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ORIGINAL PAPER

Relationship between postnatal depression measured by the Edinburgh Postnatal Depression Scale and other factors influencing mental health of women in the prenatal and postnatal period

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Abstract

Aim: Pre- and postnatal depressive symptoms may have a negative impact on maternal mental health and on mother-child bonding and interactions. The aim of the study was to assess the role of various factors on women's mental health during pregnancy and to evaluate the role of selected health care strategies in preventing mental health issues before and after delivery, with an emphasis on the development of fear of childbirth and postnatal depression. *Design:* A quantitative study. *Methods:* A non-standardized 125-item questionnaire was developed with questions about pregnancy, delivery, and puerperium, including questions about mental health, physical health, and different forms of care received before, during and after delivery, as well as personal satisfaction with these forms of care was developed. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess depressive symptoms after delivery. Enrollment was purposive, and 361 women between six weeks and nine months postpartum were addressed. Statistical analysis was performed using SASD 1.5.8. *Results:* Fear of childbirth was found to be positively correlated with mental health issues during pregnancy and with the decision to have a cesarean delivery. No correlation was found between fear of childbirth and antenatal class attendance or trust in health professionals. Postnatal depression was positively correlated with mental health issues during pregnancy and with receiving information from the midwife about psychological changes during pregnancy, but negatively correlated with satisfaction with mother-infant bonding after delivery and with having a birth plan. No correlation was found between postnatal depression and sociodemographic characteristics or physical complications during pregnancy. *Conclusion:* Mental health issues during pregnancy and postpartum can negatively affect the quality of mother-child interactions and family interactions. It is crucial to pay attention to preventive measures, to educate both midwives and gynecologists about the importance of mental health during pregnancy, and to include mental health interventions during pregnancy in antenatal classes. It is important to pay attention to mother-infant bonding straight in the delivery ward as it is strongly associated with postnatal depression in the mother and well-being of the child.

Keywords: fear of childbirth, maternal bonding, mental health, postnatal depression, pregnancy.

Introduction

The transition from young adult to mother may be accompanied by many different emotions, such as joy and excitement on the one hand, and turmoil, arousal, anxiety, and depression on the other (Shiddharthini & Manimala, 2024; Wyseure & Corneillie, 2023). Pregnancy represents a wide range of physiological, psychological, economic, and social changes. It is a period of increased vulnerability for the expectant mother (Pasricha et al., 2021). These changes affect not only the mental health of the expectant mother, but also her postpartum mental health and the mental health of her child. In addition, these changes occur quite rapidly and therefore represent a burden that engages women's coping strategies. Pregnancy has a significant impact on mother-child bonding, the quality of mother-child interaction, and the mental health of mothers after childbirth,

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including the occurrence of postnatal depression, anxiety, and stress (Pasricha et al., 2021; Shiddharthini & Manimala, 2024). The estimated global prevalence rate for perinatal mental disorders ranges from 10% (Grosse & Aggarwal, 2023) to 29% (Khanghah et al., 2020), while the estimated prevalence of mental disorders in postpartum women ranges from 13% (Grosse & Aggarwal, 2023) to 19% (Khanghah et al., 2020). The World Health Organization (WHO) cites depression as the fourth leading cause of disability worldwide, occurring in approximately one in five pregnancies (Khanghah et al., 2020). In addition, COVID-19 (Ionescu et al., 2023) and ongoing wars in various countries around the world have put additional pressure on pregnant women. In conclusion, women are more likely to develop depression and other mental illnesses during pregnancy and shortly after birth compared to other times in their lives (Khanghah et al., 2020), partly because of their altered hormonal state and partly due to psychological and socioeconomic factors (Shiddharthini & Manimala, 2024). Unfortunately, the mental illnesses of the pre-, peri- and postnatal period often remain undetected due to the lack of knowledge of their manifestations by both women and health professionals, but also partly due to the embarrassment of feeling unhappy about becoming a mother (Wyseure & Corneillie, 2023).

It is important to identify and treat depressive symptoms during pregnancy because major and minor depression may have a negative impact not only on pregnancy, but also on birth outcomes and the quality of mother-child bonding (Bunevicius et al, 2009; Lee et al., 2007). The following risk factors for the development of prenatal depression have been identified: personal or family history of depression, young age, low educational level, poor socioeconomic status, smoking, unwanted pregnancy, history of abortion, stressful events during pregnancy, fear of childbirth, lack of family support, lack of emotional support from partner, and mixed feelings about caring for the infant (Bunevicius, et al., 2009; Grosse & Aggarwal, 2023; Khanghah et al., 2020; Lee et al., 2007). Pregnant women who experience major and minor depression are twice as likely to experience nausea, vomiting, headache, abdominal pain, and dizziness during pregnancy (Bunevicius et al., 2009), as well as preeclampsia, premature rupture of membranes, preterm delivery, cesarean section, intrauterine fetal death, intrauterine fetal growth restriction, and lower mean birth weight (Khanghah et al., 2020). The measurable outcomes are more days of sick leave compared to pregnant women without depressive symptoms. Postnatal depression has been linked to previous pregnancy complications, unwanted pregnancy, memory and concentration problems, weight loss or rapid weight gain, loss of appetite, low self esteem, guilt, sleep disturbances and self-harm (Bunevicius et al., 2009; Lee et al., 2007). In particular, postnatal depression has been found to negatively affect mother-child interactions and bonding, as well as the mental development of the newborn (Wyseure & Corneillie, 2023).

On the other hand, protective factors for postnatal depression have been identified, such as being married and having other children (Akbarian et al., 2018; Ionescu et al., 2023), receiving mental health training during pregnancy (Akbarian et al., 2018), sense of coherence, social support, maternal-fetal attachment (Pasricha et al, 2021), self-respect and self-esteem, and employment (Shiddharthini & Manimala, 2024), and life satisfaction and good mental health during pregnancy (Kułak-Bejda et al., 2024).

Aim

The aim of the study was to evaluate the role of various factors on women's mental health during pregnancy and to assess the role of selected health care strategies in preventing mental health issues before and after childbirth, with an emphasis on the development of fear of childbirth and postnatal depression.

The following hypotheses were formulated:

1) Fear of childbirth positively correlates with mental health issues during pregnancy and with delivery by cesarean section.
2) Fear of childbirth negatively correlates with attending antenatal classes and with trusting health professionals in the delivery ward.
3) The development of postnatal depression positively correlates with physical complications and mental health issues during pregnancy and with age.
4) The development of postnatal depression negatively correlates with receiving information from the gynecologist and midwife about possible changes in mental health during pregnancy and after delivery, number of deliveries, existence of a birth plan, delivery by cesarean section, satisfaction with the quality of bonding in the delivery ward, and marital status characterized as married or living with a partner.

Methods

Design

The research was conducted in accordance with the ethical principles of human research. Participation was voluntary, confidentiality and anonymity were guaranteed, and informed consent was obtained. A quantitative research strategy was used, the sample selection was purposive, and only women who had given birth in the South Bohemian Region in the period between six weeks and nine months prior to the research were addressed.

Sample

A total of 361 postpartum women recruited from antenatal clinics in the South Bohemian Region were surveyed. The response rate was 361 / 394 (91.6%). The mean age of the women surveyed was 29.26 years (standard deviation 4.98, mode 28), and the age ranged from 19 to 48 years. The majority of women had secondary education (n = 184), followed by university education (n = 142); eight women had only primary education. The most common marital status was married (n = 187), followed by living with a partner (n = 151). No woman was widowed. Inclusion criteria were as follows: postpartum period in the range of six weeks to nine months, physiological pregnancy, birth of a physiological newborn, and Czech as first language. Exclusion criteria were: postpartum period shorter than six weeks or longer than nine months, stillbirth, not speaking Czech as first language. The research was conducted between January 2024 and March 2024.

Data collection

For the purpose of the study, a non-standardized 125-item questionnaire was developed with questions about pregnancy, delivery, and puerperium, including questions about mental health, physical health, various forms of care received before, during, and after delivery, and personal satisfaction with these forms of care. To obtain information on fear of childbirth, respondents were asked whether they experienced intense fear of childbirth with a "yes" or "no" response.

For the assessment of depressive symptoms, the Edinburgh Postnatal Depression Scale (EPDS) was used. The EPDS is a 10-item scale developed to assess the severity of depressive symptoms in postpartum women, where the total score is calculated according to a key, and the total score is transformed into a scale used to categorize the level of postnatal depression, such as 0–6 points (no depression), 7–13 points (mild depression), 14–19 points (moderate depression), and 20–30 points (severe depression). The Cronbach's alpha of the scale is 0.88 (Cox et al., 1987).

The women took 30 to 40 minutes to complete the questionnaire.

Data analysis

Statistical analysis was performed with the software SASD 1.5.8 (Statistical Analysis of Social Data). The first degree of categorization was processed. The level of dependence was established on the basis of χ^2, t-test and test of independence according to the type of the characters and their distribution.

The correlations between the development of postnatal depression and physical complications and mental health issues during pregnancy, age, marital status, and other factors were tested using χ^2. The level of depression was assessed using the EPDS questionnaire.

Based on the analysis, data interpretation was done.

Results

The number of women who reported fear of childbirth was 203 (56%), and the number who did not experience fear of childbirth was 156 (44%). The number of women who admitted physical complications during pregnancy was 121 (34%), those who did not experience physical complications was 238 (66%). The main physical complications reported were: pain in different parts of the body, nausea, vomiting, swollen legs, migraine, insomnia, diabetes, fatigue, changes in blood pressure (too high or too low), and varicose veins. Twenty-seven women (7.5%) reported mental health issues during pregnancy; 333 women (92.5%) stated that they had no mental health issues. The most common mental health issues were depression, anxiety, panic attack, fear, not liking oneself because of weight gain, hypersensitivity, and moodiness. A total of 136 women (37.7%) attended antenatal classes, 224 (62%) did not attend antenatal classes, one woman did not respond.

The correlation between fear of childbirth and mental health issues during pregnancy as well as cesarean delivery was tested using the χ^2 test; the level of significance was set at $\alpha = 0.05$. The women who reported fear of childbirth also indicated frequent mental health issues during pregnancy ($\chi^2 = 4.729$, $p < 0.05$). The women who reported fear of childbirth were also statistically significantly more often likely to deliver by cesarean section ($\chi^2 = 15.923$, $p < 0.01$).

The correlation between fear of childbirth and attendance of antenatal classes and trust in health professionals in the delivery ward was

tested using the χ^2 test, with the level of significance $\alpha = 0.05$. There was no statistically significant correlation between attending antenatal classes and fear of childbirth ($\chi^2 = 1.028$, $p = 0.598$). Similarly, although there is an indication that women who trust the health professionals in the delivery ward show less tendency to fear childbirth, there was no significant correlation between fear of childbirth and trust in the health professionals in the delivery ward ($\chi^2 = 8.634$, $p = 0.071$). The correlations between the development of postnatal depression and physical complications and mental health issues during pregnancy, age, marital status, and other factors were tested using χ^2. The level of depression was assessed using the EPDS questionnaire. The results are shown in Table 1.

Table 1 Correlation between the development of postnatal depression and other factors (N = 361)

Postnatal depression	χ^2	df	p
Physical complications during pregnancy	4.800	3	0.187
Mental health issues during pregnancy	17.986	3	< 0.001
Information from the gynecologist about possible psychological changes during pregnancy	18.837	12	0.093
Information from the midwife about the psychological changes during pregnancy	21.039	12	< 0.05
Previous delivery	7.221	6	0.301
Type of delivery	9.443	9	0.397
Birth plan	18.782	9	< 0.05
Satisfaction with bonding after delivery	10.905	3	< 0.05
Age	9.410	9	0.400
Marital status	9.032	6	0.172

df – degrees of freedom; N – number; χ^2 – chi-square

The results indicate a statistically significant relationship between postnatal depression (as measured by the EPDS) and mental health issues during pregnancy. Women who did not suffer from mental health issues during pregnancy were less likely to suffer from depression after childbirth. No significant correlation was found for physical complications during pregnancy. The results show a strong correlation between postnatal depression and receiving information from the midwife about possible psychological changes during pregnancy. The women who received such information did not suffer from postnatal depression at a statistically significant level. It is surprising that the same information, but given by the gynecologist, had no effect on the development of postnatal depression.

Interestingly, a strong correlation was found between postnatal depression and developing a birth plan before delivery. Women who had no birth plan did not have statistically significant levels of postnatal depression.

A statistically significant correlation was found between postnatal depression and satisfaction with postpartum bonding. The women who were satisfied with the quality of bonding immediately after delivery and during hospital stay were not statistically significantly more likely to suffer from postnatal depression, and the women who reported low satisfaction with bonding after delivery were statistically significantly more likely to suffer from moderate to severe postnatal depression. The data suggest that bonding may be one of the protective factors against the development of postnatal depression.

No correlation was found between sociodemographic characteristics such as age, education level, or marital status and postnatal depression.

Discussion

Although many studies have identified younger age as one of the factors contributing to the development of postnatal depression (Bunevicius et al., 2009; Dukhan & Salman, 2022; Lee et al., 2007), our research found no such correlation. The effect of age may have different advantages and disadvantages at different stages of life, for example, younger women tend to be in better physical condition during pregnancy and postpartum and their bodies can cope with the demands of pregnancy and child care more easily than at older ages; on the other hand, less life experience at younger ages may contribute to increased psychological vulnerability compared to older ages. Therefore, the various factors may be offsetting each other with respect to age and its association with postnatal depression. These hypotheses should be the subject of future research.

Our findings seem to be consistent with other findings supporting the effect of mental health issues during pregnancy on the development of postnatal depression (Bunevicius et al., 2009; Ionescu et al., 2023; Lee et al., 2007; Wyseure & Corneillie, 2023). Therefore, it is necessary to pay attention to preventive measures against the development of mental health issues during pregnancy, as it seems that the effect of such prevention could be long-lasting even after delivery, providing prevention against postnatal depression. One such possible measure could be effective mental health training during pregnancy (or even before planned conception). Akbarian et al. (2018) point to mental health training during pregnancy as a preventive measure against stress, anxiety, and depression, and women who underwent such training reported reduced symptoms of depression, anxiety, and stress as measured by the Depression, Anxiety, and Stress Scales (DASS-42). However, our study did not find such an association; women who attended antenatal classes did not report less fear of childbirth or fewer postpartum depressive symptoms than women who did not attend antenatal classes. The explanation could be that there are numerous antenatal classes in the Czech Republic, which may differ in quality or in the type of information provided. Not all of them deal with mental health issues. According to the findings, it might be helpful to create a unified methodology of such classes with special attention paid to mental health issues of pregnant women.

According to our results, mental health during pregnancy is not only an important factor in preventing postnatal depression, but also correlates with reduced fear of childbirth. Dukhan and Salman (2022) indicate that acute fear of childbirth (measured by a non-standardized questionnaire) occurs in 6–10% of pregnant women. According to Elgzar et al. (2023), fear of childbirth (data obtained with a fear of childbirth questionnaire) is quite common, especially in nulliparous women, and a severe form (tocophobia) is present in 1.6% to 14% of pregnant women. Our results also indicate a higher frequency of experiencing fear of childbirth (56% of the 361 women in the sample). Dukhan and Salman (2022) found that fear of childbirth was more associated with vaginal delivery than cesarean delivery; our results indicate that women who reported the fear of childbirth were also statistically significantly more likely to deliver by cesarean section. According to Elgzar et al. (2023), women with higher levels of fear of childbirth were more likely to choose cesarean section as their preferred mode of delivery than women with lower levels of fear. It is not clear whether fear of vaginal delivery leads to a conscious decision to have a cesarean delivery, or whether there is some other relationship, such as the presence of physical complications that cause fear of childbirth and, as such, are an indication for cesarean section. Future research should be done in this direction.

Although some authors (Bunevicius et al., 2009; Lee at al., 2007) claim that physical problems during pregnancy are associated with postnatal depression (measured with the WHO's Composite International Diagnostic Interview – Short Form), our research did not find such a relationship. According to Ionescu et al. (2023), marital status plays a role as a protective factor against both pre- and postnatal depression; in our findings, marital status was not associated with postnatal depression.

Dukhan and Salman (2022) point out that there is no statistically significant relationship between the level of depression and anxiety and the obstetric information provided to the mother. In our research, there was no correlation between receiving information about psychological changes during pregnancy from the gynecologist and postnatal depression, but surprisingly, there was a strong correlation between receiving such information from the midwife and postnatal depression. The women who received information about psychological changes during pregnancy from the midwife did not suffer from postnatal depression in a statistically significant way. A possible explanation could be that midwives in antenatal clinics are usually closer to the women and spend more time with them than their gynecologists. This hypothesis needs to be tested in future research.

Ahmadpour et al. (2022) conclude that having a birth plan improves mothers' experience of childbirth, reduces fear of childbirth, and reduces symptoms of postnatal depression. Surprisingly, our research yielded opposite results, such as a significantly positive correlation between having a birth plan and postnatal depression. In other words, women who did not have a birth plan were statistically significantly more likely to be free of symptoms of postnatal depression. Although the existence of a birth plan is intended to help expectant mothers feel in control of their delivery, expectations are not always met. Such an experience may lead to feelings of failure or lack of belief in one's ability to control things like childbirth. A possible interpretation could be that either women who tend to be more anxious create a birth plan to have more control over the circumstances, or the women who had such a plan and it was not fulfilled could deal with

unpleasant feelings about not being able to fulfill it. We believe that having a birth plan may be a double-edged sword; it may help to reduce fear of childbirth, while on the other hand it may lead to frustration if it is not fulfilled. This would be an interesting topic for future research.

One of the most important factors in the development and well-being of the baby is the quality of maternal bonding (Capelli et al., 2023). According to their research, the quality of maternal bonding at the baby's age between three and six months is associated with low levels of postnatal anxiety and depression. Regarding maternal bonding, Kanekasu et al. (2024) concluded that prenatal depression and anxiety were linked with poorer maternal-infant bonding two to five days after delivery, whereas prenatal health did not directly predict the quality of maternal-infant bonding three months after delivery, although low quality of bonding three months after delivery associated with postnatal depression. In our findings, a significant correlation was found between maternal mental health issues, particularly postnatal depression, and the quality of maternal bonding in the delivery ward. Women who reported dissatisfaction with bonding in the delivery ward were also more likely, statistically significantly, to suffer from moderate or severe postnatal depressive symptoms as measured by the EPDS. Therefore, it is important to pay attention to the mental health of both expectant and postpartum mothers, as the quality of maternal-infant bonding and maternal mental health are closely related.

Conclusion

The mental health of pregnant and postpartum women is a complex area requiring close attention and support, not only because this is often a time of strong emotions and vulnerability, but also because the mother's mental health is strongly related to the quality of the mother-infant bond. There are many different factors that may play a key role in preventing pre- and postnatal depression and other mental health issues. Not all available studies agree on a clear link between sociodemographic data and mental health issues, but many support the finding that mental health issues during pregnancy and postpartum can negatively affect the quality of mother-child interactions or even family interactions as a whole. Therefore, it is crucial to pay attention to preventive measures, to educate both midwives and gynecologists about the importance of mental health during pregnancy, and to include mental health interventions during pregnancy in antenatal classes. It is equally important to pay attention to mother-infant bonding in the delivery ward, as it is strongly associated with postnatal depression. Mental health issues should not be taboo, as lack of information can lead to an under-diagnosis of such conditions, which in turn can lead to lack of treatment and negatively affect not only the well-being of the mother but also that of the child.

Ethical aspects and conflict of interest

This study was conducted in accordance with the relevant ethical principles and regulations of the EU, the Czech Republic and the University of South Bohemia. The authors have no conflicts of interest to declare.

This study does not contain any ethically controversial issues. In the course of the study, the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) was adhered to. The drafting of human subjects (respondents) into the research was done in line with the Helsinki declaration of 1975 and as revised in 2013. National ethical standards and regulations were also observed. Respondents were informed beforehand about the aim of the study. The study was carried out anonymously. Further, the respondents were informed about the advantages and disadvantages of participating in the study. Participation in the study was voluntary. Respondents gave their consent verbally. The study was approved on 24 May 2023 by the Ethics Committee of the Faculty of Health and Social Sciences of University of South Bohemial in České Budějovice (6 / 2023). The authors declare no conflict of interest.

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Author contributions

Conception and design (OS), data analysis and interpretation (OS), manuscript draft (OS), critical revision of the manuscript (RB, AM, MM, DF), final approval of the manuscript (RB).

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