Original Research Article

Screening of prenatal depression and anxiety among antenatal women and their association with fear of Coronavirus disease during the COVID-19 pandemic in Coastal Karnataka, India

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ABSTRACT

Background: A vulnerable population like pregnant mothers may have several concerns and anxieties about the impact of coronavirus disease 2019 (COVID-19) infection on pregnancy outcomes and the unborn fetus. However, there is no definitive information on the effect of COVID-19 on the mental health of pregnant women in our population. We aimed to study the prevalence of depression, anxiety, and COVID-19 related anxiety among antenatal women during the COVID-19 pandemic.
Methods: This was a cross-sectional study performed on all antenatal women irrespective of their trimester. Depression, anxiety and COVID-19 related anxiety were assessed using Patient Health Questionnaire-9, Generalized Anxiety Disorder-7 and COVID-19 Anxiety Syndrome scale respectively.
Results: 381 antenatal women responded to the questionnaire. Though the prevalence of clinically significant anxiety and depression was 1.3% and 1%, 74% of them had subsyndromal anxiety and 80.6% had subsyndromal depression. Those with significant anxiety scores had higher COVID-19 anxiety. In contrast, those with significant depression had lower COVID-19 anxiety. Antenatal women who feared of various complications in pregnancy due to COVID-19 (like preterm birth, anomalous baby, fetal growth restriction, fear of getting infected with Coronavirus) had significantly higher COVID-19 anxiety.
Conclusions: The prevalence of clinically significant anxiety and depression was 1.3% and 1%. However, three fourth of the participants suffered from subsyndromal anxiety and depression. Therefore, there is a need to identify antenatal women with subsyndromal anxiety and depression and provide psychosocial support to them during the crisis. Good communication, reassurance, providing care and support to pregnant women should be prioritized during the COVID-19 pandemic to avoid increased levels of anxiety and depression.

Keywords: Depression, Anxiety, Antenatal, Subsyndromal anxiety, Subsyndromal depression, COVID-19 pandemic

INTRODUCTION

Pregnancy is a period of joy and hopeful expectation. However, it is also a period of tremendous stress and psychosocial changes, increasing their vulnerability for the onset or relapse of mental health problems.[1] It is observed that at least one in ten mothers in all strata of society experience clinical depression and anxiety before and up to a year after childbirth, hence need special attention.[2] Depression and anxiety during pregnancy have been linked with several adverse outcomes for both women and their children, leading to poor perinatal outcomes, impaired mother-to-child bonding, cognitive and behavioural changes in children.[3]

Major public health emergencies like the Coronavirus Disease 2019 (COVID-19) pandemic have shown to cause anxiety in pregnant women about several aspects of childbirth, including prenatal and postnatal care.[4,5] A vulnerable population like pregnant mothers may have several concerns and anxieties about the impact of COVID-19 infection on pregnancy outcomes and the unborn fetus.[6,7] However, there is no definitive information on the effect of COVID-19 on the mental health of pregnant women in our population.

We aimed to study the prevalence of depression, anxiety, and also COVID related anxiety among antenatal women who visited our outpatient department during the COVID-19 pandemic.

METHODS

Study design and recruitment of participants

This cross-sectional study was performed for a duration of 3 months in a tertiary care referral hospital in coastal Karnataka, in South India. The institutional ethics committee (Kasturba Medical College and Kasturba Hospital) approved the study. All the antenatal women presenting to the Obstetrics and Gynecology department, irrespective of their trimester, were invited to complete the study questionnaire during their regular antenatal visit. Women with non-viable pregnancy, fetal anomaly, multiple gestations, suspected or confirmed COVID-19 infection were excluded from the study.
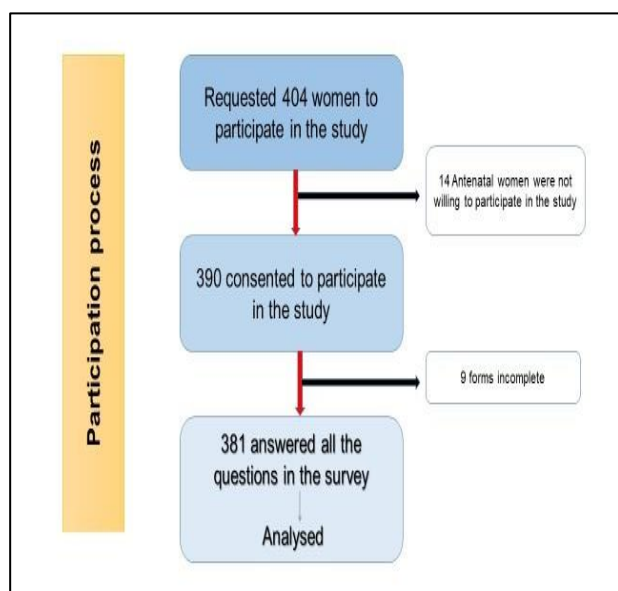

Figure 1: Participation process.

Questions pertained to the sociodemographic characteristics, obstetric history, parity index, history of mental health problems, pregnancy complications, and source of information about the Coronavirus pandemic.

We requested 404 antenatal women to participate in the study. Fourteen were not willing to participate, three hundred ninety consented to participate. Since nine forms were incomplete, they were excluded from the study. Three eighty-one pregnant women answered all the questions in the survey and analysed them (Figure 1).

Assessment criteria

Depressive symptoms were measured by Patient Health Questionnaire-9 (PHQ-9), a validated screening tool for perinatal depression.[8] The PHQ-9 is a self-administered questionnaire, which scores each of the 9 Diagnostic and Statistic Manual of Mental disorders (DSM) IV criteria for depression as "0" (not at all) to "3" (nearly every day) over the last two weeks. As a severity measure, the PHQ-9 score can range from 0 to 27. In the present study score of less than five was considered as "no depression," the score of 5 to 10 as "Subsyndromal Symptomatic Depression" (SSD), and a score of more than ten as depression.

Anxiety symptoms were measured by the Generalized Anxiety Disorder scale 7 (GAD-7), a seven-item self-reported questionnaire. It is validated for screening and to measure the severity of generalized anxiety disorder and other anxiety disorders. It is scored from "0" (not at all) to "3" (nearly every day), over the last two weeks, with scores ranging from 0-21.[9] In the present study, we considered a score of less than five as "No anxiety," a score of 5-10 as "Subsyndromal Anxiety" (SSA), and a score of more than ten as an anxiety disorder.

The word "Subsyndromal" describes a person exhibiting symptoms similar to but not severe enough for diagnosis as a clinically recognized syndrome. When applied to depression, subsyndromal depression (SSD) indicates that a person's depression symptoms do not quite meet the criteria for a diagnosis of major depressive disorder.[10] When applied to anxiety disorder, SSA indicates the mental state of having anxiety symptoms not fulfilling criteria for anxiety disorders.[11]

Anxiety related to the Coronavirus pandemic was assessed by the COVID-19 Anxiety Syndrome Scale (C-19ASS).[12] A series of statements regarding people's ways of dealing with the threat of Coronavirus (COVID-19) were scored on a five-point Likert-type scale which indicates their level of agreement over the last two weeks- thus identifying the presence of anxiety features associated with the COVID-19 pandemic. The higher the score, the more is the COVID-19 related anxiety.

To evaluate the maternal concern about perinatal complications induced by COVID-19 infection, the following fears were considered: Fear of having fetal structural anomalies, fetal growth restriction (FGR), preterm birth, and vertical transmission of the disease from mother to the newborn.

Outcome measures

Primary outcome

Prevalence of depression, anxiety, and COVID-19 related anxiety among antenatal women during COVID-19 pandemic.

Secondary outcome

Association between anxiety and depression versus COVID-19 anxiety syndrome and association between various pregnancy complication fears among antenatal women versus COVID-19 anxiety syndrome.

Statistical analysis

Data were coded and recorded in the Microsoft Excel spreadsheet program. SPSS version 22 (IBM Corp.) was used for data analysis. Descriptive statistics were elaborated in the form of means/standard deviations, medians/IQRs for continuous variables, and frequencies and percentages for categorical variables. Group comparisons for continuously distributed data were made using the independent sample 'to test. For non-normally distributed data, appropriate non-parametric tests in the form of the Wilcoxon test were used. A chi-squared test was used for group comparisons for categorical data. In case the contingency tables' expected frequency was <5 for >25% of the cells, Fisher's Exact Test was used. Linear correlation between two continuous variables was explored using Pearson's correlation (if the data were normally distributed) and Spearman's correlation (for non-normally distributed data). A p<0.05 was considered statistically significant.

RESULTS

Baseline characteristics

In the current study, 381 antenatal women completed the questionnaire and were analyzed. Two hundred thirty-eight (62.5%) of the participants belonged to the age group of 21-30 years, 139 (36.5%) of the participants belonged to the age group of 31-40 years, and four (1.1%) of the participants were aged between 41-50 years. The mean age of the participants was 29.54±4.14 years. The socioeconomic status of the majority of the participants was of the lower middle class (73%). One eighty-nine (49.6%) of the participants were primigravida, and 192 (50.4%) were multigravida.

The majority of the participants belonged to the third trimester– 358 (94%) with the mean gestational age of 35.93±5.09 weeks. Two hundred twenty-four (58.8%) of the participants belonged to high-risk pregnancies. The majority of them did not have any psychiatric illness in the past except one who was a known case of depression on treatment (Table 1).

Source of information

We collected information regarding the source of their information about COVID-19 pandemic and its effects on pregnancy and childbirth. Figure 2 shows that majority of them had their information from either social media (72%) or family/ friends (60%). The information got from a reliable source (i.e., health care professionals) was only 15%.

Table 1: Sociodemographic characteristics and clinical details of the study sample (n=381).

Sociodemographic characteristics and clinical details	N (%)
Age (years)	
21-30	238 (62.5)
31-40	139 (36.5)
41-50	4 (1.0)
Socioeconomic status	
Upper	8 (2.1)
Upper middle	68 (17.8)
Lower middle	278 (73.0)
Upper lower	21 (5.5)
Lower	6 (1.6)
Obstetric score	
Primigravida	189 (49.6)
Multigravida	192 (50.4)
Trimester	
First	5 (1.3)
Second	18 (4.7)
Third	358 (94.0)
High risk pregnancy	224 (58.8)
Psychiatric illness	
None	380 (99.7)
Depression	1 (0.3)

Table 2: Assessment of depression (PHQ-9 Score) and anxiety (GAD-7 Score) among antenatal women (n=381).

Depression and anxiety scoring		Number of antenatal women, N (%)
PHQ-9 score[a]		
No depression	<5	70 (18.4)
Subsyndromal depression (SSD)	5-10	307 (80.6)
Depression	>10	4 (1.0)
GAD-7 score[b]		
No anxiety	<5	94 (24.7)
Subsyndromal anxiety (SSA)	5-10	282 (74.0)
Anxiety	10-15	4 (1.0%)
	>15	1 (0.3%)

[a]Mean PHQ-9 score: 6.35±2.21, [b]Mean GAD-7 Score: 5.60±2.27.

Table 3: Association between anxiety, depression Versus Covid-19 Anxiety Syndrome Scale (n=381).

Parameters	C-19 ASS	P value
GAD-7	Correlation coefficient (rho)=0.16	0.002[1]
GAD-7 category		0.001[b]
<5	16.99±8.16	
5-10	19.76±6.92	
10-15	24.50±2.52	
>15	27.00±0	
PHQ-9	Correlation coefficient (rho)=0.01	0.867[a]
PHQ-9 category		0.011[b]
<5	19.49±8.49	
5-10	19.24±6.90	
11-15	6.00±6.93	

[a]Spearman's Correlation, [b]Kruskal Wallis Test (Post hoc Mann-Whitney test).

Table 4: Association between various fears among antenatal women versus COVID-19 Anxiety Syndrome Scale (n=381).

Fears	C-19 ASS	P value[a]
Fear of structural anomalies		<0.001
Yes	23.37±7.94	
No	17.13±6.07	
Fear of preterm delivery		<0.001
Yes	23.16±7.81	
No	17.36±6.35	
Fear of retarded growth		0.020
Yes	20.45±7.68	
No	18.45±7.05	
Fear of corona infection		<0.001
Yes	19.71±7.11	
No	14.72±7.61	

[a]Wilcoxon-Mann-Whitney U Test.

Knowledge regarding the Impact of COVID-19 infection on pregnancy and childbirth

Among the sample, 338 (88.7%) of pregnant women feared getting coronavirus infection in pregnancy. Pregnant women thought that they are more likely to get infected with Coronavirus than the general population. One hundred twenty-three (32.3%) of them had a fear of structural anomalies in the fetus due to coronavirus infection, 117 (30.7%) had a fear of going into preterm labor, and 132 (34.6%) had a fear of fetal growth restriction due to COVID-19 infection (Figure 3).

Prevalence of depression and anxiety in antenatal women

Seventy (18.4%) women had no depression, 307 antenatal women (80.6%) had sub-syndromal depression, and four

(1%) had depression (Table 2). The mean PHQ-9 score was 6.35±2.21.

Ninety-four (24.7%) antenatal women had no symptoms of anxiety, 5 (1.3%) had an anxiety disorder, and 282 (74%) had sub-syndromal anxiety. The mean GAD-7 score was 5.60±2.27.

Assessment of COVID related anxiety by COVID-19 Anxiety Syndrome Scale (C19-ASS)

The variable C-19ASS was not normally distributed (Shapiro-Wilk Test: p≤0.001). The mean (SD) of C-19ASS was 19.14 (7.33). The median (IQR) of C-19ASS was 18.00 (14-24). The C-19ASS ranged from 0-36.

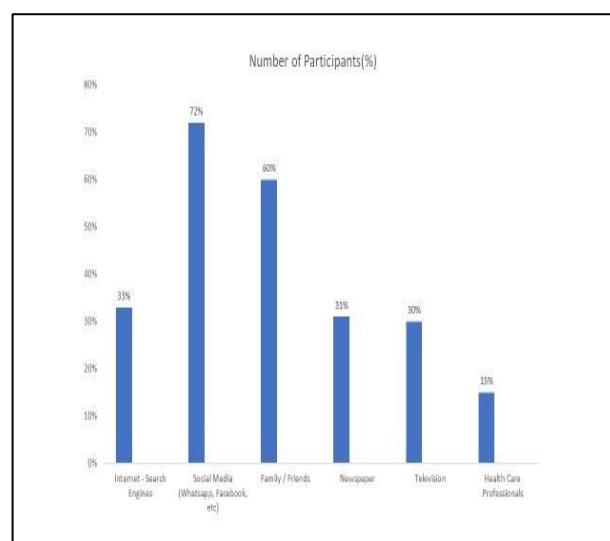**Figure 2: Source of information about COVID-19.**

Association between anxiety and depression versus COVID-19 ASS

Those with significant anxiety scores (GAD-7 score >10) had significantly high C-19 ASS compared to those with GAD-7 scores below 10, as shown in Table 3 with a significant p value of 0.001. In contrast, those with considerable depression (PHQ-9 score >10) had lower COVID-19 anxiety (C-19ASS of 6.00±6.93) with a significant p value of 0.011.

Association of fears of various pregnancy complications among antenatal women with COVID-19 related anxiety

The COVID-19 related anxiety among those women who had fears of various pregnancy complications is summarized in Table 4. Antenatal women who feared structural anomalies in the fetus due to Coronavirus, fear of having preterm labor, fear of fetal growth restriction, and fear of getting infected with Coronavirus during pregnancy had higher C19ASS scores compared with those without (p<0.001).
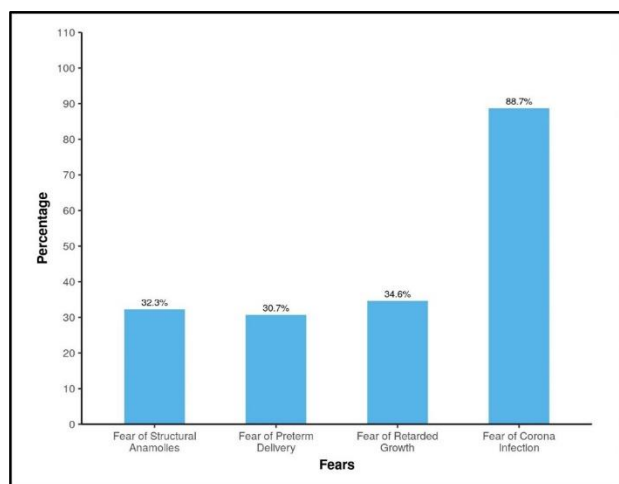
Figure 3: Fear among the antenatal women about various complications in pregnancy due to COVID-19.
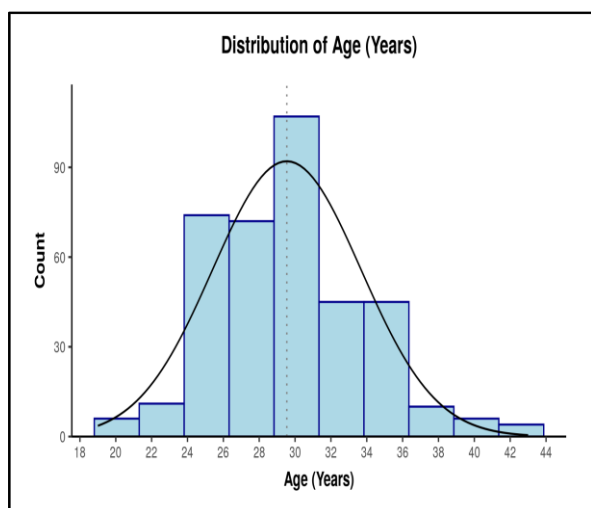

Figure 4: Distribution of the participants according to their C-19ASS (n=381).

DISCUSSION

In the present study majority of the antenatal women relied on social media, family, and friends as a source of information about Coronavirus infection. Our result reflected the previous studies, which showed that increased use of social media amplifies mental health illness and further increasing the perceived risk of coronavirus infection.[13]

In our study population, only 1% of antenatal women had depression. However, 80.6% of them had sub-syndromal depression, which was a matter of concern because these women are at higher risk for progressing to major depressive disorder.[10] Similarly, though only 1.3% had a syndromal anxiety disorder, 74% reported sub-syndromal anxiety symptoms, which are alarming.

Studies on the mental health of antenatal women during COVID times have come out with varied results. An online

survey conducted among obstetricians at the National Institute of Mental Health and Neurosciences (NIMHANS), India, to understand their obstetric patients' concerns about COVID-19. Forty percent of the antenatal women under their care reported to them regarding COVID-19 related anxiety, and 14.4% tested COVID positive. The majority of the calls received for COVID-related anxiety were those in the third trimester.[7]

A cross-sectional study was conducted in China at the beginning of the COVID outbreak regarding mental health status among antenatal women using the Edinburgh Postnatal Depression Scale. The study provided a unique opportunity to compare the mental status of pregnant women before and after the declaration of the COVID-19 epidemic. Pregnant women assessed after the declaration of coronavirus disease 2019 epidemic had significantly higher rates of depressive symptoms (26.0% versus 29.6%, p value 0.02) than women assessed before the epidemic declaration.[14]

Anandhi et al in their study, compared depression, anxiety, and stress among covid positive and negative antenatal women using the Depression, Anxiety and Stress Scale - 21 (DASS-21).[15] They found that all pregnant women, irrespective of their COVID status, had a significant psychological impact.

Tomfohr-Madsen et al conducted a meta-analysis on mental health illness during the COVID-19 pandemic: Depression was assessed in 37 studies (n=47,677), with a pooled prevalence of 25.6%, anxiety assessed in 34 studies (n=42,773), with a pooled prevalence of 30.5%. The prevalence of anxiety was higher in studies conducted later in the pandemic, probably due to exposure to chronic stressors and ongoing uncertainty.[16]

In the current study, those with significant anxiety scores on GAD-7 had higher COVID-19 anxiety, which is expected. In contrast, those with significant depression had lower COVID-19 anxiety. The reason for this finding is not very clear. There is a possibility that significant depressive symptoms could protect them against COVID-related concerns. Hence, the scores on the COVID-19 Anxiety Scale were lower.

The study population who feared various complications in pregnancy due to COVID-19 had significantly higher COVID-19 anxiety. Anxiety symptoms during pregnancy are considered an independent risk factor for adverse pregnancy outcomes. Women with antenatal anxiety are more prone to develop obstetric complications like preterm labor, pre-eclampsia, prolonged labor, fetal growth restriction, low Apgar score, postpartum depression, and poor mother-infant bonding.[17]

The brain undergoes significant changes in structure and function during the peripartum period, which are generally thought to be adaptive for facilitating maternal bonding towards the newborn.[18] Studies have shown a significant

degree of plasticity in structure and function in the mammalian brain during the peripartum period, which is thought to help cognitive and behavioral changes in the mother to face the challenges of this time.[18,19] Though a growing number of women have peripartum mental illness, our understanding of its neurobiology is still in its infancy. Researchers who studied the structural changes in the human brain during pregnancy and the postpartum period have revealed global and specific reductions in grey matter volume (GMV) in the postnatal period compared with pre-pregnancy. There is a reduction in cortical volume, thickness, and surface area reductions in sulcal depth and increases in sulcal width, cortical adaptation due to hormonal changes.[20] Anatomical changes during the peripartum period help to facilitate mother-infant bonding and caregiving behaviour in the mother.[21] In addition to these structural changes, the brain also manifests functional neuroplasticity during this period which is essential for mothers to cope with parenting stressors.[22] Exacerbation of these peripartum neuronal changes may negatively impact these so-called adaptive changes in the maternal brain, leading to peripartum mental illness.[23]

Neuroendocrine and immunological changes cause changes in brain function, causing altered stress reactivity, emotional processing, and homeostatic mechanisms, bringing up complex maternal behaviours and, possibly, the potential for dysfunction in the brain and behaviour levels.[24]

COVID-19 is a chronic stressor that is detrimental to the mental and behavioural health of these antenatal women. Chronic stress impairs the prefrontal cortical functions, which are very important for coping up with the consequences of the COVID-19 pandemic.[25]

Screening for perinatal depression and anxiety should be considered a priority during an international public health crisis like the COVID-19 pandemic. In any public health emergency, feelings of uncertainty, fear, and stigmatization are common and may act as help-seeking barriers to appropriate mental health interventions. Under such circumstances, screening and management of perinatal mental health through virtual care approach is essential.

Limitations

This was a single center, hospital-based study; hence may not represent the general population. We could not compare the prevalence of depression before and after the national declaration of the COVID-19 pandemic. Another limitation is the assessment of depressive and anxiety symptoms relied on a self-reported measure.

CONCLUSION

The prevalence of clinically significant anxiety and depression was 1.3% and 1%. However, three fourth of the participants suffered from subsyndromal anxiety and

depression. Therefore, there is a need to identify antenatal women with subsyndromal anxiety and depression and provide psychosocial support to this population during the crisis. Good communication, reassurance, providing care and support to pregnant women should be prioritized during the COVID-19 pandemic to avoid increased levels of anxiety and depression.

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