ORIGINAL ARTICLE

A Cross-sectional Study to Assess the Anxiety and Depression among Perinatal Mothers during the COVID-19 Pandemic

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Abstract

Purpose: Pregnancy, with its associated hormonal changes, leads to an increased risk of mental health problems. These are likely to be worsened by the socioeconomic effects of the coronavirus disease-2019 (COVID-19) pandemic. This study aims to find out the proportion of anxiety and depression in perinatal women and the associated risk factors during the pandemic in India, where mental health is a neglected domain.

Methods: In a cross-sectional study spanning from March 2020 to July 2021, 124 patients who were pregnant or had delivered within 1 year were selected. The survey collected sociodemographic information and assessed the severity of anxiety and depression using the pretested and validated generalized anxiety disorder 7 and patient health questionnaire-9 (PHQ-9), respectively. The results were analyzed by suitable statistical tools and techniques.

Results: Elevated anxiety and depression symptoms compared to similar pre-pandemic perinatal cohorts were observed. Anxiety (GAD), depression and both anxiety and depression were diagnosed in 31 (25%), 36 (29.03%), and 21 (16.94%) participants, respectively. Higher symptoms of anxiety and depression were associated with more concern about threats of COVID-19 to the life of mother and baby, concerns about not getting necessary medical and obstetric care during the lockdown, social isolation, and unemployment during a pandemic. Support and compassionate behavior of treating doctor was associated with lower psychological symptoms.

Conclusion: COVID pandemic has had a definite impact on the mental health of perinatal mothers with elevated levels of anxiety and depression. So clinicians need to be more vigilant in this vulnerable group to facilitate early detection and management of anxiety and depression to prevent further morbidities in mother and her offspring.

Keywords: Antenatal, COVID-19, Perinatal outcome.

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Introduction

The advent of December 2019 brought with it the dreaded coronavirus disease-2019 pandemic which has led to a devastating global health issue. The high infectivity rate of this novel virus has caused large-scale morbidity and mortality creating havoc and panic situations all over the world. In an attempt to curb the spread of this highly infectious virus, the governing authorities of the affected countries have adopted several measures like complete and partial lockdown, social distancing, and the online functioning of schools, colleges, and organizations. The social and physical distancing measures adopted by governing bodies to control the spread of COVID-19 have resulted in unexpected and never-experienced before social isolation, loneliness, widespread economic uncertainty, and unemployment. Although it is too early to comment on the psychosocial effects of this pandemic across continents, the consequences are expected to be harmful and alarming. Since the perinatal period (antenatal period and postnatal period of 1 year after childbirth) is a period where a woman undergoes a lot of physical, emotional and societal changes, it is important to analyze the effect of COVID-19 on the physical and mental health of perinatal mothers and their children.

Due to the associated hormonal changes, pregnant and postnatal women are more likely to suffer from mental health issues including anxiety and depression.[1] According to the National Mental Health Survey (NMHS)-2016, one in every 10 persons in India suffers from depression and anxiety, and 20% of these depressed Indians are pregnant women and new mothers.[2] A meta-analysis on the prevalence of antenatal depression in middle and low-income countries reported a mean prevalence of 15.6%.[3] COVID pandemic has given rise to a state of socioeconomic instability due to an overburdened and crumbling health infrastructure, social distancing measures, economic downfall, and mass-scale unemployment. All these factors are bound to affect the mental health of men and women alike, and probably increase the incidence of depression and anxiety in the vulnerable group of perinatal mothers. High levels of anxiety and depression are known to cause early pregnancy loss, preterm labor, premature birth, fetal growth restriction, and difficulties in labor. Postpartum depression is often seen in patients who had antenatal depression. Postnatal depression is known to cause difficulties in breastfeeding and mother-child bonding, thereby increasing the risk of growth retardation, malnutrition, and various viral and bacterial infections in the child due to low immunity. Children of mothers suffering from postnatal depression are at an increased risk of cognitive, behavioral, and emotional disorders. At the beginning of the pandemic, a study conducted

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in China (where the epidemic started) during January to February 2020 showed increased levels of depression in antenatal mothers. Similarly, lockdown imposed in Belgium to curb the spread of the pandemic resulted in increased levels of anxiety and depression in 13 and 25.3% of antenatal women, respectively.[4] Since the pandemic has given rise to wide-scale unemployment, financial and social uncertainty, it is important to assess the impact of all these factors on mental health, especially in pregnant and postnatal mothers. The knowledge about the burden of mental disorders will help the authorities to implement policies to safeguard the mental health of these vulnerable mothers and their children.

The aim of the current study was to determine the effect of the pandemic on the mental health of perinatal mothers in India, where mental health issues stand largely neglected and discussions on mental health are still taboo. Although the World Health Organization (WHO) has urged for an integrated approach to safeguard the physical and mental health of mothers, regular screening for mental disorders in perinatal women is deficient even in most tertiary level hospitals in India.[5] There are only a few studies on perinatal anxiety and depression in India. This study aims to specifically determine the proportion of anxiety and depression in this vulnerable group during the pandemic, identify the potential risk factors and also factors that help to reduce the negative psychological effects of the pandemic. The results of this study will enable health care professionals to gain an insight into the burden of anxiety and depression so that better care and vigilance can be given to these women to protect their health and safeguard their children.

Materials and Methods

We conducted a cross-sectional study to assess the mental health status of perinatal women through pretested and validated questionnaires that had been approved by the ethical committee of KPC Medical College, Kolkata. Informed consent was taken and the participants were ensured about privacy and confidentiality of data. The patients included in this study were pregnant and postnatal mothers who had delivered during the pandemic between March 2020 and July 2021. The main sociodemographic variables such as age, parity, educational qualification, past history of anxiety, and/or depression were recorded. Known predisposing factors like economic instability, worry about receiving emergency obstetric services during a pandemic, and death or affection of near and dear ones due to COVID-19 was also taken into account. Women with bad obstetric history, known major medical or psychiatric illness, known obstetric complications in the present pregnancy were excluded from the study to avoid bias. Patients who scored above the cutoff value of 10 for either depression or anxiety were referred to the psychiatry department of KPC Medical College for further evaluation and follow-up. Mental health status namely anxiety and depression were assessed by the following methods:

- Generalized anxiety disorder.[6] It is a 7-item self-reported questionnaire for screening and assessing the degree of generalized anxiety disorder in adults where scores from 1 to 4 indicate minimal symptoms, 5–9 mild, 10–14 moderate, and greater than 15 indicate severe anxiety. A cutoff score of 10 was selected for this study as it has a sensitivity of 89% and a specificity of 82%.
- Patient health questionnaire.[7] It is a self-reported 9-item questionnaire used to screen for depression. In our study, we used the English or vernacular version of the PHQ-9 (depending on the patient's choice) to screen for depression.[7] Scoring system: no or minimal depression (0–4), mild depression (5–9), moderate depression (10–14), moderately severe (15–19), severe depression (20–27). The cutoff score to diagnose depression was selected as 10 based on the study by Kroenke et al. which showed a sensitivity and specificity of 88%.[7]

Sample Size Determination

From past data from North India,[8] considering the prevalence of depression as 7.12%, 95% level of confidence, and 5% absolute allowable error, we adopted the formula to find the sample size:
Where the prevalence (p) = 0.0712,

$$n = \frac{(Z_{0.975})^2 \times p \times q}{d^2}$$

$q = 1-p = 0.9288$
Absolute error (d) = 0.05
Upper 2.5% area of a normal deviate ($Z_{0.975}$) = 1.96
Estimated sample size, $n = 102$

A list was prepared to take all perinatal mothers who attended at the ANC clinic or delivered at the hospital during the stipulated period and from the list, 124 mothers were selected by simple random sampling using random number method, although the estimated sample size was 102.

Data Analysis

Collected data were analyzed using Microsoft Excel. The percentages, mean, standard deviation of the variables considered were calculated wherever necessary and comparisons were made. Statistical tests of significance namely Chi-square and Student's *t*-tests were used to find the significant difference between different variables at 5% level. Karl Pearson's method was used to find correlation coefficients between (i) age and anxiety score, (ii) age and depression score, and (iii) anxiety and depression score. Regression equations of (i) age on anxiety score (ii) age on depression score (iii) anxiety on depression score, and (iv) depression on anxiety score were also found in order to estimate the dependent variable if the values of the independent variables are known.

Results

In total, 35.5% (n = 44) antenatal and 64.5% (n = 80) postnatal mothers completed the survey. The mean age was 30.6 years (SD = 4.13) ranging from 22 to 40 years (range 40–22 = 18 years) 66.9% had completed graduation. The mean level of anxiety measured by the GAD-7 was 6.7 (SD 3.4); 29% (n = 36) had none or minimal presence of anxiety, 46% (n = 57) had sum scores indicating mild, 21.8% (n = 27) moderate, and 3.2% (n = 4) severe anxiety. The mean level of depression measured by the PHQ-9 was 7 (SD = 4.1); 33.1% of participants (n = 41) had none or minimal symptoms of depression, 37.9% (n = 47) had sum scores indicating mild, 22.6% (n = 28) moderate, 5.6% (n = 7) moderately severe and 0.8% (n = 1) severe depression. The last item of the PHQ-9 is an indicator of suicidal thoughts; 2.4% (n = 3) answered "yes" to this item, indicating the presence of risk. In perinatal mothers with a past history of anxiety or depression, the percentage of anxiety and depression was observed to be 87.5%, which is significantly more than the mothers without any past history of anxiety (20.7%) and depression (25%). This difference was observed to be statistically significant at 5% level. Among perinatal mothers having anxiety scores less than 10, the percentage of depression was found to be 14%, whereas

the percentage of depression was 74% in mothers having anxiety scores of 10 and above. This difference was statistically significant at the 5% level. The correlation coefficient between anxiety score and depression score (r) was obtained as 0.6494 (*positive correlation*). Test of significance was applied using Student's t-test $r > 0$ and found to be significant ($t = 9.4335$, $p < 0.0005$, significant at 5% level) 95% confidence interval was obtained as 0.534–0.741.

Regression equations were calculated on:

- Anxiety score on age
- Depression score on age
- Depression on anxiety score
- Anxiety on depression score
- Considering X as age and anxiety score as Y, the regression equation of anxiety score on age: $Y = -0.07568X + 9.0221$
- Considering X as age and Y as depression score, the regression equation of depression score on age: $Y = -0.09934X + 10.0596$ (Fig. 1)
- Regression equation of depression (Y) on anxiety score (X): $Y = 0.78007X + 1.79015$
- Regression equation of anxiety (Y) on depression score (X): $Y = 0.5407X + 2.91172$

Discussion

WHO's the definition of health is a holistic approach that includes the physical, mental, and social wellbeing of an individual. Maternal health thus encompasses both the physical and mental health of the mother during pregnancy, childbirth, and postnatal period so that a mother can lead a meaningful, fulfilling life and contribute to the family and society at large. However, in India, discussions on mental health are still considered taboo. Few research papers are available in the electronic database to give us an idea about the pre-covid burden of anxiety and depression in antenatal and postnatal mothers. For pre-COVID prevalence rates of perinatal anxiety and depression, we selected a cross-sectional study from a tertiary care center of North India[9] because our study was also conducted in a similar tertiary care medical college in Eastern India. Unfortunately, we could not find any data on the pre-covid prevalence of perinatal anxiety and depression in Eastern India. In the above study from North India conducted by Goyal et al.,[10] anxiety disorders and depression were seen in 1.41 and 7.12%, respectively. However, in our study conducted during the pandemic, we found anxiety and depression in 25 and 29.03% of perinatal women, respectively. This significant increase can be attributed to the state of socioeconomic instability and mass fear and hysteria created by the COVID-19 pandemic. In our study, age or perinatal status did not have any statistically significant influence on anxiety or depression levels. However, we found a negative correlation between age and anxiety and age and depression using Karl Pearson's correlation (Table 1). This result of negative correlation between age and depression was also found in a study by Rich-Edwards et al.[11] However, a study by Fisher et al. found that older age had a positive correlation with depression scores. A study from South India by Srinivasan et al. showed that age had no significant relation with depression scores.[12] This could be due to the difference in the type of scale used to measure depression in our study (PHQ-9) vs. the Edinburgh postnatal depression scale which was used in the above study.

Past history of psychiatric illness is a strong predictor for psychiatric problems in antenatal and postnatal mothers. This has been validated by several studies all over the world, including the population-based study by Rich-Edwards.[11] In our study, the association between past history and current anxiety/depression scores was found to be statistically significant (Tables 2 and 3). Similarly, in our reference study from North India, the presence of anxiety and depression had a significant association with past history of psychiatric illness.[10] Among perinatal mothers having anxiety less than 10, percentage of depression was 14% whereas among mothers having anxiety ≥10, percentage of depression was 74%. This difference was observed to be statistically significant at 5% (Table 4). This is supported by the systematic review by Biaggi et al. which clearly showed that depression and anxiety are highly coexistent during the antenatal period and high anxiety during pregnancy is one of the strongest risk factors for antenatal depression.[13] The pandemic and the administrative measures to control its spread (lockdown extending up to several weeks) has caused the crashing of the global economy leading to mass-scale unemployment and salary cuts. This economic insecurity and uncertainty about the future have affected the mental health of expecting and postnatal mothers in a significant way. In our study, the association between economic instability (unemployment, salary cuts, unprecedented medical expenses) and high scores of anxiety and depression were found to be statistically significant with a p-value ≥0.05 (Table 1). In our study, the majority (71.77%) of the women reported being worried about the pandemic and its consequences, showing a statistically significant association

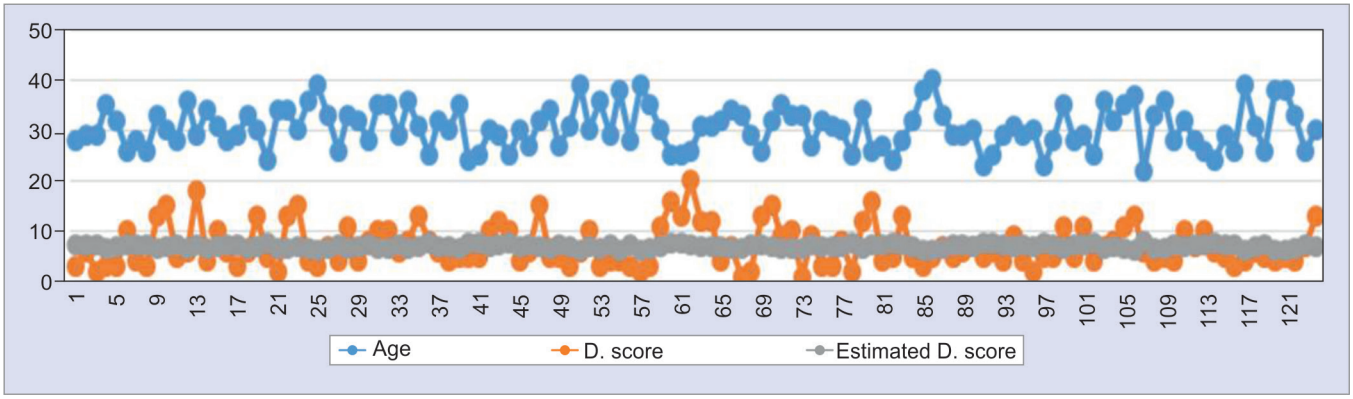

Fig. 1: The diagram shows the age (X) according to D. score (Y) and estimated D. score by the regression equation $Y = 10.0596 - 0.09934X$ of 124 patients

Table 1: Sociodemographic variables and their relation to anxiety (A) score and depression (D) score

Variables	*n (%)*	*Mean*	*S.D (95% CI)*	*p value (A score)*	*p value (D score)*
Age (in years)					
<30	54 (43.55)	30.60	4.13	$r = -0.09$	$r = -0.10$
≥30	70 (56.45)		(29.87–31.33)	$\chi^2 = 6.14$	$\chi^2 = 7.73$
				$p = 0.19$	$p = 0.10$
Perinatal status					
Antenatal	44 (35.48)			$\chi^2 = 5.19$	$\chi^2 = 3.11$
Postnatal	80 (64.52)			$p = 0.07$	$p = 0.21$
Education					
Undergraduate	41 (33.06)			$\chi^2 = 1.47$	$\chi^2 = 0.14$
≥graduate	83 (66.94)			$p = 0.23$	$p = 0.70$
Past h/o A/D					
Yes	8 (6.45)			$\chi^2 = 14.43$	$\chi^2 = 11.32$
No	116 (93.55)			(Yates correction)	(Yates correction)
				$p = 0.000145$	$p = 0.000768$
Economic instability					
Yes	59 (47.58)			$\chi^2 = 4.75$	$\chi^2 = 7.41$
No	65 (52.42)			$p = 0.029246$	$p = 0.00649$
Death/affection in family due to COVID-19					
Yes	16 (12.90)			$\chi^2 = 18.75$	$\chi^2 = 18.84$
No	108 (87.10)			$p = 0.000015$	$p = 0.000014$
Worry*					
Yes	89 (71.77)			$\chi^2 = 2.24$	$\chi^2 = 4.52$
No	35 (28.23)			$p = 0.134265$	$p = 0.033431$
Doctor's support helped					
Yes	85 (68.55)			$\chi^2 = 17.07$	$\chi^2 = 20.70$
No	39 (31.45)			$p = 0.000036$	$p < 0.00001$

*Worry about not getting timely medical aid due to Lockdown

Table 2: Past history × anxiety score

Past history	*<10*	*≥10*	*Total*
Yes	1	7	8
No	92	24	116
Total	93	31	124

$\chi^2 = 14.43$ (Yates correction); $p = 0.000145$; $p < 0.05$; Significant

Table 3: Past history × depression score

Past history	*<10*	*≥10*	*Total*
Yes	1	7	8
No	87	29	116
Total	88	36	124

$\chi^2 = 11.32$ (Yates correction); $p = 0.000768$; $p < 0.05$; Significant

Table 4: Anxiety in relation to depression at different levels

	Depression		
Anxiety	*<10*	*≥10*	*Total*
<10	80	13 (14.0)	93
≥10	8	23 (74.0)	31
	88	36	124

$\chi^2 = 40.9158$; $p < 0.00001$; $p < 0.05$; Significant

with high depression scores (Table 1). This could be attributed to (a) social alienation due to lockdown measures adopted by the administrative authorities (b) worry about not being able to receive timely, appropriate medical and obstetric care due to transportation problems, and (c) lack of support from family and friends due to intra and interstate movement restrictions during the lockdown. An online cross-national survey with 7,562 participants was conducted in 64 countries between May 26, 2020, and June 13, 2020, by Basu et al. It studied the various factors which affected the mental health of antenatal and postnatal women during the COVID-19 pandemic.[14] It was found that worries related to mother and child infection, loneliness, and lack of family support during confinement were the most common thoughts disturbing perinatal women.

In our study, 12.9% of the women reported death or hospitalization due to COVID-19 among family members. In these women, significantly elevated levels of anxiety and depression were seen compared to those who fortunately didn't have to face this ordeal. Inability to meet/see their loved ones during hospitalization and death was a major factor for this mental state. However, the majority (85%) of the women in our study reported a definite improvement in their mental wellbeing when they could contact their treating doctor in person or online. This clearly shows that the empathetic attitude and availability of health care professionals go a long way in maintaining the mental health of perinatal women, thus enabling them to cope with this unprecedented crisis.

Conclusion

Coronavirus disease-2019 pandemic has definitely impacted the mental health of perinatal women with elevated levels of anxiety and depression due to multiple predisposing factors. In these uncertain times, we clinicians play an important role in safeguarding the physical and mental health of our patients. We need to be extra vigilant to look out for early signs of anxiety and depression among this vulnerable group in order to facilitate early diagnosis and management of mental problems and to prevent complications affecting maternal, fetal, and neonatal health.

Limitations of the Study

Since it was a cross-sectional study, it was not possible to establish causal conclusions. Since we conducted our study on a sample population attending a tertiary medical college in a capital city, the findings do not represent the general population living in suburbs and smaller towns. Since our sample population was city-based, there was a higher mean age and education level compared to the general population. Moreover, since the pandemic is still going on with cumulative effects and newer challenges are coming up with every wave, the findings of our cross-sectional study just represent a particular time frame in the pandemic.

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