



## **Protective Behaviour against COVID 19 and Telemedicine Use among the Pregnant Women during Pandemic Period: A Cross Sectional Study**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author ABS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors LM and DV managed the analyses of the study. Authors RJ, MN and SJ managed the literature searches. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/IJTDH/2020/v41i1730374

#### Editor(s):

- (1) Dr. Arthur V. M. Kwena, Moi University, Kenya.
- (2) Dr. Cihad Dundar, Ondokuz Mayıs University, Turkey.
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  - (5) Tatiana de Paula Santana da Silva, Federal University of Pernambuco, Brazil.
- Complete Peer review History: <http://www.sdiarticle4.com/review-history/62666>

**Original Research Article**

**Received 20 October 2020  
Accepted 21 November 2020  
Published 30 November 2020**

### **ABSTRACT**

Even though pregnant women are more prone to have severe COVID 19, few studies have been conducted on their protective behaviours against this disease in our country during the COVID-19 pandemic. Fear of getting COVID infection may prevent antenatal women from visiting hospitals for routine antenatal checkups and utilization of telemedicine may be an alternative to get connected with their health care providers during the pandemic.

**Aims:** To evaluate the protective behaviour adopted by pregnant women during the COVID pandemic and their utilization of teleconsultation for antenatal care.

**Methods:** A cross-sectional study was conducted among pregnant women attending three selected hospitals in Trivandrum District in Kerala during May to August 2020. The data was

collected from a random sample of 252 pregnant women registered in these hospitals using a self-administered semi-structured questionnaire.

**Results:** Around 89% of pregnant women had adopted good practice to protect themselves against the COVID 19. About 94% wore a mask whenever they went outside. About 72% completely avoided crowded place. About 72% had rated themselves to have good or very good knowledge regarding protective measures of COVID 19. Among the pregnant women, 61(24.2%) missed their scheduled antenatal visit once, 32(12.7%) missed twice and 8(3.2%) missed three or more times during the pandemic period. Half of the pregnant women utilized telemedicine facility during the pandemic to stay connected with their doctors. But 31% were not aware of telemedicine facility in hospitals, while 1.6% does not have an internet access. Higher age group, current employment status and area of residence was found to be associated with poor practice.

**Conclusions:** Nearly 89% pregnant women adopted good protective measures against COVID19. Measures need to be taken to improve the availability of telemedicine facility in hospitals for antenatal women and to improve awareness about it among public which may help the antenatal women to stay connected with their health care providers during this pandemic.

*Keywords: Protective behavior; preventive practices; telemedicine utilization; COVID 19.*

## 1. INTRODUCTION

Millions of people across the world are facing challenges due to COVID19 since the last few months. The novel corona virus disease emerged in December 2019 in Wuhan, China. Since then the virus has been threatening the health and lives of millions of people. Director-General of World Health Organization declared that the outbreak of novel corona virus as Public Health Emergency of International Concern on 30<sup>th</sup> January 2020 [1]. On 19<sup>th</sup> May 2020, there were 4 731 458 cases of COVID 19 and 316 169 deaths in the world [2]. Many countries including India adopted extraordinary measures like lockdown and social distancing to prevent the spread and limit the outbreak. Kerala is a small state in the southern end of India which has a population of nearly 37 million [3], is known for its high literacy and relatively good health indicators. The first case in India was reported on 30<sup>th</sup> January in Kerala in a student who returned from Wuhan, China [4].

Preparing and responding to COVID 19 pandemic, has strained the health system in India which may cause disruptions in the provision of health services, particularly for mothers and children. It is challenging to ensure pregnant women to have access to safe birth and continuum of antenatal and postnatal care during COVID. In the event of a nationwide lockdown due to COVID, the restriction of physical movement and social distancing compounded with precious financial and human resources being directed towards tackling the outbreak, as also the fear of contracting the virus, negatively impacts the health-seeking behaviour

of pregnant women. Pregnant women being more susceptible to viral infection due to immune and anatomic alteration. Also there is evidence that if the pregnant women develop severe disease, they are more likely to need admission to intensive care and invasive than non-pregnant women with COVID-19. Especially those with pre-existing diabetes, chronic hypertension, high body mass index, and increased maternal age are at increased risk of severe COVID 19 in pregnancy [5]. In this context, pregnant women must ensure their safety, by adapting adequate protective behaviour. Government, Media and other agencies encourage public to adopt innovative communication strategies that motivate people to practice healthy behaviours [6,7]. The participation of the community and the protective behaviour adopted by the pregnant women is important in preventing the infection.

Telemedicine can provide safety to patients and health care providers especially in situations where there is risk of contagious infections. There is every possibility for telemedicine to emerge as a viable, efficient and sustainable solution to access healthcare during the COVID-19 crisis, while avoiding direct interface with doctors. India has changed the regulatory framework for providing free telemedicine services after the onset of pandemic in March 2020. The Ministry of Health and Family Welfare, India has initiated a e-Sanjeevani portal for telemedicine. In Kerala telemedicine services were available in some hospitals and clinics earlier even though not that popularised. The Government of Kerala also started efforts to provide tele-medicine through a platform "e-Sanjeevani" in the month of June 2020, where

the patients can use service free of cost by logging in to [www.esanjeevaniopd.in](http://www.esanjeevaniopd.in).

The objectives of this study are to explore the protective behaviour adopted by pregnant women during the COVID pandemic and their utilization of teleconsultation for antenatal care.

## 2. MATERIALS AND METHODS

A cross sectional study was conducted from May to August 2020 among the pregnant women to investigate the protective behaviour adopted by pregnant women during pandemic period. The study setting was Trivandrum district in Kerala. A random sample of 300 pregnant women attending three selected hospitals in Thiruvananthapuram (a tertiary care centre, a hospital in municipality area, and a rural health centre) was contacted via phone and they are invited to participate in the survey. A pretested, self-administered questionnaire in google forms was send to pregnant women to collect data. For those who did not have a smart phone, the questionnaire is sent to nearest relative's phone. The inclusion criteria included all pregnant women who gave consent to participate. The sample size was calculated as 246, by considering p as 30% good practice (Nwafor et al), with a relative precision of 20%, and at 95% confidence level, and 10% nonresponse rate. Two hundred and fifty two pregnant women from whom data is obtained was included in the study. Approval of Institutional ethics committee was obtained before starting the study. As a self-administered questionnaire was used, a consent form was introduced first to ensure autonomy and they are invited to fill the questionnaire after giving their consent. Data in excel sheet was analysed using SPSS 16. Practice was assessed using a 5 point Likert scale consists of 10 questions ranges from 0 to 4, with higher score indicates good practice. The questionnaire included questions on hand washing with soap and water or using alcohol-based hand sanitizers; social distancing, maintaining at least 6 feet distance from others; avoiding crowded places, avoid touching eyes, nose, and mouth with hands; covering mouth and nose when coughing or sneezing; wearing mask while going out, being active in social network and regularly in touch with my family members, neighbours / community and friends, use of doorstep medicine delivery apps" to buy medications, stocking enough groceries for approximately one month in advance, having enough stock of medicines prescribed by doctor. Minimum score is 0 and

maximum attainable score 40. Total practice score was computed and classified as poor (less than 14), average (14 to 26) and good (more than 26). Self-assessment of knowledge regarding the COVID19 was assessed using a single 5 point question. (How do you assess your knowledge regarding COVID19? and the participants rated from 1 to 5 in a Likert scale as Poor/moderate/average/good /very good.

Also, there were questions regarding utilization of telemedicine services for consultation and their perceptions about the pandemic. Qualitative variables were expressed in frequency and percentages. Chi square / Fishers exact test was used as test of significance for categorical variables. As the data did not follow a normal distribution Spearman rank correlation was used to find correlation between knowledge score and total practice score. P-value less than 0.05 is considered as statistically significant.

## 3. RESULTS

The results of the data analysed from participants are as follows. Reliability of practice tool was analysed and found to be Cronbach's alpha of 0.744. The response rate of the participants was 84%. The age of study participants ranged from 18 to 35 years. The socio demographic details of the participants are given in Table 1.

The protective behaviour practiced by the participants are given in Table 2.

Regarding protective behaviour, none of the participants had poor practice. Among 27 participants (10.7%) the practice of protective behaviour was average. Majority of participants 225 (89.3%) had good practice.

The self-assessment of knowledge regarding COVID 19 and its preventive measures is rated as very good by 22.22%, good by 50%, average by 22.22%, limited knowledge by 6.16% and poor by 0.40% of pregnant women. Moderate positive correlation was obtained for the correlation between knowledge regarding COVID19 and practice, Spearman rank correlation coefficient =0.163, p-value=0.010.

Out of all the pregnant women, 170(67.2%) believed that COVID 19 can be more severe in pregnancy. About 90% think that they may get infected if they visit a hospital. Among pregnant women 133(52.4%) believe that they are unlikely

to get infected with COVID19, while others think they are likely to get COVID 19.

Out of the 252 participants, 113 (44.8%) replied that telemedicine facility is available in the

hospital, 103 (40.9%) responded that they don't know whether the facility is available and the rest 36 (14.3%) responded that no telemedicine facility is available in the hospital. The utilization is shown in Fig. 1.

**Table 1. Socio personal characteristics of study participants (n=252)**

<b>Variables</b>	<b>Number (%)</b>
<b>Age group in years</b>	
<=20	7(2.8)
20-30	214(84.9)
>30	31(12.3)
<b>Educational status</b>	
Highschool	7 (2.8)
Plus two/Higher secondary	37(14.7)
Graduate	95(37.7)
PG	47(18.7)
Professional	66(26.2)
<b>Employment status</b>	
Currently employed	72(28.8)
Previously employed	100(39.8)
Not Employed	80(31.7)
<b>Socio Economic Status</b>	
Lower class	6(2.4)
Lower middle class	24(9.5)
Middle class	170(67.5)
Upper middle class	42(16.6)
Upper class	10(4)
<b>Area of residence</b>	
Corporation	32(12.7)
Municipality	48(19.0)
Panchayath	172(68.3)
<b>Any other illness</b>	
None	196(77.8)
Diabetes Mellitus	17(6.7)
Hypertension	7(2.8)
Thyroid	29(11.5)
Other diseases	3(1.2)
<b>Number of children</b>	
0	168(66.7)
1	72(28.6)
2	10(4.0)
>=3	2(0.8)
<b>Living arrangement</b>	
With Husband and child/children	25(9.9)
With Husband	104(41.3)
With Parents /in laws, Husband and child/children	82(32.5)
With Parents	41(16.3)

The opinions regarding the difficulties for utilizing the telemedicine were listed in the Table 3.

More than half of the study participants 151(59.9%) reported that they didn't miss the antenatal visits to doctor due to this pandemic.

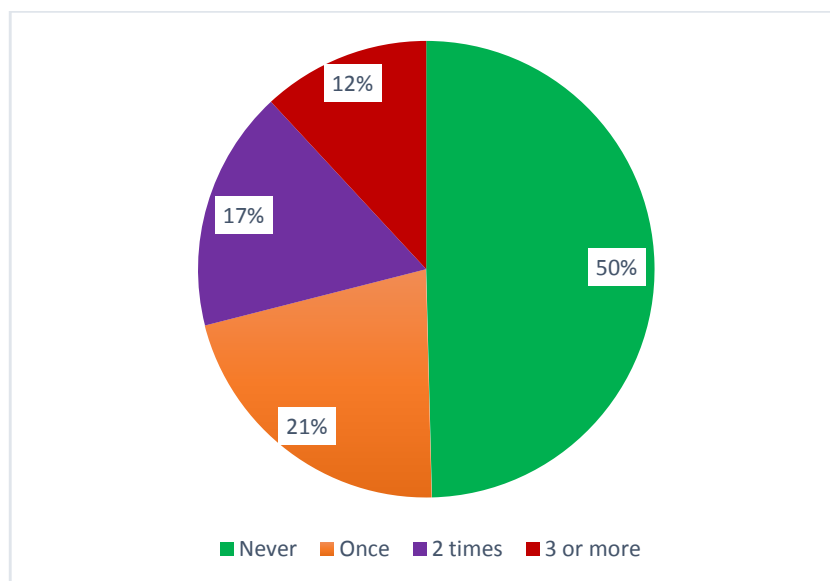
But 61 (24.2%) missed their scheduled antenatal visit once, 32 (12.7%) missed twice and 8(3.2%) missed three or more times. The antenatal women reported that during the past three months, the health worker or JPHN in their area visited once in 72 (28.6%) pregnant women, 71 (28.2%) three or more times,

70 (27.8%) two times and not even a single visit to 39 (15.5%) of the study participants.

The association between sociodemographic factors and the protective behaviour against COVID 19 is shown in Table 4.

**Table 2. Protective behaviour against COVID 19 practiced by pregnant women (n=252)**

Protective behaviour	Never	Rarely	Sometimes	Often	Always
I wear mask while going out	0	1(0.4)	4(1.6)	11(4.4)	236(93.7)
I wash hands, often with soap and water, or an alcohol-based sanitizer	1(0.4)	2(0.8)	17(6.7)	78(31.0)	154(61.1)
I practice social distancing; I keep at least six feet distance from others	0	4(1.6)	26(10.3)	74(29.4)	148(58.7)
I avoid all crowded spaces	0	2(0.8)	13(5.2)	55(21.8)	182(72.2)
I avoid touching my face, mouth, eyes and nose with unclean hands	1(0.4)	5(2.0)	15(6.0)	75(29.8)	156(61.9)
I cover my nose and mouth with bent elbows, or use the tissue/towel when I cough or sneeze and remove the used tissue immediately	0	3(1.2)	13(5.2)	54(21.4)	182(72.2)
I am active on my social network and regularly in touch with my family members, neighbours / community and friends if I need any help	2(0.8)	10(4.0)	26(10.3)	68(27.0)	146(57.9)
I use "Doorstep Medicine Delivery Apps" to buy medications	144(57.1)	34(13.5)	28(11.1)	31(12.3)	15(6.0)
I stock enough groceries for approximately one month in advance.	8(3.2)	19(7.5)	52(20.6)	91(36.1)	82(32.5)
Do you have enough stock of medicines prescribed by your doctor	4(1.6)	6(2.4)	33(13.1)	55(21.8)	154(61.1)



**Fig 1. How often you consulted doctor over phone or using telemedicine services**

**Table 3. Difficulties faced by antenatal women in using telemedicine services**

<b>Difficulties in Utilising Telemedicine</b>	<b>Number</b>	<b>%</b>
No difficulty	111	44
Do not have internet access	4	1.6
Do not have the facilities like smartphone/ computer	2	0.8
Don't know how to use it	13	5.2
Not available in the hospital	17	6.7
Not aware of the facility	78	31

**Table 4. Association between preventive practice and socio personal variables**

<b>Variables</b>	<b>Practice n(%)</b>		<b><math>\chi^2</math> / Fishers exact</b>	<b>p-value</b>
<b>Age group in years</b>	<b>Average</b>	<b>Good</b>		
<=20	1(14.3)	6(85.7)	7.45	0.02
21-30	18(8.4)	196(91.6)		
>30	8(25.8)	23(74.2)		
<b>Educational status</b>				
Primary/High school	3(42.9)	4(57.1)	7.95	0.09
Up to +2	6(16.2)	31(83.8)		
Graduate	9(9.5)	86(90.5)		
Post graduate	3(6.4)	44(93.6)		
Professional	6(9.1)	60(90.9)		
<b>Employment status</b>				
Not employed	12(12.0)	88(88.0)	7.47	0.02
Previously employed	2(2.8)	70(97.2)		
Currently employed	13(16.2)	67(83.8)		
<b>Socioeconomic status</b>				
Lower & Lower middle class	3(10.0)	27(90.0)	4.74	0.09
Middle class	14(8.2)	156(91.8)		
Upper and upper middle class	10(19.2)	42(80.8)		
<b>Area of residence</b>				
Corporation	8(25.0)	24(75.0)	8.18	0.02
Municipality	3(6.2)	45(93.8)		
Panchayath	16(9.3)	156(90.7)		
<b>Any other illness</b>				
No	23(11.7)	173(88.3)	0.96	0.33
Yes	4(7.1)	52(92.9)		
<b>No of children</b>				
0	17(10.1)	151(89.9)	5.57	0.05
1	6(8.3)	66(91.7)		
2 or more	4(33.3)	8(66.7)		
<b>Duration of gestation in Month</b>				
<=3 months	3(8.6)	32(91.4)	5.08	0.08
3-6 months	7(6.4)	103(93.6)		
>6 months	17(15.9)	90(84.1)		
<b>Living arrangement</b>				
With Husband	9(8.7)	95(91.3)	6.22	0.09
With Husband and child/children	6(24.0)	19(76.0)		
With Parents	6(14.6)	35(85.4)		
With Parents /in laws,	6(7.3)	76(92.7)		
Husband and child/children				



#### 4. DISCUSSION

Pregnant women are at increased risk than general population due to COVID 19 pandemic. It is estimated that 85% of pregnant women will have mild disease, 10% have more severe disease and 5% have critical disease. Also there are significant challenges while treating pregnant women with COVID 19 such as being cautious while prescribing experimental drugs, risk of abortions and termination of pregnancy in interest of the mother's health.

According to a living systematic review, around 10% of pregnant and recently pregnant women attending or admitted to hospital for any reason was found to have diagnosed COVID19. Also it is reported that gestational diabetes (OR=2.42) Maternal obesity (OR=1.75), pre-existing comorbidities (OR: 1.64), asthma (OR: 1.71), history of covid-19 in the support person (44.56) had high risk of COVID19 in pregnancy. Maternal risk factors associated with severe covid-19 were increasing age (OR1.78), high body mass index (OR 2.38), chronic hypertension (OR 2.0), and pre-existing diabetes (OR 2.51). There is also an increased risk of delivering preterm and their babies being admitted to the neonatal unit when pregnant women have covid-19 [5]. Hence pregnant women need to take utmost care to prevent the COVID 19 infection by practicing good protective behaviour like avoiding crowded areas, maintaining social distancing. At the same time regular antenatal check-ups are important to have a healthy child. Telemedicine is an alternative in this pandemic period. The present study addressed an important issue and measured the level of protective behaviors among pregnant women as well as the relevant determinants and the use of telemedicine as alternative during the pandemic period.

In our study overall protective behaviour was good among 225(89.3%) study participants. Previously employed women (97.2%) and unemployed mothers (88%) were found to have good protective behaviour in comparison to currently employed mothers (83.8%) and this association was found to be statistically significant( $P=0.02$ ). There was a significant association between age group and good practices ( $P=0.02$ ). Among the women more than 30 years, the proportion with good practice was less. Although there was higher proportion of good practices among more educated compared to the less educated, but there was no statistically significant association between education and protective behaviour ( $P=0.41$ ).

In a study among 225 pregnant women by Aghababaei S in Iran, the majority of the pregnant women had high protective behaviour i.e 97.3% and knowledge was 93.8% [8]. In our study, the proportion with good knowledge regarding COVID 19 among the pregnant females was 50% and that of very good knowledge was 22.22%. Only 0.4% had poor knowledge among the pregnant women. This high knowledge could be attributed to the massive and rampant awareness campaigns carried out by the central and state Governments towards prevention of COVID 19.

In a study by Nwafor et al., 60.9% of pregnant women had sufficient knowledge of preventive measures against COVID-19 but unlike our results, the overall practice was as low as 30% [9]. The determinants of poor practice in that study were higher age group, parity of 5 or more, residing in a rural area and having no formal education. In the present study also, higher age group was found to be a risk factor for poor practice. Another important finding is that there was a good practice among rural women, unlike the above study. Regarding area of residence, even rural area is somewhat urbanised in Kerala. Also, the good practice could be due to the higher literacy status among women in Kerala and also due to constant efforts from the Government and media in creating awareness among people in rural area. In Kerala female literacy is high and all women in our study had formal education and majority have higher level of education. The practice has no significant association with educational status, duration of gestation, living arrangement, socioeconomic status.

Also in the current study, a higher proportion of the pregnant women who has no children or only one child were having good practice compared to those with 2 or more children even though  $p$  was 0.05. In the study by Aghababaei et al there was association between nulliparous women and good practice [8].

Nearly 67.2% (170) believe that COVID 19 can be more severe in pregnancy. We found that 61.1% of the women washed hands with soap or used alcohol based sanitiser soap most often and 31.0% often. Also, 58.7% practised social distancing always, and 29% often. About 72.2% avoided crowding or social gatherings always, 61.9% were always cautious not to touch their nose in public and 72.2% would always cover their nose and mouth while sneezing, 93.7% wore mask and 61.1% would procure and stock

adequate medicines to prevent exposure. In a study by Corbett GA in Ireland, 32.4% of pregnant women practised work from home, 35.2% practised isolation, 63.4% avoided social gatherings, 70.4% avoided socialising, 46.5% avoided public transport, 66.2% stocked up food, 42.3% and 25.4% stocked up sanitizers and toiletries respectively [10]. Also women were most concerned about their older relatives, their children and unborn children and this led to significant anxiety. In our study, primigravidae (89.9%) and mothers having one child (91.7%) were found to have good practices in comparison to mothers with more than one child. In their study, Yassa M reported that high rate of distress among pregnant women corresponded to increased rates of willingness to comply with the rules for isolation and proper preventive measures. Panic spread by fabricated information on social media could increase distress among pregnant women and under difficult conditions of isolation and quarantine, online counselling, telemedicine and smart phones could be safe and feasible methods of accessing mental health care [11,12].

Telemedicine can help pregnant women to have direct access to medical care via web based apps. By doing so, patients can remain connected with doctors while staying safe at home. Telemedicine also has the added advantage that barriers to prenatal care such as lack of transportation, child care and long waiting times could be addressed [13,14].

During COVID 19 pandemic, in most hospitals routine health care services including antenatal care were affected due to the emphasis given to COVID control measures. In this study, 24.2% missed their scheduled antenatal visit once, 12.7% missed twice and 3.2% missed three or more times during the pandemic period. Telemedicine services could be a viable alternative during the COVID 19 crisis. In our study, 21% of study participants used telemedicine once during the pandemic as an alternative to hospital visit, 17% used twice and 12% used thrice during their antenatal period. 44% of respondents mentioned that they had no problem using telemedicine. Regarding the availability of telemedicine facility in any of the hospitals, (44.8%) replied that telemedicine facility is available in hospitals, 103 (40.9%) responded that they don't know whether the facility is available and the rest 36 (14.3%) responded that no telemedicine facility is available. Though Government has initiated teleconsultation services, it has not reached the

needy population. More facility for telemedicine at government hospitals and family health centres are to be initiated and dedicated time can be allotted for specialised services for antenatal women. There are people who do not have access to internet connectivity which hinders use of telemedicine services. Government can provide free WIFI services in rural areas so that such women can utilize the services. Around 5.2%, lack of knowledge about how to use the service was the reason for non-utilization. Measures to be taken to make people aware how to use the facilities. The study is done among participants selected from three selected hospitals in a district which may limit the generalizability.

## 5. CONCLUSION

The awareness and practice regarding protective behaviour against COVID 19 among pregnant women was good. The Government has to provide dedicated specialist teleconsultation services for antenatal women to ensure complication detection for early referral and for follow up of antenatal women. Also, more emphasis to be given to publicize regarding the facilities via mass medias to improve the awareness regarding telemedicine facilities among public which will help pregnant women's utilization.

## CONSENT AND ETHICAL APPROVAL

As per university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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