
| Iron-treated anemia | 48 | 27 | 12.5 | 21 | 16.2 | 0.74 (0.40-1.37) | 0.34 |
| Vaginal bleeding during pregnancy | 60 | 34 | 15.7 | 26 | 20.0 | 0.75 (0.42-1.31) | 0.31 |
| Cervical insufficiency | 6 | 1 | 0.5 | 5 | 3.9 | 0.12 (0.01-1.01) | 0.02 |

* – average ± standard deviation

OR – odds ratio

95% CI – 95% coefficient interval
PD occurrence during the second and third trimester were also observed. Gaynes et al. found the incidence of PD being 8.5% in the second and third trimesters in the populations of England, Scotland, Norway, Portugal, the Netherlands, Australia, the United States, Canada, Hong Kong, and Japan.20 Her children, and other family members. Objectives. We systematically review the evidence on (1 Alqahtani et al. reported the incidence reaching 12.8% and Mikšić et al. - 23% in the third trimester, while Park et al. suggested it may even approximate 61.4% in the third trimester of pregnancy. 21-23 According to Koss et al. every third woman will suffer from depression during at least one trimester of her pregnancy, while for 25% of women the experience of depression will be limited only to one trimester.24

Our research, as well as previous studies, confirmed the presence of multiple issues which increase the incidence of DS and, therefore, increase the chance of PD development if present.3,5,21,23 According to Dimidjian et al. a history of mood disorders constitutes one of the most important factors, which stays in line with our results.25 In our study pre-pregnancy mood disorders were one of the most significant risk factors of DS. A similar odds ratio was reported by Gebremichael et al. who correlated previous history of depression with a significant impact on PD occurrence.26,27 monthly income AOR (95% CI Mood disorders in family members are an independent risk factor of PD. According to Gebremichael et al. who correlated previous history of depression with a significant impact on PD occurrence.26,27 monthly income AOR (95% CI Our study also showed that confirmed mood disorders in family members were an independent risk factor of DS.

According to our results socioeconomic status played a significant role in DS occurrence. Self-assessment of the financial status as “good” reduced the incidence of DS. Additionally, questionnaires returned via internet may promote honesty of the answers. A small study group and no verification possibility of PD occurrence in the studied cohort constitute a limitation of this study.

DS are not sufficiently reported by pregnant women, with up to 80% of the cases of PD remaining under-recognised by healthcare providers.27 Implementing screening methods in modern technologies like smartphone applications or websites, which are commonly used by pregnant women, seems feasible and could be considered a way of enforcing a more private or confidential and less impersonal screening method.27-29 Creating a universal strategy of educating medical professionals regarding the risk factors of PD and developing guidelines for ways of screening for it is also crucial.29

Conclusions
Pregnant women commonly report depressive symptoms. The evaluation of relations with the family members, socio-economic status, former depressive symptoms and possible prenatal depression is essential for the proper screening of depression in pregnant women.

References
1. Csaszar E, Melichercikova K, Dubovicky M. Neuroendocrine and behavioral consequences of untreated and treated depression in pregnancy and lactation. In: Neuroendocrinology Letters. Vol 35. Maghira and Maas Publications; 2014:169-174.
2. Woody CA, Ferrari AJ, Siskind DJ, Whiteford HA, Harris MG. A systematic review and meta-regression of the prevalence and incidence of perinatal depression. J Affect Disord. 2017;219:86-92.
3. Olivier JDA, Åkerud H, Sundström Poromaa I. Antenatal depression and antidepressants during pregnancy: Unraveling the complex interactions for the offspring. Eur J Pharmacol. 2015;753:257-262.
Depressive symptoms during pregnancy and their risk factors – a cross-sectional study

4. Serati M, Carnevali G. Perinatal depression. *Clin Cases Psychiatry Integr Transl Neurosci Approaches*. 2018;35(3):155-170.

5. Urato AC. Consensus Bundle on Maternal Mental Health. *Obstet Gynecol*. 2017;130(2):467-468.

6. Ford E, Lee S, Shakespeare J, Ayers S. Diagnosis and management of perinatal depression and anxiety in general practice: a meta-synthesis of qualitative studies. *Br J Gen Pract*. 2017;67(661):e538-e546.

7. Minister of Health. Regulation of organizational standards of perinatal care. *Journal of Laws of Republic of Poland*.; item 1756, as of 16 August 2018.

8. Mitchell J, Goodman J. Comparative effects of antidepressant medications and untreated major depression on pregnancy outcomes: a systematic review. *Arch Womens Ment Health*. 2018;21(5):505-516.

9. Gentile S, Fusco ML. Untreated perinatal paternal depression: Effects on offspring. *Psychiatry Res*. 2017;252:325-332.

10. Cox JL, Holden JM, Sagovsky R. Detection of Postnatal Depression. *Br J Psychiatry*. 1987;150(6):782-786.

11. Bunevicius A, Kusminskas L, Pop VJ, Pedersen CA, Bunevicius R. Screening for antenatal depression with the Edinburgh Depression Scale. *J Psychosom Obstet Gynecol*. 2009;30(4):238-243.

12. Eberhard-Gran M, Eskild A, Tambs K, Opjordsmoen S, Samuelsen SO. Review of validation studies of the Edinburgh postnatal depression scale. *Acta Psychiatr Scand*. 2001;104(4):243-249.

13. Learman LA. Screening for Depression in Pregnancy and the Postpartum Period. *Clin Obstet Gynecol*. 2018;61(3):525-532.

14. Fisher J, de Mello MC, Patel V, et al. Prevalence and determinants of common perinatal mental disorders in women in low-and lower-middle-income countries: A systematic review. *Bull World Health Organ*. 2012;90(2):139-149.

15. Mukherjee S, Fennie K, Coxe S, Madhivanan P, Trepka MJ. Racial and ethnic differences in the relationship between antenatal stressful life events and postpartum depression among women in the United States: does provider communication on perinatal depression minimize the risk? *Ethin Heal*. 2018;23(5):542-565.

16. Fellmeth G, Pluge EH, Carrara V, et al. Migrant perinatal depression study: A prospective cohort study of perinatal depression on the Thai-Myanmar border. *BMJ Open*. 2018;8(1).

17. Jabbari B, Mirghaforivand M, Sehhatie F, Mohammad-Alizadeh-Charandabi S. The Effect of Holly Quran Voice With and Without Translation on Stress, Anxiety and Depression During Pregnancy: A Randomized Controlled Trial. *J Relig Health*. 2017;1:1-11.

18. Bennett HA, Einarson A, Taddio A, Koren G, Einarson TR. Prevalence of depression during pregnancy: Systematic review. *Obstet Gynecol*. 2004;103(4):698-709.

19. Silva MM de J, Leite EPRC, Nogueira DA, Clapis MI. Depression in pregnancy. Prevalence and associated factors. *Investig y Educ en Enferm*. 2016;34(2):342-350.

20. Gaynes BN, Gavin N, Meltzer-Brody S, et al. Perinatal depression: prevalence, screening accuracy, and screening outcomes. *Evid Rep Technol Assess (Summ).* 2005;(119):1-8.

21. Park JH, Karmaus W, Zhang H. Prevalence of and risk factors for depressive symptoms in Korean women throughput pregnancy and in postpartum period. *Asian Nurs Res (Korean Soc Nurs Sci)*. 2015;9(3):219-225.

22. Alqahtani AH, Al Khedair K, Al-Jeheiman R, Al-Turki HA, Al Qahtani NH. Anxiety and depression during pregnancy in women attending clinics in a University Hospital in Eastern province of Saudi Arabia: Prevalence and associated factors. *Int J Womens Health*. 2018;10:101-108.

23. Mikšić Š, Miškulin M, Juranic B, Rakošec Ž, Včev A, Degmečić D. Depression and suicidality during pregnancy. *Psychiatr Danub*. 2018;30(1):85-90.

24. Koss J, Bidzan M, Smutek J, Bidzan L. Influence of Perinatal Depression on Labor-Associated Fear and Emotional Attachment to the Child in High-Risk Pregnancies and the First Days After Delivery. *Med Sci Monit*. 2016;22:1028-1037.

25. Dimidjian S, Goodman SH, Felder JN, Gallop R, Brown AP, Beck A. Staying well during pregnancy and the postpartum: A pilot randomized trial of mindfulness-based cognitive therapy for the prevention of depressive relapse/recurrence. *J Consult Clin Psychol*. 2016;84(2):134-145.

26. Gebremichael G, Yihune M, Ajema D, Haftu D, Gedamu G. Perinatal Depression and Associated Factors among Mothers in Southern Ethiopia: Evidence from Arba Minch Zuria Health and Demographic Surveillance Site. *Psychiatr J*. 2018;2018:1-12.

27. Hanstoo L, Criniti S, Khan A, et al. A Mobile Application for Monitoring and Management of Depressed Mood in a Vulnerable Pregnant Population. *Psychiatr Serv*. 2018;69(1):104-107.

28. Forsell E, Bendix M, Hollandare F, et al. Internet delivered cognitive behavior therapy for antenatal depression: A randomised controlled trial. *J Affect Disord*. 2017;221:56-64.

29. Legere LE, Wallace K, Bowen A, McQueen K, Montgomery P, Evans M. Approaches to health-care provider education and professional development in perinatal depression: A systematic review. *BMC Pregnancy Childbirth*. 2017;17(1):239.