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Incidence and Risk Factor of Postpartum Depressive Symptoms in Women: A Population Based Prospective Cohort Study in a Rural District in Bangladesh

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Abstract

Objective: Limited evidence exists on the incidence of postpartum depressive symptoms (PDS) in low-income countries. This study aims to determine the incidence of and risk factors for developing PDS in a cohort of women in rural Bangladesh.

Methods: A total of 588 consecutive women were assessed during the last trimester of pregnancy, 2-3 and 6-8 months postpartum for depressive symptoms and for putative risk factors. The validated Bangla version of Edinburgh Postnatal Depression Scale was used to measure PDS. Background information was collected using a structured questionnaire at the respondents' homes. Multiple Cox's regression analyses identified risk factors of PDS.

Results: The incidence proportion of PDS from third trimester of pregnancy to 2-3 months postpartum was 8.0%, and from 2-3 to 6-8 months postpartum 18.4%. Poor socioeconomic status (HR 2.62, 95% CI 1.83-3.73), physical partner violence during pregnancy (HR 1.65, 95% CI 1.08-2.50), anxiety symptoms during pregnancy (HR 1.69, 95% CI 1.16-2.46), and previous depressive symptoms (HR 2.95, 95% CI 1.80-4.84) were identified as risk factors.

Conclusion: PDS are common, heterogeneous and largely undetected public health problem in Bangladesh. Screening for depressive symptoms in the last trimester of pregnancy or in the 6-8 months postpartum ought to be integrated into maternal and child health programmes. Intervention to reduce depressive symptoms during postpartum needs to target those women who are poor, experienced violence during pregnancy, had anxiety symptoms during pregnancy, and had a previous history of depressive symptoms.

Keywords: Postpartum depressive symptoms; Incidence; Risk factors; South Asia; Bangladesh

Introduction

Postpartum depressive symptom (PDS) is a debilitating mental disorder, generally occurring during the first year postpartum. The global prevalence rates range between 0.5-60.8% [1]. Socially disadvantaged populations show higher depression rate than population in wealthy industrial nations [2]. Epidemiological inquiries have reported PDS prevalence rates of 10-15% among women in high-income nations [3], 15.8% in the Middle East [4], 34.7% in South Africa [5], and 3.5-63.3% in Asia [6]. A meta-analysis from high-income countries reported incidences of PDS to be 10.3-14.5% during first 2-3 months and 11.1-49.0% during first 6-12 months postpartum [7].

There is evidence that PDS has negative effects on the family [3], child's well-being and cognitive and socio-emotional development [8,9], and mother-child interaction [9]. A cohort study in five European countries indicates that high maternal postnatal depression score does not have negative effect on infant growth [10]. In Australia, adverse effect of maternal PDS on infant growth and developmental outcome has been observed only in low socio-economic samples [11]. Research from low-income countries suggests that PDS may lead to malnutrition and poor physical health in infant [12,13]. Further, depression is increasingly recognized as a disorder with risk for recurrent episodes followed by high levels of chronic stress [14]. Research on risk factors for PDS increased in high-income countries during the past decade [3,7,15,16]. Important risk factors for PDS are past history of psychological disorder, psychological disturbances during pregnancy, poor marital relationship, poor social support, stressful life events, child-care stress and difficult infant temperament [3,7,16]. In Asian cultures identified associated factors for PDS have been antepartum depression, unwanted pregnancy, poverty, and son preference [6]. A study from India found risk factors to be low income, son preference, difficult relationship with mother-in-law and parents, adverse life event during pregnancy, and lack of physical help [17]. Only one study has reported prevalence and associated factors of PDS in a rural district in Bangladesh [18], with a prevalence of 22% and incidence 9.8% at 6-8 weeks postpartum [18]. Similar incidence proportion (11%) at the same postpartum period was reported in India [17]. In Bangladesh, evidence is scarce to inform current knowledge of

incidence of PDS in the first year postpartum. Given that the socio-cultural context varies even within the Asian countries, findings from other Asian countries might not generalize to Bangladesh populations. Moreover, majority of the studies collected data cross-sectionally [6].

This longitudinal study aims at investigating the incidence of PDS 2-3 and 6-8 months postpartum and its risk factors in rural Bangladesh.

Materials and Methods

Data originated from a population-based cohort study of perinatal depressive symptoms among women in two sub-districts in rural Bangladesh. A national nongovernment organization (NGO), BRAC (formerly known as Bangladesh Rural Advancement Committee) provides a variety of services in the area in health, social and economic development. Community health volunteers of BRAC identify pregnancies during the first trimester, estimate the gestational age (based on the last menstrual period reported by the women), confirm pregnancies at 4-5 months, and register them in their database.

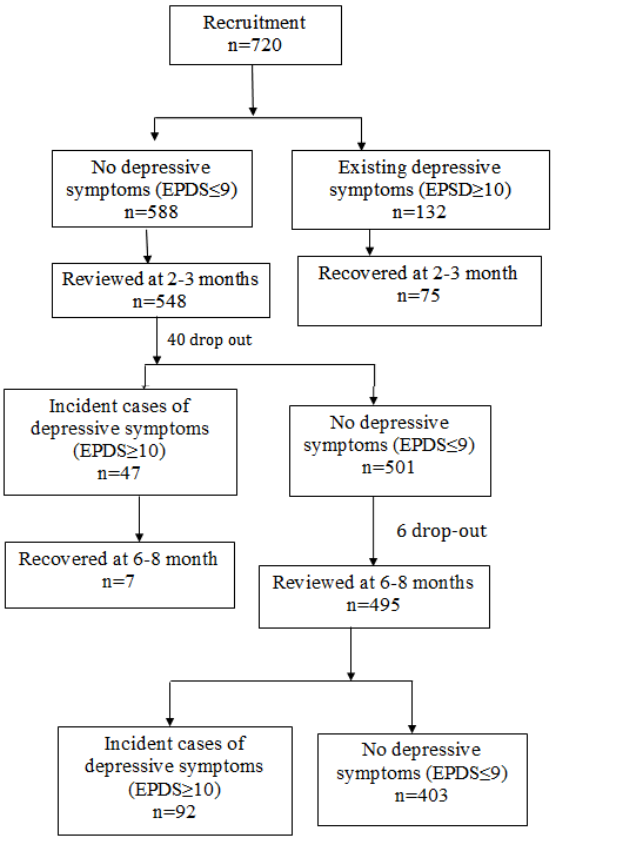

Figure 1: Sample strategy.

Sample

A cohort of 720 consecutive women was studied from the third trimester of pregnancy to 6-8 months postpartum. Assuming an estimated prevalence of depression of 20% based on research in India and Pakistan (no prevalence figure was available for Bangladesh when the study was initiated), the sample size was chosen for a significance level of 5%, power of 80%, an effect size of 40% to detect the difference between depressed and non-depressed women, and drop-out rate of 20%. In the present study those women who did not have depressive symptoms at baseline, 588 (81.7%) were included (Figure 1). Further, 46 (7.8%) women were lost to follow-up (40 at 2-3 months, and 6 at 6-8 months) due to outmigration, stillbirth, maternal, neonatal or child death.

Baseline and follow-up

The women were recruited during July-September 2008 and data collection took place during July 2008 to August 2009. The inclusion criteria were residence in the area and pregnancy in the third trimester. Baseline screening was done in third trimester based on the assumption that the prevalence was higher in late pregnancy than in early [19]. Data on the outcome were collected at four phases: at third trimester of pregnancy and birth (baseline), at 2-3 months and 6-8 months postpartum (follow-up).

Risk factors

Risk factors were assessed during pregnancy, child-birth and 2-3 months postpartum. Trained female interviewers carried out structured interviews at the respondents' homes during pregnancy on demographic and socio-economic characteristics, nutritional and reproductive history, child data, gender related factors, and mental health. Birth data included birth-weight and sex of the newborn, and at 2-3 months postpartum information about breastfeeding, infant's illnesses and mother's bonding with infant were collected. The data were organized in the following manner for the analyses of the risk factors.

Demographic and socio-economic characteristics

Age of the mother was calculated in years. Education was categorized as no or primary (0-5 years of schooling), and secondary or above (>5 years of schooling), and occupation as homemaker vs. employed. Socio-economic status (SES) of the household was measured by an index computed through principal component analysis using data on sex of household head, husband's literacy, land owned by the household, NGO membership, selling manual labour, access to safe water, type of latrine in the household, and per capita daily household expenditure on food. Based on the index, the household was ranked 1-3, 1 indicating low and 3 high SES of household. SES index was categorized as poor (rank 1) and non-poor (rank 2 and 3).

Maternal nutritional status, reproductive history and characteristics of the child

The mid upper arm circumference (MUAC) (cm) was used as a proxy indicator of the nutritional status of the women as it is independent of gestation and height and was dichotomized as <22 vs. ≥22 cm. Indicators of reproductive history included parity (primi vs.

multi), number of children (>4 children vs. ≤4 children) and planned current pregnancy (yes vs. no).

Characteristics of the child considered in the study were the newborn's sex (female vs. male), low birth-weight (LBW) (≤2.5 kg), exclusive breast-feeding, and if child suffered from acute respiratory infection (ARI), diarrhea or any other illnesses (yes vs. no).

The mother's bonding with the infant at 2-3 months postpartum was assessed by three sub-scales of the Postpartum Bonding Questionnaire (PBQ): impaired bonding (12 items), dichotomized as good (<12) vs. impaired (≥12); rejection and anger towards the infant (7 items), dichotomized as no rejection (<12) vs threatened/established (≥12); and anxiety about child-care (4 items) (20). The sub-scales were scored 0-5, a high score indicating more bonding problems. In the study, the Cronbach's alpha on total PBQ was 0.82 and on the three sub-scales ranged from 0.44-0.65, which is similar to those reported by Brockington et al. [20]. The scale has previously been used in Bangladesh [21].

Gender related factors

Three gender related domains were considered in this study. The first domain included partner violence indicated by physical violence by spouse ever and during current pregnancy. Physical violence included being slapped, shoved, punched, kicked or dragged on the ground by the partner [22]. Physical violence was scored 0-4 based upon number of violent acts faced. For the purpose of the analysis physical violence was categorized as no act of violence (score 0) and acts of violence (score 1-4); violence during pregnancy as yes vs. no The second domain enquired about women's autonomy measured by women's independence to make decisions in family matters, going to market and visiting parental home (yes vs. no). The third domain consisted of support from family and community. Family support was indicated by the women's perception of the relationships with husband and mother-in-law (good vs. poor). Social support was measured by physical support from family members/relatives, support from health professionals, and having trusting relationship with close friends (yes vs. no).

Mental health: Two measures of mental health were used: general anxiety symptoms during pregnancy and past experience of depressive symptoms. General anxiety was assessed using the trait-anxiety scale of the State-Trait Anxiety Inventory (STAI), which has been validated against the pregnancy related anxiety questionnaire and is often used to assess anxiety in pregnancy [23,24]. STAI-trait consists of 20 items scoring from 1 to 4 [24]. The scale assesses anxiety levels in general, such as feeling of pleasure, nervousness, restlessness, satisfaction, happiness, etc. The cut-off score of 45/46 was used to categorize anxious (score ≥45) or not-anxious (score <45) state [21,25]. STAI demonstrated good internal consistency in the present study with Cronbach's alpha of 0.82 and split-half correlations of 0.81 for antenatal assessment. Women were asked about their previous ever experiences of depressive symptoms in terms of their feelings ever of similar problems as we asked in the EPDS, and the variable was dichotomized as yes vs. no.

Outcome measures

Edinburgh Postnatal Depression Scale (EPDS) was used to detect depressive symptoms during pregnancy and follow-up at 2-3 and 6-8 months postpartum [26]. EPDS is a 10-item questionnaire, scored 0-3 (higher score indicating more depressive symptoms). However, using >12 as a cutoff, Cox et al. (1987) showed a sensitivity of 86%, a specificity of 78%, and positive predictive value of 73% for major depressive disorders at postpartum. As it is important in some clinical and research settings to find all persons affected by major depressions, a cutoff level of ten (≥10) was proposed to reduce detection failure [26]. When selecting this threshold, the sensitivity for the detection of major depression increased to almost 100% with a specificity of 82% [27]. In Bangladesh, a validation study by Gausia et al. [28] showed a sensitivity of 89%, specificity of 87%, positive predictive value of 40% and negative predictive value of 99% using 10 as the cutoff score. The cutoff score suggested by Gausia (2007) (≥10) signify the incident cases of PDS in this study. The scale demonstrates good reliability in the present study with Cronbach's alpha 0.70 and 0.75 for assessment of PDS during 2-3 and 6-8 months postpartum.

Analyses

Analyses of the risk factors of PDS were carried out for participants who completed at least one follow-up and who did not have depressive symptoms during pregnancy. Chi-square and Cox's regression were used with the incident cases of PDS at 6-8 months postpartum as the outcome as the higher incident cases occurred at 6-8 months postpartum than that of at 2-3 months. First, chi-square statistics and univariate Cox's regression were performed for each indicator of SES, maternal nutrition and reproductive history, child data, gender related factors, and mental health. All factors with $p<0.05$ were included in the multiple Cox's regression backward model for controlling the simultaneous confounding effects of possible risk and protective factors. Interaction between explanatory variables (previous depressive symptoms × general anxiety during pregnancy, violence during pregnancy × poverty, general anxiety during pregnancy × close friend) were examined in the model.

Ethical considerations

The study was approved by the Bangladesh Medical Research Council in Bangladesh (BMRC/Eth.C/2008/402) and Regional Ethical Review Board at Karolinska Institutet, Stockholm, Sweden (2008/919-31). The interviews were conducted after obtaining informed consent.

Results

Of the 720 women who participated in the study, 132 had depressive symptoms (EPDS score ≥10) at third trimester of pregnancy. The analyses presented here are thus based on the sample of 588 women who completed at least one follow-up and did not have depressive symptoms at baseline (Figure 1).

Sample profile

Almost 60% of the study sample was literate, the average years of schooling being 3.9 (Table 1). One-third of the sample belonged to household of low SES. Almost one-third of the respondents were primiparas, and the mean number of children was 1.8. Despite the high prevalence of reported intimate partner violence, only one-fifth rated their relationship with their husbands as poor. Forty-five percent of the women had received support from community health providers during the indexed pregnancy. However, 87% of the deliveries took place at home by traditional birth attendants.

Boys and girls were equally represented in the sample. Eighteen percent of the infants had low birth-weight. Nearly nine in 10 infants had suffered from general illnesses at age 2-3 months.

Variables	**N=588**
Socio-economic	
Mean age (years) ± SD	24.1 ± 5.9
Literate (can read and write) (%)	62.4
Mean years of schooling ± SD	3.9 ± 3.5
Occupation (%)	
Homemaker	94.6
Employed	5.4
SES Index of household (%)	
Low	31.7
Middle	32.5
High	35.9
Anthropometric	
MUAC ± SD (cm)	23.4 ± 2.3
BMI ≤18.5 (%)	9.4
Reproductive history	
Parity (%)	
Primi	29.8
Multi	70.2
Mean number of children ± SD	1.8 ± 1.8
Planned current pregnancy (%)	53.9
Intimate partner violence	
Experienced physical violence (%)	67.5
Experienced violence during pregnancy (%)	15.5
Women exercised autonomy (%)	20.9
Family support (%)	
Poor relationship with husband	19.6
Poor relationship with mother-in-law[1]	47.6
Social support (%)	
Trust and share feelings with close friends	49.8
Received support from a health provider	45.1
Mental health (%) Anxiety symptoms during pregnancy	21.5
Previous history of depressive symptoms[2]	7.8
Child data (%)	
Newborns' Sex[†]	51.4
Girl	48.6
Boy	17.6
Newborn with LBW*	88.3
Infant suffered from any illness at 2-3 months+ ARI	8.8
Diarrhea	4.4
Exclusive breastfeeding at 2-3 months[+]	42.57

[1]N=513 as 75 mothers-in-law were dead before interview date

[2]N=548 as previous depressive symptoms was assessed during 2-3 months postpartum

[†]N=537 as infant sex was recorded at age 6-8 months

[*]N=552 as newborns were weighed within 48 hrs of delivery

[+]N=538

Table 1: Sample profile at baseline.

Analysis revealed that previous history of depressive symptoms was present in 15% of cases of PDS and antepartum anxiety symptoms in 33%.

Similarly, impaired mother-infant bonding was found mainly among women with PDS (Table 2).

Incidence of postpartum depressive symptoms

A total of 139 participants developed depressive symptoms (scored ≥10 on EPDS) from the third trimester of pregnancy to 6-8 months postpartum. Thus the overall rate of new episodes of depressive symptoms during the period (mean 40.3 ± 3.1 weeks) was 23.6% (95% CI 16.5-30.7). The incidence proportion of PDS in the first 2-3 months postpartum was 8.0% (95% CI 0.6-16.6), and from 2-3 to 6-8 months postpartum 18.4% (95% CI 10.5-26.3).

Risk factors of postpartum depressive symptoms

The univariate Cox's regression analyses identified no/little education, poor socioeconomic status, maternal malnutrition (MUAC <22 cm), having four or more children, experience of physical partner violence ever or during pregnancy, anxiety symptoms during pregnancy, previous depressive symptoms and impaired mother-infant bonding as possible risk factors of PDS at 6-8 months postpartum.

The probable protective factors of PDS were trust and share feelings with close friend and support received from health-care providers. No significant difference was evident between women with and without depressive symptoms on other potential risk factors (Table 2).

However, multiple Cox's regression (backward) analyses (Table 3) showed that, after simultaneous adjustment for these possible predictors, poor socioeconomic status, experience of physical partner violence during pregnancy, anxiety symptoms during pregnancy, and previous depressive symptoms were identified as risk factors of PDS at 6-8 months postpartum. No significant interaction between variables was found.

	Depressed N=139 (%)	Non-depressed N=409 (%)	Crude Hazard ratio (CI95%)
Socioeconomic Indicator			
Education			
≥6 years of schooling	29 (20.9)	138 (33.7)	1
0-5 years of schooling	110 (79.1)	271 (66.3)	1.60 (1.06-2.41)
SES Index			
Non poor	68 (48.9)	310 (75.8)	1
Poor	71 (51.1)	99 (24.2)	2.55 (1.82-3.59)
Maternal malnutrition (mother's MUAC)			
≥22 cm	83 (59.7)	303 (74.1)	1
<22 cm	56 (40.3)	106 (25.9)	1.53 (1.08-2.18)
Number of children			
≤4	118 (84.9)	384 (93.9)	1
>4	21 (15.1)	25 (6.1)	1.76 (1.07-2.89)
Family /social support			
Trust and share feelings with close friend			
No	87 (62.6)	189 (46.2)	1
Yes	52 (37.4)	220 (53.8)	0.58 (0.41-0.83)
Support received from health providers			
No	91 (65.5)	211 (51.6)	1
Yes	48 (34.5)	198 (48.4)	0.63 (0.44-0.90)
Intimate partner violence			
Experienced physical violence			
No	29 (20.9)	148 (36.2)	1
Yes	110 (79.1)	261 (63.8)	1.76 (1.16-2.65)
Experienced physical violence during pregnancy			
No	106 (76.3	357 (87.3)	1
Yes	33 (23.7)	52 (12.7)	1.69 (1.12-2.54)
Mental health			
Anxiety symptoms during pregnancy			
No	93 (66.9)	338 (82.6)	1
Yes	46 (33.1)	71 (17.4)	1.94 (1.35-2.79)
Previous history of depressive symptoms			
No	118 (84.9)	387 (94.6)	1
Yes	21 (15.1)	22 (5.4)	2.50 (1.55-4.02)
Child data			

Child's sex			
Boy	54 (40.3)	207 (51.4)	1
Girl	80 (59.7)	196 (48.6)	1.25 (0.88-1.78)
Exclusive breastfeeding			
Yes	51 (38.1)	178 (44.1)	1
No	83 (61.9)	226 (55.9)	1.49 (0.93-2.38)
Infant's illness (2-3 months)			
Yes	120 (89.6)	355 (87.9)	1
No	14 (10.4)	49 (12.1)	0.83 (0.47-1.48)
Mother's bonding with infant			
Bonding			
Good bonding	104 (77.6)	368 (91.1)	1
Impaired bonding	30 (22.4)	36 (8.9)	2.05 (1.33-3.15)
Rejection and anger			
No rejection	127 (94.8)	400 (99.0)	1
Threatened/established rejection	7 (5.2)	4 (1.0)	2.35 (0.96-5.74)

Table 2: Risk factors of post-partum depressive symptoms identified by unadjusted analyses during third trimester pregnancy to 6-8 months post-partum.

Risk factors	Hazard Ratio	CI95%
Poor socioeconomic status	2.62	1.84-3.73
Experienced physical violence during pregnancy	1.65	1.08-2.50
Anxiety symptoms during pregnancy	1.69	1.16-2.46
Previous history of depressive symptoms	2.95	1.80-4.84

Table 3: Risk factors of postpartum depressive symptoms (during third trimester of pregnancy to 6-8 months postpartum) selected by stepwise Cox's regression amongst women in rural Bangladesh.

Discussion

This study provides information on the incidence of and prospectively assessed risk factors for the development of postpartum depressive symptoms (PDS) amongst women in a rural area of Bangladesh. Our findings identified poor socioeconomic status, violence and anxiety symptoms during pregnancy, and previous depressive symptoms as independent risk factors.

In this cohort of pregnant women, 8% developed depressive symptoms in the first 2-3 months postpartum and 18% during 2-3 to 6-8 months. Our findings were in accordance with 9.8% and 11% during the first 1.5-3 months postpartum in Bangladesh and India, respectively [17,18]. However, Patel et al. reported a 12-month incidence of either depressive or anxiety disorder as 1.8% [29]. Comparability of study results is however complicated due to the use of different screening/diagnostic tools, different cut-off points on EPDS scores to determine postpartum depression, and varying time period for collecting data regarding depressive symptoms [6]. The prevalence of depression in this cohort in the last trimester of pregnancy was 18% [30], dropped to 14% during first 2-3 months postpartum, and nearly doubled (32%) during 6-8 months postpartum indicating greater onset after 2-3 month postpartum. This finding differs with the results from a systematic review of prevalence and incidence of perinatal depression from high-income countries, where upward trend in incidence was observed in the first 3 months postpartum [7]. Fisher et al. [31] argued that perinatal mental health problems were not observed in traditional cultures, including low-income settings, because women were given structured postpartum care, which included a status of honour, relief from normal household tasks, and a mandated period of rest which are protective. Our result partly confirms this, because the low incidence of PDS at 2-3 months, compared to the incidence at 6-8 months, can be explained as a protective period for PDS. However, the high incidence after 2-3 months postpartum is noteworthy. One explanation may be that the postpartum period after the mandated period of rest and support is vulnerable in relation to child-care related stress, illnesses and worries regarding socio-economic conditions and gender related disadvantages.

One of the compelling findings is that poor socioeconomic status is an independent risk factor of PDS in this population. The relationship between poverty and mental disorder have been elucidated in a recent review of six low- and middle-income countries [32]. The likely mechanism through which this association is mediated is diverse. For example, poorer women are more likely to suffer from adverse life events, live in crowded and stressful conditions, have chronic illnesses

and fewer occupational opportunities; all of these are recognized risk factors for postpartum depression [32]. The fact that there is association between poverty and depressive symptoms in countries which are diverse in their economic strength suggests that relative poverty is a key explanatory factor for PDS. Bangladesh is an economically disadvantaged country where 40% of the population lives in poverty [33]. Poverty may be a general source of anxiety and depression for pregnant women in terms of the family's growing financial needs with the increased number of children and the need to ensure food, education and health-care for the children.

The transition of risk from anxiety antenatally to depression postnatally has been noted elsewhere in the literature [26,34], a pattern demonstrated in our study as well. While many perinatal interventions have focused on the treatment or prevention of depression, almost none have addressed perinatal anxiety [35].

In accordance with previous research [18,36], our study has shown that a previous history of depression is a strong risk factor for PDS. The key advantage of identifying this risk factor is that it provides a possibility to reduce the morbidity of PDS by targeting mothers at high risk [37]. However, the major limitation of the study is that the previous depressive symptoms were not screened, instead we only asked whether the women faced the symptoms of EPDS ever before. Moreover, we did not differentiate whether these cases previously experienced ante- or postpartum depressive symptoms.

Gender-based violence has been described as one of the most important predictors of depression in women [38-40]. Violence during pregnancy results in adverse consequences for fetal and maternal survival. Bacchus et al., [39] identified pregnancy as a 'high-risk' period for abuse which may be initiated or accelerated during pregnancy. Consistent with studies in Brazil [40] and India [38], this study confirmed that an increasing risk of PDS was associated with the coexistence of physical intimate partner violence during pregnancy. The adjusted model in this study showed that experience of physical partner violence ever becomes non-significant although seven in ten women reported being abused by their husbands. Astbury explained that the rural women in Bangladesh do not necessarily recognize certain acts (such as a slap or shove) as violence and that such violent behavior is considered to be the husband's prerogative [41]. Among the few published studies examining abuse in Bangladesh, a survey found that the majority of Bangladeshi men felt that a wife was accountable to her husband for her behavior and that violence was an acceptable form of corrective punishment [42]. In this study, we did not find any interaction effect between the risk factors. One explanation may be there is ceiling effect as most of the participants reported overlapping i.e. one or more, or almost all risk factors.

Limitation of the Study

Although a substantial number risk factors of PDS was assessed in this study, several important variables were not controlled for, such as son preference, chronic physical illness, gynecological morbidities, complications during pregnancy (hypertension, preeclampsia, bleeding), and smoking. Additionally, physical violence may have been under-reported due to its sensitive nature.

Conclusion

This study serves as a lens to update the knowledge about the incidence and risk factors of PDS in rural Bangladesh. The high prevalence and incidence rates of PDS in a rural community in Bangladesh reflect the significance of mental health concerns in the context of public health in the country. Hence, a screening programme to detect PDS at least up to 8 months, not only in early postpartum is warranted. Interventions aiming at reducing depressive symptoms during postpartum need to target those women who are poor, experienced violence during pregnancy, had anxiety symptoms during pregnancy, and have had previous history of depressive symptoms.

Authors Contributions

All authors (HEN, ME, MP, YF, ZNK) participated in the planning, and conception of the research questions and the study design. ZNK was the principal investigator of the study and primarily conceptualized the research. HEN was responsible for retrieving the data, and HEN and MP were responsible for analyzing the data. HEN drafted the article and all authors participated in interpreting the data and critically revising the manuscript for important intellectual content. All authors read and approved the revised manuscript.

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