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Paternal postpartum depression, its relationship to maternal postpartum depression and to insufficient income

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ABSTRACT

Introduction: No studies on paternal postnatal depression (PPND) have been performed in Poland.

Aim: The aim of the study was to estimate the symptoms of depression in women and men and identify the determinants of mental health of fathers after the birth of their child.

Material and methods: Parents (142) participated in the study during the period 1 to 12 months after the birth.

Results and discussion: The analyses reveal that 13% of fathers and 18% of mothers after the birth of their child had Edinburgh postnatal depression scale (EPDS) scores of 10 or higher, which indicates possible depression. At score 12 and more, the proportion detected by EPDS decreased to 7% of fathers and 13% of mothers, which is an indicator of major depressive disorder. At EPDS score 12 and more, a probable depressive disorder was indicated in 10% of fathers in the period of 1–3 months, 7% of fathers at 4–7 months and 4% of fathers at 8–12 months. The symptoms of maternal depression at a score of 12 and more were detected in 16% of women at 1–3 months, 12% at 4–7 months 11% at 8–12 months. PPND was significantly associated with depression in mothers OR 5.7, lower education OR 4.3, low financial income OR 6.0, decreased relationship satisfaction OR 3.3, and previous history of depression OR 3.2.

Conclusions: Psychosocial factors were strong predictors of PPND up to a year after the birth of the child. The authors suggest the routine screening and assessment of both parents should occur during the woman's pregnancy and in the postnatal period.

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1. INTRODUCTION

For many men, becoming a father is a departure from individualism. It leads to a greater sense of responsibility and self-reflection, which, in turn, initiates positive changes in behaviour.[1] Some studies suggest that paternity can have a protective influence on men's health.[2] However, other findings indicate that the period of transition to paternity may be demanding and it may entail many aspects, affecting negatively men's health, causing anxiety, fear and an increased risk of depression.[3,4] Depression in fathers is not widely known and few studies discuss it. In principle, the health of fathers is often ignored when their child is born. Men remain unnoticed, undiagnosed and untreated.[5] According to DSM-5, postnatal depression usually occurs from 4 to 6 months after the birth of the child,[6] but this period lasts up to 12 months in clinical practice and studies.[7] The prevalence of postnatal depression in mothers ranges from 15% to 20%.[7,8] According to the review of the literature, the percentage of cases in fathers ranges from 1.2% to 25.5%.[3,4,9] However, in collective study groups, the symptoms of depression were estimated from 24% to 50% in men whose partners experienced postnatal depression.[10] Scientific studies indicate that adaptation to parenthood is a stressful factor for both parents. This, in turn, may lead to the intensification of conflicts and a decrease in the quality of marital life.[11] The main risk factors for paternal postnatal depression (PPND) are: mother's depression and a severe father's depression or symptoms of depression or anxiety in the prenatal period.[9] An important role is also attributed to biological mechanisms that may underlie paternal depression, with changes observed in the levels of testosterone, estradiol, cortisol and prolactin.[12,13] Findings of researchers reveal that PPND affects the emotional, behavioural and social functioning of babies at the age of 36 months.[14,15] Some studies suggest that the symptoms of depression may have a distant negative impact on the health and behaviour of children, as well as on their social and emotional development when they start school.[16] In another study, the main predictors of paternal PPND were: the lack of the sense of competence to perform paternal care and dissatisfaction with the marriage,[14,16–18] an unfavourable socio-economic situation,[8,19–21] an unplanned pregnancy, a young age 8, the fact of being unmarried,[8,20] the lack of empathy and support from the intimate partner,[20,22,23] unfriendly relations with parents-in-law, experiencing violence from the intimate partner, insufficient emotional and practical support, female sex of the baby,[8] reduced paternal-infant attachment[24] and previous mental health problems.[8]

2. AIM

To estimate the symptoms of depression in women and men and to identify the determinants of the mental health of fathers after the birth of their child.

3. MATERIAL AND METHODS

The research tools included: a questionnaire of own concept, the Edinburgh postnatal depression scale (EPDS).[25] The EPDS has been validated for assessing postnatal depression in fathers using a cut-off of 10 points.[26] The data for the study was collected from 142 mothers and 142 fa-

Table 1. Participants' sociodemographic and obstetrics characteristics.

Characteristics	
Average age, years	Women: 28 ± 5, min 18, max 43; Men: 30 ± 6.7, min 18, max 57
Marital status, *n*(%)	Married couples: 122(85); In union / living together: 20(14)
Education, *n*(%)	Women: higher 57(40), secondary 47(33), vocational 38(27) Men: higher 61(43), secondary 33(23%), vocational 48(34)
No. of children, *n*(%)	One 57(40), two 50(36), three 26(18), four 8(5), five 1(0.7)
Healthy baby / sick baby, *n*(%)	Healthy 119(84), sick 23(16)
Baby born, *n*(%)	On-time 113(80), prematurely 29(20)
Sex of the child, *n*(%)	Female 68(48), male 74(52)
The deliveries, *n*(%)	Caesarean section 56(40), naturally 83(58), surgical delivery 3(2)
Participation in delivery, *n*(%)	Yes 80(56), no 62(44)
Financial income, *n*(%)	Good income 111(78), low income 31(22)
Social assistance, *n*(%)	Yes 19(13), no 123(87)
Support received from women, *n*(%)	Yes 126(89), no 15(11)
Lower satisfaction in men with a partner relationship, *n*(%)	Yes (35), no 91(64)
Smoking cigarettes, *n*(%)	Yes 43(31), no 99(69)
Alcohol abuse, *n*(%)	Yes 10(7), no 132(93)
Experiencing anger, aggression, *n*(%)	Yes 17(12), no 125(88)
History of father's depression, *n*(%)	Yes 18(13), no 124(87)
Mental illness in the father's family, *n*(%)	Yes 12(9), no 130(91)

thers who were waiting with their child to see a doctor, from the beginning of October 2017 to the end of May 2018. In total, 26 (8%) questionnaires were rejected due to unanswered questions. The inclusion criteria were the consent of both partners/spouses and the age of the child from 1 to 12 months. Each participant completed questionnaires individually. The respondents did not receive any rewards for participating in the study. The women who

Table 2. The results of EPDS.

	Women	Men
Score, mean ± SD	6.8 ± 3.9	4.94 ± 3.8
EPDS ≥ 10		
No depression, *n*(%)	117(82.3)	124(87.3)
Depression, *n*(%)	25(17.6)	18(12.6)
EPDS ≥ 12		
No depression, *n*(%)	123(86.6)	132 (92.9)
Depression, *n*(%)	19 (13.3)	10 (7,0)

Table 3. The results for EPDS ≥ 10 and EPDS ≥ 12.

	Months since the birth of the child					
	1–3		4–7		8–12	
	EPDS ≥ 10	EPDS ≥ 12	EPDS ≥ 10	EPDS ≥ 12	EPDS ≥ 10	EPDS ≥ 12
Women						
Depression, *n*(%)	11(20)	9(16.4)	11(18.3)	7(11.7)	3(11.1)	3(11.1)
No depression, *n*(%)	44(80)	46 (83.6)	49(81.7)	53(88.3)	24(88.9)	24(88.9)
Men						
Depression, *n*(%)	8(14.6)	5 (9.0)	7(11.7)	4(6.7)	3(11.1)	1(3.7)
No depression, *n*(%)	47(85.5)	50(90.9)	53(88.3)	56(93.3)	24(88.9)	26(96.3)

Table 4. Multivariate logistic regression model of depression prediction according to EPDS in men.

EPDS ≥ 10	Coefficient error	Coefficient b	–95% CI	+95% CI	Walda stat	P value	Odds ratio	–95% CI	+95% CI
obs. term	–4.98	1.36	–7.66	–2.31	13.33	0.003	0.006	0.005	0.09
Lower or secondary education	1.26	0.82	–0.34	2.87	2.36	0.12	3.54	0.70	17.71
Bachelor	–1.28	1.07	–3.39	0.81	1.44	0.23	0.27	0.03	2.26
Age up to 30	0.85	0.79	–0.69	2.41	1.16	0.27	2.36	0.49	11.22
Partner's depression	1.74	0.75	0.25	3.23	5.30	0.02	5.72	1.29	25.30
Insufficient income	1.80	0.82	0.18	3.41	4.76	0.02	6.05	1.20	30.53
Using social assistance	–1.18	1.05	–3.24	0.88	1.25	0.26	0.30	0.03	2.41
Caesarean section / surgical delivery	1.13	0.72	–0.28	2.556	2.46	0.11	3.11	0.75	12.89
No. of children up to 2	0.64	0.85	–1.03	2.31	0.56	0.45	1.89	0.355	10.13
Child's age less than 6 months	–0.51	0.67	–1.82	0.79	0.58	0.44	0.59	0.16	2.22
Sex of the child (male)	0.69	0.66	–0.60	1.98	1.09	0.29	1.99	0.54	7.28
Preterm birth	–1.48	1.12	–3.67	0.71	1.74	0.18	0.22	0.02	2.04
Sick child	0.04	1.04	–2.00	2.09	0.00	0.96	1.04	0.13	8.10
No participation in delivery	–0.70	0.74	–2.16	0.76	0.87	0.34	0.49	0.11	2.14
Lack of satisfaction with the relationship	0.98	0.73	–0.45	2.41	1.79	0.18	2.66	0.63	11.20
Lack of support from the partner	–0.42	1.10	–2.57	1.73	0.14	0.70	0.65	0.075	5.67
Fathers' depression in the past	0.11	0.92	–1.69	1.92	0.01	0.90	1.12	0.18	6.85
Mental illness in the family	–0.96	1.40	–3.71	1.78	0.47	0.49	0.38	0.02	5.95
Smoking	0.63	0.67	–0.69	1.95	0.87	0.34	1.88	0.50	7.06
Alcohol abuse	–0.21	1.23	–2.64	2.21	0.03	0.86	0.80	0.07	9.13
Aggression and anger towards others	0.18	1.12	–2.02	2.39	0.02	0.87	1.20	0.13	10.95

participated in the study gave birth in various hospitals in the Kuyavian-Pomeranian Voivodeship. In the study group, at score equal to or more than 10 and 12 by EPDS, the incidence of depression symptoms between 1 to 12 months was determined. However, at a score of equal to or more than 10 by EPDS, risk factors for paternal depression were analysed. The statistical analyses were conducted using the PQStat statistical package v. 1.6.6.202 (PQStat Software). The test probability was assumed to be significant at *P* less than 0.05.

Table 5. Univariate logistic regression model of depression prediction according to EPDS in men.

	B coneff	b error	-95% CI	+95% CI	Walda stat	P value	Odds ratio	-95% CI	+95% CI
abs. term	–2.96	0.59	–4.12	–1.80	25.02	<0.0001	0.05	0.01	0.16
Lower or secondary education	1.48	0.65	0.19	2.76	5.06	0.02	4.39	1.21	15.94
abs. term	–1.96	0.27	–2.50	–1.42	50.78	<0.0001	0.14	0.08	0.24
Bachelor	0.23	0.68	–1.11	1.57	0.11	0.73	1.25	0.32	4.81
abs. term	–2.25	0.42	–3.09	–1.41	27.51	<0.0001	0.10	0.04	0.24
Age up to 30	0.53	0.53	–0.51	1.57	1.00	0.31	1.70	0.60	4.82
abs. term	–2.37	0.33	–3.01	–1.72	51.37	<0.0001	0.09	0.04	0.17
Partner's depression	1.61	0.54	0.55	2.67	8.91	0.002	5.03	1.74	14.55
abs. term	–2.31	0.331	–2.96	–1.66	48.66	<0.0001	0.09	0.05	0.18
Insufficient income	1.25	0.52	0.22	2.29	5.67	0.01	3.51	1.24	9.88
abs. term	–2.05	0.28	–2.60	–1.49	52.25	<0.0001	0.12	0.07	0.22
Using social assistance	0.73	0.63	–0.50	1.96	1.34	0.24	2.07	0.60	7.14
abs. term	–2.10	0.35	–2.79	–1.41	35.61	<0.0001	0.12	0.06	0.24
Caesarean section/surgical delivery	0.39	0.50	–0.59	1.38	0.60	0.43	1.48	0.54	3.98
abs. term	–2.10	0.43	–2.94	–1.25	23.57	<0.0001	0.12	0.05	0.28
No. of children ≥2	0.26	0.53	–0.77	1.31	0.25	0.61	1.30	0.46	3.71
abs. term	–1.86	0.40	–2.65	–1.06	20.97	<0.0001	0.15	0.07	0.34
Child's age (month) <6	–0.11	0.51	–1.12	0.90	0.04	0.83	0.89	0.32	2.47
abs. term	–2.16	0.39	–2.94	–1.38	29.43	<0.0001	0.11	0.05	0.25
Sex of the child (son)	0.41	0.51	–0.59	1.43	0.66	0.41	1.52	0.55	4.18
abs. term	–1.87	0.27	–2.42	–1.33	45.82	<0.0001	0.15	0.08	0.26
Preterm birth	–0.28	0.66	–1.59	1.03	0.17	0.67	0.75	0.20	2.80
abs. term	–2.09	0.29	–2.67	–1.52	50.99	<0.0001	0.12	0.06	0.21
Sick child	0.81	0.58	–0.32	1.96	1.95	0.16	2.26	0.72	7.12
abs. term	–1.83	0.32	–2.47	–1.19	31.98	<0.0001	0.15	0.08	0.30
No participation in delivery	–0.22	0.51	–1.23	0.78	0.19	0.66	0.79	0.29	2.19
abs. term	–2.48	0.39	–3.25	–1.71	39.89	<0.0001	0.083	0.03	0.18
Lack of satisfaction with the relationship	1.19	0.52	0.17	2.21	5.26	0.02	3.3	1.19	9.14
abs. term	–1.92	0.26	–2.45	–1.40	51.91	<0.0001	0.14	0.08	0.24
Lack of support from the partner	–0.01	0.80	–1.58	1.55	0.005	0.98	0.98	0.20	4.72
abs. term	–2.14	0.29	–2.71	–1.57	53.52	<0.0001	0.11	0.06	0.20
Fathers' depression in the past	1.18	0.60	0.00	2.36	3.89	0.04	3.28	1.00	10.69
abs. term	–1.89	0.26	–2.40	–1.3843	53.0181	<0.0001	0.15	0.09	0.25
Mental illness in the family	–0.50	1.07	–2.61	1.6059	0.219	0.63	0.60	0.07	4.98
abs. term	–2.18	0.33	–2.83	–1.5324	42.9614	<0.0001	0.11	0.05	0.21
Smoking	0.71	0.51	–0.29	1.7187	1.9044	0.16	2.034	0.74	5.57
abs. term	–1.98	0.26	–2.50	–1.4583	55.179	<0.0001	0.13	0.08	0.23
Alcohol abuse	0.59	0.83	–1.04	2.23	0.5081	0.47	1.81	0.35	9.29
abs. term	–2.07	0.28	–2.62	–1.5146	53.2943	<0.0001	0.12	0.07	0.21
Aggression and anger towards others	0.89	0.63	–0.35	2.1428	1.9524	0.16	2.43	0.69	8.52

4. RESULTS

The characteristics of the sample is shown in Table 1. The resuts in EPDS are shown in Table 2. The results of mothers and fathers with possible depression at EPDS score more than or equal to 10 and 12 are shown in Table 3.

Tables 4 and 5 show multivariate and univariate logistic regression models of depression prediction according to EPDS in men. In multivariate analyzes, two predictors emerged to be significant ($P < 0.05$): if 'Partner's depression' appears, the possibility of father's depression increases almost sixfold and if 'Insufficient income' appears, the possibility of father's depression increases more than six-fold. In univariate analyzes, the significant ($P < 0.05$) predictors of father's depression were lower or secondary education, when the risk of depression increased four-fold, and 'Mother's depression' which increased the possibility of depression five-fold.

Other significant ($P < 0.05$) predictors of father's depression were 'Insufficient income,' 'Lack of satisfaction with the relationship,' 'Fathers' depression in the past,' which increased the risk of men's depression more than three-fold.

5. DISCUSSION

The main conclusion from this study is that depression in fathers in the postpartum period is associated with psychosocial factors: partner's depression and low financial income. A univariate analysis found that lower education level, low financial income, partner's depression, the lack of relationship satisfaction and the history of father's depression are risk factors for the development of paternal depression. Similar observations were also made by other researchers.[8,9,19–21,26,27] The conducted analyses show that the symptoms of mental disorders, according to the EPDS, were estimated at 18% in women at the score equal to or more than 10, whereas at the score equal to or more than 12 it decreased to 13%. Those results are consistent with British studies, where the symptoms of depression were diagnosed a year after the childbirth in 11% (23.623) of women[28] and with Polish studies, in which the symptoms of depression appeared in 15% of women.[29] In the presented project, 13% of fathers were assessed to be at risk of depression according to the EPDS, at the score equal to or more than 10, whereas at the score equal to or more than 12, the percentage decreased to 7%. In Sweden, the symptoms of depression in fathers were estimated at 8%.[26] In the research carried out in Japan the prevalence of paternal postpartum depression symptoms was 11.2% and 12.0% at 1 and 6 months postpartum.[30] In big research from Jamaica the symptoms of depression were observed in 9% of fathers at the EPDS score above 10.[31] Our research shows that both mothers and fathers[32] may experience the symptoms of postnatal depression, which is the most common mood disorder in the perinatal period.[26,33] In this research project, when the cut-off was above 10 points in the EPDS, 15% of fathers were depressed for up to 3 months, and up to a year the percentage remained at 11%. However, when the cut-off was above 12 points in the EPDS, a decrease in the percentage of possible father depression was observed throughout the period (9% vs. 7% vs. 4%). British researchers made similar observations. Depression was found in 10% of fathers and 3.7% in mothers at 7 weeks after their child was born.[27] In a study from Japan, 13% of fathers and 10% of mothers were depressed 4 months after their child was born, with cut-off for fathers above 8 points in EPDS.[34] In this study, when the cut-off was above 10 points in EPDS, 20% of the mothers were depressed for up to 3 months. After 4 months, the percentage decreased to 18%, and from 8 to 12 months it fell to 11%. However, when the cut-off was above 12 points in EPDS, 16% of mothers were depressed for up to 3 months. Then the percentage remained at the level of 11%–12% up to the year. A lower frequency of depression in mothers and fathers was presented by authors from Spain. The incidence of paternal depression was 5% up to 3 months after the birth of their child, while 5.8% was revealed up to 1 year. Depression symptoms were found in 11.4% of mothers within 3 months after delivery, and in 8% of mothers within 1 year. The incidence of depression was higher among mothers than fathers at 3 months postpartum, but it was similar among mothers and fathers at 12 months postpartum.[35] This may be due the fact that Hispanics retain certain cultural elements, such as *familism* and *caballerismo*, which offer protection against mental health disorders and poor parenting behaviours.[36] This study as well as other studies showed a higher level of mood disorders in women than in men.[3,8,10,18,31] In this study, the severity of possible depression in mothers and fathers gradually decreased with less than 12 points in EPDS. However, it was at a similar level in mothers and fathers (11%) in the period of 8–12 months, when the cut-off was set at 10 points in EPDS. Goodman noted that, as opposed to mothers, for whom postpartum depression usually starts in the early postpartum period, some evidence shows that depression among men begins later, frequently following the onset of depression in women, with the rate among fathers increasing over the first year.[9] A high percentage of PPND can be associated with the fact that parents whose children were premature (20%) and sick (16%) participated in the study. However, the analyzes did not show any relation to depression, probably due to the small sample. Nonetheless, high rates of depression were shown by researchers in Australia when they analyzed parents of children born before 30 weeks of pregnancy. The authors used the Center for Epidemiological Studies Depression Scale and hospital anxiety and depression scale. Depression was diagnosed in 40% of mothers shortly after the birth of the child, and in 36% of fathers; and in 14% of mothers and 19% of fathers after 6 months.[37]

5.1. Maternal postpartum depression

In the study group, fathers were five times more likely to suffer from depression when mothers were depressed. Depression in mothers was considered to be the strongest predictor of paternal depression in the postnatal period,[9] but in

contrast to mothers, PPND in fathers usually occurs later and it often results from maternal depression.[38,39] Our observations as well as those made by other authors are similar and demonstrate that the prevalence of mental disorders in men is associated with disorders in women.[19,24]

5.2. History of father's depression

In this study, the risk of paternal depression increased threefold when fathers were depressed in the past. Similar results have been obtained by Ramchandani et al. (2008).[40] The history of severe depression and high prenatal symptom scores for depression and anxiety were the strongest predictors of paternal depression in the postnatal period.[40] In Matthey's study at most time points at which the couples were assessed, antenatal mood and partner relationship were significant predictor variables for the postnatal mood of both mothers and fathers.[37]

5.3. Social support from mothers

A review of the literature shows that the lack of social support contributed to the deterioration of the emotional state in fathers.[22,23] Our analyses showed that 11% of fathers did not receive support from their partners. In this research project, men received support from women, although their partners demonstrated a higher rate of postnatal depression. Based on the above analyses, it can be concluded that the support received from the partners protected fathers from the symptoms of depression. Scientific findings indicate that the lack of support and empathy from the partner, the fact that partners are not compatible and the occurrence of conflicts induce a predisposition to depression and anxiety symptoms.[8]

5.4. Relationship satisfaction with a partner

The factors that protect fathers from postnatal depression include: having higher education, permanent employment as well as a kind and trustworthy life partner.[8] In this study, the risk of paternal depression increased threefold when a father felt the lack of relationship satisfaction. After the child is born, parents are burdened with new obligations, the lack of free time, which often have a negative effect on marital relations. As many as 35% of men experienced lower relationship satisfaction after their child was born. It is known that the period after the birth of the child is a sudden and significant change for each parent. Partners experience the lack of intimacy and the loss of female partner's interest in a sexual relationship. A sense of lower satisfaction and relationship deterioration were also observed by other researchers.[3,4,11,14,18] Conflicts in marriage were also recognised as a significant risk factor for the symptoms of depression in fathers.[17]

5.5. Low education and financial income

Socio-economic factors such as: fathers' unemployment, low financial income, renting a flat, were connected with a higher level of depression symptoms in fathers.[8,19,21] Similar observations have been made in this study, fathers who had lower education and insufficient financial income obtained higher scores in the EPDS.[19] The risk of depression increased six-fold for fathers with insufficient financial income and four times for fathers with lower education.

5.6. The strengths and weaknesses of the study

The specific design of this study must be taken into account when interpreting the results. The research was carried out among those fathers who agreed to participate in the study and were waiting with their partners in an outpatient clinic for children. It should be noted that 16% of the children were sick and 20% were premature infants. The analysis of the situation of fathers whose children were sick and premature can partly explain the high percentage of possible depression. Another limitation of the study is that the participants were well educated and, presumably, had a high socioeconomic status, which is not typical for the Polish population. Poland is a developing country. The group of the respondents was small (142 pairs), which means that the results do not apply to the entire population. It was partly caused by the rejection of about 8% of the questionnaires due to the lack of answers. The fact that the parents agreed voluntarily to be involved in the research might have introduced bias as well.[27] The study of risk factors for depression included a cut-off of more than 10 points in EPDS for men, as other researchers recommend.[27] We studied the respondents within three periods of 1 to 12 months, which shows a fairly long period of time.

A high percentage of prevalence of depression among polish mothers and fathers indicates the necessity to take care of not only mothers in the postpartum period, but also fathers. A new Standard for Perinatal Care was implemented in Poland on 1 January 2019 and a screening test for postpartum depression using EPDS is performed, but only among mothers. Fathers are excluded from healthcare provided by National Health Fund in the postpartum period. Thus, on the basis of this study, recommendations for further actions can be formulated. Educational activities aimed at lowering the stress experienced by parents should be undertaken in order to reduce the risk of depression in fathers. Institutions providing financial support for parents with lower education and financial income should be included in the activities.

6. CONCLUSIONS

(1) The incidence of possible depression was higher in mothers than in fathers.
(2) Psychosocial factors such as mother's depression, the history of father's depression, insufficient financial income, low education and the lack of relationship satisfaction with a partner were strong predictors of paternal depression up to a year after the birth of the children.

Conflict of interest

None declared.

Funding
None declared.

Ethics
In order to conduct the study, ethical approval was obtained from the Bioethics Committee 229/2017 at CM NCU in Torun, Poland. All participants gave a voluntary, informed consent to participate in the study, no one withdrew from participation during the study.

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