

Pregnant Women's Knowledge Regarding Telemedicine as Antenatal Care Strategy during Corona Pandemic

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Abstract

Background: A terrible illness known as COVID-19 is on the rise, and it has been demonstrated that it can have deadly effects on pregnant mothers and their unborn children. For maternal and fetal conditions, telemedicine has become essential to ensuring safe and effective health. **Aim:** assess pregnant women's knowledge regarding telemedicine to be used as antenatal care strategy during corona pandemic. **Research Design:** A descriptive exploratory design was utilized to conduct this study. **Setting:** The study was conducted in the Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital. **Sample:** Convenient sample consisted of 368 women from the previous mentioned setting. **Tools:** tool was used; structured interviewing questionnaire was used to assess general characteristics, medical and family history, obstetric history, and pregnant women's knowledge regarding telemedicine. **Result:** the current study revealed that 53.3% of studied sample had good knowledge about telemedicine. **Conclusion:** The present study was concluded that about half of pregnant women had satisfactory knowledge regarding telemedicine. Moreover, there was a high statistical significant relation between studied sample knowledge and their educational level with p value <0.001, also there is significance relation between knowledge and family income with p-value 0.010. **Recommendation:** Awareness programs should be developed up to raise women's knowledge regarding telemedicine services & Application of instructional guideline to healthcare providers to improve Obstetric services access via telemedicine after COVID-19 **Further researches:** evaluate the effect of educational programs regard telemedicine in reducing maternal mortality and morbidity among pregnant women during COVID19.

Key words: Telemedicine, Antenatal care, knowledge.

Introduction

Corona virus pandemic has been declared by the World Health Organization after facing many countries of the world with a sudden significant increase in hospitalizations for pneumonia and multi organ disease. According to world health organization; the incidence rate of covid19 in Egypt from January 2020 to June 2022 have been 514,008 confirmed cases with 24,720 deaths, and a total 88,052,405 vaccine doses have been administered. Globally; at June 2022, there have been 535,863,950 confirmed cases with 6,314,972 deaths, and a total 11,902,271,619 vaccine doses have been administered. (WHO, 2022)

Corona viruses are a large family of viruses that cause illness ranging from the

common cold to more severe diseases. Symptoms of COVID-19 are variable, such as headache, nasalcongestion , rhinorrhea, cough, muscle pain, sore throat, fever, loss of appetite, diarrhea, and breathing difficulties. COVID-19 pandemic affected the health care services across the world. This effect also includes maternal and child health. (WHO, 2021).

The COVID-19 pandemic has forced a significant amount of health care resources to be diverted from providing ordinary care in order to deal with the epidemic. This use of resources differently could result in the interruption of other crucial healthcare services that impact the continuum of treatment, like follow-up visits and medicine

supply, etc. Additionally, due to unavailability, infection risk, and limited access, pregnant women may use less services overall. The most susceptible group of the population, such as pregnant women, can be negatively impacted by these circumstances. (Kotlar et al., 2021)

During pregnancy, women undergo many physiological changes in all body organs. According to center of disease control and prevention (CDC), pregnant women with COVID-19 are more likely to experience adverse health outcomes than non-pregnant women, so pregnant women should follow preventive measures to reduce exposure to viral infections as social distancing. (CDC 2020)

A broad range of pregnancy-related services could be offered via telemedicine. Consultation with specialists could be for addressing complaints, regular antenatal checkup, and to provide home monitoring for conditions like diabetes and hypertension (Bush et al., 2017).

According to World Health Organization telemedicine is “The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information about diagnosis, treatment, prevention of disease, injuries, research, evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities (WHO, 2010)

Numerous medical specialties, including dermatology, behavioral health, cardiology, and prenatal care, use telemedicine. The care given to pregnant women by qualified healthcare professionals is known as antenatal care (ANC). The wellbeing of women and their unborn children depends on it. It encompasses risk assessment, screening, and prevention; management of illnesses connected to pregnancy; and health promotion. To reduce the risk of maternal death, international recommendations advise having regular prenatal consultations. (Tunçalp et al., 2017).

Pregnant women knowledge about telemedicine is an important component for the success of telemedicine. However, there are various factors that affect how pregnant women perceive telemedicine service. Technical training and clear guidelines are necessary to improve knowledge about telemedicine. In order to ensure adequate care, maintaining home quarantine, pregnant women were included in a multidisciplinary tele-assistance network. (Hassibian & Hassibian, 2016)

The nurse can play a crucial role among pregnant women during global pandemic acting as key drivers of health care since nurse play multidisciplinary roles regarding pregnant women's care, education and counseling through telemedicine. Nurses play different roles in telehealth. Nurses can use of technology to conduct telehealth sessions in homes, at doctor's offices, and in clinics and hospitals. Mainly, any place where the proper technology is available is a suitable place for telehealth nursing. (Rutledge & Gustin, 2021)

Justification of the study:

COVID-19, the disease caused by a new corona virus, spread rapidly around the globe and is a pandemic, according to the World Health Organization. (WHO, 2020). The impact of COVID-19 could be greater in vulnerable populations as among the pregnant women. The Prevalence of COVID-19 among the pregnant women worldwide is about 10% of all pregnant women admitted to hospital with COVID-19, while 73% of the pregnant women with COVID-19 were asymptomatic. (WHO Collaborating Centre for Global Women's Health 2020).

Telemedicine using for antenatal care health services could be a useful, alternative option for pregnant women in need of basic antenatal care and health consultation. It could reduce the unnecessary hospital visits and limit potential risks for infection among this vulnerable group during the COVID-19 pandemic (Brown & DeNicola, 2020)

Telemedicine may offer convenient access to routine care for women who are more

likely to be impacted such as pregnant women without putting them at risk of exposure in a busy hospital or impacted waiting room. Telemedicine is a perfect way to provide medical care during a corona pandemic, and it plays a major role in slowing virus transmission by reducing social isolation and person-to-person interaction. (Pradhan et al., 2022)

Using telemedicine for antenatal care and health services could be a useful alternative option for pregnant women in need of basic antenatal care and health consultation. It could reduce unnecessary hospital visits and limit potential risks for infection among this vulnerable group during the COVID-19 pandemic. So pregnant women knowledge about telemedicine is an important component for the success of telemedicine, so the current study aimed to assess pregnant women knowledge regard telemedicine usage in antenatal care (Wu et al., 2020)

Aim of the study:

To assess pregnant women's knowledge regarding telemedicine to be used as antenatal care strategy during corona pandemic.

Research questions:

- 1- Are pregnant women's had knowledge that telemedicine used as alternative strategy to traditional health care services?
- 2- What are the barriers that affect pregnant women acquire knowledge regard telemedicine?

Subjects and Methods

Technical design

Research Design:

A descriptive exploratory design was utilized to conduct this study.

Setting:

This study was conducted in the Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital.

Subject (sampling):

Sample Type: convenient sample was used.

Sample size & technique:

Study subjects include a representative sample of total pregnant women in outpatient clinical units' attendance rate (N=8640) / year at Ain Shams University Maternity Hospital; according to the flow rate of the pregnant women who were visited the antenatal clinic during the period 2019-2020. Based on sample size equation 368 women was participated in the study.

The sample size was calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% and a known total population of 368 women using the following equation:

- Type I error (α) = 0.05
- Type II error (B) = 0.2
- With power of test 0.80

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times (d^2 \div z^2) \right] + p(1-p) \right]}$$

$$368 = \frac{8640 \times 0.5(1-0.5)}{\left[\left[8640-1 \times (0.05^2 \div 1.96^2) \right] + 0.5(1-0.5) \right]}$$

N= Community size

z= Class standard corresponding to the level of significance equal to 0.95 and 1.96

d= the error rate is equal to 0.05

p= Ratio provides a neutral property = 0.50

• **Data collection tools:** Two tools were used:

Tool I: A structured Interviewing Questionnaire schedule:

The researcher designed the questionnaire in a simple Arabic language after reviewing the recent and related literature to assess pregnant women's knowledge regarding telemedicine as antenatal care during corona virus pandemic. It divides into five parts:

- **Part I:** assessed women's general characteristics including five questions regarding Age, Level of education, marital status, Employment status, and family income from Q 1 to Q 5.
- **Part II:** assessed obstetric history. It consists of questions about Gravida, Parity, Previous abortion, causes of abortion, and previous pregnancy complication from Q 6 to Q 10.
- **Part III:** assessed present pregnancy history. It consists of questions regarding Gestational age, present complain during pregnancy (Q 11 & Q12)
- **Part IV:** assessed medical and family history. (Q 13 & Q14).
- **Part V:** assessed pregnant women knowledge about telemedicine as antenatal care during corona virus pandemic. It consists of questions about meaning of telemedicine, advantages & disadvantages, source of information, fields of telemedicine, communication techniques of telemedicine, barriers of telemedicine, and previous training program from Q 15 to 24.

❖ **Scoring system for evaluating women's knowledge was developed as the following:**

- This subsection consisted of 10 items about telemedicine which was used to assess knowledge. Each item was scored with a 2-point scale with scores of 1-2 (2=satisfied, 1=un satisfied). The overall score could range from a minimum of 1 to a maximum of 20. The overall level of knowledge was assessed by summing scores for all responses, and then a percentage score was calculated. This percentage score was categorized into satisfactory= (>75%) and unsatisfactory= (<=75%).

Validity and reliability:

Tools were revised and evaluated for feasibility and content validity by five experts from the Faculty of Nursing Ain Shams University in the Maternity-Gynecological Nursing Department, their comments were considered.

Reliability was done by Cronbach's Alpha coefficient test which revealed $r = 0.8022$.

Ethical Considerations:

The ethical research considerations in this study include the following:

- Ethical approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing at Ain Shams University before starting the study.
- In addition, the researcher was clarifying the objective and aim of the study to women that was included in the study.
- Oral consent was obtained from each participant prior to data collection.
- The women's right to leave the study at any moment
- they were told that their privacy and confidentiality would be protected without any harm.

Administrative Design:

An official permission was obtained from the director of the Ain Shams University Maternity Hospitals in which the study was conducted as a letter was sent from the Faculty of Nursing-Ain Shams University explaining the aim of the study to obtain the permission for conducting this study.

Operational Design:

The Operational design includes preparatory phase, pilot study and fieldwork.

The Preparatory Phase:

It included reviewing of the current local and international related literature using books, articles and scientific magazines to develop tools for data collection.

Pilot Study:

A pilot study was carried out on 10% (36 women), selected regarding previous mentioned criteria and the period of study within one month. It was aimed to evaluate the simplicity and clarity of the tools, help in the estimation of the time needed to fill the questionnaire and also determine obstacles facing data collection. No modification was needed and the pilot sample wasn't excluded.

Field Work:

Through this phase the researcher had attend Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital from 1 December 2021 to 1 June 2022, 2days /week from 10 am to 1pm until predetermined sample size collected. The researcher started to introduce herself & explain the aim of the study to the women & take oral consent from her. The average numbers of women interviewing/day were 8-10 women/day using tool to carry out the research in which a structured interviewing questionnaire used to assess pregnant women knowledge regarding telemedicine as antenatal strategy during corona virus pandemic with range time 10 minutes & the questionnaire filled by the study women except uneducated women. The researcher repeated previous steps until finished the duration of data collection.

Statistical Design:

Utilizing the statistical program for social sciences, version 22.0, recorded data was examined (SPSS Inc., Chicago, Illinois, USA). The mean and standard deviation were used to express quantitative data (SD). Frequency and percentage were used to express qualitative data.

The following tests were done:

- Chi-square (χ^2) test of significance was used in order to compare proportions between qualitative parameters.
- Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
 - Probability (P-value)
 - P-value <0.05 was considered significant.
 - P-value <0.001 was considered as highly significant.

- P-value >0.05 was considered insignificant.

Results:

Table (1) revealed that (57.9%) among studied sample aged between 20-30 years while (42.2%) aged between 31-40 years with mean 29.21 ± 6.72 . Concerning educational level (60.6%) among studied sample had intermediate qualification while (11.4%) was illiterate. In relation to marital status (93.5%) of studied women are married, moreover (66.3%) are working, and (84.8%) have enough family income.

Table (2) indicates that 45.1% of the study samples were gravida 3. As regards their parity, 50.8% of the study samples were primipara. Concerning abortion, 76.4% of the study sample had no previous abortion. Moreover 72.4% had complications during previous pregnancy, and the dominant complication was gestational hypertension that represents 43.6%. In relation to gestational age 42.7% of studied sample between 14-26 weeks, while 88.3% had problems with pregnancy, and the most dominant problem was nausea and vomiting that represents 36.3%.

Table (3): show that 53.3% of studied sample had satisfactory level of knowledge about telemedicine.

Figure (1): show that 29.3%, 17.4% of the studied samples their barriers that reduce knowledge about telemedicine services were lack of education, guidance, and training.

Table (4) revealed that there is a high statistical significant relation between studied sample knowledge and their educational level with p value <0.001, also there is significance relation between knowledge and family income with p-value 0.01

Table (1): Number and percentage distribution of the studied pregnant women's during corona pandemic according to their socio-demographic data (N=368).

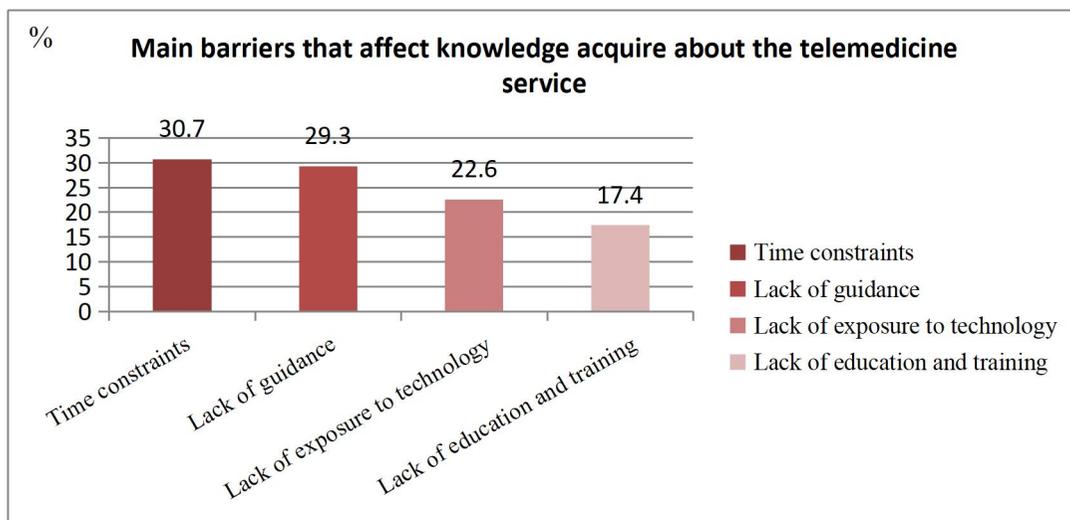
Socio-demographic data	No.	%
Age (years)		
20-30 years	213	57.9
>30 - 40 years	155	42.1
—		
X ±SD		29.21±6.72
Education level		
Illiterate	42	11.4
Intermediate qualification	223	60.6
High qualification	103	28.0
Marital status		
Married	344	93.5
A widow	15	4.1
Divorced	9	2.4
Occupation		
Worker	244	66.3
A housewife	124	33.7
Family income		
Enough	312	84.8
Not enough	56	15.2
Enough and overflowing	0	0.0

Table (2): Number and percentage distribution of the studied pregnant women during corona pandemic according to their pregnancy and birth history (N=368).

Items	No.	%
Pregnancy and birth history		
Gravida		
Primi gravida	38	10.3
2 nd gravida	143	38.9
3 rd gravida	166	45.1
More than three	21	5.7
Para		
Primi parous	187	50.8
2 nd parous	119	32.3
3 rd parous	9	2.4
>3 rd	53	14.4
Previous abortion		
Yes	87	23.6
No	281	76.4
If found, what is the cause of abortion (n=87)		
Chromosomal abnormalities	15	17.2
Hormonal irregularities	23	26.4
Environmental hazard	10	11.5
Uterine abnormalities	12	13.8
Others	27	31.0
Complications during your previous pregnancy		
Yes	101	27.4
No	267	72.6
If you suffer, what are these complications (n=101)		
Gestational diabetes	6	5.9
Gestational hypertension	44	43.6
Cardiac disease	2	2.0
Chest disease	42	41.6
Immunological disorder	2	2.0
Others	5	5.0
Present pregnancy history		
Gestational age (wks)		
1-13 weeks	99	26.9
14-26 weeks	157	42.7
27-40 weeks	112	30.4
Are there any problems associated with the current pregnancy?		
Yes	325	88.3
No	43	11.7
If you find, remember it (n=325)		
Nausea and vomiting	118	36.3
Heart burn	44	13.5
Headache	38	11.7
Dyspnea	11	3.4
Orthostatic hypotension	63	19.4
Varicose vein and edema	51	15.7

Table (3): Number and percentage distribution of the studied pregnant women during corona pandemic according to their total knowledge level about the telemedicine service (N=368).

Level of total knowledge for pregnant women about telemedicine service	No.	%
Satisfactory >75%	196	53.3
Un satisfactory ≤75%	172	46.7
Total	368	100.0

**Figure (1):** Number and percentage distribution of the studied pregnant women's according to the main barriers that reduce knowledge about the telemedicine service (N=368).**Table (4):** Relation between level of total knowledge for pregnant women using the telemedicine service according to their socio-demographic data during corona pandemic (N=368).

Socio-Demographic data	Level of total knowledge				Chi-square test	
	Satisfied (n=172)		Un satisfied (n=196)		x ²	p-value
	No.	%	No.	%		
Age (years)						
20-30 years	108	62.8%	105	53.6%	3.194	0.074
31-40 years	64	37.2%	91	46.4%		
Educational level					40.507	<0.001**
Illiterate	39	22.7%	3	1.5%		
Intermediate qualification	91	52.9%	132	67.3%		
High qualification	42	24.4%	61	31.1%		
Social status					2.568	0.277
Married	164	95.3%	180	91.8%		
A widow	6	3.5%	9	4.6%		
Divorced	2	1.2%	7	3.6%		
Occupation					0.204	0.651
Worker	112	65.1%	132	67.3%		
A housewife	60	34.9%	64	32.7%		
Family income					6.591	0.010*
Enough	137	79.7%	175	89.3%		
Not enough	35	20.3%	21	10.7%		

Discussion

The COVID-19 pandemic is an erupting infection that has been demonstrated to have deadly effects on pregnant mothers and their unborn children. To provide safe and effective health for maternal and fetal disorders, mobile applications and SMS-based telehealth programs are essential. Telemedicine was demonstrated during COVID-19 to be a practical method of providing medical care while maintaining a physical barrier and significantly lowering the danger of virus transmission. Applications in telemedicine were crucial for assisting public health measures, lowering risk while maintaining high standards of treatment **Wang et al., (2019)**.

Based on this critical issue, the present study was conducted to assess pregnant women knowledge regarding telemedicine as antenatal care strategy during corona pandemic. The researcher analyses the available data for studied sample through the following:

Regarding general characteristics, the current study's findings showed that, with a mean age of 29.216.72, slightly more than half of women were in the 20–30 age range. The bulk of them were married, at least in terms of marital status. At the same time, around 35% of them had some college experience. A worker made up about two thirds of them, and about four fifths of them had sufficient income.

The current study's findings were in partial agreement with those of **Besho et al., (2021)** who reported that the mean age of cases was 25.46 4.67, that nearly half had some college education, and that the majority were married and employed.

Regarding obstetric history, the current study showed that more than two fifths of the study sample was third gravida, and about half of them were primi-para, while about three quarters of them had no previous abortion. Moreover, about one fifth of them had complications during previous pregnancy, and the dominant complication was gestational hypertension that represents about two fifths of them. In relation to gestational age about two fifths of studied sample between 14-26 weeks, while the majority had problems with pregnancy,

and the dominant problem was nausea and vomiting that represents one third of them.

Contrary to earlier findings, **Abd El-wahab, S., et al., (2022)** found that the majority of the study group was primi-para and that less than three-fourths of them were primi-gravida, and that the majority had never had an abortion before. Additionally, the majority of women had trouble-free pregnancies in the past. Approximately three-fourths of the analyzed sample were in the third trimester relative to gestational age.

As regards study sample knowledge about telemedicine, the current study carried out among pregnant women and pointed out that more than half of pregnant women had satisfactory level of knowledge regard the meaning of telemedicine, communication techniques and fields of telemedicine, and about half of them were oriented with advantages and disadvantages of telemedicine services, this result may be due to WHO recommendations to reduce numbers of traditional prenatal visits to avoid exposure of pregnant woman and health workers to infected persons with the Corona virus and merge it with virtual prenatal visits, so many health care providers diversion to telemedicine in follow up the pregnant women through providing information about antenatal care and pregnancy guidelines through communication via SMS message, also the majority of study sample were intermediate and highly educated so there is capability to learn and acceptance of new models of care.

The previous findings agreed with **Sukumaran et al., (2020)** reported that about half of study sample had good level of knowledge regard telemedicine and usage in antenatal care.

Regarding barriers that reduce knowledge about telemedicine service, the current study revealed that about three quarter of study sample reported lack of guidance, education and training as a barrier while about one third of study sample reported time constraints as a barrier, this result may be due to lack of training program on how to use telemedicine and this result in inability of

clients to access to equipment and connectivity, difficulty downloading software, so needs to increase training session duration and frequency and more practical exposure would help them to gain more experience.

These findings were on the contrary with **Morgan et al., (2022)** who carried out a study on Prenatal telemedicine during COVID-19: patterns of use and barriers to access and reported that two fifth of barriers related to poor phone or internet connection.

In addition, the current study revealed that there is a high statistically significant relation between studied sample knowledge and their educational level, also there is significance relation between knowledge and family income. This may be due to most of study sample had intermediate and high qualification so they able to deal with technological devices, also the majority of them had enough family income, so the assisted devices could be available and ability for receiving training on technology.

This finding agreed with **Chagpar, (2022)** who reported there is high statistical significance between age, educational level and family income.

Conclusion

Based on the results of the study, it is concluded that: The current study's findings answered the present study's questions and aim was achieved, which stated that about half of pregnant women had satisfactory level of knowledge regarding telemedicine.

Recommendations

In light of the study's findings, the following suggestions are made:

Awareness programs should be developed up to raise women's knowledge regarding telemedicine services & Application of instructional guideline to healthcare providers to improve Obstetric services access via telemedicine after COVID-19.

Further researches: evaluate the effect of educational programs on telemedicine in

reducing maternal mortality and morbidity among pregnant women during COVID19.

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