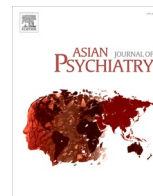




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Anxiety among pregnant women during the COVID-19 pandemic in India – A multicentric study

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ABSTRACT

While higher anxiety during antenatal period cause several maternal and foetal health related complications, lower anxiety levels are found to be associated with lesser “precautionary behaviours” and consequently greater risk of infection, during the COVID-19 pandemic. In this study, we aimed to assess rates and determinants of generalized anxiety at the time of the pandemic as well as anxiety that was specific to the context of being pregnant during the COVID-19 pandemic. (COVID-19-antenatal anxiety) in Indian women. This hospital-based, cross-sectional study using face-to-face interviews was conducted at antenatal clinics of five medical college hospitals in India. The Generalized Anxiety Disorder-7 scale (GAD –7) and a customized scale to assess antenatal COVID-19 anxiety along with other tools that assessed social support and COVID-19-risk perception were administered to 620 pregnant women. We found that the percentage of women with moderate or severe anxiety based on GAD –7 was 11.1%. Multivariate analysis showed that higher COVID-19-risk perception, greater antenatal COVID-19 anxiety and lower perceived support significantly predicted moderate and severe generalized anxiety. Greater number of weeks of gestation, lower education, semiurban habitat and lower perceived social support were significant predictors of antenatal COVID-19 anxiety. We conclude that the rates of anxiety in pregnant women though not very high, still warrant attention and specific interventions.

1. Introduction

Pregnant women are vulnerable to develop anxiety disorders in varying severity, across the three trimesters. Globally, the prevalence of anxiety symptoms and disorders during pregnancy have been found to be 22.9% and 15.2%, respectively (Dennis et al., 2017); the range (1–26%) however is very broad (Dennis et al., 2017; Jha et al., 2018). The Low and Middle Income Countries (LAMIC), including India, have a higher rate of anxiety disorders (Dennis et al., 2017; Nath et al., 2019; Priya et al., 2018). In India, the rates of common mental disorders in the antenatal period are approximately 22% and include anxiety, depression and stress related disorders (Kalra et al., 2021). While some amount of anxiety during pregnancy is considered ‘normal’, higher levels of anxiety requiring clinical attention are not uncommon, as data from India shows. In fact, the rates of certain anxiety disorders are more common in pregnant women compared to the general population (Viswasam et al., 2019). Moreover, a form of anxiety that is specifically related to worries and fears about pregnancy, childbirth (tocophobia), infant health and parenting– the “pregnancy specific anxiety (PSA)” has also been recognized (Chandra and Nanjundaswamy, 2020). Strained marital relationship, perceived lack of social support and violence during pregnancy, lower education and unemployment have been identified as risk factors for anxiety disorders during pregnancy (Kalra et al., 2021). Further, antenatal anxiety disorders have been associated with several adverse maternal and neonatal consequences. When left untreated, they may be associated with postpartum depression, suicidal behaviour, preeclampsia and preterm birth, as well as low birth weight and impaired neuro-behavioral and socio-emotional development of the child (Cantwell, 2016; Kinsella and Monk, 2009; Madigan et al., 2018).

During the COVID 19 pandemic, pregnant women are faced with an

array of concerns and worries related to health of the woman herself, her unborn foetus as well as the family. These are related to fear of infection, lack of social connectedness due to social isolation, limited access to antenatal care as well as other social and financial problems. In fact, pregnant women from India have reported concerns regarding contracting the COVID-19 infection, safety of their infant, safety related hospital visits, methods of protection against COVID-19 and anxieties related to social media messages to their obstetricians (Nanjundaswamy et al., 2020). Anxiety about contracting the COVID-19 infection has been found to be directly related to “precautionary behaviours”, which would reduce the risk of infection (Shiina et al., 2020) and likely be beneficial to pregnant women in reducing negative maternal and neonatal outcomes. However, clinically significant levels of such anxiety/fear of COVID-19, also named “coronaphobia”, is now being understood as a distinct entity that is associated with dysfunction similar to other anxiety disorders (Arora et al., 2020). Anxiety/fear of COVID-19 during pregnancy has been found to directly and positively correlate with occurrence of a mental health ‘disorder’ (Salehi et al., 2020). Rates of anxiety in general are higher in the population during the pandemic (Xiong et al., 2020), which may also be reflected in pregnant women. In fact, Indian studies reported that COVID related anxiety is greater in females (Sahu et al., 2021).

Recent meta-analyses have suggested that the overall pooled prevalence of anxiety among pregnant women during the COVID-19 pandemic is 42% (Fan et al., 2021) and 43% (Zhang et al., 2021) (range: 3–82%). Our updated literature search found 35 relevant studies (Table S1). Eight studies each have been reported from Europe and American continents, and 17 studies are reported from Asia, of which only one study (Anandhi et al., 2021) that assessed anxiety in pregnant women who were COVID positive, compared to those who were COVID

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negative) was from India. Antenatal anxiety during the COVID-19 pandemic has been found to be related to employment status (Ceulemans et al., 2021; Wu et al., 2020), educational level (Effati-Daryani et al., 2020; Mappa et al., 2020; Mei et al., 2020), income (Berthelot et al., 2020; Liu et al., 2020; Patabendige et al., 2020; Wu et al., 2020), parity (Hamzehgardeshi et al., 2021; Ding et al., 2021; Mappa et al., 2020; Wu et al., 2020) and trimester (Saadati et al., 2021; Saccone et al., 2020). COVID-19 anxiety/fear, perceived social support and risk perception of COVID-19 too have been reported as significant determinants of antenatal anxiety (Ayaz et al., 2020; Bavel et al., 2020; Effati-Daryani et al., 2020; Dagklis et al., 2020; Ding et al., 2021; Farewell et al., 2020; Hamzehgardeshi et al., 2021; Hossain et al., 2020; Jiang et al., 2021; Kuang et al., 2020; Lebel et al., 2020; Moyer et al., 2020; Özmete and Pak, 2020; Patabendige et al., 2020; Saccone et al., 2020; Yue et al., 2020).

In this study, our primary aim was to assess the rates of anxiety in pregnant women attending antenatal clinics in different geographical locations in India through face-to-face clinical interviews. Further, as anxiety/fear of COVID-19 during pregnancy and “pregnancy specific anxiety” during COVID-19 are closely related (Corbett et al., 2020), we aimed to assess anxiety that is specific to the composite context of COVID-19 and pregnancy in addition to generalized anxiety. The secondary aim of the study was to determine the various demographic and clinical predictors of generalized and antenatal COVID-19 anxiety. Further, we also assessed the role of perceived social support and risk perception of COVID-19.

2. Methodology

2.1. Setting and sample

This hospital based cross-sectional study was conducted at antenatal clinics of five medical college hospitals in India - All India Institute of Medical Sciences (AIIMS) Raipur; Lady Hardinge Medical College (LHMC), New Delhi; Pt. JNM Medical College, Raipur; Shri Guru Ram Rai Institute of Medical and Health Sciences, (SGRR IMHS), Dehradun; and Hi-Tech Medical College, Bhubaneswar. While the former three centres are Government colleges, the latter two are private. The study had the approval of the institutional ethics committee (IEC) of the primary study site (1147/IEC-AIIMSRPR/2020). Subsequently, IEC approvals or waivers for review from other study sites were received. Data was collected between August and October 2020. These locations were chosen as they represented different geographies, were seeing women for face-to-face antenatal care and were willing to participate in the study.

Women attending antenatal clinics at the study centres- (a) with confirmed pregnancy (b) gestational period < 36 completed weeks and (c) willing to give written informed consent were included in the study. Pregnant women with current history of any psychotic disorder were excluded. Across study sites, a total of 750 women were approached and screened for inclusion in the study. Finally, data from 620 pregnant women, purposively sampled based on the inclusion and exclusion criteria, was collected and analysed.

2.2. Procedure and tools used

A uniform standard operating procedure for data collection was followed across the five centres (Supplementary document-1). Data was collected by trained residents in psychiatry/obstetrics under the supervision of a teaching faculty from the department of psychiatry at each study site. A video demonstrating a template interview in Hindi was circulated among the residents for training and ready reference while conducting the interviews. After obtaining written informed consent, demographic and clinical details (both obstetric and medical) were recorded.

COVID status too was assessed. A “suspect” status meant “having

COVID symptoms” or “having a high risk exposure” and having underwent a covid test (an rtPCR or RAT). “Exposure” meant being exposed to “high risk situations” that were notified by the Indian Council for Medical Research (ICMR) checklist, in the early part of the pandemic (first wave). The diagnostic status was recorded according to the COVID positive lab report. These details were noted during the participants’ interview and were reported based on their verbal reporting. This report was confirmed by the reports they received on their registered mobile phones. No confirmation though was available if the participants reported otherwise.

Hindi translated version of the Generalized Anxiety Disorder-7 (GAD-7) scale (Spitzer et al., 2006) was used to assess and score the severity of anxiety. GAD-7 has strong psychometric properties across population based samples and patients with various anxiety disorders (Rutter and Brown, 2017), and has also been used specifically in the context of COVID-19 in pregnant women (Zhang et al., 2021). Scores of 5, 10, and 15 were interpreted as cut offs for mild, moderate, and severe levels of anxiety respectively on the GAD-7. The scale was translated in Odiya also using standard procedure.

Antenatal COVID-19 anxiety was studied by a scale developed for the purpose of this study. The items were generated based on review of existing literature on pregnancy related anxiety and COVID-19 specific anxiety. The final 12-item antenatal COVID-19 anxiety (AnCAN) scale was rated on a Likert scale of 0–3 (Never, rarely, sometimes and very often). See Table S3 for items of the AnCAN scale. On content and face validity assessment, the AnCAN scale received an overall mean validity score of 88.47%. The English version of the AnCAN scale was then translated into Hindi and Odiya, by 2 language experts each. Social support during pregnancy, in terms of- emotional, domestic, financial, social relations and work place support, was assessed using the Psychosocial Risk Evaluation in Pregnancy- Maternal version (PREP-M). The items are rated on a Likert scale of (0–2, never, sometimes and most of the time); higher scores denote lower perceived social support. A customized tool was created for assessing COVID-19 risk perception (Table S4). This tool consists of 12 items that represent situations or conditions where an individual is perceived to be a higher risk for contracting COVID-19 infection such as being in crowded places, residing in containment zones, involved in essential services, etc. The items are scored as Yes-No and higher scores represent greater risk perception. Each interview was conducted with all COVID-19 safety precautions and completed within 20 min.

2.3. Statistical analysis

Descriptive statistics (mean/standard deviation (SD) and frequencies) were used to describe the demographic and clinical variables. Mean/SD were calculated for the scores on various scales. Frequencies were determined for assessment of the prevalence of generalized anxiety based on cut-off scores on GAD-7. The one-way association between various demographic/clinical variables, scores of perceived social support, COVID risk perception, antenatal COVID-19 anxiety and generalized anxiety was assessed using chi-square test and *t*-test. A multivariate mixed models analysis was conducted to assess for predictors of generalized anxiety and antenatal COVID-19 anxiety, at two separate levels- for GAD-7 and AnCAN.

3. Results

3.1. Description of sample- demographic details

The mean age of the total sample was 26.36 years. The majority of the sample were Hindus (88.5%), married and staying with their husbands (99.4%), educated up to high school or above (64.1%), homemakers (84.8%), belonging to middle socio-economic status and above (66.5%) living in joint family (59.5%) and urban/semiurban habitat (82.3%).

3.2. Obstetric details

The mean weeks of gestation was 23.83 weeks with 15.3%, 41.1% and 43.5% of the samples belonging to first, second and third trimester of pregnancy, respectively. More women were multiparous (61.6%) and had no current (85.3%) or previous (85.5%) pregnancy complications.

3.3. Other clinical details

Most women had no general medical (85.5%) or psychiatric (98.8%) illness and were not suspected to have COVID or had not tested for COVID-19 infection (80.48%).

Table S2 shows demographic, obstetric and other clinical characteristics of the sample.

3.4. Rates of anxiety

The percentage of women rated to have anxiety disorder i.e. scores of > 10 on GAD-7 were 11.1%. Of the total sample, while 64.2% showed no anxiety, 24.7%, 8.5% and 2.6% had mild, moderate and severe anxiety, respectively. The mean scores on AnCan scale were 10.27 (SD=8.28; range= 0–32). The most common worries or fears reported were related to risk of corona virus infection to the fetus (40.6%), risk of corona virus infection to herself due to pregnancy (37.7%) followed by risk of corona virus infection during delivery/labour (36.6%). Table S3 shows percentage of the sample who scored > 2 (i.e. 'sometimes' or 'very often') on each of the items of the AnCan scale. The mean scores on COVID risk perception tool was 1.47 (SD=1.57); 79.5% of women perceived to be related to only 2 or less risky situations or factors. On the social support scale 31.9%, 33.9%, 31.3% and 37.4% of women reported support to be available 'only sometimes' or 'never' in the domains of emotional, domestic, financial and social relations, respectively; Of the employed women, 37.1% of women reported support from work place to be only 'sometimes' or 'never'.

Univariate analysis revealed the following factors to be significantly related to anxiety measured by anxiety disorder scored on GAD 7–religion (Islam), employment status (employed), presence of financial loss, habitat (semiurban), presence of complications in present and previous pregnancies, presence of general medical or psychiatric illness, COVID testing status (positive and recovered), lower perceived social support, greater COVID risk perception and greater antenatal COVID-19 anxiety (AnCan scores). See Table 1.

In the first model of multivariate analysis to predict determinants of generalized anxiety, we found that higher COVID risk perception ($p < 0.001$), greater antenatal COVID-19 anxiety ($p < 0.001$) and lower perceived support scores ($p < 0.01$) were significantly associated with moderate and severe anxiety scores. In the second model of multivariate analysis, we found that greater number of weeks of gestation ($p < 0.05$), lower education ($p < 0.01$), semiurban habitat ($p < 0.001$), and lower perceived social support ($p < 0.001$) significantly predicted antenatal COVID-19 anxiety.

4. Discussion

Our study found that 11.1% of pregnant women attending antenatal clinics have significant generalized anxiety. Although the univariate analysis identified several correlates of significant generalized anxiety, only higher COVID risk perception, greater COVID related antenatal anxiety and lower perceived support were determined to be associated on multivariate analysis. Moreover, antenatal COVID-19 anxiety was found to be significantly determined by gestational period, education, habitat, and perceived social support.

Mild anxiety was found in 24.7% of our study sample and moderate/severe anxiety in 11.1%. The rates of generalized anxiety reported in our study are lower than most of the other studies conducted during the pandemic thus far. This finding is akin to the wide variation in the rates

Table 1

Association between levels of anxiety on GAD-7 and demographic and clinical variables.

Variable	GAD-7 levels of anxiety n (n %)/ Mean \pm SD	χ^2/F	p		
				No/Mild (n = 451)	Moderate/Severe (n = 69)
Trimester	First	86 (90.5)	9 (9.5)	0.312	0.855
	Second	226 (88.6)	29 (11.4)		
	Third	239 (88.5)	31 (11.5)		
Religion	Hindu	493 (89.5)	56 (81.2)	7.741 ^f	0.037*
	Islam	38 (6.9)	12 (17.4)		
	Christianity	6 (1.1)	0 (0)		
	Sikh	14 (2.5)	1 (1.4)		
Employment status	Employed	77 (14.0)	17 (24.6)	5.421	0.02*
	Homemaker	474 (86.0)	52 (75.4)		
SES	Upper	5 (55.6)	4 (44.4)	7.71 ^f	0.08
	Upper middle	162 (88.5)	21 (11.5)		
	Lower middle	196 (89.1)	24 (10.9)		
	Upper lower	184 (90.2)	20 (9.8)		
Financial Loss	Yes	4 (100)	42 (60.9)	6.789	0.009**
	No	244 (44.3)	27 (39.1)		
Habitat	Rural	102 (18.5)	8 (11.6)	7.86	0.02*
	Semiurban	113 (20.5)	24 (34.8)		
	Urban	336 (61.0)	37 (53.6)		
Family Type	Joint	327 (59.3)	42 (60.9)	6.45 ^f	0.043*
	Nuclear	223 (40.5)	25 (36.2)		
Parity	Primi	213 (89.1)	26 (10.9)	0.025	0.875
	Multi	338 (88.7)	43 (11.3)		
Previous abortion or stillbirth	Yes	124 (93.2)	9 (6.8)	3.606	0.066
	No	427 (87.7)	60 (12.3)		
Complications in present pregnancy	Yes	74 (13.4)	17 (24.6)	6.15	0.013*
	No	477 (86.6)	52 (75.4)		
Complications in previous pregnancy	Yes	71 (12.9)	19 (27.5)	10.607	0.001**
	No	480 (87.1)	50 (72.5)		
Past General Medical Illness	Yes	64 (11.6)	19 (27.5)	13.405	<0.001
	No	487 (88.4)	50 (72.5)		
Past psychiatric illness	Yes	3 (0.5)	4 (5.8)	18.89 ^f	0.004**

(continued on next page)

Table 1 (continued)

Variable	GAD-7 levels of anxiety n (n %)/ Mean \pm SD	χ^2/F	p		
	No/Mild (n = 451)	Moderate/ Severe (n = 69)			
COVID status	No	548 (99.5)	65 (94.2)	10.89 ^f	0.007**
	Positive_active	11 (2.0)	0 (0)		
	Positive recovered	15 (2.7)	8 (11.6)		
	Negative	77 (14.0)	10 (14.5)		
COVID Exposure status	Not tested/Not suspected	448 (81.3)	51 (73.9)	2.13	0.14
	Not exposed	103 (18.7)	18 (26.1)		
	Exposed	448 (81.3)	51 (73.9)		
COVID risk perception	1.28 \pm 1.39	3.00 \pm 2.11	9.07	<0.001	
Antenatal COVID-19 Anxiety	9.12 \pm 7.46	19.46 \pm 8.86	10.61	<0.001	

^f. Fisher exact test used; *p < 0.05; **p < 0.01

observed in these studies. As speculated, the variations in the mode of interview, sample size and the measurement tools used might have influenced the reported rates. Our literature search (Table S1) showed that sample sizes ranged from 11 to > 4000; median being 300. Nine studies used the GAD-7, 5 studies used the State Trait Anxiety Inventory (STAI) and 4 studies used the Zung Self-Rating Anxiety Scale (SAS). Twenty of these studies were conducted using online surveys, which have some inherent limitations on the validity of the reporting (Sharma et al., 2021; Andrade, 2020), especially in the low income and low literacy populations. In general, our literature review shows that the rates of significant anxiety are higher in studies that have used smaller sample sizes. However, one of the factors that likely determined the low anxiety rates found in our study might be the period of study. Most of the reported studies were conducted before April 2020, i.e. during the first global wave of the COVID-19 pandemic where the cases were on the rise, public restrictions were being imposed and the information regarding the COVID-19 infection and its management was uncertain. In contrast, this study was conducted between August and October 2020 when the public restrictions in India began to be waived off and better management strategies for pregnant became operational. Kotabagi et al. (2020) also reported that the mean scores of anxiety in pregnant women reduced during the tail end of the pandemic (first wave). Further, access to antenatal care and to outdoor spaces, which were deemed not only to reduce vulnerability to stress but also improve resilience among pregnant women (Preis et al., 2020), were possible during the “unlocking” of public restrictions in India during the study period. The resultant higher sense of well-being and relief after lockdown may have decreased rates of anxiety. Moreover, relatively better COVID related outcomes in Asia might have also had an influence on the lower rates of anxiety (Tandon, 2021a).

During the study period, with pandemic led restrictions being eased, evidently the fear of COVID infection as well as the risk perception in general population lowered and social supports networks began to get reintegrated. However, despite that our results showed that higher antenatal COVID-19 anxiety, lower COVID risk perception and lower perceived social support were significantly associated with generalized anxiety. Previous studies too have consistently found a direct association of generalized anxiety with COVID-19 infection/pandemic specific fears or factors (Ayaz et al., 2020; Bavel et al., 2020; Effati-Daryani et al.,

2020; Farewell et al., 2020; Hamzehgardeshi et al., 2021; Kuang et al., 2020; Lebel et al., 2020; Özmete and Pak, 2020; Yue et al., 2020) risk perception of COVID-19 (Yue et al., 2020) and perceived social support (Ayaz et al., 2020; Farewell et al., 2020; Effati-Daryani et al., 2020; Hamzehgardeshi et al., 2021; Lebel et al., 2020).

With lower rates of anxiety incident upon lower risk perceptions, women during pregnancy might exhibit less “precautionary behaviours”. Especially from the point-of-view of the rapidly growing second wave of COVID-19 pandemic in India, such behaviours are likely to make pregnant women more vulnerable for negative outcomes. Our results suggest that pregnant women with pregnancy complications, both previous and current, had higher chances of being anxious.

Previous studies have reported that ‘employed’ status, higher educational level, lower income, nulliparity and being in the first or third trimester are significant correlates of antenatal anxiety (Berthelot et al., 2020; Ceulemans et al., 2021; Ding et al., 2021; Effati-Daryani et al., 2020; Hamzehgardeshi et al., 2021; Liu et al., 2020; Mappa et al., 2020; Mei et al., 2020; Patabendige et al., 2020; Saadati et al., 2021; Saccone et al., 2020; Wu et al., 2020). In our study, either some of these variables did not reach statistical significance in the multivariate model for predicting generalized anxiety or were found to be significant correlates only of antenatal COVID-19 specific anxiety. It is possible that antenatal COVID-19 anxiety might have a mediating influence between these variables and generalized anxiety and is an area for further study. Interestingly, Chandra and Nanjundaswamy (2020) have noted that the LAMIC and the high income countries have distinct predictors of PSA. While, lower education, lower income and nulliparity were associated with the risk of PSA in high income countries, only perceived stress, active depression and the size of the household determined PSA in LAMIC. We deem, a similar distinction between countries/regions might exist for determinants of antenatal COVID-19 anxiety as well.

4.1. Strengths

Being one of the first studies from India to assess the rates of anxiety in pregnant women is a distinction for our study. The fact that face-to-face interviews were conducted by trained residents enhances the validity of our results. Further, data was collected from 5 centres across India with a sample size adequate for generalizing our results. Perhaps, studying the composite context of COVID-19 anxiety and pregnancy related anxiety too is a distinction.

Importantly, dissemination of the study finding that pregnant women have relatively lower rates of anxiety in India might help to avoid speculation and therefore sensationalization of mental health outcomes related to the pandemic (Tandon, 2021b).

4.2. Limitations

The cross sectional design of the study limits determination of the directionality of the associations found. The duration for data collection (3 months) included the period of rise, peak (2nd and 3rd week of September) and also the fall of daily new cases in India, which might have influenced the results. India has seen two waves of the COVID-19 pandemic with different stressors in each wave. This study provides data from the period when the pandemic was slightly more in control in most study sites and restrictions were lifted, possibly giving a sense of relative safety. The anxiety rates might be different during the second wave. While there is a possibility that anxiety levels might have lowered with improved vaccination rates in the early months of 2021, they might as well have risen with media portrayal of rising daily case and death statistics, morbidity levels, shortage of hospital bed availability and more virulent strains during the current second wave in India. The study also did not assess depressive symptoms which might influence anxiety levels.

Further, restricting the study sites to only a few states of India (based on willingness to participate and resources) and lack of participation

from some states where COVID infection rates were high limits the generalizability of the findings.

4.3. Conclusions

The rates of moderate and severe generalized anxiety in pregnant women in India was found to be 11% during the phase of the pandemic when the incidence of COVID cases were still high but the social and economic restrictions had weaned off. Antenatal COVID-19 anxiety, COVID risk perception and perceived social support significantly determined the rates of generalized anxiety. Our study results imply that along with the fundamental need to integrate screening for anxiety in existing antenatal programs, provision of psychological assistance to pregnant women in dealing with secondary mental health challenges related with COVID-19 and prioritization of maternal mental health, especially in Asian nations, is mandated (Ali and Shahil Feroz, 2020; Aryal and Pant, 2020).

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Previous presentation

None.

Conflicts of Interest

None.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.ajp.2021.102880](https://doi.org/10.1016/j.ajp.2021.102880).

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