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Knowledge, perceived threats and protective behaviour related to COVID 19 among pregnant women

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ABSTRACT

Pregnancy is usually a period of joy, happiness, and expectation for a baby. However, COVID-19 changed the priority and created an environment of worry, perceived threats, and increased protective behaviour to safeguard mother and baby against COVID-19.

Method: A cross-sectional study was conducted to assess, the level of knowledge, perceived threats, protective behavior, and factors affecting protective behavior among pregnant women by using a convenient sampling technique. The questionnaire collected the demographic profile, knowledge related to the risk factors of COVID-19, perceived treats (severity and susceptibility), and protective behaviors adopted by pregnant women.

Result: Among the 325 pregnant women, knowledge was high (50.5%), the highest relative Importance Index for perceived susceptibility and severity was coming to hospital visits (0.64), and the belief that COVID-19 is a severe health problem (0.81) respectively. Around 69.8% had followed COVID appropriate protective behaviors. The study also revealed that, a high level of knowledge (AOR=2.45, 95%CI:1.45–4.13) and having a university education (AOR= 2.91, 95%CI:1.62–5.22) had a significantly higher probability of adapting COVID appropriate behavior among pregnant women.

Conclusion: This study emphasizes the need to streamline communication and adequate education for pregnant women which can help reduce perceived threats and improve protective behavior.

1. What is already known on this subject?

COVID-19 made life more difficult for everyone, especially for a vulnerable group like pregnant women. Stress and worry were already present among pregnant women but during this pandemic, it escalated to a new level causing various issues on the health of women and children.

2. What do the results of the study add?

This study shows that pregnant women with a high level of knowledge and university education had a significant association with COVID-appropriate behavior. The knowledge, Perceived threat, and protective behavior were significantly different between the university and non-university pregnant women. All the finding emphasizes the need for educating women and the need for special education during pandemics like COVID.

3. What are the implications of these findings for clinical practice and/ or further research

Further study in this area will help health care workers to prepare interventions based on the need of pregnant women during pandemics. The result gives an insight into the relationship between variables like perceived threats and protective behavior which is essential for the prevention of communicable diseases.

4. Introduction

The coronavirus disease-2019 (COVID-19) is affecting people of all ages on a large scale. On March 11, 2020, World Health Organization has declared COVID-19 a global concern (Lowe, 2020) COVID-19 related

Abbreviations: BPL, Below poverty line; APL, Above poverty line; AOR, Adjusted odds ratio; UOR, Unadjusted odds ratio; IQR, Interquartile range; CI, Confidence Interval; RII, Relative Important Index; CAB, COVID Appropriate Behavior.

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complications are lethal for high-risk populations viz. immunosuppressed individuals, elderly individuals, and women during pregnancy or postnatal period, especially with comorbidities (Mascarenhas et al., 2020). Pregnant women relay an amplified risk of infection and complications and have also suffered hardships during this pandemic (Times of India, 2021). Hence, managing pregnant women is a great challenge to the health care system during this covid pandemic (Aghababaei et al., 2020a; Maharlouei et al., 2020a). Recently many articles and government guidelines have published that the risk of COVID-19 among pregnant women is no different than that of nonpregnant women and most vaccines are safe to administer for pregnant women (Adhikari et al., 2020; CDC, 2021; Shimabukuro et al., 2021). But, due to social media being bombarded with information related to COVID-19, pregnant women who are already vulnerable will perceive that they are more vulnerable and result in increased fear, stress, and worry about the health and wellbeing of their babies (Qi et al., 2020). Studies have also stated that psychological distress is more prevalent in pregnant women during the COVID-19 pandemic than before (Issac, 2021) (Hessami et al., 2020).

Raising COVID cases, the development of newer virus strains, sandwiched with a decreased willingness towards vaccine (Stuckelberger et al., 2021) due to misinformation about vaccine safety has led to the development of perceived threats among pregnant women. Therefore, psychobehavioural surveillance is a necessary assessment for improving the overall health of mother and child. Only a few studies have been conducted to find the relationship between knowledge, perceived threats, and protective behaviors (Aghababaei et al., 2020a; Ning et al., 2020a). Hence, researchers felt the need to conduct a study on pregnant women which will help in developing protocols and imparting knowledge regarding COVID-19 or other communicable diseases in the Indian context.

5. Material and methods

This cross-sectional study was conducted among 325 pregnant women (all trimesters) attending OPD from December 2020 to March 2021. Purposive sampling was used to collect data. sample size calculation was done on basis of a previously published study, with a precision/absolute error of 5% and a type 1 error of 5%, the sample size was calculated to be 325 pregnant women (Nwafor et al., 2020a). Ethical approval was obtained from the institutional ethical research committee with ref no: T/IM-NF/Nursing/20/79.

6. Instruments

6.1. Participant's characteristics

The questionnaire (self-reported questionnaire & checklist) consisted of socio-demographic and obstetrics profiles including age, education level, occupation, socio-economic status, area of residence, gestational week, no of time visited, and purpose of visit.

6.2. Self-report questionnaire on COVID-19 related risk

COVID-19-related risk factors knowledge self-report questionnaire contained 9 items which, were designed based on the health protocols by the World Health Organization, as well as the Ministry of Health and Medical Education/literature. Exposure to a crowded area, contact with a suspected case, visiting a hospital, being pregnant, not maintaining social distance, visiting a neighbor's house, pregnancy with other medical problems, shaking hands with others, attending family functions. The participants had to respond whether each situation increases or decreases the probability of getting infected by COVID, increase probability responses were given 1 point, and decrease probability responses got 0 points. The total score was converted into a percentile. A score $\geq$ of 75% was designated as high, 50–75% as moderate, and $\leq$ 50% as a low level of knowledge regarding COVID-19 related risks.

6.3. COVID-19 related perceived threats

COVID-19-related perceived threats are again divided into perceived severity and susceptibility.

The perceived severity self-reported questionnaire contains 4 items using a 4-point Likert scale ranging from 4 (strongly agree) to 1 (strongly disagree) with a total score of 16. The perceived susceptibility self-reported questionnaire contains 6 items that were measured on a 4-point Likert scale ranging from 0 (no change) 0–3 (high chance). For each item of perceived severity and susceptibility, the relative importance index (RII) was calculated to find the priority of perceived threats.

6.4. Protective behaviours questionnaire

COVID-19-related protective behaviors self-reported questionnaire contains (10 items):The items were designed based on the health protocols by the WHO (World Health Organization, 2020), as well as the Ministry of Health and Medical Education, (Indian Council of Medical Research, 2020) the aspects of preventive behaviors included, personal hygiene perform hand wash with soap, wearing a mask, maintaining social distancing, avoid unnecessary travel, disinfecting/cleaning frequently touched surface and objects avoid social contact with those who are already infected/suspected cases avoid touching your face, self-quarantine. Responses were measured on 4 points Likert scale rating as most of the time, sometimes, seldom, and never. If the behavior is followed most of the time then it was considered appropriate behavior whereas, sometimes, seldom, and never responses were considered inappropriate behavior. The validity of all questionnaires was assessed using different experts' opinions, and their reliability was calculated using the Cronbach α coefficient (0.89) (Jacob, 2017).

6.5. Data collection method

Participants were assured that no direct identifiers (eg, name, email address, ID number) were collected, all data collected would remain confidential, and only the research team would have access to the data.

Pregnant women who agreed to participate in the study were asked to provide informed consent, and data was collected from each participant by face-to-face/in-depth interview for around 10–15 min.

6.6. Plan for statistical analysis

Descriptive statistics were used for describing the demographic characteristics and outcome variables. For Likert scales of perceived threat (severity and susceptibility), the relative importance index (RII) was calculated by dividing the obtained score for each item by the total possible score.

Inferential statistical tests viz. Mann Whitney U test, Karl Pearson's Correlation, and Regression analysis were performed to find the association of within the study variables and demographic variables like education, occupation, and place of residence. Data were analyzed using Microsoft Excel and Statistical Package for Social Sciences (SPSS) software version 17.0.

7. Results

7.1. Participant characteristics

Out of 325 clients, the majority (57.2%) were aged 26 years or above with mean age of 26.98 + 4.56. having primary schooling (51.7%), 79.7% were housewives, 53.2% belonged below the poverty line, 65.5% were residing in an urban area, and 78.2% were in their 3rd trimester.

Table 1 shows the distribution of respondent responses to the items of risk factors knowledge related to COVID-19. The average of correct

Table 1
Distribution of participants' responses to the items of risk factors knowledge related to COVID 19 and protective health behavior.

	Covid 19 Risk factors Knowledge Questions	Percentage of the correct answer
1	Exposure to crowded areas	81.5
2	Contact with suspected cases	79.4
3	Visiting Hospitals	84.9
4	Being Pregnant	73.2
5	Not maintaining social Distance	87.7
6	Visiting neighbor houses	57.2
7	Pregnancy with other medical problems	61.8
8	Shaking Hands with others	63.5
9	Attending family functions	62.5
Covid 19 related protective health behavior:		
1	Perform hand wash with soap	75.4
2	Wearing mask	87.7
3	Maintaining social distance	81.2
4	Avoid unnecessary travel	76.6
5	Disinfecting / cleaning frequently touched surface or objects	52.9
6	Avoid social contact with those who are already infected/suspected cases	83.1
7	Avoid touching your face	45.2
8	Self-quarantine	48.9
9	Using Tissue or cloth while coughing and sneezing	57.5
10	Dispose of used tissue in a proper way	63.1

answers was 72.4%. the low scores pertained to visiting neighbors' houses (57.2%), pregnancy with other medical problems (61.8%), and attending family functions (62.5%), Whereas, the high scores pertained to not maintaining social distance (87.7), visiting hospitals (84.9%) and exposure to crowded areas (81.5%).

In the protective health behavior section, The COVID appropriate behavior most of them adopted was wearing a mask (87.7%) followed by avoiding social contact with those who are already infected/suspected cases (83.1%), On the contrary, the lowest adopted behaviors were avoiding touching face (45.2%) and self-quarantine (48.9%).

Table 2 reveals the relative importance index (RII) for perceived susceptibility and severity. Most pregnant women rated hospital visits will increase their probability of COVID infection (RII: 0.63), followed by drug therapy affecting oneself and the child (RII: 0.55). Whereas, for the Relative importance index for perceived severity, most pregnant women believed that COVID-19 is a severe health problem (RII: 0.81), followed by the belief that COVID-19 is a serious threat to their health (RII: 0.80). Fig. 1.

Table 3 reveals that knowledge related to COVID-19 risk factors was significantly different between pregnant women with below university vs university education ($Z = -2.44$, $p < 0.05$), housewife, and working ($Z = -3.28$, $p < 0.01$). Whereas, the perceived threat of high severity was significantly different between pregnant women with below university vs university education ($Z = -3.58$, $p < 0.01$) housewife, and working ($Z = -2.02$, $p < 0.05$). Appropriate protective health behavior was significantly higher among pregnant women having university education ($Z = -6.22$, $p < 0.01$), working ($Z = -5.15$, $p < 0.01$), and belonging to Above Poverty Line (APL) status ($Z = -1.97$, $p < 0.05$). (Table 3).

Table 4 reveals that there was a strong, positive correlation between COVID-19 risk factor-related knowledge with perceived susceptibility ($r = 0.165$ $p < 0.01$), severity ($r = 0.181$ $p < 0.01$), and appropriate protective behavior ($r = 0.182$ $p < 0.01$). Perceived severity is positively associated with appropriate protective behavior ($r = 0.13$, $p < 0.01$) and perceived susceptibility ($r = 0.23$, $p < 0.01$).

Pregnant women with a high level of knowledge (AOR=2.45, 95% CI: 1.45–4.13) and university education (AOR= 2.91, 95% CI: 1.62–5.22) had a significant association with COVID appropriate behavior. Although the odds of pregnant working women residing in urban areas were more adapted to COVID protective behavior, the difference became insignificant after adjustment with other variables (Table 5).

Table 2
Relative importance index of perceived severity and perceived susceptibility.

Sl no	Perceived severity	Relative important index
1	I believe that covid 19 is a severe health problem	**0.81**
2	I believe that covid 19 is a serious threat to my health.	**0.80**
3	I believe that no vaccine/treatment for this Covid	**0.71**
4	I believe that the consequence of covid-19 more serious for mother and baby	**0.79**
	Perceived Susceptibility	
1	I am worried that coming for a hospital visit may increase the probability of getting an infection	**0.64**
2	I am worried that drug therapy affects my health and my child's health	**0.55**
3	I am worried that covid 19 will affect my unborn baby	**0.54**
4	I am worried that during the labor process may my baby will get the disease	**0.51**
5	I am worried that breastfeeding will affect the baby	**0.41**
6	I am worried that I will die if I got Covid 19	**0.45**

8. Discussion

COVID-19 is a pandemic infectious disease that became a global concern. Given the severe threats imposed by the first and second wave of COVID-19 adequate knowledge is essential for preventing and managing COVID-19 (Al-Hanawi et al., 2020; Roy et al., 2020). Adequate knowledge is a prerequisite for the perception of risk, preventive measures, and appropriate protective behavior. Preventive measures play a significant role in reducing the infection and controlling the spread of the disease (Al-Hanawi et al., 2020).

In the present study, the finding suggests that participants had high-level risk factors knowledge of COVID-19. Whereas, a study from Iran showed a significantly high level of knowledge (93.85) related to COVID-19 (Aghababaei et al., 2020b). The present study also revealed that pregnant women who had a university education and who were employed had significantly higher knowledge regarding risk factors related to COVID-19 compared to other pregnant women. This was reflected in an Iranian study where pregnant women with a university degree(41.1%) and employed women ($p = 0.03$) had obtained a higher knowledge score regarding COVID-19 (Maharlouei et al., 2020b). On the contrary, a study from Africa revealed, no formal education was one of the factors related to inadequate knowledge on preventive measures against COVID-19 among pregnant women (Nwafor et al., 2020b). The numbers were also greater when competed with studies conducted during other epidemics, such as SARS (eg, around 20% of pregnant women reckoned themselves likely to get infected with SARS during the SARS epidemic period) (Lee et al., 2006). The above results may be due to the fact that women with education and employment updated correct information by reading newspapers, articles, or learning from websites or forward messages. It also supports the fact that empowering women with education and employment will help in gaining adequate knowledge which will help in the primary prevention of pandemics like COVID-19.

The current study revealed that pregnant women were most worried about coming to the hospital and believed that it will make them susceptible to COVID-19 overlapping with the belief that COVID-19 is a severe health problem. Similar perceptions were seen among Chinese pregnant women (78.7–86.1%) who believed that the disease would have various serious consequences whereas, 32.1% and 36.45% of the participants perceived that they or their family members were susceptible to COVID-19 (Mo et al., 2021). Similar to our study findings, during pregnancy (74%) of the participants were worried and very worried about being infected with COVID-19, and (47%) of women think that there is a high risk of COVID-19 infection to their unborn baby (Lee

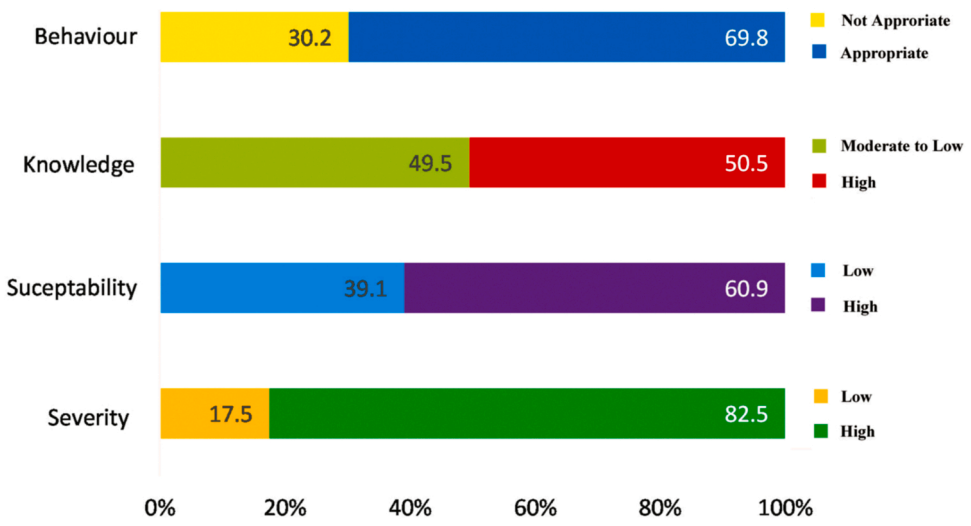

Fig. 1. reveals that 50.5% of participants had a high level of knowledge regarding COVID-19 risk factors, 60.9% of the participants had perceived that they are highly susceptible to being infected with COVID-19 infections, 82.5% agreed COVID-19 infections would lead to severe outcomes (perceived severity) and 69.8% had appropriate protective health behavior.

Table 3
Comparison of subgroups against outcome variables.

Variable	Knowledge	Protective Behavior	Susceptibility	Severity
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
Age				
< 25	7 (2)	37 (5)	10 (5)	12 (3)
> 26	7 (2)	37 (6)	10.5 (6)	13 (3)
Z value#	*-0.66*	*-0.36*	*-0.46*	*-0.84*
Education				
<University	6 (2)	36 (2)	10 (5)	12 (3)
University	7 (2)	38 (4)	10 (5)	13 (3)
Z value#	*-2.44**	*-6.22***	*-1.23*	*-3.58***
Occupation				
Housewife	6 (2)	36 (5)	10 (5)	12 (3)
Working	7 (1)	39 (4)	10 (5.25)	13 (2.25)
Z value#	*-3.28***	*-5.15***	*-0.06*	*-2.02**
SES				
BPL	6 (2)	37 (5)	10 (4)	12 (3)
APL	7(2)	37 (5.50)	9 (6)	13 (3)
Z value#	*-0.38*	*-1.97**	*-0.91*	*-0.56*

*p < 0.05, **p < 0.01, # Mann Whitney U test

et al., 2020). In another study finding 94.4% of participants perceived high severity and a low 29.2% of participants perceived susceptibility (Ning et al., 2020b). The above studies reflected almost similar levels of perceived severity and susceptibility which emphasizes the need for counseling and reassurance for high-risk groups like pregnant women through community oriented activities assisted by community health workers during housevisits (Issac, 2021) .

Since the outbreak of coronavirus, the spread is rapid and engagement of protective behavior of the population is significantly important (Lages et al., 2021). In the present study highest number of pregnant women were opted for (87.7) wearing a mask and (81.2) maintaining social distance. Whereas in Iranian pregnant women 97.3% performed high protective behavior during the COVID pandemic reduced going to closed spaces like theaters, libraries (99.6%), Avoid the place where a large number of people gather (99.1%), Reduced use of public transport (98.2%) (Aghababaei et al., 2020b). This shows that pregnant women were having adequate knowledge about COIVD appropriate protective behaviors and the majority had followed it to prevent COVID 19 infection.

The present study showed participants with high-risk factor knowledge of COVID 19 had perceived the risk and serious consequences of the infection and exhibited appropriate protective behavior. On the contrary, Iranian pregnant women's knowledge was negatively associated with protective behavior, but risk perception was significantly associated with protective behavior (Aghababaei et al., 2020b).

The current study also depicted that pregnant women with a high level of knowledge and having university education had adapted COVID appropriate behavior better than the rest of the pregnant women. Similar findings were found in China where, Higher levels of knowledge (AOR = 1.77, $p < 0.001$) and perceived severity (AOR = 1.90, $p < 0.001$) were associated with higher levels of protective behaviors. Perceived susceptibility and controllability did not show significant associations with protective behaviors. Those who reported good health (AOR = 1.94, $p < 0.001$) and high negative emotion (AOR = 1.36, $p = 0.005$) were more likely to adopt protective behaviors (Ning et al., 2020b). These studies prove that education will help pregnant women to adapt covid appropriate behavior which will directly help in curbing COVID infection among pregnant mothers.

Table 4
Relationship between Knowledge, Perceived Threats, and Protective factors related to COVID19 among pregnant women.

	Mean + SD	Knowledge	Susceptibility	Severity	Protective behavior
Knowledge	5.81 + 1.74	1	0.165**	0.181**	0.182**
Susceptibility	9.3 + 3.70		1	0.23**	0.07
Severity	12.48 + 2.17			1	0.13*
Protective behavior	35.68 + 4.09				1

* $p < 0.05$,
** $p < 0.01$

Table 5
Univariate regression to identify determinants of COVID appropriate protective behaviors among pregnant women.

Sl no	Variable	UOR (95% CI)	AOR (95% CI)	R^2
1	Knowledge			0.18
	Moderate to low (reference)			
	High	3.05 (1.85–5.04)**	2.45 (1.45–4.13)**	
2	Education			
	< University (reference)			
	University	4.05 (2.40–6.86)**	2.91 (1.62–5.22)**	
3	Occupation			0.18
	Housewives (reference)			
	Working women	3.86 (1.76–8.44)**	1.73 (0.72–4.14)	
4	Place of Residence			
	Rural (reference)			
	Urban	1.79 (1.09–2.91)*	1.20 (0.70–2.05)	

UOR= unadjusted odds ratio; AOR: Adjusted odds ratio, CI: Confidence Interval
Financial disclosure: NONE
* $p < 0.05$,
** $p < 0.001$

8.1. Limitations

The study was limited to pregnant mothers attending outpatient department services. Even though a small number of samples were taken the recommended samples were taken as per sample size calculation hence, generalization can be done. Only one setting and convenient sampling were considered for sampling so there is a chance of bias in selection. But, considering the initial stage of COVID authors have tried to collect information face to face rather than online to get accurate information and to prevent false information.

9. Conclusion

Motherhood is a period when women feel very susceptible and fear for the well-being of the newborn. COVID has escalated the perception of severity and susceptibility to a new high. Providing adequate knowledge will help pregnant women to implement appropriate protective behaviors which can make them feel safer and protect them in the process.

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Ethical approval

Ethical approval was obtained from the Institution Ethics Committee, All India Institute of Medical Sciences, Bhubaneswar, wide Ref. Number T/IM-NF/Nursing/20/79.

Contribution statement

JJ did the supervision and analysis; PI & P did conceptualization and original draft, whereas DS and RT did the review and revised the report. PI & JJ did the acquisition & validation, DS,P and JJ did the methodology and framework. PI acted as project administrator and visualization. All authors contributed in data collection and approved the final manuscript submission.

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