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Prevalence of Paternal Depression during pregnancy period : A Cross - Sectional Study

Abhirami Rajasekhar, Adithyan R S, Dr. Dhanya Dharman*, Shaiju S Dharan

1 Department of Pharmacy Practice, Ezhuthachan College of Pharmaceutical Sciences, Kerala, India.

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*Corresponding author:

Email : dhanyadharman07@gmail.com
Phone : +91 -

ABSTRACT

Depression is a mental health disorder characterized by persistent feelings of sadness, hopelessness and lost of interest or pleasure in activities. Depression during pregnancy also known as antenatal depression, refers to the occurrence of depressive symptoms in expectant mothers. Paternal depression is a condition that effects the mood of fathers that can lead to irritability insecurity consistent breakdown and crying episode. This study is to analyse the prevalence of paternal depression during pregnancy period. The depressive symptoms are analyzed by using BDI (Beck Depression Inventory) scale, consist of 21 questions related to mood, cognition and physical symptoms. The scope of this research article to analyse the occurrence of depressive symptoms in expecting fathers and to determine the associated factors regard to it. The study was conducted at KM Cherian Institute of Medical Sciences, Chengannur in expecting fathers who accompany their pregnant spouse for routine checkup. The sample size was 40. The plan of study was cross-sectional study by consecutive sampling at the data collecting time. The data was collected by using a self structured data collection form and analysed the condition by BDI (Beck Depression Inventory) Scale. The analysis revealed several significant associations between various factors and the likelihood of moderate to severe paternal depression during the pregnancy period. For participants aged over 30, the odds of experiencing moderate to severe depression were 9.33 times higher compared to those aged 30 or younger (OR = 9.33, 95% CI: 1.90-70.65, p=0.012). Participants with an income of 4 lakh INR or below had 6.87 times higher odds of moderate to severe depression than those earning more (OR = 6.87, 95% CI: 1.48-50.26, p=0.025). The odds of moderate to severe depression were also elevated for those married for more than 3 years (OR = 4.22, 95% CI: 1.11-18.83, p=0.042). Additionally, unplanned pregnancies were strongly associated with increased odds of moderate to severe depression, with affected participants showing 11.67 times higher odds than those with planned pregnancies (OR = 11.67, 95% CI: 2.51-86.19, p=0.005). These findings suggest that age, income, marriage duration, and pregnancy planning status are significant predictors of paternal depression severity. Overall, this study contributes to the growing body of research on paternal mental health, a relatively underexplored area within prenatal care. By identifying specific risk factors, it opens avenues for developing tailored interventions that address the unique challenges faced by expectant fathers.The findings suggest that mental health professionals should develop targeted interventions focusing on financial stress, pregnancy planning, and emotional support to mitigate the risk of paternal depression.

INTRODUCTION

Depression is a group of conditions that are associated with alteration in mood. More than 10% of fathers experience depression and anxiety during perinatal period, but in comparison to maternal part, the recognition is very less.[1,2] Paternal perinatal depression (PPND) is a major depressive disorder in men that occurs during any of the period of pregnancy. Majorly being a parent is a significant life transition that increase the vulnerability to psychological stress often lead to depressive thoughts and behavior.[3] Although the condition is less understood in men, low testosterone has been directly linked to symptoms of depression in men, whereas low levels of estrogen, prolactin, vasopressin and/or cortisol in expecting fathers might cause difficulties in father- infant bonding that contribute to depressed condition in father.[4,5]

The Beck Depression Inventory Scale (BDI) is the most widely used screening instrument for detecting symptoms of depression. It is a valid scale and tested to detect symptoms and severity of depression. It is a 21 measure designed to document a variety of depressive symptoms.

BDI cut off scores used for detecting depression in several research literatures have ranged from 8.5 to 16.5. A cut score of either 17 or 18 provide the best balance between sensitivity and specificity. More than 20 indicates severe depression and over 40 indicates extreme depression.[6]

METHODOLOGY

Study setting

This is cross- sectional study was carried out in K M Cherian Institute of Medical Sciences, Chengannur, Pathanamthitta, Kerala on outpatient basis of Obstetrics and Gynaecology department.

Participants and Procedures

After the consideration of attrition rate, the sample size taken to be 40. Inclusion criteria were spouse of expecting mothers. People with history of Psychiatric conditions and those who are not willing to participate in the study were excluded. Data were collected within the month of October 2024 by use of consecutive sampling method (collecting data from ecpecting fathers who accompany their pregnant spouse in hospital for check-ups during the collecting time).

Ethical Approval

Ethical approval was granted from Research Ethics Committee of Ezhuthachan College of Pharmaceutical Sciences. After obtaining permission from the Director and Senior HR Manager from the hospital, this study was conducted in compliance with the ethical priciples of Declaration of Helsinki. The information regarding the study were explained in detail to the all participants before signing the consent form. Informed consent was obtained from all participants.

Measurements

A data collection form was included that contains subject demographic details, trimester of pregnancy, marriage life year, professional or educational status and annual income.

A structured questionnaire named Beck Depression Inventory (BDI) scale was included which is a 21- item, self- report rating inventory that measures characteristic attitudes and symptoms of depression. It is used to measure the severity of depression and to monitor the course of treatment. It can help for diagnosis of the same. It is scored by:

1-10: These ups and downs are considered normal

11-16: Mild mood disturbance

17-20: Borderline clinical depression

21-30: Moderate depression

31-40: Severe depression

Over 40: Extreme depression

Data Analysis

The statistical analysis in this study employed both univariate and multivariate approaches to examine the association between various demographic and socio-economic factors and the severity of paternal depression during the pregnancy period. Chi-square tests assessed the association between each factor and depression severity and the strength of association was expressed in terms of OR with 95% CI. The multivariate analysis of binary logistic regression was performed to confirmed income and unplanned pregnancy as independent predictors of depression severity, with adjusted ORs of 38.23 and 24.75, respectively. A p value <0.05 was considered as statistically significant. Data analysis was performed using "Jamovi 2.5.3".

RESULT

(Table 1.1) In the study sample of 40 participants, individuals aged 30 years or below comprised 25% (10 participants), while those above 30 years represented 75% (30 participants). Average age was 32.6±2.7 years and age ranges from 28 to 41 years This age distribution suggests a predominantly older participant pool, indicating potential age-related factors in paternal depression. Among the participants, 27.5% (11 individuals) had completed higher secondary education or below, 60% (24 individuals) were graduates, and 12.5% (5 individuals) had a postgraduate education. This suggests that the majority of participants held at least a graduate degree, indicating a relatively educated population in this study, which could influence awareness and reporting of depressive symptoms. Income distribution showed that 32.5% of participants (13 individuals) earned an annual income of 4 lakh INR or less, while the majority, 67.5% (27 individuals), earned more than 4 lakh INR annually. This income distribution suggests a predominantly higher-income group, potentially impacting stress and mental health differently than lower-income counterparts. The duration of married life varied, with 57.5% (23 participants) married for 3 years or less, and 42.5% (17 participants) married for over 3 years. The average duration was 3.6 years with a standard deviation of ±2.1, ranging from 1 to 10 years. The relatively short duration of marriage among participants may indicate varying stress levels related to early marriage stages. Participants were distributed across pregnancy trimesters, with 30% (12 participants) in the first trimester, 32.5% (13 participants) in the second trimester, and 37.5% (15 participants) in the third trimester. This distribution highlights that paternal depression may vary according to the pregnancy stage, which could affect fathers differently as the pregnancy progresses. Unplanned pregnancies were reported by 40% of participants (16 individuals), while 60% (24 individuals) indicated their pregnancies were planned. The proportion of unplanned pregnancies may relate to higher stress and depressive symptoms due to unexpected changes and responsibilities.

Depression levels, as measured by the Beck Depression

Table 1.1 : Subject Demographic Details

Variables	FREQUENCY	PERCENT
Age wise Distribution		
≤30 years	10	25
>30 years	30	75
Total	40	100
Education		
Higher secondary or below	11	27.5
Graduate	24	60
Post graduate	5	12.5
Total	40	100
Income		
≤4 lakh	13	32.5
>4 lakhs	27	67.5
Total	40	100
Duration of married life wise Distribution		
≤3 years	23	57.5
>3 years	17	42.5
Total	40	100
Trimester wise Distribution		
First	12	30
Second	13	32.5
Third	15	37.5
Total	40	100
Unplanned Pregnancy		
Yes	16	40
No	24	60
Total	40	100

Table 1.2 : Depression Levels Based on BDI Score

Depression	Frequency	Percent
Normal	6	15
Mild Mood Disturbance	11	27.5
Borderline Clinical Depression	8	20
Moderate Depression	10	25
Severe Depression	5	12.5
Total	40	100

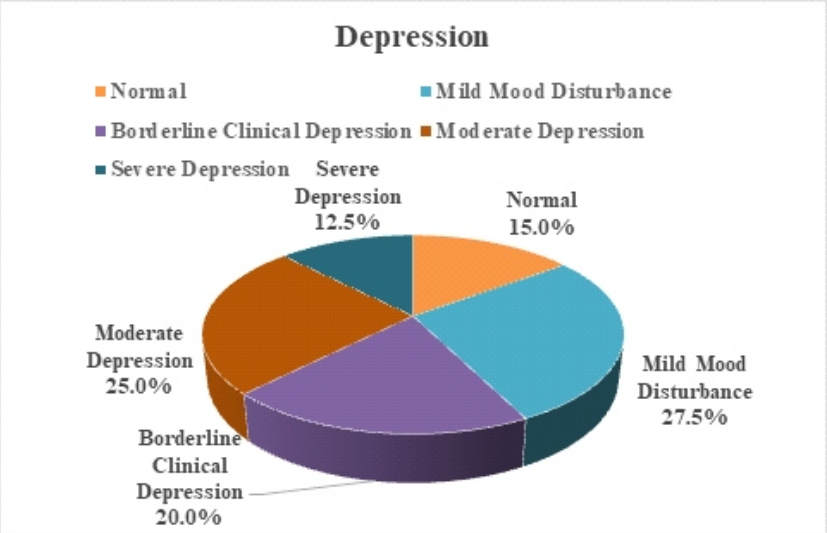

Fig. 1.2 : Depression Levels Based on BDI Score

Inventory (BDI), showed a range of experiences among participants: 15% (6 individuals) exhibited normal mood, 27.5% (11 individuals) had mild mood disturbance, 20% (8 individuals) fell into borderline clinical depression, 25% (10 individuals) experienced moderate depression, and 12.5% (5 individuals) were categorized as having severe depression. Average BDI score was 19.6±7.4 and the score ranges from 7 to 36 . This distribution indicates that a significant portion of fathers experience some level of depressive symptoms during their partner's pregnancy, with a notable subset reaching moderate to severe levels(Table 1.2, Figure 1.2).

The association between age and depression severity reveals a statistically significant relationship. Among participants aged 30 years or younger, 80% exhibited normal or mild depression levels, while only 20% experienced moderate or severe depression. Conversely, in the group over 30, 30% had normal or mild depression, while a significant 70% showed moderate or severe depressive symptoms. This difference in depression levels between the two age groups was statistically significant, with a

Table 1.3 : Correlation of age and depression

Age in years	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
≤30	8	80	2	20	10	100	7.673	1	0.006
>30	9	30	21	70	30	100			
Total	17	42.5	23	57.5	40	100			

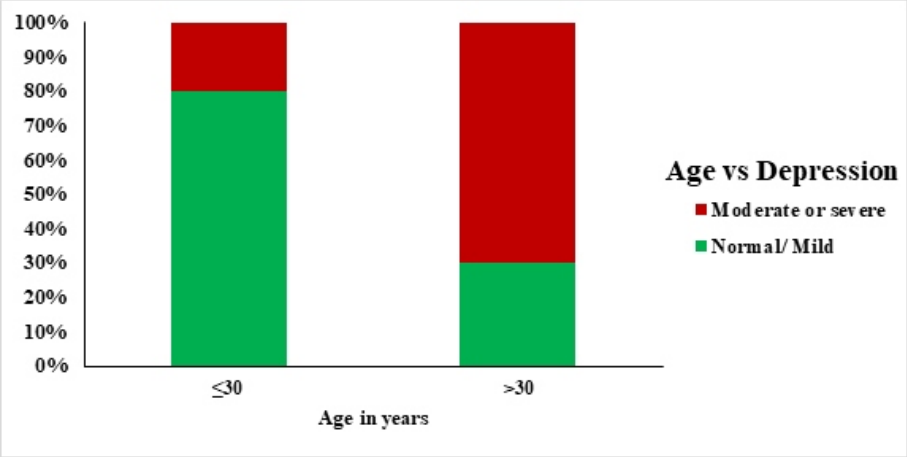

Fig. 1.3 : Correlation of age and depression

Table 1.4 : Correlation of Education qualification and Depression

Education	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
Higher secondary or below	5	45.5	6	54.5	11	100	0.059	2	0.971
Graduate	10	41.7	14	58.3	24	100			
Post graduate	2	40	3	60	5	100			
Total	17	42.5	23	57.5	40	100			

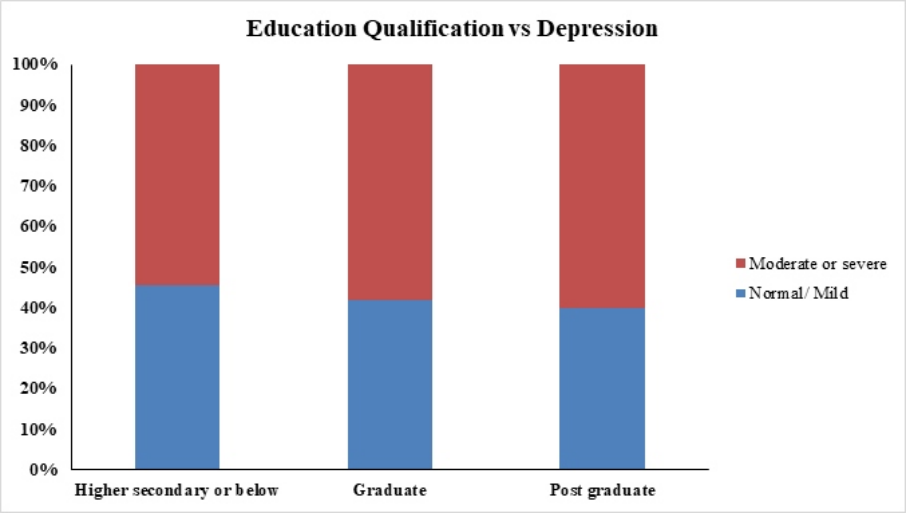

Fig. 1.4 : Correlation of Education qualification and Depression

chi-square value of 7.673, 1 degree of freedom, and a p-value of 0.006. This indicates a strong association, suggesting that older age may be linked to higher severity of depressive symptoms during their partner's pregnancy (Table 1.3, Figure 1.3).

The association between educational qualification and depression severity did not show statistical significance. Participants with a higher secondary education or below had 45.5% in the normal/mild category and 54.5% in the moderate/severe category. Among graduates, 41.7% had normal/mild depression, while 58.3% had moderate/severe symptoms. For postgraduates, 40% exhibited normal/mild depression, and 60% showed moderate/severe depression. The

Table 1.5 : Correlation of income and depression

Income	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
≤4 lakh	2	15.4	11	84.6	13	100	5.794	1	0.016
>4 lakhs	15	55.6	12	44.4	27	100			
Total	17	42.5	23	57.5	40	100			

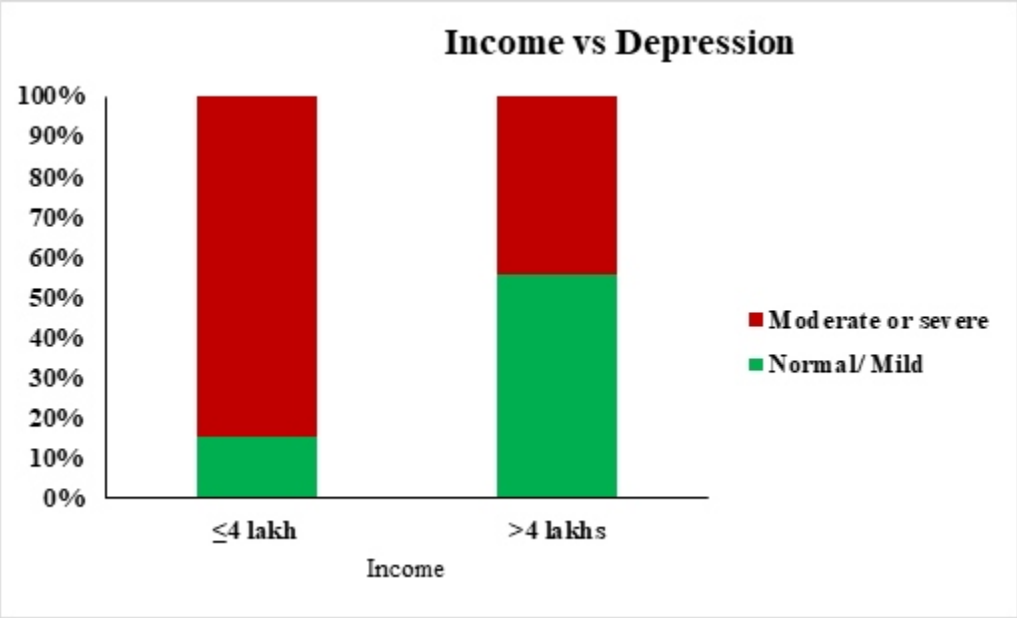

Fig. 1.5 : Correlation of income and depression

chi-square value for this association was 0.059 with 2 degrees of freedom, yielding a p-value of 0.971, indicating no significant association between educational level and depression severity (Table 1.4, Figure 1.4).

Income level showed a statistically significant association with depression severity. In the lower-income group (≤4 lakh INR), only 15.4% of participants had normal/mild depression, while a notable 84.6% had moderate/severe depression. In contrast, among those earning more than 4 lakh INR, 55.6% exhibited normal/mild symptoms, and 44.4% experienced moderate/severe depression. The chi-square value for this association was 5.794 with 1 degree of freedom and a p-value of 0.016, suggesting that lower income may be linked to higher depression severity (Table 1.5, Figure 1.5).

The duration of married life also displayed a significant association with depression severity. Among those married for 3 years or less, 56.5% had normal/mild depressive symptoms, while 43.5% fell into the moderate/severe category. For those married longer than 3 years, 23.5% showed normal/mild symptoms, while 76.5% had moderate/severe depression. This association yielded a chi-square value of 4.354 with 1 degree of freedom and a p-value of 0.037, indicating that longer marriages may correlate with higher depressive symptom severity during the partner's pregnancy (Table 1.6, Figure 1.6).

The association between the trimester of pregnancy and depression severity was not statistically significant. In the first trimester, 25% of participants had normal/mild symptoms, and 75% had moderate/severe symptoms. In the second trimester, 46.2% had normal/mild depression, and 53.8% experienced moderate/severe depression. For the third trimester, 53.3% exhibited normal/mild symptoms, while 46.7% had moderate/severe depression. The chi-square value was 2.295 with 2 degrees of freedom, and the p-value was 0.317, indicating no significant association between the trimester stage and depression severity (Table 1.7, Figure 1.7).

The association between unplanned pregnancies and depression severity was statistically significant. Among participants with unplanned pregnancies, only 12.5% had

Table 1.6 : Correlation of duration of marriage and depression

Duration of married years	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
≤3	13	56.5	10	43.5	23	100	4.354	1	0.037
>3	4	23.5	13	76.5	17	100			
Total	17	42.5	23	57.5	40	100			

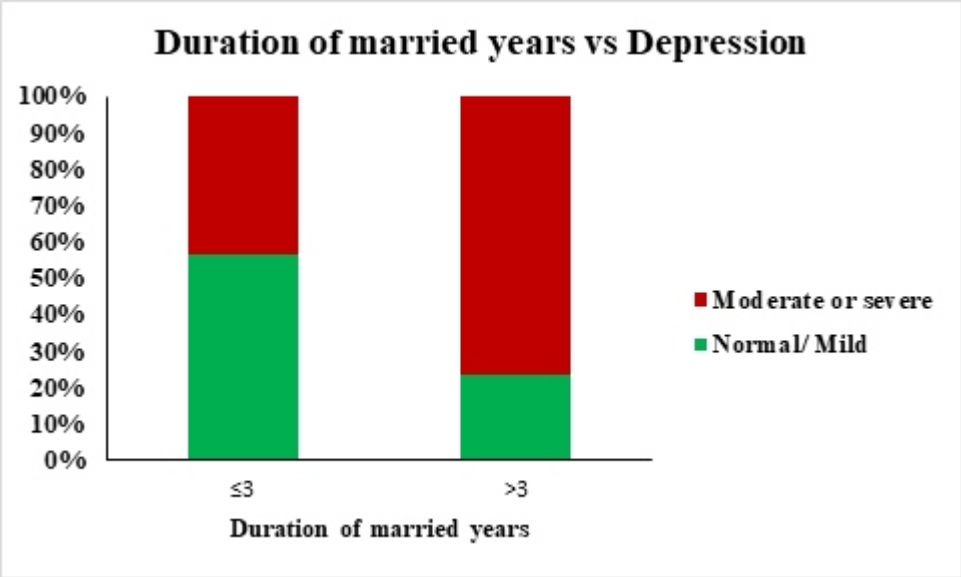

Fig. 1.6 : Correlation of duration of marriage life and depression

Table 1.7 : Correlation of trimester and depression

Trimester	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
First	3	25	9	75	12	100	2.295	2	0.317
Second	6	46.2	7	53.8	13	100			
Third	8	53.3	7	46.7	15	100			
Total	17	42.5	23	57.5	40	100			

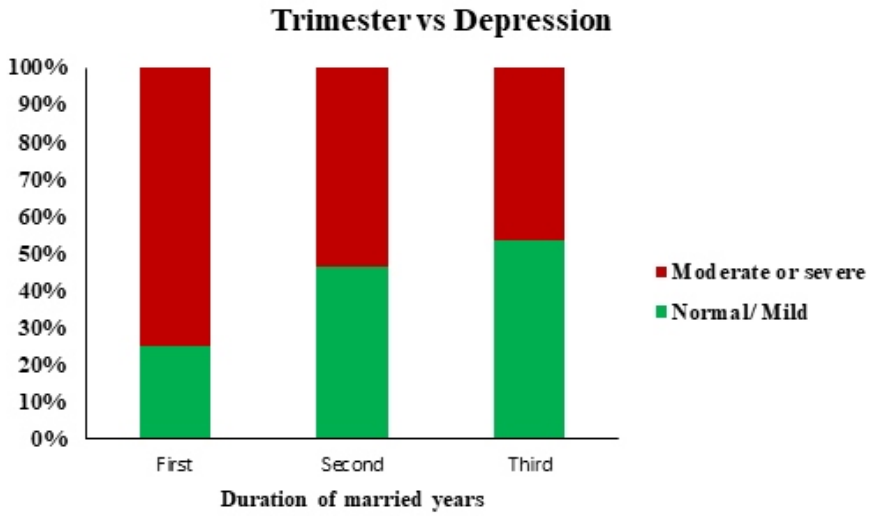

Fig. 1.7 : Correlation of trimester and depression

Table 1.8 : Correlation of unplanned pregnancy and depression

Unplanned Pregnancy	Depression				Total		χ^2	df	p
	Normal/ Mild		Moderate or severe						
	N	%	N	%	N	%			
Yes	2	12.5	14	87.5	16	100	9.821	1	0.002
No	15	62.5	9	37.5	24	100			
Total	17	42.5	23	57.5	40	100			

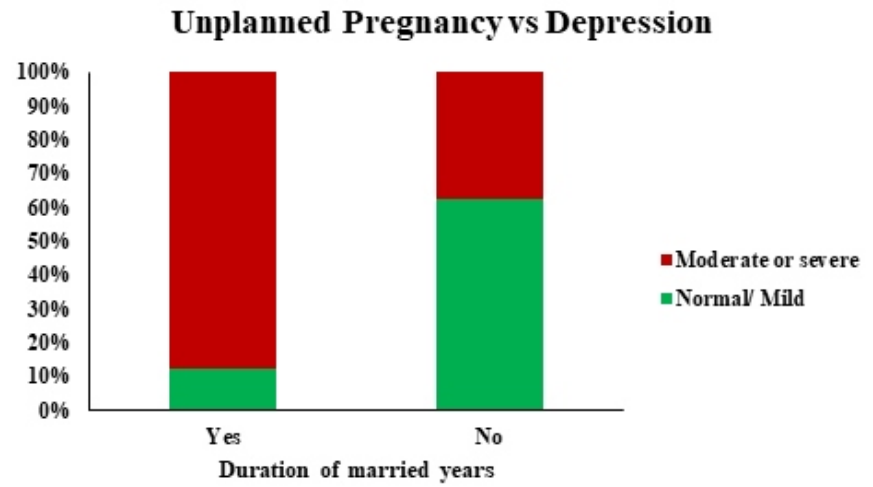

Fig. 1.8 : Correlation of unplanned pregnancy and depression

normal/mild depression, while 87.5% exhibited moderate/severe symptoms. In contrast, participants with planned pregnancies had 62.5% in the normal/mild category and 37.5% in the moderate/severe category. The chi-square value for this association was 9.821 with 1 degree of freedom and a p-value of 0.002, suggesting that unplanned pregnancies may be strongly linked to higher depression severity (Table 1.8, Figure 1.8).

DISCUSSION

The results of this study provide significant insights into the factors influencing paternal depression during the partner's pregnancy. The analysis highlights the critical roles played by age, income, marital duration, and whether the pregnancy was planned or unplanned in determining depression severity in expectant fathers. Additionally, education level and the trimester of pregnancy did not exhibit significant associations with depression severity.

A significant finding in this study is the relationship between age and depression severity. Fathers aged 30 years or younger exhibited significantly fewer cases of moderate or severe depression (20%) compared to fathers above 30 years, where 70% showed moderate or severe depressive symptoms. This finding aligns with previous research, which has suggested that older fathers may be more vulnerable to depression due to compounded life stressors such as career pressures, financial responsibilities, and concerns about aging and health . Specifically, Barker et al. [7] found that older paternal age is associated with an increased risk of depression, likely due to increased life stressors, which are compounded as fathers age. Additionally, Cohen et al. [8] also noted that older fathers often face greater challenges in balancing the responsibilities of parenthood with the expectations of their careers and personal lives, contributing to heightened psychological distress.

However, contrary to our expectations, the study found no significant association between education level and depression severity. Participants with higher secondary education or below, graduates, and postgraduates showed similar distributions of depressive symptoms. This finding contrasts with previous studies, such as Paulson and Bazemore [9], which indicated that higher educational attainment is often associated with better mental health outcomes. Also it was reported that higher education is typically linked to better coping mechanisms and a greater ability to seek help when experiencing mental health difficulties. One possible explanation for the lack of significant findings in this study is that while education may provide certain coping benefits, other psychosocial stressors related to parenthood, career pressures, or social isolation may exert a stronger influence on depression in this population.

In contrast, income level was found to have a statistically significant association with depression severity. Fathers earning an annual income of 4 lakh INR or less were more likely to report moderate or severe depression (84.6%) compared to those earning more than 4 lakh INR, where only 44.4% exhibited moderate/severe depression. This result is consistent with existing research, including Cohen et al. [8], who found that lower income is a significant predictor of depressive symptoms in fathers. Financial stress, particularly concerning the ability to provide for a growing family, is a major source of psychological distress for fathers. In this study, the higher incidence of moderate and severe depression in lower-income fathers suggests that financial concerns related to raising a child, particularly during pregnancy, exacerbate mental health challenges. Cohen et al. [8] demonstrated that the stress of managing household finances during pregnancy often contributes to poorer mental health outcomes, especially in lower-income populations.

The duration of marriage also exhibited a significant relationship with depression severity. Fathers who had been married for more than three years were more likely to report moderate or severe depressive symptoms (76.5%) compared to those married for three years or less (43.5%). This finding contrasts with the conventional understanding that longer marriages tend to provide emotional support, which could buffer against mental health difficulties. However, this study's results align more closely with the research by Chung et al. [10], which found that marital stress, particularly as couples approach parenthood, may accumulate over time. Also suggested that the increasing demands of parenthood and the added responsibilities of caring for a newborn can cause marital stress to become more pronounced, potentially leading to higher depression severity in fathers. The emotional burden of preparing for fatherhood, particularly when compounded by long-term relationship stress, may contribute to depressive symptoms in longer marriages.

Interestingly, the trimester of pregnancy did not show a statistically significant association with depression severity. Although the study found variations in depressive symptoms across the three trimesters, these differences were not large enough to be considered statistically significant. This contrasts with the findings of Goodman [11], who reported that paternal depression tends to increase as pregnancy progresses, likely due to increasing anxiety and the responsibilities associated with impending fatherhood. Morover depressive symptoms often worsen during the later trimesters due to heightened anxiety about the birth and the financial and emotional responsibilities of becoming a parent. The lack of significant findings in this study could be due to sample characteristics, small sample size, or other confounding variables not accounted for in the analysis.

Another important finding from this study is the significant association between planned versus unplanned pregnancies and depression severity. Fathers with unplanned pregnancies had significantly higher rates of moderate or severe depressive symptoms (87.5%) compared to those with planned pregnancies (37.5%). This finding is consistent with Martins et al. [12], who also found that unplanned pregnancies contribute to heightened stress and emotional distress in fathers, often leading to higher levels of depression. Unplanned pregnancies introduce a greater sense of uncertainty and loss of control, as reported which can lead to feelings of anxiety and depression as fathers adjust to unexpected life changes. The psychological strain of facing parenthood unprepared, coupled with financial and relationship stress, likely contributes to the significantly higher levels of depressive symptoms observed in fathers of unplanned pregnancies.

In summary, the findings of this study underscore the complexity of paternal depression, which is influenced by a variety of demographic and psychosocial factors. Age, income, marital duration, and the planned/unplanned nature of pregnancy all play critical roles in shaping the severity of paternal depression during pregnancy. These results suggest that interventions targeting fathers at higher riskparticularly older fathers, those with lower incomes, those in longer marriages, and those experiencing unplanned pregnanciescould be effective in mitigating the impact of depression during this critical period. Future research should continue to explore these relationships in larger and more diverse populations to gain a deeper understanding of the mechanisms that contribute to paternal depression and to develop more targeted and effective support strategies.

The limitations of this study should be acknowledged. Firstly, the sample size of 40 participants is relatively small, which may not provide a representative view of the broader population of

expectant fathers, limiting the generalizability of the findings. Additionally, the cross-sectional nature of the study restricts the ability to draw causal inferences or observe changes over time, such as how depressive symptoms may evolve throughout the pregnancy. The reliance on self-reported data introduces the potential for biases, such as social desirability bias or underreporting of depressive symptoms, particularly given the stigma surrounding mental health issues in men. Moreover, the study was conducted in a single hospital in Kerala, which may limit its applicability to other regions or populations with different social, cultural, or economic contexts. The use of consecutive sampling might have led to selection bias, as only fathers accompanying their pregnant spouses to the hospital were included, potentially overrepresenting those more engaged in the pregnancy process. Furthermore, the study did not account for potential confounding variables, such as previous mental health history, relationship quality, social support, and coping strategies, which may significantly influence paternal depression. The Beck Depression Inventory (BDI), while widely used, is a self-report measure that may not fully capture the range or severity of depressive symptoms, and clinical confirmation of depression could have provided a more accurate diagnosis. There is also the possibility of recall bias regarding factors such as pregnancy planning and demographic details, as participants might have difficulty recalling or accurately reporting this information. Finally, the absence of longitudinal data limits the understanding of how paternal depression develops over time and its long-term impact on family dynamics. Future research should address these limitations by employing larger, more diverse samples, longitudinal designs, and clinical assessments to better understand paternal depression and improve interventions.

CONCLUSION

In conclusion, this cross-sectional study sheds light on the prevalence and predictors of paternal depression during pregnancy, highlighting the significance of socioeconomic factors and pregnancy planning. The findings indicate that 57.5% of expectant fathers experienced moderate to severe depressive symptoms, with income and unplanned pregnancy emerging as independent predictors of depression severity. Fathers earning less than 4 lakh INR annually had 38.23 times higher odds, and those facing unplanned pregnancies had 24.75 times higher odds, of experiencing moderate to severe depression. These results underscore the need for targeted interventions, including financial guidance, counseling, and emotional support, to mitigate the risk of depression among vulnerable fathers. Healthcare providers and policymakers should prioritize destigmatizing paternal depression and encouraging help-seeking behavior. Future research should explore the longitudinal impacts of paternal depression on family dynamics and child development, informing the development of tailored interventions to support expectant fathers and promote healthier family relationships. By addressing these critical factors, we can better support the mental health and well-being of expectant fathers, ultimately fostering a healthier and more resilient family unit. This study contributes significantly to the growing body of research on paternal mental health, emphasizing the importance of holistic prenatal care that encompasses the psychological needs of both mothers and fathers.

CLINICAL IMPLICATIONS

The study's implications are multifaceted. Healthcare providers should prioritize routine screening for paternal depression, particularly among those with lower incomes or facing unplanned pregnancies. Public health campaigns should focus on destigmatizing paternal depression, encouraging fathers to seek help when needed. Policymakers should consider implementing support programs addressing financial insecurity and providing resources for expectant fathers. Future research should explore longitudinal impacts of paternal depression on family dynamics and child development, informing tailored interventions to support expectant fathers and promote healthier family relationships.

By addressing these critical factors, we can better support the mental health and well-being of expectant fathers, ultimately fostering healthier family relationships and resilient family units. This study contributes significantly to the growing body of research on paternal mental health, emphasizing the importance of holistic prenatal care encompassing psychological needs of both mothers and fathers. The findings suggest that mental health professionals should develop targeted interventions focusing on financial stress, pregnancy planning, and emotional support to mitigate the risk of paternal depression.

Moreover, the study highlights the importance of considering paternal mental health within the context of prenatal care, underscoring the interdependence of maternal and paternal well-being. By recognizing and addressing the unique challenges faced by expectant fathers, we can promote a more comprehensive understanding of family mental health, ultimately enhancing support systems for families during this critical life transition. Therefore, integrating paternal mental health into prenatal care and promoting awareness about its significance are crucial steps toward fostering healthier families and resilient communities.

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