Original research article

Predictors of increased depressive symptoms in the postpartum period

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Abstract

Introduction: Pregnancy and the postpartum period are a risk period in a woman's life in terms of manifesting mental disorders, such as postpartum depression. Previous research has identified several risk factors affecting the onset and progression of postpartum depression. **Aim:** (1) to find the occurrence of depressive symptoms in the postpartum women group; (2) to verify the influence of selected factors on the level of postpartum depression.

Materials and methods: Study sample consisted of 510 mothers in the postpartum period, mean age 30.6 years (± 5.3 ; range 19–45 years). The Edinburgh postnatal depression scale was used to measure symptoms of depression; a questionnaire of our own design was used to assess selected factors potentially influencing level of depressive symptoms.

Results: In the Edinburgh postnatal depression scale, the respondents achieved an average score of 9.3 ± 5.6 ; and the prevalence of severe depressive symptoms was 25.3%. The linear regression model showed that significant predictors of postpartum depression were: lower education; history of depression; dependence on the opinion of others; concerns about future; low satisfaction with motherhood; problems with partner; problems with breast-feeding; tearful child; negative emotions toward the baby; and poor mastering of maternity.

Discussion: Significant predictors of postpartum depression identified in this study can be easily detected in clinical practice using the unique long-term contact that a woman has with her prenatal midwife. Evaluation of mothers' emotional health and screening for postpartum depression risk factors can enable midwives to identify those at risk and intervene in a timely manner.

Keywords: Depressive symptoms; Edinburgh postnatal depression scale; Postpartum period; Predictors

Introduction

Pregnancy and the postpartum period are risk periods in the life of a woman in terms of the manifestation of mental disorders. While many women can adapt themselves to developing physiological, psychological, and social changes related to pregnancy and childbirth, some women may develop mental disorders at different levels (Batmaz et al., 2015). The most common disorders include postpartum dejection, postpartum depression, postpartum psychosis, but also post-traumatic stress disorder (Izáková, 2015; Mazúchová et al., 2016a; Söderquist et al., 2009).

Depressive symptoms in the postnatal period are a well-developed topic in the literature, but there is no consensus in its estimated prevalence. In studies dealing with this issue there are large differences due mainly to the fact that the individual measurements are influenced by the methodology, as well as the health, cultural, demographic and socio-economic factors (Halbreich and Karkun, 2006; Tebbe et al., 2013), and the differences in perceptions of mental health and its stigmatization (Halbreich and Karkun, 2006). As a result, the international prevalence of depressive difficulties during pregnancy ranges

between 7 and 30 percent (Tebbe et al., 2013). Postpartum depression often remains undiagnosed, because the woman herself considers her condition to be natural (Izáková, 2015; Izáková et al., 2013). Of course, it is not possible for psychiatrists to examine each woman who has just given birth (Izáková, 2015), so midwives should play an important role in identifying women at risk of maternal distress (Seimyr et al., 2013). It seems appropriate to use screening questionnaires such as, for example, the Edinburgh Postnatal Depression Scale (Cox et al., 1987) and the Postpartum Depression Screening Scale (Beck a Gable, 2000), which are not time-consuming and technically easy (Izáková, 2015). They are intended mainly for primary care. It is advisable to repeat the examination after 2 weeks (Bašková, 2015). The use of EPDS during pregnancy can improve the ability of midwives to provide support to women in maternity hospitals (Seimyr et al., 2013) and in the primary care sphere (home care), as non-psychotic depression is manifested later on (Bašková, 2015). Especially for accurate prevention, diagnosis and treatment, further information is needed on the differences between populations with varying degrees of risk in the prevalence and course of postnatal depression (Verkerk et al., 2003).

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The previous studies have identified a number of risk (but also protective) factors influencing the onset and progression of postpartum depression. The main risk factors based on which we can predict the onset of postnatal depression include history of a previous depressive episode (Abdollahi et al., 2014; Fiala et al., 2017; Izáková, 2015; Milgrom et al., 2008; Zubaran and Foresti, 2011), prenatal depression (Abdollahi et al., 2014; Rich-Edwards et al., 2006; Zubaran and Foresti, 2011), prenatal anxiety (Austin et al., 2007; Zubaran and Foresti, 2011), postpartum blues (Zubaran and Foresti, 2011), premenstrual syndrome (Lee et al., 2015), lifelong psychiatric disorder (Helle et al., 2015), and family history of depression (Fiala et al., 2017).

The risk of postnatal depression is also higher in mothers with gestational diabetes, recurrent urinary tract infection (Abdollahi et al., 2014), abuse of psychoactive substances, thyroid disorders and other chronic diseases of the mother, for example asthma (Izáková, 2015). Smoking cigarettes at any time during pregnancy and non-use of prenatal vitamins in the first trimester were significantly associated with worse depressive symptoms (Dagher and Shenassa, 2012).

In addition to the mental and physical health problems of mothers, significant predictors of postpartum depression include socio-demographic variables such as younger age (Izáková et al., 2013; Seimyr et al., 2013), lower education (Fiala et al., 2017) and unemployment (Seimyr et al., 2013). An important predictor is also the lack of social support, especially on the part of the partner (Helle et al., 2015; Izáková, 2015; Izáková et al., 2013; Milgrom et al., 2008), a shorter relationship with the partner (Seimyr et al., 2013), or his absence (Fiala et al., 2017; Zubaran and Foresti, 2011). Similarly, socio-economic status (Zubaran and Foresti, 2011), low household income (Abdollahi et al., 2014; Batmaz et al., 2015), or financial difficulties (Rich-Edwards et al., 2006) can contribute to the increased incidence of depressive symptoms during pregnancy and in the postpartum period.

Mother's low self-esteem, the presence of life stressors (Fiala et al., 2017; Zubaran and Foresti, 2011), the stress of parental responsibility, and the difficulty of managing responsibilities are stressors associated with worse depressive symptoms (Dagher and Shenassa, 2012; Zubaran and Foresti, 2011). Women who have given birth due to unplanned and unwanted pregnancies also belong to risk groups (Abdollahi et al., 2014; Faisal-Cury et al., 2017; Fiala et al., 2017; Rich-Edwards et al., 2006; Steinberg and Rubin, 2014; Zubaran and Foresti, 2011). In their study, Fiala et al. (2017) describe, in particular, feelings of unhappiness about unwanted pregnancies that aggravate a woman's psychological well-being and put her at higher risk of postpartum depression.

The known risk factors that coact on postnatal mood disorders can include complicated childbirth, a child requiring increased postnatal care (Izáková et al., 2013), a pathological condition of the newborn (Izáková, 2015; Izáková et al., 2013), child's colic (Dagher and Shenassa, 2012), a newborn with a very low birth weight, the female gender (Helle et al., 2015), the temperament of the child (Izáková, 2015), an adverse start of breastfeeding (Dagher and Shenassa, 2012; Izáková et al., 2013), or the absence of breastfeeding (Fiala et al., 2017).

As reported by Seimyr et al. (2013), limited access to protective factors is associated with a higher degree of maternal distress. Among these the most frequently mentioned are: higher maternal age (Izáková et al., 2013; Seimyr et al., 2013), higher education of mothers (Fiala et al., 2017; Izáková et al., 2013), and existing social base. An uncomplicated birth, good health of the newborn (Izáková et al., 2013), the male gender

and family savings also have a positive impact (Fiala et al., 2017).

In their study, Reck et al. (2016) highlight the importance of bonding that can prevent postpartum depression and alleviate stress from parenthood. The results of research in this area highlight the need to promote bonding and mother-child interaction to avoid disrupting the relationship between mother and child (Mazúchová et al., 2016b; Reck et al., 2016). The beneficial effect of early skin-to-skin contact on breastfeeding is also described (Mazúchová et al., 2016a).

Higher self-efficacy of women for maternity and self-esteem also has a potentially protective effect on the development of psychiatric disorders during both the pregnancy and postpartum period (Abdollahi et al., 2014).

Similarly, the results of the study by Ding et al. (2014), dealing with the correlation of epidural analgesia and the risk of developing PPD, indicate that epidural analgesia is associated with a lower risk of postpartum depression.

Postpartum depression affects all aspects of a woman's life, including her relationship with her partner and her child's development (Abdollahi et al., 2014). Examining potential risk factors for depressive disorders can help to better target preventive interventions for threatened mothers and children (Martini et al., 2015).

The aim of our study was (1) to detect the occurrence of depressive symptoms in a postpartum women group; (2) to verify the influence of selected factors on the degree of postpartum depression.

Materials and methods

Study design

The study used a cross-sectional design to elicit information about risk factors of maternal distress and risk for postpartum depression.

Participants

We used the convenience sampling method to recruit participants to our study. The research sample consisted of 510 women in the postpartum period. The average age of respondents was 30.6 years (± 5.3). The minimum age was 19 years and the maximum age 45 years. Most women who participated in the survey were in the 30–39 age group (52.7%). Women of 29 years and under were 41.5% and the smallest group (5.8%) were women aged 40 and over. Respondents who achieved higher education were 56.2%, and 39.8% of women achieved secondary education. A lower level of education was reported by 4.1% of respondents. Most women who participated in the survey gave birth once (60.8%). Women who gave birth two or more were 39.2%. The largest percentages were married women (71.5%), and then single (9.0%), in a relationship (17.1%) and divorced (2.3%).

Measures

The quantitative data were collected using two questionnaires
The Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) was used to measure symptoms of maternal distress and depression after childbirth. This self-report scale includes ten items, all items are scored on a four-point response from 0 to 3. The scale indicates how the mother has felt during the previous week. Mothers who score above 13 are likely to be suffering from a depressive illness of varying severity. The EPDS score should not override clinical judgment. A careful clinical assessment should be carried out to confirm the diagnosis.

However, the EPDS is easy to administer and has proven to be an effective screening tool. The Edinburgh Postnatal Depression Scale was translated into Slovak and then back-translated in order to check that the questions elicited the intended information. The internal consistency measured by Cronbach's alpha was 0.985.

The second questionnaire of our own design was used to assess selected factors potentially influencing level of depressive symptoms (EPDS): socio-demographic characteristics (i.e. age, marital status, level of marital satisfaction, education, socioeconomic status), risk factors for mental disorders (i.e. family history and past history of psychological problems), obstetric characteristics (i.e. parity, breast feeding, pregnancy intention, mode of delivery, epidural analgesia) and psychological characteristics (i.e. self-esteem, ability to express emotions, satisfaction with motherhood).

Data collection

The survey was conducted in February–March 2016. The questionnaire was distributed in a local gynaecological outpatient clinic based on the doctor's oral approval and via the Internet. The total number of questionnaires was 510, of which 60 questionnaires were from the gynaecological clinic and 450 questionnaires were collected via the Internet. The questionnaire response rate of the gynaecological clinic was 75%.

Ethical consideration

The research ethics committee of the University Hospital in Martin, Slovakia, reviewed and approved the research protocol.

Statistical analysis

Answers from the questionnaire of our own design were converted into dichotomous (yes/no) variables to enter into the regression model. Logistic regression was used when multiple variables were considered simultaneously. Odds ratios (OR) were presented with 95% confidence intervals (CI). Statistical significance was defined as two-sided *p* values using a significance level of 5%.

Results

Mother's mean age was 30.6 ± 5.3 years. The majority (63.3%) were primiparous, married or living in long-term relationship (88%), had university education level (56.3%), and had undergone vaginal delivery (65.9%) (Table 1).

In the EPDS scale, the respondents achieved an average score of 9.3. When applying a cut-off score of 13 points, scores of 129 (25.3%) respondents indicated severe levels of depressive symptoms.

The linear regression model showed that significant predictors of postpartum depression were (Table 2): lower education [$\beta = -0.079$; 95% CI = $(-1.477; -0.007)$]; history of depression [$\beta = 0.287$; 95% CI = $(0.680; 3.005)$]; dependence on the opinion of others [$\beta = -0.097$; 95% CI = $(0.252; 2.010)$]; concerns about future [$\beta = 0.097$; 95% CI = $(0.617; 1.576)$]; low satisfaction with motherhood [$\beta = -0.132$; 95% CI = $(-2.847; -0.680)$]; problems with partner [$\beta = -0.090$; 95% CI = $(-1.239; -0.042)$]; problems with breast-feeding [$\beta = 0.82$; 95% CI = $(0.062; 1.124)$]; tearful child [$\beta = 0.089$; 95% CI = $(0.068; 1.040)$]; negative emotions toward the baby [$\beta = -0.170$; 95% CI = $(-2.806; -1.029)$]; and poor mastering of maternity [$\beta = -0.167$; 95% CI = $(-2.303; -0.718)$].

Table 1. Socio-demographic data of participants (N = 510)

Characteristics	mean ($\pm$ SD, range)	n (%)
Maternal age	30.60 ($\pm$ 5.3; 19–45)	
Parity		
Primiparous		323 (63.3)
Multiparous		187 (36.7)
History of miscarriage(s)		96 (18.8)
Marital status		
Married/with partner		449 (88.0)
Single/without partner		56 (11.0)
Education status		
Primary education		4 (0.8)
Secondary school education		218 (42.7)
University education		287 (56.3)
History of psychological problems		72 (14.1)
Family history of depression		92 (18.0)
Delivery method		
Vaginal delivery		336 (65.9)
Planned caesarean section		74 (14.5)
Urgent caesarean section		100 (19.6)

The other factors did not predict high levels of postpartum depression. The total explained variance in the linear regression model was 55.1%.

Discussion

The aim of our study was to determine the influence of risk factors on the onset of postnatal depression in postpartum women. The basis of our research was the Edinburgh Postnatal Depression Scale questionnaire, and a questionnaire that we designed, focusing on each risk factor.

In our study, the prevalence of depressive symptoms (EPDS ≥ 13 points) was 25.3%. The most commonly reported mean incidence of postnatal depression is 10–15% (Fiala et al., 2017; Izáková, 2015), but there are large differences in the prevalence among studies (Batmaz et al., 2015; Halbreich and Karkun, 2006; Tebbe et al., 2013). In their longitudinal study, Fiala et al. (2017) monitored a group of 3.2 Czech women for the occurrence of depressive symptoms using EPDS, finding the prevalence of depression 6 weeks after birth (11.8%) and 6 months after birth (10.1%). On the other hand, Batmaz et al. (2015) based on the results of their study, reported 18.3% of postnatal depression in a group of 170 Turkish mothers. Kumwar et al. (2015), who examined depression in a sample of 100 Nepalese women, found it in 29% of cases (mean EPDS score was 10.3; *SD* = ± 4.0).

The linear regression model showed that the education status was a significant socio-demographic predictor for postpartum depression among women in the postpartum period. Respondents with lower education achieved higher scores in postnatal depression compared to mothers with higher education. In a Turkish study led by Inandi et al. (2002), a statistically significant association between low education and postpartum depression was found, whereas Batmaz et al. (2015) did not find such a correlation.

Other risk factors we examined were the economic and social situation of mothers. As a significant predictor of postnatal depressive symptoms, a conflicting partnership relationship was confirmed in our sample, whereas the family's financial

Table 2. Linear regression model with the effect of selected variables (socio-demographic, psycho-social and obstetric characteristics) on postpartum depression

	β	p	95% CI for B	
			Lower bound	Upper bound
Age	0.56	0.190	-0.030	0.150
Marital status	-0.014	0.710	-1.656	1.128
Education	-0.078	0.048	-1.477	-0.007
Epidural analgesia	-0.030	0.425	-1.356	0.573
Mode of delivery	0.014	0.748	-0.540	0.751
Satisfaction with labour	0.042	0.307	-0.306	0.970
Course of labour	0.018	0.650	-0.743	1.188
Parity	0.038	0.416	-0.638	1.541
History of miscarriage(s)	-0.034	0.363	-1.584	0.582
PMS	0.039	0.294	-0.397	1.309
Depression in family	-0.040	0.274	-0.878	0.249
History of depression	0.287	0.002	0.680	3.005
Antenatal education	0.004	0.921	-0.903	0.999
Emotions after labour	-0.065	0.084	-1.320	0.084
Dependence on the opinion of others	0.097	0.012	0.252	2.010
Concerns about future	0.186	0.000	0.617	1.576
Satisfaction with motherhood	-0.132	0.001	-2.847	-0.680
Pessimism	0.059	0.157	-0.303	1.874
Expression of emotions	-0.028	0.503	-0.813	0.400
Self-esteem	-0.066	0.119	-1.864	0.214
Satisfaction with finances	0.029	0.460	-0.346	0.762
Pregnancy intent	0.012	0.768	-0.783	1.061
Readiness for motherhood	-0.051	0.247	-1.271	0.328
Problems with partner	-0.090	0.036	-1.239	-0.042
Disabled child	-0.019	0.612	-4.081	2.407
Preterm delivery	0.005	0.899	-0.627	0.714
Problems with breast-feeding	0.082	0.029	0.061	1.124
Worries about the child	0.73	0.055	-0.017	1.697
Tearful child	0.089	0.026	0.068	1.040
Emotions toward the baby	-0.170	0.000	-2.806	-1.029
Synchronisation of needs	-0.056	0.191	-2.217	0.443
Mastering maternity	-0.167	0.000	-2.303	-0.718
Bonding	-0.051	0.273	-0.998	0.283
$R^2 = 0.551$				

situation was not ascertained. In their studies, Asselmann et al. (2016) and Martini et al. (2015) found a strong relationship between a lack of social support and the emergence of postpartum depression and anxiety disorders. The mother's good social background and, in particular, a long-term, non-conflictual relationship with a partner/spouse is a significant protective factor (Izáková et al., 2013; Seimyr et al., 2013).

A statistically significant association was observed between the presence of a depressive episode after previous birth and the current depressive symptoms. Similar results were also reported in a Batmaz et al. (2015) study where they found a significantly higher risk of postpartum depression in wom-

en who had previously had depression, and reported depression history as the most significant risk factor for postpartum depression. Similarly, Seimyr et al. (2013) report that mental health problems, especially depression, are a strong risk factor for postpartum depression, while the incidence of mental disorders in the family did not affect the stress and depression of the respondents ($N = 283$) during the pregnancy and postpartum period. As Pidermann (2006) states, the overall psychological faculties of a woman, psychological problems in the past, or disease or heritability, can play their part in the onset and course of postpartum depression.

The respondents in our study who reported dependence on the judgement of their surroundings and who experience increased fears about the future were more susceptible to the development of postnatal depression. However, according to Seimyr et al. (2013), worries and fears are associated with maternal responsibility rather than postpartum depression. Dependence on the views of others may be associated with low self-esteem and uncertainty in a new unusual situation.

On the other hand, subjective satisfaction with motherhood and management of the duties associated with it can be considered, on the basis of our results, as protective factors that reduce the occurrence of depressive symptoms in the postpartum period. The study of Abdollahi et al. (2014) found that a lack of postnatal parental competence and low parenting self-efficacy were significant risk factors for postpartum depression. On the other hand, women who have a positive view of their maternal capabilities were found to be more able to care for the infant with confidence immediately after birth.

An increased risk of postpartum depression was also closely related to reports by the respondents of an indifferent relationship to the baby shortly after birth and problems with breasts and breastfeeding. The negative impact of persistent problems with breastfeeding, or completely impossible breastfeeding, on the psychological wellbeing of mothers was proven also by Izáková et al. (2013). According to these authors, the mother's best efforts to cope with lactation can be supported by the fact that breastfeeding is currently much appreciated and highlighted by both experts and society. Maternal insufficiency in breastfeeding in the first days after birth, often biologically conditioned by a later onset of lactation, e.g. due to operative delivery, may contribute to the manifestation of depressive symptoms (Izáková, 2015; Izáková et al., 2013).

One of the factors associated with the occurrence of depressive symptoms is also the temperament of the child (Izáková, 2015). A crying baby requiring increased attention of the mother contributed to the development of psychological problems in the women in our study. Similarly, Petzoldt et al. (2016) found a correlation between anxiety and depressive disorders of mothers and breastfeeding problems, crying babies and babies with sleep disorders. The research led by Kumwar et al. (2015) proved an association between the child's health problem and postnatal depression, but this was not confirmed in our study.

Although several studies have proved the relationship between birth characteristics such as birth complications (Izáková et al., 2013), type of delivery (Patel et al., 2005), epidural analgesia (Ding et al., 2014), bonding (Reck et al., 2016), etc., and postpartum depression, our study did not confirm this relationship. Similarly, the study by Bell et al. (2016), which examined the relation of the course of childbirth and symptoms of postpartum depression, did not confirm the relationship between the type of childbirth and complications during and after birth and postpartum depression. However, regardless

of the clinical postnatal birth assessment, women may experience childbirth as a traumatism, which has a negative impact on their wellbeing and mental processing of the event (Seimyr et al., 2013).

Limitations of the study

We have seen several limitations in the study that negatively affect the validity of the presented results. The focal group was a random sample of midwifery clients who completed the online questionnaire. The response rate was relatively high, which is common with the use of electronic media. However, the disadvantage of electronic media may be the selection of a relatively privileged group that does not represent the entire target population. The research sample was characterized by a relatively high educational level and a high proportion of primiparas. Participation in the study was voluntary, which may have influenced the prevalence of reported psychological difficulties (Tebbe et al., 2013).

The use of the self-assessment scale and the questionnaire, which reflect the subjective perception of respondents, can be also considered a limitation and thus the data obtained may be subject to considerable distortion. The use of a non-standardized questionnaire could have resulted in misclassification of information and lack of comparability of results to those of prior studies that have used standard instruments.

Conclusions

Risk factors of postpartum depression include lower education of the mother, psychological problems after previous birth and in puerperium, women's dependence on their social background's judgement, tendency to experience fear of the future, low satisfaction with maternity and a negative judgement on coping with maternity, partnership/marriage problems, problems with breastfeeding, crying baby and an indifferent to negative relationship to the baby after birth. These risk factors can significantly affect the psyche of a woman in the postpartum period, thereby contributing to the emergence of postpartum depression. Therefore, it is necessary to focus on the implementation of the acquired knowledge and finding effective ways of early intervention to prevent and mitigate depressed mood. These interventions should take advantage of the unique long-term contact that a woman has with her midwife. Staying in touch with mothers frequently during pregnancy and the postpartum period provides an opportunity for health service professionals to evaluate the mother's emotional health and to screen for postpartum depression risk factors to identify those at risk and intervene in a timely manner.

Conflict of interests

The authors declare that they have no conflict of interests.

Prediktory zvýšených depresivních příznaků v poporodním období

Souhrn

Úvod: Těhotenství a poporodní období jsou rizikovým obdobím v životě ženy, pokud jde o projev duševních poruch, jako je poporodní deprese. Předchozí výzkum identifikoval několik rizikových faktorů ovlivňujících nástup a průběh poporodní deprese.

Cíl: (1) zjištění výskytu depresivních příznaků u skupiny žen po porodu; (2) ověření vlivu vybraných faktorů na úrovni poporodní deprese.

Metodika: Vzorek byl sestaven z 510 matek v poporodním období v průměrném věku 30,6 let ($\pm 5,3$, v rozmezí 19–45 let). Na měření postnatální deprese byla použita Edinburská škála k měření symptomů deprese a vlastní dotazník byl použit k posouzení vybraných faktorů, které by mohly ovlivnit úroveň symptomů deprese.

Výsledky: Na Edinburské škále respondenti dosáhli průměrného skóre $9,3 \pm 5,6$; prevalence závažných depresivních symptomů byla 25,3 %. Lineární regresní model ukázal, že významnými prediktory deprese po porodu byly: nižší vzdělání; historie deprese; závislost na názorech druhých; obavy ohledně budoucnosti; nízká úroveň spokojenosti s mateřstvím; problémy s partnerem; problémy s kojením; plačtivé dítě; negativní emoce vůči dítěti; špatné zvládnutí mateřství.

Diskuse: Významné prediktory poporodní deprese identifikované v této studii lze snadno zjistit v klinické praxi pomocí jedinečného dlouhodobého kontaktu, který má žena s její prenatální porodní asistentkou. Vyhodnocení emočního zdraví matek a screening rizikových faktorů poporodní deprese mohou umožnit porodním asistentkám identifikovat ty rizikové a zasáhnout včas.

Klíčová slova: Edinburská škála poporodní deprese; poporodní období; prediktory; příznaky deprese

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