

Knowledge and Anxiety of Pregnant Women towards COVID-19 Pandemic in the Prevaccination Phase

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ABSTRACT

Introduction: Coronavirus Disease-2019 (COVID-19) pandemic has led to devastating and unprecedented health crises especially in the vulnerable population, ever since its origin in 2019. COVID-19 management in pregnant women had been a matter of controversy before the introduction of the standard protocols by the various international bodies. A lot of concern still prevails around the adverse foeto-maternal outcomes such as preterm birth, stillbirth, increased caesarean rates, maternal morbidity and mortality. Furthermore, uncertainty about the duration of the COVID-19 pandemic had also increased anxiety among pregnant women, particularly during the first wave.

Aim: To find out the knowledge and beliefs of pregnant women towards the COVID-19 infection in first wave and to know whether it had increased anxiety among non infected pregnant women before the advent of the COVID-19 vaccination.

Materials and Methods: A cross-sectional observational study was conducted on the 280 asymptomatic pregnant women attending the Department of Obstetrics and Gynaecology, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh,

India, over four months (10th October 2020 to 10th February 2021). These women were provided with a questionnaire and a Generalised Anxiety Disorder Score-7 (GAD-7) chart. Statistical analysis was performed using the Pearson's Chi-square analyses with $p < 0.05$ considered statistically significant.

Results: The total number of participants were 280. Majority of them were in their 20's and were primigravida. The mean GAD-7 score for the study population was 4.642 and the overall prevalence of anxiety in the present study was 34.3% (n=96). GAD-7 score chart showed 65.7% (n=184) had 0-4 levels (minimal) while severe scores ≥ 15 were noted in 2.9% (n=8). In the current study, greater anxiety scores were found in the homemakers. A high prevalence of anxiety was seen in primigravida and during the third trimester. About 37.5% of the participants believed that COVID-19 could transmit to the foetus-in-utero, if infected and 50.36% felt being pregnant could increase the risk of contracting COVID-19 infection.

Conclusion: The present findings suggest that pregnant women showed a lot of concerns and significant anxiety due to COVID-19 during the study period.

Keywords: Caesarean section, Coronavirus disease-2019, Depression, Mental health, Premature birth, Prenatal care

INTRODUCTION

The COVID-19 pandemic started as affected individuals with pneumonia of unknown aetiology from Wuhan, Hubei (China) province in December 2019 were found. It was declared as a public health emergency of international concern by World Health Organisation (WHO) on March 11, 2020 [1]. The pathogen was recognised as the causative agent for Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) [2]. Ever since the viral spread and implementing nationwide "lockdown", pregnant women have shown concerns regarding their routine antenatal care services. Mental health disorders are a common cause of morbidity during pregnancy with approximately 12% of women experiencing depression and upto 22% experiencing high levels of anxiety in late pregnancy [3]. GAD during pregnancy is more common and estimated to be around 8.5%, while its prevalence varies between 4.4-8% during the postpartum period [4].

A number of factors have been thought to increase the anxiety issues in pregnant women pertaining to the COVID-19 infection. These include the increased probability of acquiring the infection during pregnancy and possibility of vertical transmission to the foetus, if contracted [2,5]. Increased risk of delivery occurring before 37 weeks (preterm birth) has been suggested with COVID-19 infection, causal association is still unproven [6-9]. Few studies have also mentioned other possible risks associated with COVID-19 infection in pregnancy, such as the need for caesarean section, risk of maternal death, abortion, neonatal respiratory distress [6,10,11]. Despite the inconsistent data about the clinical outcomes of pregnant women with COVID-19, the unfavourable psychological outcome is almost certain by taking

previous epidemics into account [12,13]. All these factors do have a huge psychological impact on the uninfected individuals.

To the best of authors' knowledge, the present study was the first of its kind from the region of Central India during the first wave of COVID-19 pandemic [14-17]. Through the present study, the authors aim to assess the degree of anxiety levels due to COVID-19 infection in uninfected pregnant women from central India and their knowledge and beliefs towards COVID-19 infection in pregnancy during the prevaccination phase.

MATERIALS AND METHODS

A cross-sectional observational study was performed over four months from 10th October 2020 to 10th February 2021 on asymptomatic pregnant women from the Outpatient Department (OPD) and Inpatient Department (IPD) of Department of Obstetrics and Gynaecology, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh, India. The study was conducted according to the principles expressed in the 1975, Declaration of Helsinki [18] and after obtaining approval from the Institutional Human Ethics Committee (IHEC) (LOP/2020/IM0311). An informed written consent was taken from all the eligible participants prior to inclusion in the study, in their vernacular language, after elaborating the purpose of the study.

Inclusion criteria: Asymptomatic pregnant women attending the OPD and IPD sections of the department.

Exclusion criteria: Patients admitted for maternal or foetal emergencies, previous or current psychiatric disorder and patients in established labour were excluded. Pregnant women with known COVID-19 infection were also excluded.

Sample size calculation: Sample size was calculated by the following formula:

$$n = z^2 pq / d^2$$

where,

n=sample size

p=prevalence of feeling vulnerable/weak during the pandemic because of their pregnant state (taken as 50% from the quoted study) [19];

d=allowable error (absolute)=5%;

z=value of the standard normal variable at 0.05 (two sided) level of significance (1.96).

Substituting the values in the equation, the calculated sample size was 360. But due to the prevailing COVID-19 situation, a sample size of 280 could be achieved as there was a significant reduction in the number of patients attending the hospital for routine antenatal visits after March 2020 (far less than the preCOVID-19 patient load).

However, doing a post-hoc power analysis using 34.3% (as observed in the present study) as the prevalence of the anxiety in the participants, the power of the study was still >90%. Thus, the results are presented with an acceptable error of ±5% points.

Study Procedure

Detailed demographic and clinical information of all the participants was recorded viz. age, socio-economic status (modified kuppusswami scale) [20], occupation, parity, gestational age and high-risk factors in pregnancy. These women were asked to fill a questionnaire (Hindi/English) which was prepared by the authors (experts from the Departments of Obstetrics and Gynaecology and Psychiatry). The questionnaire was pretested on a group of 20 participants and their concerns were incorporated into it. The questionnaire comprised of 10 questions regarding knowledge and beliefs during pregnancy about the ongoing COVID-19 pandemic where these questions were designed to be answered in either "Yes", "No" or "I don't know"; where "Yes" meant if the participant agreed to or was aware of the particular question asked; "No"=if the participant disagreed to the particular question asked or felt the question was not applicable to her and "I don't know"=if the participant was not aware of the relevant answer to the particular question being asked. One of the co-investigators

was involved in explaining the questions to the pregnant women who were illiterate (same co-investigator for all the participants).

The participants were also provided the GAD-7 scale to assess the levels of their anxiety. It is a seven-item anxiety scale (Likert scale) developed by Spitzer RL et al., [21]. Scores range from 0 (never) to 3 (nearly every day) against each question with a total score from 0 to 21. As per the GAD-7 score, 0-4 was considered minimal anxiety, 5-9 mild, 10-14 moderate and a score of ≥15 suggested severe anxiety. The GAD-7 scores of the participants were also associated with all the demographic variables viz. education level, literacy status, socio-economic status, occupation, maternal characteristics like trimester, gravida and pregnancy associated risk factors.

STATISTICAL ANALYSIS

Descriptive and Pearson's Chi-square analyses were used to determine the associations between stress and anxiety of current COVID-19 pandemic and other independent variables, including demographics. A p-value <0.05 was considered as statistically significant. R version 4.0.4 software was used for all the statistical calculations.

RESULTS

Demographic characteristics: Majority of the study participants fell in the 20-30 years age group category (80.71%, n=226); most of the subjects were primigravida (56.1%, n=157) and in third trimester (53.2%, n=149). Majority of the study participants hailed from periphery areas and belonged to lower middle socio-economic class (33.2%, n=93) and 52.9% (n=148) pregnant women were illiterate. A fair share of literate population comprised 47.1% of the total study population but only about 8.21% were engaged in payable jobs [Table/Fig-1]. Eighty-five (30.4%) participants had associated risk factors in pregnancy. These risk factors included anaemia (n=25, 29.41%), hypothyroidism (n=20, 23.53%), anaemia with hypothyroidism (n=3, 3.53%), hyperthyroidism (n=2, 2.35%), hypertensive disorders of pregnancy (n=15, 17.65%), gestational diabetes mellitus (n=7, 8.24%), rheumatic heart disease (n=3, 3.53%), Rhesus negative (n=3, 3.53%), foetal congenital anomalies (n=5, 5.88%) and asthma (n=2, 2.35%).

S. No.	Demographic variables	Sub-groups	Number of participants in subgroup (%)	GAD-7 score (0-4) Minimal number of participants	GAD-7 score (5-9) Mild number of participants	GAD-7 score (10-14) Moderate number of participants	GAD-7 score (≥15) Severe number of participants	Chi-square (Pearson's) value	p-value
1	Age (years)	<20	1 (0.36)	0	1	0	0	6.961	0.324
		20-30	226 (80.71)	149	54	16	7		
		>30	53 (18.93)	35	13	4	1		
2	Literacy	Literate	132 (47.1)	85	32	11	4	0.588	0.899
		Illiterate	148 (52.9)	99	36	9	4		
3	Occupation	Homemaker	257 (91.79)	169	63	20	5	17.107	0.009
		Govt. job	14 (5)	11	2	0	1		
		Pvt. job	9 (3.21)	4	3	0	2		
4	SES*	Lower	78 (27.9)	52	17	6	3	13.301	0.348
		Upper-lower	68 (24.3)	41	19	7	1		
		Lower-middle	93 (33.2)	62	24	5	2		
		Upper-middle	31 (11.1)	25	3	2	1		
		Upper	10 (3.5)	4	5	0	1		
5	Gravidity	Primi	157 (56.1)	97	39	14	7	5.669	0.129
		Multi	123 (43.9)	87	29	6	1		
6	Trimester	First	93 (33.2)	57	26	7	3	4.086	0.665
		Second	38 (13.6)	27	10	1	0		
		Third	149 (53.2)	100	32	12	5		

[Table/Fig-1]: Shows the distribution of participants as per demographic variables and their correlation with the anxiety levels pertaining to COVID-19 infection (total=280).

*=Socio-economic status

Assessment of knowledge and beliefs: Owing to the widespread awareness about the COVID-19 infection and implementation of the community safety measures, nearly 80% (n=224) participants were aware of the necessary precautions to be followed to prevent the spread of coronavirus infection. This also reflected well in the participants' opinion regarding the need for testing as 47.5% (n=133) said "Yes", if the need arises. Around 50.36% (n=141) felt pregnancy poses an increased risk of getting infected with the virus [Table/Fig-2]. 37.5% (n=105) of the participants felt that Coronavirus is capable of vertical transmission, but 40.36% (n=113) were uncertain of the effects of the virus. While only 16.07% (n=45) participants felt that COVID-19 infection in pregnancy can cause foetal anomalies, 54.29% (n=152) were certain that it does not. None of the participants felt that they were already infected by COVID-19 virus during their pregnancy [Table/Fig-2]. Around 20.71% (n=58) participants considered the possibility of preterm delivery and 45% (n=126) felt there is no increased risk for the same. About 28.22% of the participants felt that there was a need for change in the mode of delivery, if infected. Lastly, 41.07% (n=115) participants felt that infected mothers should not breastfeed their newborns [Table/Fig-2].

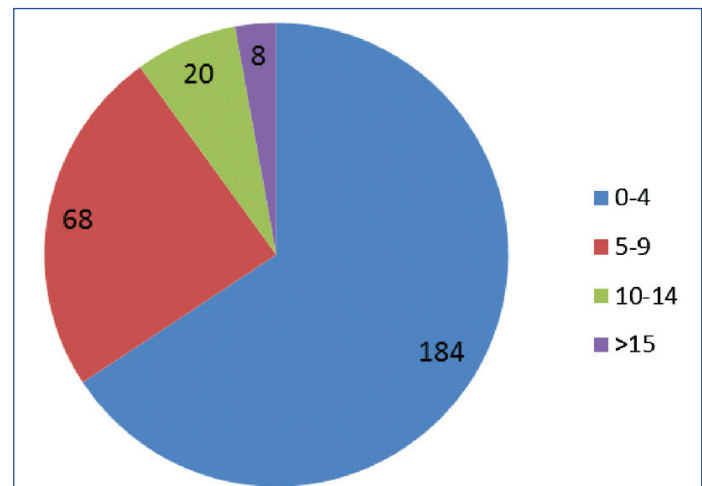
S. No.	Question	Yes n, (%)	No n, (%)	I don't know n, (%)
1	Are you aware of the precautions to prevent coronavirus infection?	224 (80)	22 (7.86)	34 (12.14)
2	Do you think being pregnant can increase the risk of contracting the coronavirus?	141 (50.36)	68 (24.29)	71 (25.35)
3	Do you think you need to get tested for COVID-19 during pregnancy?	133 (47.5)	114 (40.71)	33 (11.79)
4	Do you think you can get infected with COVID-19 during or after pregnancy?	55 (19.64)	142 (50.72)	83 (29.64)
5	Do you feel you may have been already infected with coronavirus during pregnancy?	0	241 (86.07)	39 (13.93)
6	Do you feel you could transmit the Covid-19 infection to your foetus, if infected?	105 (37.5)	62 (22.14)	113 (40.36)
7	Does coronavirus infection in the mother causes birth defects in the foetus?	45 (16.07)	152 (54.29)	83 (29.64)
8	Do you think the coronavirus infection can lead to a preterm labour/delivery?	58 (20.71)	126 (45)	96 (34.29)
9	Do you feel that coronavirus infection in pregnancy can change/decide the mode of delivery?	79 (28.22)	83 (29.64)	118 (42.14)
10	Do you think breastfeeding is safe during the coronavirus pandemic?	98 (35)	115 (41.07)	67 (23.93)

[Table/Fig-2]: Shows the questionnaire on knowledge and beliefs of pregnant women to coronavirus pandemic and response by the participants (N=280).

Assessment of the anxiety: Mean GAD score for the study population was 4.642 and the overall prevalence of anxiety in the present study was 34.3% (n=96). GAD-7 chart showed 65.7% (n=184), 24.3% (n=68), 7.1% (n=20) and 2.9% (n=8) scored minimal, mild, moderate and severe scores respectively [Table/Fig-3].

There were increased anxiety levels in the Homemakers. Of all the women having severe anxiety (GAD score ≥ 15) most were homemakers (n=5 of 8, 62.5%); while all women (n=20 of 20) with moderate anxiety were homemakers ($p=0.009$) [Table/Fig-1]. Literacy levels, however, have not been shown to have much effect on the anxiety levels; four participants in either group had GAD scores ≥ 15 ($p=0.899$) [Table/Fig-1]. A score of more than 10 was found in 13.4% (21 of 157) primigravida as compared to 5.7% (7 of 123) of multigravidas. Overall primigravida (87.5%, n=7 of 8) were more anxious, amongst the participants with severe scores, when

compared to the multigravidas (12.5%, n=1 of 8), although the results were statistically insignificant ($p=0.129$) [Table/Fig-1]. Out of 85 participants had high risk factors during pregnancy, about 50.6% (n=43 of 85) of had GAD scores more than 10.



[Table/Fig-3]: Shows the frequency distribution of participants as per GAD-7 scale. 0-4 No/minimal anxiety (n=184, 65.7%); 5-9 Moderate anxiety (n=68, 24.3%); 10-14 moderate anxiety (n=20, 7.1%); ≥ 15 Severe anxiety (n=8, 2.9%) Total N=280

DISCUSSION

The number of COVID-19 cases in central India during the month of September alone were found to be more than the combined cases in all the previous months. Further, the beginning of October saw a flattening of the curve in this region [22]. Through the current study, the authors attempted to highlight the knowledge possessed by the uninfected pregnant women about the effects of COVID-19 on mother and foetus and their attitudes pertaining to it.

In the current study, the working group of pregnant women comprised of 8.21% and homemakers 91.79% of the study population. Contrary to the findings of Wu Y et al., [2], being homemaker was the major contributing factor for the raised stress levels in the present study. The findings were statistically significant ($p=0.009$). This could be possibly due to their psychological inhibition of stepping out of their houses and income losses incurred by the only working spouse due to the strain on the economic sector. Zhou Q and Li X reported greater anxiety levels (GAD-7 score) in participants having heavy work hours and higher incomes [23]. Lower anxiety levels in the working group of the present study could be attributed to the new "Work-from-home" culture which was implemented to mitigate the rates of transmission.

The awareness instilled by the local authorities encouraged the correct attitudes of wearing a mask, social distancing and hand hygiene among the pregnant women as demonstrated by 80% of the study group. This reflected well in the participants opinion regarding the need for testing as 47.5% (n=133) said "Yes", if the need arises. In contrast to this, a primary healthcare level study conducted in south Africa by Hoque AM et al., mentioned low levels of knowledge (43.5%) and attitudes (30%) among pregnant women towards the COVID-19 pandemic [24]. Although the social distancing has had led to a commendable decrease in the transmission rates, it has increased the anxiety amongst the pregnant women owing to lack of social support.

Despite the decreasing trend of COVID-19 cases during the study period, the overall prevalence of anxiety in the present study was 34.3%, which was lower than that reported by other studies (63-68%) [25-27]. As much as 2.9% of pregnant women showed severe anxiety levels (GAD score ≥ 15) with the fear of contracting infection as per GAD-7 score chart whereas 65.7% fell into 0-4 score levels. This could be due to the fear of resurgence in the case load. The prevalence of anxiety in the present study was more than that found in a similar study by Ding W et al., which reported 20.8% [28] and a global study with 18.2-24.6% which was conducted before the

COVID-19 pandemic [29]. In one of the foremost studies done by Wang C et al., the anxiety levels in were as high as 53.8% using Depression Anxiety Stress Scale-21 (DASS-21) [30].

The current findings revealed that the highest prevalence of anxiety (53.2%) was in the participants who were in the third trimester as also seen in the study by Nanjundaswamy MH et al., [31] and the lowest

Lastly, majority of the participants, 41.07% (n=115) felt breastfeeding the new-born while being infected with the virus should not be practised. The study by Yassa M et al., similarly noticed around 50% were not aware if breastfeeding was safe [19]. [Table/Fig-4] highlights the salient features of similar studies reporting psychological impact of COVID-19 pandemic on pregnant women [2,19,23-28,35].

S. No.	Author and publication year	Place of the study	Sample size	Outcome of scores
1	Wu Y et al., 2020 [2]	China	4124	Prevalence of depressive symptoms increased from 26% to 34.2%.
2	Yassa M et al., 2020 [19]	Turkey	172	52% women reported that they felt vulnerable and 80% were concerned.
3	Zhou Q and Li X et al., 2020 [23]	China	688	A total of 136 (19.8%) were anxious (Generalized anxiety disorder-7) GAD-7 scale and 174 (25.3%) were depressive (Edinburgh postnatal depression scale, EPDS).
4	Lebel C et al., 2020 [25]	Canada	1987	37% reported clinically relevant symptoms of depression and 57% symptoms of anxiety.
5	Saccone G et al., 2020 [26]	Italy	100	Moderate psychological impact on pregnant women (mean IES-R score, Impact of Event Scale-Revised was 36.9±10.1) and Mean score at STAI (Spielberger State-Trait Anxiety Inventory questionnaire) was 45.2±14.6, with an overall incidence of STAI >36 of 68% (68 of 100).
6	Corbett GA et al., 2020 [27]	Ireland	71	Pregnant women had anxiety regarding their older relatives' health (83.3%,55/66), other children (66.7%, 28/42) and (63.4%, 45/71).
7	Hoque AM et al., 2021 [24]	South Africa	346	Mean knowledge score was 4.7 (SD=1.58) out of a total of 13, mean practice score 4.69 (SD=0.97) out of six, mean score for attitude towards COVID-19 was 1.77 (SD=1.12) out of a total five points.
8	Ding W et al., 2021 [28]	China	817	Pregnant women had good knowledge, attitudes, practices towards COVID-19. The general prevalence of anxiety was 20.8%.
9	Nowacka U et al., 2021 [35]	Poland	439	None/Minimal (0-4)-65%; Mild (5-9)-28%; Moderate (10-14)-5%; Severe (≥15)-2%. Including infected pregnant women, included pre-pregnant diagnosis of psychiatric disorder.
10	Singh B et al., (current study), 2022	India	280	None/Minimal (0-4)-65.7%; Mild (5-9)-24.3%; Moderate (10-14)-7.1%, Severe (≥15)-2.9%. greater anxiety scores were found in the homemakers, primigravida women and women in their third trimester. About 37.5% of the participants believed that coronavirus could transmit to the foetus-in-utero.

[Table/Fig-4]: Shows similar studies reporting psychological impact of COVID-19 on pregnant women [2,19,23-28,35].

in those who were in the second trimester (13.6%) possibly due to the threat of preterm labour and in the anticipation of the arrival of the baby. Maternal age ($p=0.324$), education status ($p=0.899$) and socio-economic status ($p=0.348$) did not considerably affect the anxiety levels.

About 12.5% of multigravida and 87.5% of all primigravida revealed stress levels in severe GAD category (score ≥ 15); though this difference was not significant unlike observations made by Ding W et al., stating a positive correlation of parity with the maternal anxiety levels [28].

While only 16.07% (n=45) participants felt that COVID-19 virus infection in pregnancy could cause foetal anomalies, 54.29% (n=152) were certain that it does not. As high as 76% patients in a study by Yassa M et al., felt that the viral infection in mothers could lead to congenital anomalies [19].

A good proportion 45% (n=126) participants denied the possibility of a preterm delivery and only 20.71% felt there is an increased risk for the same. Di Mascio D et al., observed preterm delivery occurring in 41% COVID-19 positive patients though the cause was not known [7]. There lies uncertainty of the effects of the medications used in the treatment of COVID-19 infection in pregnancy due to lack of robust evidence; for instance, Remdesevir, Hydroxychloroquine, Chloroquine. Corticosteroids have created a lot of concern in the general population including pregnant women for the fear of unknown long term effects (including Mucormycosis) [32].

When enquired about their outlook on the need for change in the mode of delivery upon contracting COVID-19 infection, 28.22% answered in favour. Yang R et al., compared the adverse foetal outcomes between infected and non infected pregnant women where they found an increased incidence of caesarean section in the COVID-19 group when compared to their non-infected counterparts (OR 3.63; 95% CI 1.95-6.76) [33]. It is really difficult to predict the rates of caesarean section due to COVID-19 positive status and there is a need for larger multicentric studies for validation. In a systematic review including six studies with 51 pregnant women, it was found that the outcome has been generally favourable for both mothers and foetuses. In their review, women have been most often delivered by caesarean section and frequently before term gestation [34].

Psychological stress of the COVID-19 pandemic during pregnancy can increase risk of neurodevelopmental disorders in off springs owing to the changes in hypothalamo-pituitary-adrenal axis in the mother [13]. The increased risk of having a severe disease during pregnancy may be secondary to an unknown natural history of the disease and the sudden outbreak, which may lead to disproportionate socio-economic consequences [36,37].

Concerns about the pandemic had led to drastic health measures including the large vaccination drive in the country. Although the general population was thought to be benefitted before its initiation, participants (pregnant women) who expressed their need for vaccination were unsure of the ill effects it could have on pregnancy including a small increased risk of thrombosis.

Limitation(s)

The calculated sample size was 360. But due to the prevailing COVID-19 situation, a sample size of 280 could be achieved. Also, the current study was based on a non-validated questionnaire.

CONCLUSION(S)

The study findings suggest that healthcare providers should carefully attend to the pregnant women who have one or more of the risk factors for the increased anxiety scores like primigravida, third trimester of pregnancy and homemakers. The major concern shown by the participants was the possibility of vertical transmission either during the antenatal period or related to breastfeeding. Along with the risk of contracting the coronavirus infection, psychological and other anxiety issues may be the second important focus of attention. The pregnant women concerns and anxiety are extremely relevant. Therefore, for better understanding of the psychological impact of the COVID-19 pandemic on pregnancy, further studies using a validated questionnaire will be needed to document the effect of COVID-19 pandemic on mental health of the pregnant women.

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