

ORIGINAL RESEARCH ARTICLE

Knowledge, attitudes and preventive practices towards COVID-19 among prenatal women in an antenatal clinic in Sakaka City, Aljouf region: A cross-sectional study

DOI: 10.29063/ajrh2023/v27i1.7

Mervat Ahmed AbdRabou

Biology Department, College of Science, Jouf University, P.O. Box: 2014, Sakaka, Saudi Arabia

*For Correspondence: Email: mababdraboh@ju.edu.sa; Phone: 00966537242262

Abstract

It is known that prenatal women with COVID-19 are more liable to severe disease and poor newborn outcomes. Understanding the effects of this pandemic on prenatal women is still not known. Studies have shown that gravid women are more liable to COVID-19 infection because of changed physiology and immunological characters. So, this study aimed to investigate gravid women's knowledge, attitudes, and preventive practices to avoid COVID-19 in Sakaka city, Al jouf region, Saudi Arabia. A community-based cross-sectional study was conducted with 150 gravid women in Sakaka City. The samples were achieved using a simple random sampling technique from February to March, 2022. The data were collected by face-to-face survey with a planned and pre-tested survey and analyzed by SPSS. The study tool consists of six sections including. The demographics of the prenatal women, knowledge about COVID-19, Participants' attitudes, symptom, practices of prenatal women toward COVID-19. The results showed that the percentage of score of good knowledge before awareness was (34.0%), and the percentage of score of good knowledge after awareness was (73.33%) and the score of practices of prenatal women of good practices before awareness was (33.33%), and the percentage of score of good practices after awareness increased to (91.33%).The percentage of change between score of knowledge and practices of prenatal women before awareness was - 0.67 but percentage of change between score of knowledge and practices of prenatal women after awareness increased to +18%. Although most study members had good knowledge about the preventative measures of COVID-19, they did not practice them, but their practices increased after awareness. The study recommended that the awareness should be extended to rural areas where access to electronic media is limited. (*Afr J Reprod Health 2023; 27 [1]: 73-83*).

Keywords: COVID-19, prenatal women, knowledge, attitudes, practices

Résumé

On sait que les femmes enceintes atteintes de COVID-19 sont plus susceptibles de contracter une maladie grave et d'avoir de mauvais résultats pour le nouveau-né. La compréhension des effets de cette pandémie sur les femmes enceintes n'est toujours pas connue. Des études ont montré que les femmes gravides sont plus susceptibles d'être infectées par le COVID-19 en raison d'une modification de la physiologie et des caractères immunologiques. Ainsi, cette étude visait à enquêter sur les connaissances, les attitudes et les pratiques préventives des femmes gravides pour éviter le COVID-19 dans la ville de Sakaka, région d'Al jouf, en Arabie saoudite. Une étude transversale communautaire a été menée auprès de 150 femmes gravides dans la ville de Sakaka. Les échantillons ont été réalisés à l'aide d'une technique d'échantillonnage aléatoire simple de février à mars 2022. Les données ont été recueillies par enquête en face à face avec une enquête planifiée et pré-testée et analysées par SPSS. L'outil d'étude se compose de six sections dont. La démographie des femmes enceintes, les connaissances sur le COVID-19, les attitudes des participantes, les symptômes, les pratiques des femmes enceintes face au COVID-19. Les résultats ont montré que le pourcentage de score de bonne connaissance avant sensibilisation était de (34,0%), et le pourcentage de score de bonne connaissance après sensibilisation était de (73,33%) et le score de pratiques des femmes prénatales de bonnes pratiques avant sensibilisation était de (33,33 %), et le pourcentage de score de bonnes pratiques après sensibilisation est passé à (91,33%). Le pourcentage de changement entre le score de connaissances et les pratiques des femmes prénatales avant la sensibilisation était de - 0,67 mais le pourcentage de changement entre le score de connaissances et les pratiques de prenatal femmes après sensibilisation a augmenté à +18%. Bien que la plupart des membres de l'étude aient une bonne connaissance des mesures préventives du COVID-19, ils ne les ont pas pratiquées, mais leurs pratiques ont augmenté après la sensibilisation. L'étude a recommandé que la sensibilisation soit étendue aux zones rurales où l'accès aux médias électroniques est limité. (*Afr J Reprod Health 2023; 27 [1]: 73-83*).

Mots-clés: COVID-19, femmes enceintes, connaissances, attitudes, pratiques

Introduction

In December 2019, a coronavirus known as COVID-19 emerged in Wuhan, China. It was caused by the SARS-CoV-2 coronavirus¹. The first cases were described in Japan, Thailand, and the Republic of Korea. The devastating effects of the disaster were felt all across the world². On January 30, 2020, the WHO's Director-General declared the outbreak of the contagious disease COVID-19 as a public health emergency².

On June 2, 2020, there were 6,403,439 cases of COVID-19 and 378,113 deaths globally. In Ethiopia, there were 14,234 cases and 14 case death³. The case fatality rate for prenatal women with SARS-CoV infection is 25%⁴. The virus can be transmitted through respiratory droplets and coughing or sneezing. It can also be spread through close contact with individuals⁵. Considerably the droplets fall on the land or on surfaces without traveling over long distances through the air. In a less common context, or viral treatment against the emerging coronavirus, and management of the disease is limited to symptomatic treatment with supportive treatment⁶.

The symptoms of COVID-19, usually appear within two to 14 days after infection. The period post exposure to the virus and prior to appearance of symptoms is called incubation. The common symptoms of COVID-19 include cough, fever, difficulty breathing, chills, muscle pain, headache, nausea, vomiting, and a rash. Although diarrhea is usually seen in about 20% to 25% of patients infected with SARS-CoV or MERS-CoV, it is rarely seen in COVID-19. In another study, nausea and confusion were additionally reported⁷. Some of the other symptoms that can be associated with COVID-19 include coughing, sore throat, sneezing, and sputum production. In addition, some laboratory studies have indicated that the presence of cytokines storm and ribonucleic acid (RNA) anemia in COVID-19⁸.

Despite the rising cases of deaths due to COVID-19 and the lack of definitive data about the disease's clinical characteristics, there are still limited studies on the effects of this condition on prenatal women⁹. Preventative recommendations include washing hands, covering the mouth when coughing, maintaining an appropriate distance

between persons, wearing medical facemasks in public places, and control and self-isolating people suspected of infection. Imposing restrictions on air traffic, applying general closures, defining occupational hazard controls, and closing facilities. Many countries have also improved their capacity to test and follow up on contacts of patients. Preventive measures are the current strategy to limit the spread of cases. Early screening, diagnosis, isolation, and treatment are necessary to prevent further spread. Preventive strategies are focused on the isolation of patients and careful infection control, including appropriate measures to be adopted during the diagnosis and the provision of clinical care to an infected patient¹⁰. Having a strategic distance from clinical offices helps human service frameworks work more efficiently¹¹.

According to a report released by the World Health Organization, over 97 vaccines are in clinical trials from 1 to 3 phase, while 182 vaccine are in their preclinical stages¹². Various technologies have been used in the preparation of vaccines against the SARS-CoV-2 coronavirus¹³. Some of the most common reasons why women refuse to use the COVID-19 vaccine are the lack of reliable data regarding its safety and toxicity in pregnancy. Women who are prenatal are more prone to getting viral respiratory infections. The physiological changes during pregnancy can affect the development and maintenance of the respiratory system¹⁴. In order to avoid the prevalence of the disease, it is important that antenatal women and their family members are taught about proper hygiene and infection avoidance to prevent the COVID-19 infection¹⁵. The mortality rate among prenatal women who were infected with COVID-19 was lower than that of other mothers who were infected with SARS (9.14%) and MERS (34.4%)¹⁶. It is also important that healthcare workers have the necessary information about corona virus to help antenatal women avoid experiencing any complications. This info will allow them to reply the many questions that they may have regarding the virus and its effects on their unborn child. Since there is a limited information resource for prenatal women in rural zones, this illness will have a severe impact due to most pregnant women in West Africa were not accessing health services, out of fear of the virus¹⁷. In Saudi Arabia, there has been a lack of

studies on the attitudes and knowledge about corona virus among prenatal women, so this work is aimed to evaluate the knowledge, attitudes and preventive practices of prenatal women towards COVID-19 in an antenatal clinic of Sakaka city, Al jouf region, Saudi Arabia.

Methods

Study design

A cross-sectional study using a questionnaire was conducted in antenatal clinics in Sakaka city, Al-Jawf region from February to March, 2022. The survey included questions about the knowledge, attitudes and preventive practices among prenatal women towards COVID-19. An awareness program was conducted for pregnant women, where information was taken from them before and after the awareness.

Sampling strategy

All participants were pregnant and they filled written informed consent. It was conducted in the city of Sakaka. The participants were aged 18 to above, and excluded those below 18 years old.

Data collection

The study tool was developed based on a comprehensive literature review and it was judged by faculty members in the Department of Microbiology and Immunology, College of Pharmacy, Jouf University. The survey contained many questions about knowledge, attitudes and preventive practices among pregnant women to avoid COVID-19 infection. It consists of five sections. The first topic dealt with the demographics of the prenatal women and it consists of 12 questions. The second section of the questionnaire addressed participants' knowledge about COVID-19 (12 questions). The third section of the questionnaire consisted of 4 questions and addressed participants' attitudes towards covid 19. The fourth section of the questionnaire consists of 2 questions including symptoms and sources of information. The fifth section of the questionnaire consists of 11 questions about practices of prenatal women toward COVID-19. All questions of the

survey were in Arabic Language and the participants filled it within 10 minutes. The score of knowledge was poor for answer yes for 6 statement or less, from 7-9 statement (moderate knowledge), from 10 to 12 (good knowledge). The score of practices was poor for answer yes for 7 statement or less, from 8-11 statement (good practices)¹⁸.

Statistical study

The data collected were analyzed using descriptive statistics to describe the characteristics of the participants. Categorical data were described as percentages (frequencies). The statically analysis were carried by using SPSS program and Excel for graphing.

Results

Table 1 show the demographic characteristics of prenatal women, the highest percentage of prenatal women was 53.3% for women age (21-30 year), but the lowest percentage of prenatal women was 5.3% for women age (more than 40 year). According to Residence, the highest percentage of prenatal women was 88.0% for women live in urban but 12.0% for rural. According to Marital status, the highest percentage of prenatal women was 98% for married women, but the lowest percentage of prenatal women was 0.7% for divorced women. According to Educational Status, the highest percentage of prenatal women was 69.3% for college and above women, but the lowest percentage of prenatal women was 0.7% for do not read nor write women. According to Occupation, the highest percentage of prenatal women was 74% for not employee women, but the lowest percentage of prenatal women was 12% for governmental job women. According to number of family member, the highest percentage of prenatal women was 40.7% for (3 – 5), but the lowest percentage of prenatal women was 23.3% for (≥ 4).

Table 2 show pregnancy data of prenatal women, according to pregnancy type, the highest percentage of prenatal women was 75.33% for multi pregnancy, then 24.7% for the first time. According to the number of live children, the highest percentage of prenatal women was 64% for (1 – 3), but the lowest percentage of prenatal women was 14.7% for abortion, no life. According

Table 1: The demographic characteristics of prenatal women (N=150)

Variables	N	%
Age		
17-20	17	11.3
21-30	80	53.3
31-40	45	30.0
More than 40	8	5.3
Residence		
Urban	132	88.0
Rural	18	12.0
Marital status:		
Married	147	98.0
Divorced	1	0.7
Widow	2	1.3
Educational Status:		
Do not read nor write	1	0.7
Primary school	6	4.0
Secondary	39	26.0
college and above	104	69.3
Occupation		
Governmental job	21	14.0
non-governmental job	18	12.0
Not employee	111	74.0
Number of family member		
≤ 2	54	36.0
3 – 5	61	40.7
≥ 4	35	23.3
Variables	N	%
Age		
17-20	17	11.3
21-30	80	53.3
31-40	45	30.0
More than 40	8	5.3
Residence		
Urban	132	88.0
Rural	18	12.0
Marital status:		
Married	147	98.0
Divorced	1	0.7
Widow	2	1.3
Educational Status:		
Do not read nor write	1	0.7
Primary school	6	4.0
Secondary	39	26.0
college and above	104	69.3
Occupation		
Governmental job	21	14.0
non-governmental job	18	12.0
Not employee	111	74.0
Number of family member		
≤ 2	54	36.0
3 – 5	61	40.7
≥ 4	35	23.3

Table 2: The pregnancy data of prenatal women (N=150)

Variables	N	%
Pregnancy type		
The first time	37	24.7
Multi	113	75.33
The number of live children		
Abortion, no life	22	14.7
1 - 3	96	64.0
≥ 4	32	21.3
Current pregnancy status		
Planned and wanted	104	69.3
Unplanned and wanted	39	26.0
Unplanned and unwanted	7	4.7
Number of visits to the doctor in a month		
1- 2	126	84.0
≥3	24	16.0
Pregnancy stage		
first trimester	40	26.7
Second trimester	51	34.0
Third trimester	59	39.3
Is there a possibility of premature birth in the current pregnancy?		
yes	21	14.0
No	129	86.0
Variables	N	%
Pregnancy type		
The first time	37	24.7
Multi	113	75.33
The number of live children		
Abortion, no life	22	14.7
1 - 3	96	64.0
≥ 4	32	21.3
Current pregnancy status		
Planned and wanted	104	69.3
Unplanned and wanted	39	26.0
Unplanned and unwanted	7	4.7
Number of visits to the doctor in a month		
1- 2	126	84.0
≥3	24	16.0
Pregnancy stage		
first trimester	40	26.7
Second trimester	51	34.0
Third trimester	59	39.3
Is there a possibility of premature birth in the current pregnancy?		
yes	21	14.0
No	129	86.0

to current pregnancy status, the highest percentage of prenatal women was 69.3% for Planned and wanted women, but the lowest percentage of prenatal women was 4.7% for Unplanned and unwanted women. According to number of visits to

Table 3: Prenatal women responses of knowledge toward COVID-19 infection

Variables	Before awareness		After awareness	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)
1. Did you hear about COVID-19?	149 (99.3)	1 (0.7)	149(99.3)	1(0.7)
2. Do you know the symptoms of COVID-19?	143 (95.3)	7 (4.7)	149(99.3)	1(0.7)
3. Does COVID-19 have treatment at the current time?	61(40.7)	89(59.3)	90(60)	60(40)
4. Can everyone get infection with COVID-19?	95(63.3)	55(36.7)	139(92.7)	11(7.3)
5. Is COVID-19 is dangerous for the elderly and those with chronic diseases?	140(93.3)	10(6.7)	149(99.3)	1(0.7)
6. Can a COVID-19 infection occur more than once?	140(93.3)	10(6.7)	150(100)	0(0)
7. Can COVID-19 infection be transmitted through air droplets?	89(59.3)	61(40.7)	128(85.3)	22(14.7)
8. Does avoiding touching the eyes and nose prevent COVID-19 infection?	116(77.3)	34(22.7)	140(93.3)	10(6.7)
9. Should ordinary people use a mask to prevent COVID-19?	137(91.3)	13(8.7)	150(100)	0(0)
10. Can crowding reduce the risk of catching a COVI-19?	142(94.7)	8(5.3)	148(98.7)	2(1.3)
11. Is isolation important after contact with an infected person?	139(92.7)	11(7.3)	150(100)	0(0)
12. Do you recommend reporting suspected symptoms?	133(88.7)	17(11.3)	147(98)	3(2.0)

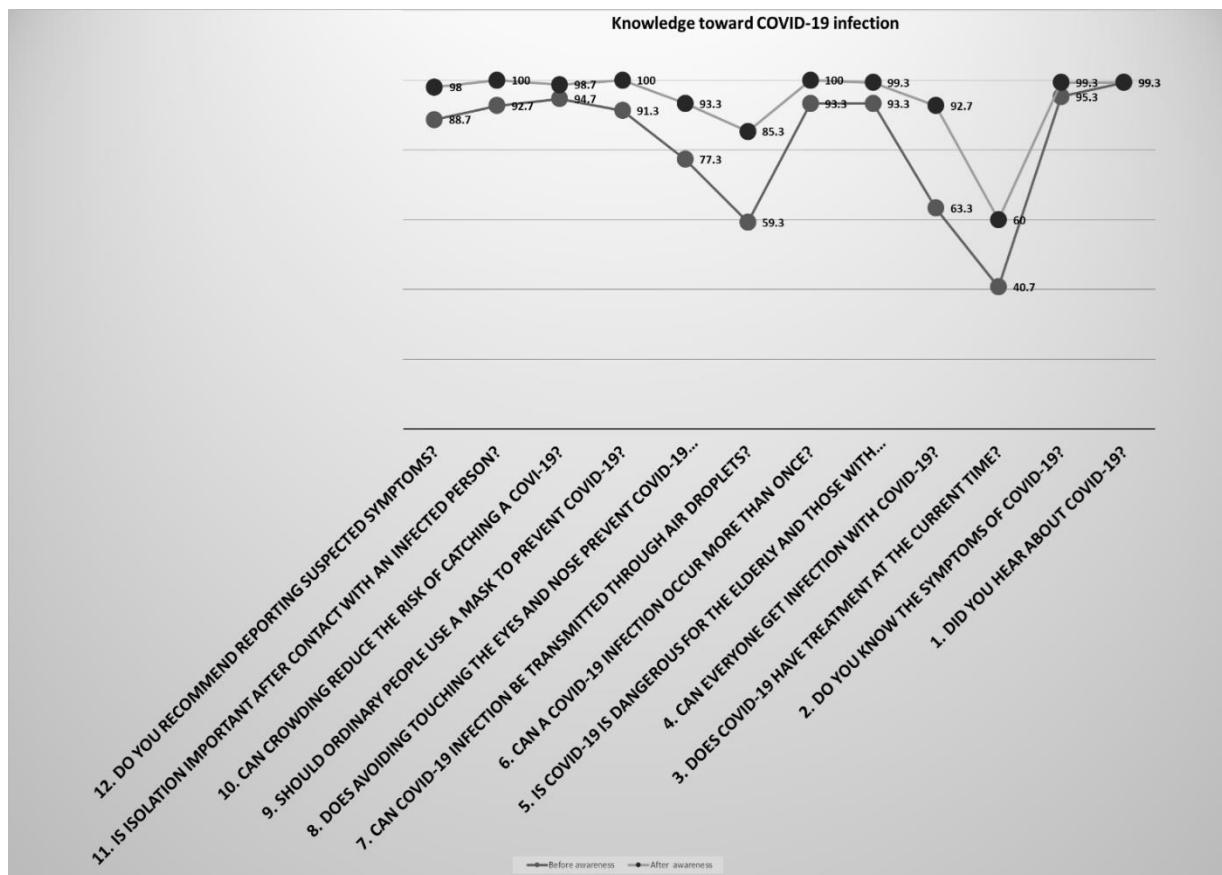


Figure 1: Prenatal women 'responses of knowledge toward COVID-19 infection before and after awareness

the doctor in a month, the highest percentage of prenatal women was 84% for (1- 2), then 16% for (≥3). According to Pregnancy stage, the highest

percentage of prenatal women was 39.3% for third trimester women, but the lowest percentage of prenatal women was 26.7% for first trimester.

Table 4: The prenatal women's knowledge of COVID-19 about source of information (N=150)

Sources of information	N (%)
The radio	6(4)
Social media	17(11.3)
Ministry of Health	13(8.7)
Friends	2(1.3)
family members	1(0.7)
More than 2 – 3 options	100(66.7)
From 4 - 5 options	11(7.3)

Table 5: The prenatal women's knowledge of symptoms of COVID-19 (N=150)

Symptoms	Before awareness	After awareness
	N (%)	N (%)
Fever	9(6.0)	5(3.3)
Cough	1(0.7)	0(0%)
2 - 3 options	28(18.7)	10(6.7)
4 - 7 options	112(74.7)	135(90.0)

According to the possibility of premature birth in the current pregnancy, the highest percentage of prenatal women was 86% for (No), then 14% for (Yes).

Table 3 and Figure 1 show prenatal women 'responses of knowledge toward COVID-19 infection before and after awareness, the percentage was equal for prenatal women for before and after awareness to did you hear about COVID-19, According to statement Do you know the symptoms of COVID-19, the percentage was 95.3% before awareness and arise into 99.3% after awareness. According to the statement does COVID-19 have treatment at the current time; the percentage was 40.7% before awareness and arise into 60.0% after awareness. According to the statement can everyone get infection with COVID-19, the percentage was 63.3% before awareness and arise into 92.7% after awareness. According to the statement, is COVID-19 dangerous for the elderly and those with chronic diseases, the percentage was 93.3% before awareness and arise into 99.3% after awareness. According to the statement, can a COVID-19 infection occur more than once, the percentage was 93.3% before awareness and arise into 100.0% after awareness. According to the statement Can COVID-19 transmit infection through air droplets, the percentage was 59.3% before awareness and arise into 85.3% after awareness. According to the statement does avoiding touching the eyes and nose prevent

COVID-19 infection; the percentage was 77.3% before awareness and arise into 93.3% after awareness. According to the statement should normal people use a mask to avoid corona virus, the percentage was 91.3% before awareness and arise into 100.0% after awareness. The question that states does crowding reduce the risk of catching a COVID-19, the percentage was 94.7% before awareness and arise into 98.7% after awareness.

The question that states does isolation important after contact with an infected person the percentage was 92.7% before awareness and arise into 100.0% after awareness. According to Do you recommend reporting suspected symptoms, the percentage was 88.7% before awareness and arise into 98.00% after awareness.

Table 4 show prenatal women's knowledge of COVID-19 source of information, the highest percentage of prenatal women was 66.7% for choose more than 2 - 3 (The radio, Social media, Ministry of Health, Friends, family members) Options from source of information, the lowest percentage was 0.7% for women choose family member as a source of information.

Table 5 and Figure 2 Show prenatal women's knowledge of COVID-19 symptoms, the highest percentage before awareness was 74.7% for choose more than 4 - 7 (Fever, cough, sore throat, cough, diarrhea, difficulty breathing, and headache) and increased into 90.0% after awareness.

Table 6 shows the attitude of prenatal women about COVID-19, According to the statement do you think that COVID-19 is the wrath from god, the percentage of prenatal women was 70% agree. According to the statement will COVID-19 be successfully controlled in the end, the percentage of prenatal women was 96.7% agree. According to the statement do you think a prenatal woman is at higher hazard of problems of COVID-19 compared to non-prenatal, the percentage of prenatal women was 95.3% agree. According to the statement do you fear that you may miss your life/family member by corona virus, the percentage of prenatal women was 91.3% agree.

Table 7 show prenatal women's practices against COVID-19 before and after awareness, According to Wash your hands with soap, the percentage was 90.0% before awareness and arise into 96.7% after awareness. According to the

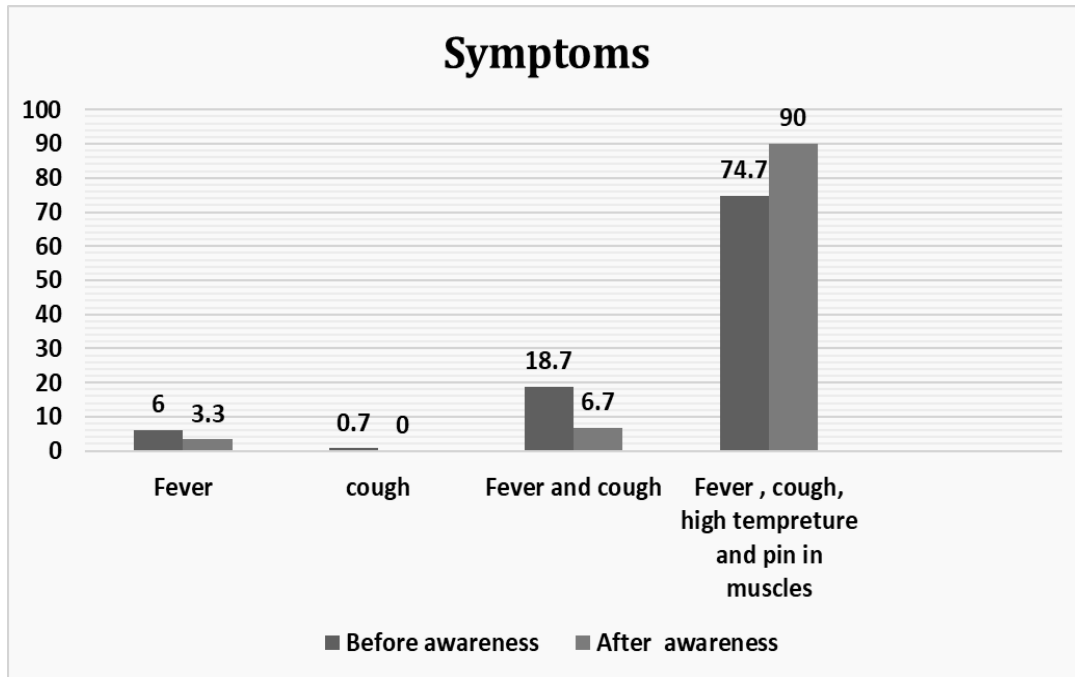


Figure 2: shows prenatal women's knowledge of symptoms of COVID-19 (N=150)

Table 6: The attitude of prenatal women about COVID-19 (N=150)

Variables	Agree (%)	Disagree (%)
1. Do you think that COVID-19 is the wrath from god?	(70)105	(30)45
2. Will COVID-19 be successfully controlled in the end?	(96.7)145	(3.3)5
3. Do you think a prenatal woman is at higher risk of problems of COVID-19 compared to non-prenatal?	(95.3)143	(4.7)7
4. Do you fear that you may miss your life/family member by corona virus?	(91.3)137	(8.7)13

Table7: The prenatal women's practices against COVID-19 before and after awareness (N=150)

Variables	After awareness			Before awareness		
	Yes (%)	No (%)	Sometimes (%)	Yes (%)	No (%)	Sometimes (%)
Wash your hands with soap.	145(96.7)	2(1.3)	3(2)	135(90)	1(0.7)	14(9.3)
Sanitize your hands with alcohol.	141(94)	2(1.3)	7(4.7)	80(53.3)	10(6.7)	60(40)
Covering mouth with the elbow while sneezing.	(96.7)145	(0.7)1	(2.7)4	(87.3)131	(2.7)4	(10)15
Maintain social distancing and do not go to social events.	(92.7)139	(0.7)1	(6.7)10	(60)90	(5.3)8	(34.7)52
Wearing a mask while go out.	(92.7)139	(1.3)2	(6)9	(82)123	(1.3)2	(16.7)25
Avoid physical distancing	(91.7)137	(0.7)1	(8)12	(70)106	(4)6	(25.3)38
Avoid traveling to avoid infection.	(92.7)139	1(0.7)	(6.7)10	(62.7)94	(21.3)32	(16)24
Stay at home or work at home.	(92)138	(1.3)2	(6.7)10	(73.3)110	(12.7)19	(14)21
Call the health facility if you feel symptoms of Covid-19.	(95.3)143	(0.7)1	(7)6	(82)123	(4.7)7	(13.3)20
Stop shaking hands with people.	(88)132	(0.7)1	(11.3)17	(67.3)101	(6)9	(26.7)40
Maintain a distance of one or two meters between you and others to avoid spreading the disease.	(100)150	(0)0	(0)0	(69.3)104	(0)0	(30.7)46

Table 8: The score of knowledge of prenatal women before and after awareness (N=15)

After awareness		Before awareness		
%	N	%	N	
0%	0	26.66%	40	Poor
26.66%	40	39.33%	59	Moderate
73.33%	110	34.0%	51	Good

Table 9: The score of practices of prenatal women before and after awareness (N=150)

	Before awareness		After awareness	
	N	%	N	%
Good Knowledge	51	34.0%	110	73.33%
Good Practices	50	33.33%	137	91.33%
% of change		(-0.67%)		18%)+(



Figure 3: The score of practices of prenatal women before and after awareness (N=150)

Table 10: Percentage of change between the score of Knowledge and practices of prenatal women before and after awareness (N=150)

	Before awareness		After awareness	
	N	%	N	%
Poor	100	66.67%	0	0%
Good	50	33.33%	137	91.33%

statement sterilize your hands with alcohol, the percentage was 53.3% before awareness and arise into 94.0% after awareness. According to covering mouth with the elbow while sneezing, the percentage was 87.3% before awareness and arise into 96.7% after awareness. According to Maintain social distancing and do not go to social events, the percentage was 60.0% before awareness and arise

into 92.7% after awareness. According to Wearing a mask while go out, the percentage was 82.0% before awareness and arise into 92.7% after awareness. According to Avoid physical distancing, the percentage was 70.0% before awareness and arise into 91.7% after awareness. According to Avoid traveling to avoid infection, the percentage was 62.7% before awareness and arise into 92.7%

after awareness. According to Stay at home or work at home, the percentage was 73.3% before awareness and arise into 92.0% after awareness. According to Call the health facility if you feel symptoms of Covid-19, the percentage was 82.0% before awareness and arise into 95.3% after awareness. According to Stop shaking hands with people, the percentage was 67.3% before awareness and arise into 88.0% after awareness. According to maintain a distance of one or two meters between you and others to avoid spreading the disease, the percentage was 69.3% before awareness and arise into 100.0% after awareness.

Table 8 show the score of knowledge of prenatal women before and after awareness, the percentage of score of good knowledge before awareness was (34.0%), and the percentage of score of good knowledge after awareness was (73.33%).

Table 9 and Figure 3 show the score of practices of prenatal women before and after awareness, the percentage of score of good practices before awareness was (33.33%), and the percentage of score of good practices after awareness was (91.33%).

Table 10 show the percentage of change between score of knowledge and practices of prenatal women before and after awareness, the percentage of change between score of knowledge and practices of prenatal women before awareness was - 0.67. The percentage of change between score of knowledge and practices of prenatal women after awareness was +18%.

Discussion

The data collected during the study were insufficient to provide a comprehensive understanding of the effects of COVID-19 on the pregnancy outcome. Gravid women and new mothers are a unique population, with special mental and physical healthcare needs¹⁹. The attitude and knowledge about COVID-19 can help determine the readiness of a society to accept public health measures. Various factors such as ethnicity, socioeconomic status, and obstetrics care can also affect the practice and knowledge of women about the virus²⁰.

On the other hand, there are also reports of poor practices and knowledge regarding the prevention of COVID-19 between prenatal women

in developing countries²¹. A study showed in Ethiopia revealed that only about half of the study's participants were well-informed about the virus and had good practice against coronavirus infection. Although it's not known if prenatal women are more liable to severe complications or COVID-19, there are still studies suggesting that they may have a higher risk of experiencing miscarriages and other pregnancy-related issues²². In New York City, a study revealed that about 1 in 8 patient who were admitted to the hospital with no symptoms of COVID-19 were positive for the virus¹.

In the US, a case study revealed that a high risk prenatal woman had respiratory fail due to the presence of COVID-19²³. In the study of AbuAlhommos *et al.*²⁴, the majority of the participants knew that COVID-19 is classified as a severe acute respiratory syndrome, is caused by viral infection, and that it is more common among the elderly and those who have a chronic illness. More than half of the participants were able to identify the symptoms of COVID-19 correctly, which are fever, dry cough, and loss of taste. Approximately half the study participants were knowledgeable about appropriate distancing, handwashing, and preventive measures (e.g., wearing a cloth mask, smoking cessation, avoiding dangerous cultural behaviors that increase the probability of disease transmission). More than half of the study participants were able to identify the appropriate actions that should be taken if common COVID-19 symptoms appear.

The prenatal women in South Africa had inadequate knowledge and attitude of COVID-19 infection. However, preventive practices were good among them²⁵.

This work provides an insight on the level of knowledge and practice of preventative measures against COVID-19 among prenatal mothers in Sakaka City, Saudi Arabia, to protect prenatal mothers from coronavirus disease and its associated morbidity and mortality in addition to protect their embryos. The present study showed demographic characteristics of gravid women, the highest percentage of prenatal women was 53.3% for women age (21-30 year), but the lowest percentage of prenatal women was 5.3% for women age (more than 40 year). According to marital status, the highest percentage of prenatal women was 98% for

married women. The highest percentage of pregnant women was 69.3% for college and above women, but the lowest percentage of prenatal women was 0.7% for do not read nor write women. According to pregnancy type, the highest percentage of prenatal women was 75.33% for multi pregnancy, then 24.7% for the first time. In this work, the level of knowledge among prenatal women was high. This is probably because since the onset of the first confirmed case of the disease, Saudi government have embarked on aggressive media campaign to educate the populace on the preventive measures to curtail person-to-person transmission of the disease. Therefore, it is not surprising that television and friends and relatives were the sources of information on the preventive measures for the majority of the study participants. Having the proper knowledge about the virus will not always lead to the implementation of effective preventive measures. This is why the government will have to follow a regulatory strategy to improve the knowledge of the public about the virus. Although the majority of the study participants had limited knowledge about the various preventive measures that can be used to prevent the spread of the virus, the practice of these measures improved after they were exposed to more information about the disease.

Due to the emergence of COVID-19 as an infectious disease, the exact effects of this illness on gestation still need more studies to investigate the matter²⁶. Current knowledge about COVID-19 among prenatal women is higher than that of women in Egypt who participated in a similar study²⁷. The possible reason may be that all the previous studies were conducted during the pandemic's earlier stages, they may have helped in improving the knowledge of the population about the virus. Therefore, poor practices of preventive measures against COVID-19 infection among prenatal women would put these women at high risk of infection which could worsen our maternal morbidity and mortality profile during this coronavirus pandemic.

The study revealed that about half of the participants were not knowledgeable about the virus (table 8). This is similar to the results of previous research conducted in Nigeria and Ethiopia, which also showed that only about 38%

and 47.6% of prenatal women have good practice in preventive measures against coronavirus²⁸. This is also justified since the new public health measures that were implemented during the pandemic are still in their early stages. It will take time for them to adapt to new norms.

The American College of Obstetrics and Gynecology indicates that prenatal patients with comorbidities are at increased risk for severe illness consistent with the general population with similar comorbidities²⁹. Therefore, much more care be considered during antenatal period to avoid negative outcome of prenatal women.

Conclusion

Although the study found that most of the participants had good knowledge about the virus, they only practiced low on preventive measures. The results of the research also showed that the level of knowledge and their practices about the virus rose after awareness. So, the study recommended extending the focus of health care providers to include addressing prenatal women in rural areas, where there is a lack of electronic media. Besides implementing the new measures, proper legal enforcement should also be carried out to prevent COVID-19 from infecting others. In addition, health education programs should be geared toward addressing the needs of women who are less educated.

Acknowledgments

The author wish to thank Haya Talal Al-Ruwaili, Hala Munaizil Al-Ruwaili, Mashael Oublan Al-Shammari for their valueable support in this work.

References

1. Sutton D, Fuchs K, D'Alton M and Goffman D. Universal screening for SARS-CoV-2 in women admitted for delivery. *N Engl J Med* 2020;382(22):2163–2164.
2. WHO. Home Care for Patients with Suspected Novel Coronavirus (Ncov) Infection Presenting with Mild Symptoms and Management of Contacts. 2020.
3. Worldo meter. Corona virus daily report. Available from: <https://www.worldometers.info/coronavirus/>. Accessed December 15, 2020.
4. Poon LC, Yang H, Kapur A, Melamed N, Dao B, Divakar H and Hod M. Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals.

- International Journal of Gynecology & Obstetrics 2020; 149(3): 273-286.
5. European Center for Disease Prevention and Control (ECDC). Archived from the original on May 18, 2020. Retrieved April 30, 2020.
 6. Hopkins C and Kumar N. Loss of sense of smell as marker of COVID-19 infection. *Ent Uk* 2020; 26(03): 2020.
 7. Chen N, Zhou M, Dong X, Qu J, Gong F and Han Y. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet* 2020;395(10223):507–513.
 8. Cascella M, Rajnik, M, Aleem A, Dulebohn SC and Di Napoli R. . Features, evaluation, and treatment of coronavirus (COVID-19). *Statpearls* [internet] 2022.
 9. Jiang H, Jin L, Qian X, Xiong X, La X, Chen W and Li M. Evidence of accessing antenatal care information via social media platforms supports mental wellbeing in COVID-19 epidemic. *Bull World Health Organ* 2020; 10.
 10. GÜNER HR, Hasanoğlu İ and Aktaş F. COVID-19: Prevention and control measures in community. *Turkish Journal of medical sciences* 2020; 50(SI-1): 571-577.
 11. Home care for patients with COVID-19 presenting with mild symptoms and management of their contacts”, Interim Guidance, 17 March 2020, COVID-19: Clinical care.
 12. Grun GC. COVID-19 Vaccine Development: What’s the Progress? DW Agency, Updated on 12 May 2021. Available online: <https://www.dw.com/en/covid-19-vaccine-development-whats-the-progress/a-55648707> (accessed on 20 May 2021).
 13. WHO. Draft Landscape of COVID-19 Candidate Vaccines. Available online: <https://www.who.int/publications/m/item/draftlandscape-of-covid-19-candidate-vaccines> (accessed on 28 May 2021).
 14. Rochelson B, Nimaroff M, Combs A, Schwartz B, Meiorowitz N, Vohra N and Chervenak F. The care of pregnant women during the COVID-19 pandemic—response of a large health system in metropolitan New York. *Journal of Perinatal Medicine* 2020; 48(5): 453-461.
 15. Abdollahpour S and Khadivzadeh T. Improving the quality of care in pregnancy and childbirth with coronavirus (COVID-19): a systematic review. *J Matern Neonatal Med* 2020;1–9.
 16. Beheshtkhoo N, Alipour MH, Nemati R, Baghbani R, Behzad F, Shafiee M and Mehrabi M. A review of COVID-19: the main ways of transmission and some prevention solutions, clinical symptoms, more vulnerable human groups, risk factors, diagnosis, and treatment. *J Environmental Treat Tech* 2020; 8: 884-893.
 17. Kotlar B, Gerson E, Petrillo S, Langer A and Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: a scoping review. *Reproductive health* 2021; 18(1): 1-39.
 18. Besho M, Tsegaye R, Yilma MT, Kasaye HK, Tolossa T, Hiko N and Wakuma B. Knowledge, attitude and practice toward Corona virus infection among prenatal women attending antenatal care at public hospitals in three wollega zones, Ethiopia. *International Journal of General Medicine* 2021;14: 3563.
 19. Kotlar B, Gerson E, Petrillo S, Langer A and Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: a scoping review. *Reproductive health*, 2021, 18(1), 1-39. .
 20. Kamal D, Thakur VD, Swain SK and Vikneshram CR. Knowledge, attitude, and practice toward COVID-19 among prenatal women in a tertiary care hospital during the COVID-19 outbreak. *Journal of Marine Medical Society* 2020;22(3):66.
 21. Cheng S, Khan S and Alsafi Z. Maternal death in pregnancy due to COVID-19. *Ultrasound Obstet Gynecol* 2020; 56(1):122.
 22. Type I, Library NH, Evidence KS and Executive HS. Evidence summary: in prenatal women who have tested positive for COVID-19 is there any evidence in relation to the safest mode of delivery — caesarean or vaginal — for the woman, her baby and those caring for her? *Irish Health Repos* 2020.
 23. Mehta H, Ivanovic S, Cronin A, VanBrunt L, Mistry N, Miller R and Rezai, F. Novel coronavirus-related acute respiratory distress syndrome in a patient with twin pregnancy: a case report. *Case Reports in Women's Health* 2020; 27, e00220.
 24. AbuAlhommos AK, Alhadab FE, Almajhad MM, Almutawaa R and Alabdulkareem ST. Community Knowledge of and Attitudes towards COVID-19 Prevention Techniques in Saudi Arabia: A Cross-Sectional Study. *Int. J. Environ. Res. Public Health* 2021; 18: 12783.
 25. Hoque AM, Alam AM, Hoque M, Hoque ME and Van Hal G. Knowledge, attitudes, and practices towards COVID-19 of prenatal women at a primary health care facility in South Africa. *European Journal of Medical and Health Sciences* 2021; 3(1): 50-55.
 26. Mullins E, Evans D, Viner RM, O’Brien P and Morris E. Coronavirus in pregnancy and delivery: rapid review and expert consensus. *MedRxiv* 2020.
 27. Metwally HMS and Desoky MMAEM. Knowledge, practice and attitudes of preventive measures against coronavirus infection among prenatal women in Egypt. *Saudi Journal of Nursing and Health Care* 2021.
 28. Ayele AD, Mihretie GN, Belay HG, Teffera AG, Kassa BG and Amsalu BT. Knowledge and practice to prevent COVID-19 and its associated factors among prenatal women in Debre Tabor Town Northwest Ethiopia, a community-based cross-sectional study. *BMC pregnancy and childbirth* 2021; 21(1):1–2.
 29. Lopes de Sousa AF, Carvalho H, Oliveira LB, Schneider G, Camargo E, Watanabe E and Fronteira I. Effects of COVID-19 infection during pregnancy and neonatal prognosis: what is the evidence?. *International journal of environmental research and public health* 2021; 17(11): 4176.