

Original Research Article

Prevalence of postpartum depression and associated factors among the postpartum mothers in Vijayanagar District, Karnataka, India

Abstract

Postpartum depression is most common public problem which occurs during postpartum period. If it was unrecognized and undiagnosed it may affect the health of the mother. With this present study was designed to study the prevalence of postpartum depression and identify the influence of selected demographic, personal and child factors on postpartum depression. A differential design was used to compare mothers with postpartum depression and mothers without postpartum depression during postpartum period. A convenient sample of 164 postpartum mothers were selected randomly in the Vijayanagar district of Karnataka state. A self-structured interview schedule to elicit the demographic information and personal characteristics about mother and the infant was used. Edinburgh Postnatal Depression Scale (EPDS) by Cox *et al.* (1987) and Socio-Economic Status (SES) by Aggarwal *et al.* (2005) were also used for the study. The results of the study revealed that overall prevalence rate postpartum depression was 42.70 per cent (70 out of 164). Mothers between 31 to 35 years had higher odds of risk (OR=3.02, 95%CI =0.1.18, 7.68) of having postpartum depression and mothers between 25 to 30 years had (OR=0.77, 95%CI =0.36, 1.66) 0.77 times risk of having postpartum depression. There was a significant association found between age of the mother and postpartum depression. The factors associated with postpartum depression were age of the mother, mothers age at marriage, number of years of marriage, occupation of the mother, size of the family, gender of the infant, mode of breast feeding and age and birth weight of the child. There is a need to design the suitable intervention programmes to eliminate the such contributory factors which can substantially help to improve the emotional well-being of women in the vulnerable postnatal period.

Key words: Postpartum period, size of the family, socio economic status, demographic factors, gender of the infant.

Introduction

Postpartum depression is a fairly prevalent condition that affects women of childbearing age within 6 weeks of childbirth, yet it is frequently unrecognized or untreated, resulting in a large public health burden (Desai et al, 2012). The presence of significant anxiety components distinguishes postpartum depression from other depressive illnesses (Leigh and Milgrom, 2008). Postnatal depression has not only immediate negative consequences for the mother, her newborn, child, and family, but it can also lead to long-term morbidity of chronic or recurring depression (WHO, 2010).

In resource-poor nations, mental health disorders among women of reproductive age (15-44 years) are neglected public health issues (Gelaye et al, 2016, Fisher et al, 2012). According to the World Health Organization (WHO), depression will be the second major cause of disability by 2030, accounting for a significant portion of the illness burden (WHO, 2011). Depression and anxiety are the most frequent mental health issues during pregnancy, with roughly 12% of women having depression, 13% experiencing anxiety, and many women suffering both. Depression and anxiety affect 15-20% of women during the first year after giving birth (NICE guidelines, 2014; Bauer et al, 2014).

The postpartum period, which begins one hour after delivery and lasts 42 days, is crucial for both mother and child's health. During the postpartum time, women encounter a variety of physical, mental, and emotional changes that may interfere with their daily routines and caregiving for their infants (Batt et al, 2020). PPD, also known as postnatal depression, is a form of mood disorder connected with childbirth. Onset usually occurs between one week and one month after childbirth. (NIMH (2017), "Postpartum Depression Facts" Postpartum depression is classified as a major depressive illness with "peripartum onset" in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Mothers suffering with PPD may experience intense melancholy, decreased pleasure, low energy, anxiety, anger, and suicidal thoughts. PPD can lead to mother suicide in severe circumstances. Postpartum depression has an incidence ranging from 6.5% to 19% (Hutchens & Kearney, 2020; Suicide, 2003).

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Postpartum depression (PPD), defined as the development of depressive episodes following childbirth, occurs at a vital point in a woman's life and can last for a long time (Crotty et al, 2004, Cooper et al 2003). Depressive episodes are twice as likely in women as in men (Cox et al, 1993), and they frequently go undetected and untreated (Pearlstein et al, 2009), wreaking havoc on partners as well as the emotional and cognitive development of infants and adolescents (Lovestone et al, 1993, Murray et al, 1996). Desperation, sadness, nausea, changes in sleeping and eating habits, decreased libido, crying spells, anxiety, irritability, feelings of isolation, mental liability, thoughts of harming oneself and/or the infant, and even suicidal ideation are all common symptoms of this type of depression (Robertson, 2004). Social stresses such as poverty, intimate partner abuse, a history of pregnancy loss, and unwanted pregnancy are risk factors for postpartum depression, and these variables have a negative impact on maternal health (Telake et al, 2018). Postpartum depression can strike at any time within the first year after giving birth and last for years.

Many bio-cultural factors influence postpartum health and mental wellbeing (including depression risk), including racism and racial disparities in resource access, pregnancy intendedness (i.e., whether the pregnancy was planned), previous experiences of trauma or poor physical and mental health, work-related anxiety, financial stress, and physical activity patterns (Batra et al, 2020, Thayer & Gildner et al, 2020).

Postpartum depression has been documented in 10-20% of moms worldwide. In comparison to upper-middle- and high-income countries, the prevalence of PPD is highest in low-middle income countries (20.14 (range: 16.39-24.50)) (Wang et al, 2021).

Postnatal depression is an important disorder to detect, treat, and avoid because of the effects it has on the mother, her marital relationship, and her children. Care would be provided differently depending on socio-demographic and obstetric characteristics. PPD prevalence and associated risk factors must be identified globally, particularly in low- and middle-income countries. In this context, the study was conducted with the following objectives:

1. To study the prevalence of postpartum depression.
2. To study the influence of selected demographic, personal and child factors on postpartum depression.

Method and materials

Research design

A differential design was used to compare mothers with postpartum depression and mothers without postpartum depression during postpartum period to study the factors influencing PPD among women.

Population and sample

Population of the study

The target population of the study was postpartum mothers from Vijayanagar district of Karnataka state in the age group of 18-35 years, post delivery 10 days to 3 months as PPD is more prominent during these months. The district has six taluks of which two (Hadlgi & Harapanalli) were randomly selected. The postpartum mother – child dyads from the urban areas and rural area from these two talukas formed the population of the study.

Sample for the study

Women who were attending OPD and who came for the regular checkups after their delivery were interviewed. In rural area door to door survey was conducted with the help of asha workers from women and child welfare department. Women who met the **study criteria** were screened for the postpartum depression.

A total of 164 postpartum women were selected for the study from Hadagali and Harapanahalli taluka. Among Hadagali taluka and Harapanahalli taluka each two villages were selected randomly. From each of the selected taluka one urban and rural area each 41 women were selected randomly. Thus, the total sample for the study constituted 164 postpartum women.

Initially all 164 women were screened for postpartum depression using EPDS tool. Based on the EPDS scores the prevalence of postpartum depression was calculated and women were categorized as depressed and non-depressed.

Tools used for the study

A self- structured interview schedule to elicit the demographic information and personal characteristics about mother and the infant was used. Edinburgh Postnatal Depression Scale (EPDS) by Cox *et al.* (1987) and Socio-Economic Status (SES) by Aggarwal *et al.* (2005) were also used for the study.

Methods of statistical analysis

Descriptive statistics and binomial logistic regression were used to analyze and interpret data using SPSS.26 version.

Results and discussion:

The demographic characteristics of the mothers selected for the study is presented in Table 1. The sample of the study includes 164 postpartum mothers from Vijayanagar district. With regard to the age of the mother, 47.60 per cent of the mothers were between 25-35 years, 27.40 per cent were between 31-35 years and 25 per cent of the women were between 19-24 years of age. With regard to the age at marriage of the participants, 36.60 per cent of mothers were between 26 to 29 years, 34.80 per cent were between 22 to 25 years and 28.70 per cent were in 18 to 21years age group at the time of their marriage. With respect to the number of years of marriage 73.80 per cent had completed 1 to 5 years of their marriage, 26.20 per cent had completed 5-10 years of their marriage.

Regarding education 25.60 per cent were illiterate, 32.30 per cent completed their primary education, 20.1 per cent had secondary education, 14.0 per cent completed PUC and diploma, and 5.50 per cent and 2.40 per cent participants completed graduation and post graduation respectively. Majority of mothers were homemakers (61.60%) and only 38.40 per cent mothers were working.

Table 1. Distribution of postpartum mothers based on demographic characters N=164

Characteristics	Category	Frequency (N)	Percentage (%)
Age of the mother	19-24 years	41	25.00
	25-30 years	78	47.60
	31-35 years	45	27.40
	Total	164	100.00
Age at marriage	18-21 years	47	28.70
	22-25 years	57	34.80
	26-29 years	60	36.60
	Total	164	100.00
Number of years of marriage	1-5 years	121	73.80
	5-10 years	43	26.20
	Total	164	100.00
Education of the mother	Illiterate	42	25.60
	Primary	53	32.30
	Secondary	33	20.10
	PUC & Diploma	23	14.00
	Graduation	9	5.50
	Post graduation	4	2.40
	Total	164	100.00
Occupation of the mother	Home maker	101	61.60
	Working	63	38.40
	Total	164	100.00
Religion	Hindu	117	71.30
	Muslim	39	23.80
	Others	8	4.90
	Total	164	100.00
Type of family	Nuclear	111	67.70
	Joint	53	32.30
	Total	164	100.0
Size of the family	1-5	39	23.80
	6-10	52	31.70
	More than 10	73	44.50
	Total	164	100.00
Socioeconomic status	Upper high	2	1.20
	High	5	3.00
	Upper middle	63	38.40
	Lower middle	72	43.90
	Very poor	22	13.40
	Total	164	100.00

With respect to the type of family, majority belonged to nuclear family (67.70%) followed by joint family (32.30%). Whereas with regard to the size of the family, 44.5 per cent

of participants were living with 1 to 5 family members, 31.70 per cent were living with 6 to 10 family members and 44.50 per cent of the participants were living with more than 10 family members. With respect to the socio-economic status of the families 43.90 per cent respondents belonged to lower middle SES followed by 38.40 per cent upper middle SES.

Distribution of postpartum mothers based on personal factors.

Majority of the mothers (53.00%) had consanguineous marriage and only 47.00 per cent had non-consanguineous marriage. The parity of mothers shows that 43.90 per cent were first time mothers and 56.10 per cent were mothers with two or more births. About 65.20 per cent of the mothers had their delivery in government hospitals followed by private hospital (34.8 %).

Haemoglobin level at the time of delivery indicated that majority of the mothers (42.10%) were severely anaemic, 34.80 per cent were non- anaemic, 22.60 per cent were mild anaemic, 28.70 per cent had moderate anaemia. Majority of the women had normal delivery (65.20 %) followed by 26.90 per cent having C – section delivery (Table 2).

Table. 2 Distribution of postpartum mothers based on personal factors. N=164

Characteristics	Category	Frequency (N)	Percentage (%)
Consanguinity	Yes	87	53.00
	No	77	47.00
	Total	164	100.00
Mode of delivery	Normal	107	65.20
	C- section	57	34.80
	Total	164	100.00
Parity	Primiparity	72	43.90
	Multiparity	92	56.10
	Total	164	100.00
Plurality	Singleton	160	97.60
	Twins	4	2.40
	Total	164	100.00
Place of delivery	Govt hospital	107	65.20
	Private hospital	57	34.80
	Total	164	100.00
Mother Hb level at the time of delivery	Non – anemic (>11)	37	34.80
	Mild anemic (10-10.9)	47	22.60
	Moderate anemic (7.9- 9)	69	28.70
	Severe anemic (<7)	11	42.10
	Total	164	100.00
Gestational period	Preterm	49	29.90
	Full term	115	70.10

	Total	164	100.00
Mothers hieght in cm	≤ 145 cm	5	3.00
	> 145 cm	159	97.00
	Total	164	100.00
Mothers weight in kgs	≤ 45 kg	16	9.80
	>45 kg	154	90.20
	Total	164	100.00
BMI	Underweight (<18.5)	54	32.90
	Normal or healthy weight (18.5-24.9)	66	40.20
	Overweight (25- 29.9)	44	26.80
	Total	164	100.00
MUAC	< 21 cm	10	6.10
	≥ 21 cm	154	93.90
	Total	164	100.00

Prevalence of postpartum depression among mothers.

Over all 164 mothers were screened for postpartum depression. The results indicated that overall prevalence rate is 42.70 per cent (70 out of 164). The prevalence rate with respect to the age of the mothers indicated that majority of the mothers in the age group of 25-30 years were found depressed (52.60%). With respect to age at marriage 59.60 per cent were depressed who were between 22 to 25 years and 34.00 per cent mothers were depressed who were 18-21 years at the time of marriage (Table 3).

Table.3 Prevalence of postpartum depression among mothers.

Variables	Postpartum depression			
	Depressed		Non depressed	
	Frequency	Percentage	Frequency	Percentage
Age of the mother				
19-24	19	46.30	22	53.70
25-30	41	52.60	37	47.40
31-35	10	22.20	35	77.80
Total	70	42.70	94	57.30
Age at marriage				
18-21	16	34.00	31	66.00
22-25	34	59.60	23	40.40
26-29	20	33.30	40	66.70
Total	70	42.70	94	57.30

No of years of marriage				
1-5 years	50	41.30	71	58.70
5-10 years	20	46.50	23	53.70
Total	70	42.70	94	57.30
Education of the mother				
Illiterate	22	52.40	20	47.60
Primary	19	35.80	34	64.20
Secondary	15	45.50	18	54.50
PUC & Diploma	7	30.40	16	96.60
Graduation	6	66.70	3	33.30
Post graduation	1	25.00	3	75.00
Total	70	42.70	94	57.30
Occupation				
Homemaker	37	36.60	64	57.70
Working	33	52.40	30	56.60
Total	70	42.70	94	57.30
Size of the family				
1-5	9	23.10	30	76.90
6-10	30	57.70	22	42.30
More than 10	31	42.50	42	57.50
Total	70	42.70	94	57.30
Socio economic status				
Upper high	1	50.00	1	50.00
High	2	40.00	3	60.00
Upper middle	29	46.00	34	54.00
Lower middle	26	36.10	46	63.90
Poor	12	54.50	10	45.50
Total	70	42.70	94	57.30
Gender of the infant				
Male	13	23.60	42	76.4
Female	57	52.30	52	47.7
Total	70	42.70	94	57.3
Parity				
Primiparity	33	45.80	39	86.40
Multiparity	37	40.20	55	28.90
Total	70	42.70	94	57.30
Mode of breast feeding				
Exclusively breast fed	49	42.20	67	57.80
Formula fed	21	43.80	27	56.30

Majority of the mothers who completed their education up to graduation were depressed (66.70%) followed by illiterate and secondary (52.40% and 45.50 %). Prevalence of postpartum depression was high among mothers who were working (52.40%) in comparison with homemakers (36.60%). When socio economic status of mothers was considered, the prevalence of postpartum depression among women with poor socio-economic status (54.50%) was high compared to the other category. The mothers who had female baby prevalence of postpartum depression was high (52.30%) and it was 23.60 per cent among women who had male infant. With respect to parity mothers who were first time mothers had high prevalence rates (45.80%) of postpartum depression in comparison with multiparity (40.20%). Fifty four (32.90%) of the study participants had a BMI less than 18.5 kg/m² (chronically energy deficient), whereas 44 study participants had a BMI greater than or equal to 25 kg/m² (over weight). Study subjects with a height of less than or equal to 145 cm (stunted) and with a weight of less than or equal to 45 kg (underweight) were 5 (3.00%) and 159 (97.00%), respectively (Table 4).

Table.4 Bivariate analysis of demographic factors influencing postpartum depression among mothers. **N=164**

Variables	Post partum depression		OR (95% CI)	P value
	Depressed	Non depressed		
	N (%)	N (%)		
Age of the mother				
19-24	19 (46.30)	22 (53.70)	1	0.006**
25-30	41 (52.60)	37 (47.40)	0.779 (0.365, 1.663)	
31-35	10 (22.20)	35 (77.8)	3.023 (1.189, 7.685)	
Age at marriage				
18-21	16 (34.00)	31 (66.00)	1	0.007**
22-25	34 (59.60)	23 (40.40)	0.349 (0.156, 0.779)	
26-29	20 (33.30)	40 (66.70)	1.032 (0.460, 2.315)	
No of years of marriage				
1-5 years	50 (41.30)	71 (58.70)	1	0.05**
5-10 years	20 (46.50)	23 (53.50)	0.810 (0.402, 1.631)	
Education of the mother				
Illiterate	22 (52.40)	20 (47.60)	1	0.259^{NS}
Primary	19 (35.80)	34 (64.20)	1.968 (0.862, 4.495)	
Secondary	15 (45.50)	18 (54.50)	1.320	

			(0.529, 3.294)	
PUC & Diploma	07 (30.40)	16 (96.50)	2.514 (0.858, 7.367)	
Graduation	06 (66.70)	03 (33.30)	0.550 (0.121, 2.496)	
Post graduation	01(25.00)	03 (75.00)	3.300 (0.317, 34.354)	
Occupation of the mother				
Home maker	37 (36.60)	64 (57.70)	1	0.008**
Working	33 (52.40)	30 (56.60)	1.526 (0.577, 1.996)	
Size of the family				
1-5 members	09 (23.10)	30 (76.90)	1	0.006**
6-10 members	30 (57.70)	22 (42.30)	0.220** (0.087, 0.555)	
>10 members	31 (42.50)	42 (57.50)	0.406** (0.169, 0.978)	

Bivariate analysis of demographic factors influencing postpartum depression among mothers

Table 5 shows the association between demographic factors and postpartum depression. Mothers between age group of 31 to 35 years had higher odds of risk (OR=3.02, 95%CI =0.1.18, 7.68) of having postpartum depression. There was a significant association found between age of the mother and postpartum depression. Mothers who married between 26 to 29 years had high odds (OR=1.03, 95%CI =0.46, 2.31) of risk for developing postpartum depression. A significant association was present between age at marriage and postpartum depression. Working mothers showed higher odds of risk (OR=1.526, 95%CI =0.577, 1.996) of postpartum depression. However, significant association is seen between mother's occupation and postpartum depression.

Table.5 Bivariate analysis of personal factors and infant factors influencing postpartum depression among mothers.

Variables	Post partum depression		OR (95% CI)	P value
	Depressed	Non depressed		
	N (%)	N (%)		
Consanguinity				
Consanguineous	45 (51.70)	42 (48.30)	1	0.01**
Non - consanguinious	25 (32.50)	52 (67.50)	2.229** (1.180, 4.209)	

Parity				
Primiparity	33 (45.80)	39 (86.40)	1	0.480^{NS}
Multiparity	37 (40.20)	55 (28.90)	1.258 (0.674, 2.346)	
Gender of the infant				
Boy	13 (23.60)	42 (76.40)	1	0.001^{**}
Girl	57 (52.30)	52 (47.70)	3.231 ^{**} (0.137, 0.584)	
Mode of breast feeding				
Exclusively breastfed	49 (42.20)	67 (57.80)	1	0.01^{**}
Formula fed	21 (43.80)	27 (56.30)	1.940 (0.477, 1.984)	
Mother Hb level at the time of delivery				
Non Aneamic	44 (43.10)	58 (56.90)	1	0.88^{NS}
Aneamic	26 (41.90)	36 (58.10)	(0.555, 1.990)	
Age of the child				
2.1 – 2.7 months	3 (3.80)	76 (96.20)	1	0.000^{***}
1.5 – 2.1 months	67 (78.80)	18 (21.20)	0.011 (0.003, 0.038)	
Birth weight				
Normal (≥ 2.5 kg)	22 (37.90)	36 (62.10)	1	0.05^{**}
Low birth wt(≤ 2.5 kg)	48 (45.3)	58 (54.7)	0.738 (0.384, 1.420)	
Birth order				
First born	33 (35.90)	59 (64.10)	1	0.05^{**}
Second born	37 (51.40)	35 (48.60)	0.529 (0.282, 0.992)	

Figures in the parentheses indicates percentage

*Significant at 5 per cent level

** Significant at 1 per cent level

Bivariate analysis of personal factors influencing postpartum depression among mothers

Influence of personal factors on postpartum depression is observed in Table 5. It was clear that mothers without consanguineous marriage had 2.22 times higher odds risk (OR=2.22, 95%CI =1.18, 4.20) than the mothers with consanguineous marriage. Significant association was found between consanguinity and postpartum depression. Mothers who fed their baby with formula showed higher odds of risk postpartum depression (OR=1.940, 95%CI =0.477, 1.984) than the mother who breast fed their baby. Mothers who were anaemic had high odds of risk (OR=2.68, 95%CI =0.55, 1.99) than non-anemic mothers with postpartum depression.

Mothers showed 0.01 times lower odds of risk of having postpartum depression who had infants age between 1.5 months to 2.1 months (OR=0.01, 95%CI =0.03, 0.38) when compared to reference category. Mothers of female baby showed 3.23 times higher odds of risk (OR=3.23, 95%CI =0.13, 0.58) and 1.7 times higher odds of risk with low birth weight infant (OR=1.7, 95%CI =0.38, 1.42) with PPD when compared with the respective reference categories. The risk of PPD was more in mothers who gave birth to first baby.

Discussion:

The overall prevalence rate of PPD was 42.70 per cent. Similar results are found by the studies conducted in Mumbai, India 4% (Kale *et al*, 2019), Gujarat, by Nimisha *et al*. (2012). The prevalence of postpartum depression was found to be 15.6% in Ethiopia (Wubetu *et al*, 2020). Also, the present study reveals the high prevalence of PPD among women in age group (25-30 years) than the other group. The reason may be these women had difficult experiences; adjustment problems to motherhood and in addition older women had some health problems and disparities from social norms concerning maternal age. Older mothers in present study had more health issues (Table 5) like delayed pregnancy, anaemia which pressurized the expectations of motherhood. This finding is in line with the study conducted by Muraca *et al*. (2014) which showed women with advanced maternal age (>30 years) had significantly higher risk of postpartum depression than younger mothers.

Mothers of poor class showed high prevalence rates (54.50%) of postpartum depression. This may be because of inadequate prenatal care and related health problems because of low education, occupation and financial barriers for utilization of medical facilities. This finding is supported by the studies conducted by Gebregziabher *et al*. (2020) which showed that the mothers who belong to low socio-economic status were in a high-risk category of postpartum depression.

Mothers in higher age group that is 31 to 35 years were more depressed than the younger mothers. The result of the study also reports that higher the age of the mother, higher will be the postpartum depression. Mothers between 31 to 35 years had 3.02 times higher odds of risk of PPD when compared with lower age of the mothers. This may be because women with older age group experienced higher rate of obstetric complications and faced severe maternal morbidities like thyroid problems, heart problems, gestational diabetes, infertility problem and delayed pregnancy. Also, the mothers expressed more concern about their pregnancy and related risks in

the present study which may have increased their stress level. Similar results were observed in the study conducted by Alikamali *et al.* (2020) where women between age of 28 to 33 had 1.98 times and 34 to 36 had 2.09 times higher odds of risk of postpartum depression. In the study conducted by Cantilino *et al.* (2010), mothers with age >31 years had 2.223 times higher odds risk. Bener *et al.* (2012) also showed that mothers more above 30 years had high prevalence of postpartum depression (49.90%) than non -depressed mothers (39.20).

Mothers who were married between 26-29 years were more depressed than the mothers who married in younger age (Table 4), result was found to be significant. Women who had late marriage expressed more adjustment problems and health issues which may be the reason for post partum depression. Alikamali *et al.* (2020) also reported higher the age at marriage higher is the odds of risk of postpartum depression. Working mothers showed 1.526 times higher odds of risk of depression than reference category. This might be because working mothers had to adjust to the working condition and lack of support from the family or partner. Significant association was found between occupation and postpartum depression. Fantahun *et al.* (2018) showed similar results as results of the current study that is working mothers had high odds of risk however, they also observed non significant relation. The risk of PPD was 2.22 times more among mother with non-consanguineous marriage (Table 5). This could be because familiarity in consanguineous marriage helps women to adjust better with spouse and family, whereas in case of non-consanguineous marriage the women may face some adjustment issues with spouse initially. These results are in line with the findings of the study conducted by Sheeba *et al.* (2019) in which mothers with non- consanguineous marriage had high risk of postpartum depression than mothers with consanguineous marriage.

All the mothers who were moderately and severally anaemic were depressed, and the association was found to be non-significant. The risk of PPD was 2.85 times high among anaemic mothers (Table 6). This may be because anaemia during and after pregnancy increases the incidence of postpartum depression markedly as haemoglobin depletion may disrupt neurotransmitter activity and, affecting cellular, oxidative, and thyroid hormone metabolism. Also, heavy bleeding (more than 1000 ml) after childbirth causes anaemia and postpartum depression (Paterson *et al.*, 2019). Mothers with low-birth-weight children showed high rates of postpartum depression and had 1.73 times more odds of risk of postpartum depression than mothers having infants with normal weight. It could be because having a low-birth-weight baby

might be viewed as an emotionally stressful experience as low birth weight is associated with long hospital stay and increased stress. The results of the study are consistent with the results of the study conducted by Kale *et al*, (2019), which showed postpartum depression among respondents whose new born child with low birth weight were three times more likely to be depressed as compared those who had high birth weight (≥ 2.5 kg) of new born.

Conclusion

Postpartum depression was more prevalent in mothers aged 25 to 30 years. Depression was associated with sociodemographic characteristics such as mother's age, lower education levels, and low socioeconomic status. Working women were more likely to suffer from depression than their counterparts. Postpartum depression was more common in mothers who were moderately or severely anaemic. There is a need to develop appropriate programmes to treat postpartum depression in postpartum mothers. Eliminating such risk factors can significantly improve the emotional well-being of women during the critical postnatal time.

References:

- Alikamali M, Khodabandeh, S, Motesaddi, M, Bagheri Z and Esmaeili M A, 2020, The association between demographic characteristics and attempting of pregnancy with postpartum depression and anxiety among women referring to community health centres: A cross sectional study. *The Malaysian journal of medical sciences*, 27(3), 93–104.
- Batra K, Pharr J, Olawepo J O and Cruz P, 2020, Understanding the multidimensional trajectory of psychosocial maternal risk factors causing preterm birth: a systematic review. *Asian J Psychiatr*, 54:102436.
- Bener A, Burgut F T, Ghuloum S and Sheikh J A, 2012, Study of postpartum depression in a fast developing country: prevalence and related factors. *The International Journal of Psychiatry in Medicine*, 43(4):325-337.
- Cantilino A, Zambaldi F C, Albuquerque C L T, Paes A J, Montenegro P C A and Sougey E B, 2010, Postpartum depression in Recife – Brazil Prevalence and association with bio-socio-demographic factors. *J. Bras Psiquiatr*, 59(1):1-9.

- Cooper PJ, Murray L, Wilson A, Romaniuk H, 2003, Controlled trial of the short- and long-term effect of psychological treatment of post-partum depression. Impact on maternal mood. *Br J Psychiatry*. 182:412–9.
- Cox J L, Murray D and Chapman G A, 1993, Controlled study of the onset, duration and prevalence of postnatal depression. *Br J Psychiatry*. 163:27–31.
- Crotty F and Sheehan J, 2004, Prevalence and detection of postnatal depression in an Irish community sample. *Ir J Psychol Med*.21:117–21.
- Desai N D, Mehta R Y and Ganjiwale J, 2012, “Study of prevalence and risk factors of postpartum depression,” *National Journal of Medical Research*. 2 (2)194–198.
- Fantahun A, Cherie A and Deribe L, 2018, Prevalence and factors associated with postpartum depression among mothers attending public health centers of Addis Ababa, Ethiopia. *Clinical practice and epidemiology in mental health: CP & EMH*, 14, 196–206.
- Fisher J, Cabral de Mello M, Patel V, Rahman A, Tran T and Holton S, 2012, Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: A systematic review. *Bull World Health Organ*, 90:139–149.
- Gebregziabher N K, Netsereab T B and Fessaha Y G, 2020, Prevalence and associated factors of postpartum depression among postpartum mothers in central region, Eritrea: a health facility based survey. *BMC Public Health*, 1614(20): 1-10.
- Gelaye B, Rondon M B, Araya R and Williams M A, 2016, Epidemiology of maternal depression, risk factors, and child outcomes in low-income and middle-income countries. *The Lancet Psychiatry*, 3: 973–982. [https://doi.org/10.1016/S2215-0366\(16\)30284-X](https://doi.org/10.1016/S2215-0366(16)30284-X) PMID: 27650773
- Gildner T E, Laugier E J and Thayer Z M, 2020, Exercise routine change is associated with prenatal depression scores during the COVID-19 pandemic among pregnant women across the United States. *PLoS One*, 15 (12):e0243188.
- Hutchens, B F and Kearney, J, 2020, Risk Factors for Postpartum Depression: An Umbrella Review. *J. Midwifery Women’s Health* 2020, 65:96–108.
- Kale P D, Tambawala Y Z and Rajput M N, 2019, Postpartum depression prevalence in a tertiary care hospital in Mumbai, Maharashtra, India. *Journal of South Asian Federation of Obstetrics and Gynaecology*, 11 (4): 185-192.

- Leigh B and Milgrom J, 2008, "Risk factors for antenatal depression, postnatal depression and parenting stress," *BMC psychiatry*, 8(1):1–24.
- Lovestone S and Kumar R, 1993, Postnatal psychiatric illness: the impact on partners. *Br J Psychiatry*.163:210–6.
- Matsumura K, Hamazaki, K and Tsuchida A, 2019, Education level and risk of postpartum depression: results from the Japan Environment and Children's Study (JECS) . *BMC Psychiatry*, 419(19): 1-11.
- Muraca, G M and Joseph K S, 2014, The association between maternal age and depression. *J Obstet Gynaecol Can*, 36(9): 803-810.
- Murray L, Fiori-Cowley A, Hooper R, and Cooper P, 1996, The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. *Child Dev*.67:2512–26.
- Nimisha D, Ritambhara M and Jaishree G, 2012, Study of prevalence and risk factors of postpartum depression. *National J. of med. Research*, 2(2): 194-198.
- Oates, M. Suicide, 2003, The leading cause of maternal death. *Br. J. Psychiatry*, 183, 279–281.
- Paterson J A, Davis J, Gregory, M, Holt S J, Pachulski A, Stamford D E, Wothers J B and Jarrett A, 2019, A study on the effects of low haemoglobin on postnatal women. *Midwifery*, 10(2): 77-86.
- Pearlstein T, Howard M, Salisbury A, Zlotnick C, 2009, Postpartum depression. *Am J Obstet Gynecol*, 200:357–64.
- Robertson E, Grace S, Wallington T, Stewart D E, 2004, Antenatal risk factors for postpartum depression: a synthesis of recent literature. *Gen Hosp Psychiatry*.26:289–95.
- Sheeba B, Anita N, Chandra S M, Murali K, Shubhashree V, Vindhya J and Satyanarayana V G M, 2019, Prenatal Depression and Its Associated Risk Factors Among Pregnant Women in Bangalore: A Hospital Based Prevalence Study. *Frontiers in Public Health*, 7: 1-9.
- Telake A F, Abebaw M, Girmay and Charlotte H, 2018, "Coping strategies of women with postpartum depression symptoms in rural Ethiopia: a cross-sectional community study," *BMC Psychiatry*, 18(1) 1–13.
- Thayer Z M and Gildner T E, 2020, COVID-19-related financial stress associated with higher likelihood of depression among pregnant women living in the United States. *Am J Hum Biol*.

Wang Z, Liu J, Shuai H, 2021, Mapping global prevalence of depression among postpartum women. *Transl Psychiatry*. 11(1):1–24.

WHO. Global burden of mental disorders and the need for a comprehensive, coordinated response from health and social sectors at the country level [Internet]. Geneva; 2011. https://apps.who.int/gb/ebwha/pdf_files/EB130/B130_9-en.pdf

World health organization, 2010. *WHO Technical Consultation on Postpartum and Postnatal Care*, WHO Press, Switzerland, 2010.

Wubetu D A, Engidaw A N and Gizachew, 2020, Prevalence of postpartum depression and associated factors among postnatal care attendees in Debre Berhan, Ethiopia, 2018. *BMC Pregnancy and Childbirth*, 20:189-197.

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