Knowledge, Attitude, and Practice toward Corona Virus Infection among Pregnant Women Attending Antenatal Care Clinics at Kafrelsheikh, Egypt

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ABSTRACT

Background: COVID-19 is a pandemic disease begins on 11March, 2020; it was growing internationally. Pregnancy suppresses the immune system, making pregnant women more vulnerable to COVID-19 infection and severe sickness. To avoid becoming infected with the virus, extreme awareness is advised. Knowledge of the condition and one's attitude toward it both play a role in one's willingness to embrace public health interventions. **Aim:** Was to assess the knowledge, attitude and practice toward corona virus infection among pregnant women attending antenatal care clinics at Kafrelsheikh Hospitals, Egypt. **Subjects and method: Design:** Descriptive research design was utilized in this study. This study was conducted at antenatal care Clinics at Kafrelsheikh General and University Hospitals, Egypt. **Subjects:** A convenient sample of 415 pregnant was included in this study. **Tools:** The data were collected using four tools. Tool 1: Socio-demographic structured interview schedule Tool II: The pregnant woman's knowledge about COVID-19 infection assessment questionnaire. Tool III: The pregnant woman's attitude toward COVID-19 infection assessment questionnaire. Tool IV: The pregnant woman's practice of COVID-19 preventive measures questionnaire: **Results:** According to current study, more than two-thirds (75.4 percent; 95 percent and 43.6 percent of pregnant women respectively) had good knowledge, positive attitude, and excellent practice concerning the coronavirus pandemic. Studied women according to the factors related to their knowledge of coronavirus infection 2.99 revealed that, (1.7–5.0) and 1.6 (1.2–2.7) respectively were found to be more likely to have good knowledge among pregnant women who had completed secondary school or above and lived in urban area. AOR = 1.7 (1.2–2.6) and 2.3 (1.3–4.0) respectively for good practice of preventive measures were maternal age of 25 years and being an urban resident. **Conclusion:** The target population had good knowledge, excellent practice, and positive attitude towards COVID-19. **Recommendations:** Pregnant women from isolated areas as well as those with lower levels of education should be educated, and legal enforcement should be established to improve the implementation of covid-19 preventive measures.

Keywords: Pregnant Women, Knowledge, Practice, Attitude, Corona Virus, Egypt

Introduction

COVID-19 is pandemic diseases begin on 11March, 2020, it was growing internationally at an accelerated rate and had spread to over 110 nations, according to World Health Organization (WHO), there were 294,482 confirmed cases of COVID-19 in Egypt from 3 January 2020 to 17 September 2021, with

16,908 deaths. A total of 12,194,537 vaccine doses have been delivered as of 14 September, 2021. The Egyptian Ministry of Health confirmed 85 new coronavirus positive cases and five new deaths on Saturday; all of the victims are Egyptians who got the virus from prior cases. So far, 1070 people have tested positive for the virus, including 241 who have been

recovered and 71 who have died. The Egyptian government has been taking little actions to combat the spread of the coronavirus since mid-March, starting with the suspension of schools and institutions. International flights have also been halted until mid-April. Six villagers were tested positive for the new coronavirus (COVID-19) in Biyala city in Kafrelsheikh governorate; Egypt's Delta. A 14-day lockdown was imposed on an Egyptian village where 500 households were quarantined after six people were proven positive for the new coronavirus (COVID-19). Another study reported about geographical distribution of COVID-19 at Egypt (Sohrabi et al, 2019, Anjorin, 2020 and Nadira et al., 2021).
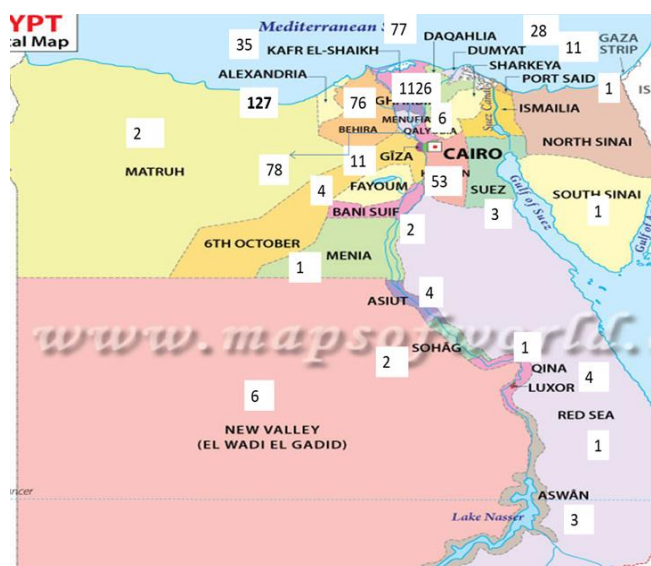
By Nadira et al, 2021

When the World Health Organization (WHO) proclaimed COVID-19 a pandemic disease on 11March, 2020, it was growing internationally at an accelerated rate and had spread to over 110 nations, including Ethiopia. With more than 6 million infections by 30 May, 2020; the pandemic poses a major threat to worldwide public health. The pandemic began in Asia in December and January 2020, and then spread to Europe and America, with the second wave beginning in February and lasting till now. The global spread of the pandemic may accelerate in the third wave. In

Egypt, the first confirmed case of COVID-19 was detected in 14 February 2020 in non-Egyptian (Cheng, 2021 and Besho, 2021). From 3 January 2020 to 12 March 2021, there have been 189,639 confirmed cases of COVID-19 in Egypt with 11,214 deaths (Sohrabi et al, 2019, Anjorin, 2020, Nadira et al., 2021 and Cheng, 2021).

In different countries, including Egypt, global action plans have been put in place and public health protocols including the required preventive precautions started to control the spread of the virus. Many of these precautions were related to staying at home, proper hand washing, avoid shaking and kissing, social distancing, limiting public vehicle traffic, locking down public places that do not dispense essential services, and reducing traffic hours to certain daily hours. To date no specific antiviral treatment has been recommended and the duration of effectiveness of different vaccines is questionable so, management of this crisis depends mainly on adherence to preventive precautions recommended by the WHO. The commitment with preventive precautions is greatly influenced by knowledge and attitudes of the population. A recent study in Egypt showed good level of knowledge among its participants. Although knowledge is important for awareness of any problem, risk perception is a key factor that would contribute to attitudes and change public behavior during outbreaks of global epidemics to prevent their spread (Nadira et al, 2021 and Cheng, 2021).

Pregnancy suppresses the immune system, making pregnant women more vulnerable to COVID-19 infection and severe sickness. Despite the fact that everyone is at risk of contracting COVID-19, pregnant women are more likely than the general population to become infected. It is spread by airborne droplets, making it easy for pregnant women to inhale and

difficult to eliminate due to changes in the respiratory system's anatomical structure during pregnancy (Nadira et al, 2021, Cheng, 2021 and Zhao et al., 2020).

Furthermore, pregnancy suppresses the immune system, making pregnant women more vulnerable to viral respiratory infections and their repercussions.COVID-19 has a higher chance of causing serious sickness in pregnant women. Morbidity, caesarean section deliveries, and preterm birth rates were all found to be higher. Vertical transmission is a point of contention (Tanjuakio, 2021 and Tug et al., 2020).

The existing data on COVID-19's impact on pregnancy outcomes is insufficient and limited to tiny case studies. They were classified as a vulnerable population in the lack of more solid evidence, and they were encouraged to take extra care while the COVID-19 epidemic unfolded. Pregnant women are deemed to be at high risk and are advised to take extra care to avoid contracting the virus. COVID-19 In order to prevent and contain the transmission of coronavirus, public health measures such as social distance, frequent hand washing, and the use of protective equipment are essential. Failure to implement these critical public health strategies could lead to inadequate control. As well as increasing the risk of infection (Tanjuakio, 2021, Tug et al, 2020, Wastnedge et al, 2021, Liang, 2020 and Carter, 1981).

Knowledge of the disease, as well as attitudes and practices toward it, all play a role in influencing a society's willingness to accept public health initiatives. According to studies, socio-demographic characteristics such as age, ethnicity, front-line job, and obstetrics treatment and history influence pregnant women's awareness, attitude, and precautionary practices about COVID-19. On the other hand, particularly in underdeveloped countries, low knowledge and practice

of COVID-19 prevention measures among pregnant women has been recorded (Cheng et al, 2021, Ayele et al, 2021 and Kamal et al, 2020).

The amount of material available on the level of knowledge, attitude, and practice of COVID-19 among Egyptian pregnant women is limited: As far as we know, no research has been done in the study region. Policymakers will utilize the findings of this study as a baseline for developing suitable actions to combat the pandemic effect in this vulnerable demographic. Health providers will use it when providing services to pregnant women. It will also be used by future scholars conducting study on comparable themes. Health education programs are beneficial for enhancing COVID-19 knowledge as well as developing a positive attitude and practicing safe activities. Nurses are the primary health care providers who deliver health education to pregnant women during antenatal visits (Nadira et al., 2021 and, 1981).

Significance of the study:

Pregnancy is a period of great anticipation and excitement. Fear, anxiety, and uncertainty are clouding this normally pleasant time for expectant women who are dealing with the coronavirus illness (COVID-19) outbreak. The fight against COVID-19 is still on over the globe. People's compliance with these control measures is critical to the eventual success of the project, which is strongly influenced by their knowledge, attitudes, and practices (KAP) concerning COVID-19, according to KAP theory. Furthermore, according to the Lessons learned from the SARS outbreak in 2003, knowledge and attitudes concerning infectious diseases are linked to levels of panic emotion across the population, particularly among pregnant women and high-risk groups, complicating efforts to limit disease transmission (Sohrabi et al, 2019, Anjorin, 2020 and Nadira et al, 2021). Understanding pregnant

women's awareness of COVID-19 at this key time is critical for outbreak management of COVID-19 among pregnant women.

Since its inception in Wuhan (China) in December 2019, the unique corona virus respiratory disease 2019 (COVID-19) has wowed the world. It was fast growing and spreading globally, prompting the World Health Organization (WHO) to proclaim it a new pandemic, posing a serious threat to livelihoods and human lives, including those of pregnant women. There was no specific vaccine or antiviral medicine available during the initial wave of the pandemic, and the epidemiological character of the disease was unknown. As a result, the WHO issued worldwide action plans and public health guidelines to prevent virus infection and manage disease spread in communities (Sohrabi et al, 2019).

These protocols included preventive measures such as restricting people's movement and raising the slogan "stay at home" around the world, closing down educational institutions and public places except for those providing essential community services, maintaining social distance, proper hand washing, avoiding shaking hands and kissing, and wearing masks in overcrowded places. Many of these precautions were difficult to implement because they interfered with social behaviors and customs, but their observance by the populace was critical in containing the crises. During outbreaks of worldwide epidemics, risk perception is a significant component that can influence public attitudes and behavior in order to prevent the spread of the disease. As a result, policymakers needed to identify population practices and their level of adherence to these preventative measures, as well as the underlying risk perceptions and attitude toward the problem, in order to plan how to overcome the crises (Anjorin, 2020 and Nadira et al, 2021).

Aim of the study

The aim of this study was to assess the knowledge, attitude and practice toward corona virus infection among pregnant women attending antenatal care clinics at Kafrelsheikh, Egypt.

Research questions:

The following research questions were formulated to fulfill the aim of this study:

1-What is the knowledge about corona virus infection among pregnant women attending antenatal care clinics at Kafrelsheikh hospitals, Egypt?

2-What is the attitude toward corona virus infection among pregnant women attending antenatal care clinics at Kafrelsheikh hospitals, Egypt?

3-What is the practice of corona virus preventive measures among pregnant women attending antenatal care clinics at Kafrelsheikh hospitals, Egypt?

4- Are the pregnant women's educational level and place of residence significant predictors of their appropriate knowledge?

5- Are the the pregnant women's age and place of residence significant predictors of their excellent practice of Covid-19 preventive measures?

II- Subjects and Method

Study Design

Descriptive research design was used aims to accurately and systematically describe a population, situation or phenomenon. It can answer what, where, when and how questions, but not why questions. A descriptive research design can use a wide variety of research methods to investigate one or more variables (Cheng et al., 2021).

Setting:

The study was conducted randomly in at two hospitals namely the General Hospital and the University Hospital at Kafrelsheikh governorate, Egypt.

Subjects:

The pregnant women who were attending Antenatal Care Clinics (ANC) at the previously mentioned hospitals were the target population for current study.

Sample Size

With the probability was set at 50%, with a 5% margin of error and a 95% confidence interval. As a result, the target variable in this study is 415 pregnant women referred for antenatal follow up. The sample size was calculated using the following formula: n = [(Zα/2 + Zβ)2 × {2(SD)2}]/ (mean difference)2 = [(1.96+0.84)2x 2(8.9)2]/ (2.5)2=198.7. Based on this formula, 415 participants were recruited according to the inclusion and exclusion criteria.

Sampling

The pregnant women were chosen using systematic random sampling. The sample size was proportionally assigned to each institution based on the number of pregnant women who attended the ANC.

Inclusion Criteria

Pregnant women who were attending ANC and who aged 18 - >35years regardless of their trimester of pregnancy, absence or presence of comorbidity, and number of ANC visits.

Exclusion Criteria

Pregnant women who were unable to communicate or refused to participate in the study.

Tools of data collection:

Four tools were constructed by the researchers after reviewing the related literature. The questionnaires were adopted from different articles published in English and contextualized to local situations. The adopted questionnaires were translated to Arabic language and pre tested.

Validity:

The tools were submitted to five scholastic nursing specialists in the field of Maternity and Midwifery Nursing to test its content validity. Modifications were carried out according to their recommendations. The tools were validated for clarity, appropriateness, and completeness of the content. The tools were evaluated by comparing the consistency between its original and re-translated version.

Tool 1: Socio-demographic and obstetric data structured interview schedule: It included the following two parts:

1-Socio-demographic data: such as age, residency, marital status, occupational status, family monthly income, and ethnicity.

2-Obstetric and reproductive data: as parity, gravidity, history of ANC, etc.

Tool II: The pregnant woman's knowledge about COVID-19 infection assessment questionnaire: Included 12-items to assess the pregnant woman's knowledge about COVID-19 as "COVID 19 infection can be spread by air droplets".

Tool III: The pregnant woman's attitude toward COVID-19 infection assessments questionnaire: Composed of 4-items for assessing the pregnant woman's attitude toward COVID-19 infection. Example: "COVID 19 is damn from God".

Tool IV: The pregnant woman's practice of COVID-19 preventive measures assessments questionnaire:

Included 10-items to assess the pregnant woman's practice of COVID-19 preventive measures such as "wash hand with soap and use sanitizer".

Scoring system:

Scoring of women's knowledge, attitude and practice were either 1 (for correct, done and positive response) or 0 (for incorrect, not done and negative response). The maximum score was 12 for knowledge, 10 for the practice and 4 for attitude components of the questions whereas the minimum score was 0 for all of them.

Total knowledge score range: Good knowledge: Participants who scored ≥ mean (which was 11 for this study).

Inadequate knowledge: Women who scored < mean score for knowledge questions.

Total attitude score range: Poor attitude: Women who scored < 100% (score below 12) on the practice of COVID-19 preventive measures questionnaire.

Total practice score range: Good practice: Women who scored 100% (score of 12) on the practice of COVID-19 preventive measures questionnaire.

Method

Administrative design

Official permission was obtained from the study setting directors.

Ethical considerations

Each pregnant woman was informed about the purpose of the study and its importance. The researchers emphasized that participation in the research is entirely voluntary, and all pregnant women informed that they can withdraw from the study at any time. Anonymity and confidentiality were assured through the coding of the data. Informed verbal consent was taken from nurses who accept to be included in the study.

The study phases:

Preparatory and implementation phases:

Data was collected through a period of 3 months from the beginning of July to the end of September 2021. Each pregnant woman was interviewed individually to keep her privacy and prevent contamination of the result where the researchers firstly explained the purpose and nature of the study to obtain informed consent. After that, the researchers used an interviewer administered structured questionnaire to collect data. The pregnant women' knowledge, attitude, and practice toward Covid-19 preventive measures were assessed. The questions were asked in Arabic and the pregnant women's responses were documented by the researchers. The time taken to complete these tools was about 30 minutes. The researchers appreciate and acknowledge the pregnant women for her time and effort. Completeness and consistency of the completed questionnaires were examined at random.

Outcome assessment phase:

-The pregnant women's knowledge, attitude, and practice toward Covid-19 were assessed.

Limitation of the Study

Because this was an institutional study, it may not be able to explain the degree of knowledge and practice in the community. Only individual level characteristics that may be linked to COVID-19 knowledge, attitude and practice.

Statistical Analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS version 19. COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio; CI,

confidence interval were used. P value under 0.05 was considered accurately significant.

III-Results

The pregnant women were enrolled in the current study was (415) according to the inclusion and exclusion criteria. Result findings of the current research presented in 7 tables and 2 figures.

The study participants ranged in age from 18 to more than 35 years old. The bulk of the study participants (71.10%) were between the ages of 21 and 30, followed by those between the ages of 18 and 20. (15.20 %). The majority of the study participants (80.90%) were urban residents; more than 35.3 0 percent of the participants had completed a higher degree of education (Table I).

The majority of the pregnant women in the current study (63.10%) were multigravida, while the remaining 36.90% were primigravida. More over half of the pregnant mothers (61.90%) had three or fewer live children, whereas only 6% had four or more live children. The present pregnancy was wanted and planned by more than three quarters of the women (83.60%). Sixty-seven percent (16.10%) of the study participants had some pregnancy related difficulties, while more than two thirds (83.90%) had no prior history of chronic disease or obstetrics complications (Table II).

The corona virus pandemic was mentioned by every single one of the 415 study participants (100 %). The majority of pregnant women (96.40%) said they were aware of at least one common symptom of COVID 19 infection. 87.20 % of the total respondents were aware that COVID 19 presently has no effective therapy, 83.1 percent were aware that anyone can become infected with COVID 19, and 95.90% were aware that wearing a mask can minimize the risk of infection. The vast majority of pregnant women (96.40%) were aware of at least one COVID 19 symptom (Table III).

Dry cough was recognized by 86.50 % of those who were familiar with COVID 19's usual symptoms, whereas sneezing and dry cough were recognized by more than 70% of those who were familiar with coronavirus disease's frequent symptoms. Only over 60.00% of the participants knew that sore throat could be a sign of coronavirus infection (Figure 1).

More over two-thirds of the total respondents (75.40 %; 95 % CI: 71.1–79.30 %) had an excellent understanding of COVID 19, according to this study. The majority of participants (80.90%) reported that television was their primary source of knowledge about COVID 19, followed by health professionals (Figure 2).

The majority of the pregnant women sampled (68.20%) believed COVID19 was a damn from God. More than half of those polled (61.20%) believe the pandemic can be successfully contained. In this study, 61.70 % of pregnant women believed they were more likely than non-pregnant women to have difficulties if infected with COVID19; nevertheless, only 15.0% of them believe they will lose their life or a family member as a result of COVID 19 (Table IV).

The present study found that only 43.6 percent of study participants had good practice of COVID 19 infection prevention methods, with a high percentage of women (56.40 %) having poor practice. Covering mouth with flexed elbow while coughing or sneezing (91.80%), frequent hand washing (90.60%), using face mask (88.20%), avoiding hand shaking with others (87.70%), and maintaining physical distance (73.70%) were among the women's reactions to preventive measures against COVID-19 infection (Table V).

In a single variable logistic regression, having high understanding of COVID 19 was linked to having a higher education and being a city or urban inhabitant. In a multivariate logistic regression study, pregnant women who attend secondary school were 1.6 times more likely than their counterparts to have adequate knowledge about the pandemic. When compared to those from rural regions, city inhabitants were roughly three times more likely to have adequate understanding regarding coronavirus infection (Table VI).

In a single variable logistic regression, a mother age of less than or equal to 25 years and being a city or urban inhabitant were linked to strong COVID-19 infection prevention practices. When the above mentioned variables were subjected to multivariate logistic regression analysis, pregnant women who were less than or equal to 25 years old were 1.7 times more likely than those who were above 25 years old to have good practice of pandemic prevention measures. Pregnant women who lived in cities were 2.3 times more likely to take effective precautions against coronavirus infection (Table VII).

Results

Table I: Distribution of the studied women according to their socio-demographic characteristics

Items	Category	No	(%)
Age group/ year	18–<20	63.0	15.20
	20–30	295.0	71.10
	>30	57.0	13.7.0
Residence	Urban	336.0	81.00
	Rural	79.0	19.00
Educational status	Cannot read and write	36.0	8.70
	Primary school	89.0	21.40
	Secondary school	144.0	34.70
	College and above	146.0	35.20
Occupation	Government Employee	83.0	20.0
	Non-Government Employee	5.0	1.20
	House wife	231.0	55.80
	Others	95.0	22.90
Number of family member	≤ 2	175.0	42.2
	3–4	174.0	41.9
	≥ 4	66.0	15.9

Table II: Distribution of the studied women according to their obstetric and reproductive data

Items		No	(%)
Gravidity	Primigravida	153.0	36.9
	Multigravida	262.0	63.1
Alive children Number	Nulliparous	133.0	32
	1–3	257.0	61.9
	4 and above	25.0	6
Current condition of pregnancy	Wanted and planned	68.0	16.40
	Not planned	347.0	83.60
Number of current antenatal care visit	1–2 visit	352.0	84.80
	3 and above	63.0	15.20
Appointment' Gestation	Before 3 months	81.0	19.50
	3–6 month	296.0	71.30
	After 6 months	38.0	9.20
Obstetrics complications in present pregnancy	Yes	67.0	16.10
	No	348	83.90

Table III: Distribution of the studied women according to their knowledge about Corona Virus Infection

Items	Reply	
	Yes	No
Heard about COVID 19	415.0 (100.0%)	0.0 (0.0%)
Do you know the symptom of COVID 19	400.0 (96.40%)	15.0 (3.60%)
COVID 19 has effective treatment	53.0 (12.80%)	362.0 (87.20%)
Everyone can be infected by COVID 19	345.0 (83.10%)	70.0 (16.90%)
COVID 19 is severe in Co morbid and ageing people	373.0 (89.90%)	42.0 (10.10)
Re infection can occur with COVID 19	349.0 (84.10%)	66.0 (15.90%)
COVID 19 infection can be spread by air droplets	401.0 (96.60%)	14.0 (3.40%)
Preventing touching eyes and nose prevents COVID 19	375.0(90.40%)	40.0(9.60%)
Normal people should use mask to prevent COVID 19	398.0(95.90%)	17.0(4.10%)
Preventing overcrowding can decrease risk of COVID 19	402.0(96.90%)	13.0(3.10%)
Isolation is important after contact with infected person	405.0(97.60%)	10.0(2.40%)
Report of the suspected symptom is recommended	379.0(91.30%)	36.0(8.70%)

Figure I: Distribution of COVID-19's symptoms
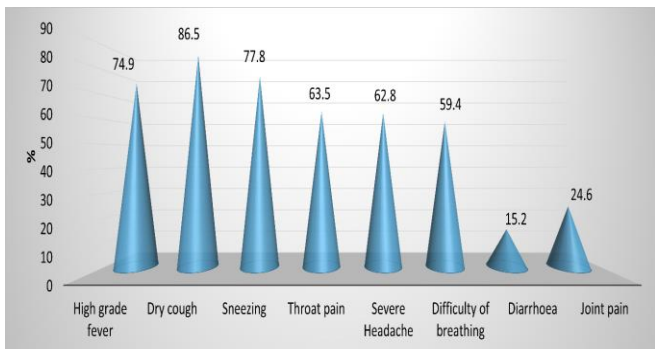
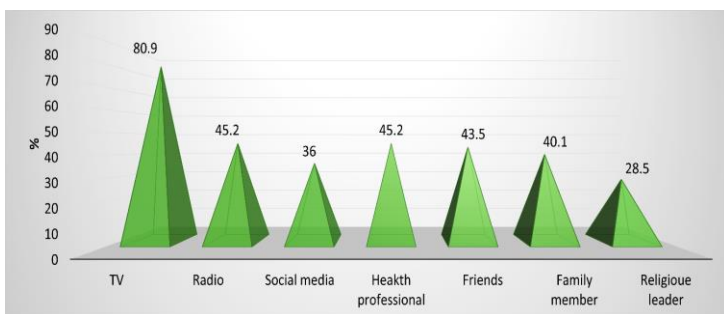

Figure II: Distribution of COVID-19's source of knowledge

Table IV: Distribution of the studied women according to their attitude toward Corona Virus Infection

Attitude Report	Reply	
	Positive	Negative
COVID 19 is damn from God	283.0 (68.20%)	132.0 (31.80%)
COVID 19 will eventually be successfully controlled	256.0 (61.20%)	159.0 (38.80%)
Do you think a pregnant woman is at higher risk of complication from COVID-19 compared with non-pregnant	256.0 (61.70%)	159.0 (38.30%)
Do you fear that you may lose your life/family member by COVID 19	64.0 (15.40%)	351.0(84.60%)

Table V: Distribution of the studied women according to their practice of Corona Virus preventive measures

Questions of Practice	Reply	
	Done	Not done
Wash hand with soap and use sanitizer	376.0(90.60%)	39.0(9.40%)
Cover mouth with elbow while sneezing	381.0(91.80%)	34.0(8.20%)
Keep physical distancing	306.0(73.70%)	109.0(26.30%)
Wear face mask when go out	366.0(88.20%)	49.0(11.80%)
Change travel	285.0(68.70%)	130.0(31.30%)
Staying at home and working from home	226.0(54.50%)	189.0(45.50%)
Report COVID 19 symptoms to health facility	325.0(78.30%)	90.0(21.70%)
Stop hand shaking with people	364.0(87.70%)	51.0(12.30%)
Health care seeking when get ill	375.0(90.400%)	40.0(9.60%)
Preventing going to social gathering	344.0(82.9%)	71.0(17.10%)

Table VI: Distribution of the studied women according to the factors related to their knowledge of coronavirus infection

Covariant		Status of Knowledge		COR	AOR	P value
		Poor	Good			
Status of education	Under secondary school	44(35.20%)	81.0(64.80%)	1.0	1.0	
	Secondary school and above	58 (20.0%)	232.0(80.0%)	2.20(1.40–3.50)	1.60(1–2.70)	0.0500*
Residency	Rural	36(45.60%)	43.0(54.40%)	1.0	1.0	
	Urban	66(19.60%)	270.0(80.40%)	3.40(2.00–5.80)	2.990(1.70–5.00)	0.0000***

category, *PV≤ 0.05, ***P<0.0001.

Abbreviations Notes Key: 1 = Reference: COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio; CI, confidence interval.

Table VII: Distribution of the studied women according factors related to their practice of coronavirus preventive measures

Covariant		Status of Practice		COR	AOR	P value
		Poor	Good			
Age/year	Under 25	122.0(50.20%)	121.0(49.80%)	1.80(1.30–2.80)	1.70(1.20–2.60)	0.0080*
	≥25	112.0(65.10%)	60.0(34.90%)	1.0	1.0	
Residency	Rural	58.0(73.40%)	21.0(26.60%)	1.0	1.0	
	Urban	176.0(52.40%)	160.0(47.60%)	2.50(1.50–4.30)	2.30(1.30–4.00)	0.0020*

Notes Key: 1 = Reference category, *P<0.05.

Abbreviations: COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio; CI, confidence interval.

Discussion

COVID-19 is pandemic diseases begin on 11March, 2020; pregnancy suppresses the immune system, making pregnant women more vulnerable to COVID-19 infection and severe sickness. COVID-19 public health interventions were not widely used among pregnant women. Coronavirus education initiatives conducted across the country has a good influence on public awareness of the disease. This means that having sufficient knowledge does not always imply that a new practice will be adopted. The government will have to follow a COVID-19 prevention regulation policy.

The pregnant women were enrolled in the current study was (415) according to the inclusion and exclusion criteria. Result findings of the current research presented in 7 tables and 2 figures. In socio demographic data that, the study participants ranged in age from 18 to more than 35 years old as in table (I). And the study presented the reproductive data as in table (II). The discussion of the current study will answer the questions and achieve the aim of the study.

According to table (III) in the current study, two-thirds of the pregnant women had an excellent understanding of the coronavirus pandemic and the source of their knowledge that was the TV as in figure (I). The current study's findings matched those of cross section studies done in India and China, which found that 76.4 percent of study participants, respectively, had a satisfactory degree of awareness of coronavirus illness (Ayele et al, 2021 and Lee, 2020). One probable explanation is that the disease is a worldwide public health issue that is discussed in a similar manner all around the world.

However, present finding was substantially higher than that of community based cross section studies conducted in other parts of Egypt that where only forty-six-point eight percent and fifty-four-point eight percent of pregnant women knew about COVID-19, respectively (Kamal et al., 2020 and Fikadu et al., 2021). Pregnant women's existing level of knowledge regarding COVID-19 was also greater than that was discovered in another Egyptian descriptive study, which found that fifty-seven-point six percent of women had a sufficient level of knowledge also, the symptoms of disease was the dry cough which was the higher symptoms in the current study as in figure (II) that differ from the previous study which was the fever (Metwally, 2020). The explanation for this could be that all of the previous descriptive and cross section studies were conducted at a later stage of the pandemic than the current study, and coronavirus risk communication around the world may have had a favorable impact on the target population's knowledge. The study's design could explain the gap; the level of health-related information is expected to be high among the populations being followed up at a health organization.

According to table (III, IV and V), more than half of the participants in the current study had sufficient knowledge of COVID-19 infection and also, had adequate coronavirus prevention practice as well as had a positive attitude. These findings were consistent with findings from descriptive studies conducted in North West Ethiopia and Nigeria, which found that fifty-seven-point six percent and sixty-point three percent of pregnant women respectively had enough knowledge, adequate coronavirus prevention practice and had a positive attitude (Ayele et al, 2021 and Kamal et al, 2020). This is given that the public health initiatives are good, and it may take principals for people to adjust their health.

According to table (VI) in the current study, women with a secondary or higher education were more likely than those with only a primary school education to have good knowledge of COVID- 19. This finding is confirmed by data from descriptive researches conducted by Debra Tabor (Kamal et al., 2020), China (Lee, 2020), and Iran (Maharlouei et al., 2020), which found that pregnant women with better educational status had a larger proportion of good knowledge. This could be because educated women are more likely to be exposed to various forms of mainstream media and social media, including internet access to learn about COVID-19. They're also more likely to understand what they've learned.

In the current study, pregnant women from urban regions had a higher chance of knowing COVID-19 than pregnant women from rural areas. This finding is backed up by a study of pregnant women in low-income nations, which discovered that being from a rural location was linked to inadequate understanding among pregnant women (Maharlouei et al, 2020). This could be because pregnant women in urban regions have access to more information through various social media platforms.

According to table (VII), young pregnant women (18- 25 years old) were more likely to follow COVID-19 prevention guidelines practices in the current study. This finding corroborated finding from a cross sectional study conducted in Ethiopia's Debra Tabor city, which found that younger women were more likely to have adequate knowledge and practice of COVID-19 (Kamal et al, 2020). This could be attributed to the fact that a younger population is more likely to adopt a new way of life.

Researcher judgment had some notable objects. The current study was conducted at a period when Egypt's coronavirus infection disease was at its peak, so it can be used as a standard for people working on the issue. Furthermore, characteristics linked with COVID-19 knowledge, attitude and practice among pregnant women has been identified, providing a pathway to follow during health intervention.

Conclusion

The study concluded that, the majority of the pregnant women in this study had adequate knowledge, the area's practice of preventative measures was adequate also, and the pregnant women had a positive attitude related to COVID-19 infection. Maternal educational status and place of residence were significant predictors of appropriate knowledge, while maternal age and place of residence were also significant predictors of excellent practice of COVID-19 infection prevention among pregnant women. Consequently, the study questions were answered and the study aim was achieved.

Recommendations

Based on the findings of this study, the following recommendations were suggested:

- Health education initiatives and outreach programs to remote areas should be encouraged to promote good practice of COVID-19 preventive measures.

- Pregnant women from rural areas, as well as those who lower level of education, should be given extra attention for raising their health awareness and promoting their health.

- Legal enforcement should be adopted to improve the practice of COVID-19 prevention.

Abbreviations

ANC, Antenatal care; AOR, Adjusted Odds Ratio; CI, Confidence Interval; FMOH, Federal Ministry of Health of Ethiopia; HEW, Health Extension Workers; GA, Gestational age; MMR, Maternal Mortality Ratio; PIH, Pregnancy Induced Hypertension; CS, Cesarian section; UNICEF, United Nation International Children's Emergency Fund; WHO, World Health Organization.

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