Knowledge and Practices of Pregnant Women Regarding (COVID 19) in Rural Area

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Abstract

Background: The COVID-19 pandemic has posed significant health challenges globally, with pregnant women being particularly vulnerable due to potential complications. **Aim of the Study:** This study aims to assess the knowledge and practices of pregnant women regarding COVID-19 in a rural area. **Research design:** A descriptive analytical research design was used to conduct this study. **Setting:** Maternal and child health centers at Bany-suief governorate. **Sample:** A purposive sample composed of 350 pregnant women attending antenatal clinics in rural area. **Tools:** Data was collected using a structured questionnaire, which included demographic data, knowledge about COVID-19, and practices related to COVID-19, self reported practices pregnant woman. **Results:** The study found that 74.3% of the studied pregnant women have unsatisfactory level of total knowledge about COVID-19 disease. Regarding practices of pregnant women toward hand washing, 80.6% and 90.0% of the studied pregnant women have unsatisfactory level of total reported practice toward hand washing and rubbing hand with alcohol. Regarding reported practice of pregnant women toward general prevention and home isolation in case of infection 64.6% and 88.6%, of them have unfollow level of total practices toward cough etiquette and social distance, 77.7% and 76.6%, of them have unfollow level of total practices toward general prevention and home isolation in case of infection. **Conclusion:** There was highly statistically significant correlation between total score of knowledge and reported practices regarding COVID19. **Recommendations:** Implementing regular educational sessions at antenatal clinics to provide up-to-date information on COVID-19 and preventive measures.

Keywords: Knowledge, practices, Rural area, COVID-19, pregnant women

Introduction

Coronaviruses are a type of virus. There are many different kinds, and some cause disease. A coronavirus identified in 2019, SARS-CoV-2, has caused a pandemic of respiratory illness, called COVID-19, the disease caused by a new coronavirus called SARS-CoV-2. WHO first learned of this new virus on 31 December 2019, following a report of a cluster of cases of 'viral pneumonia' in Wuhan, People's Republic of China ***(WHO, 2020).***

Corona virus is spread through droplets and virus particles released into the air when an infected person breathes, talks, laughs, coughs or sneezes. Larger droplets may fall to the ground in a few seconds, but tiny infectious particles can linger in the air and accumulate in indoor places, especially where many people are gathered and there is poor ventilation. This is why mask-wearing, hand hygiene and physical distancing are essential to preventing COVID-19 ***(WHO, 2020).***

The most common symptoms of COVID-19 are fever dry cough, fatigue other symptoms that are less common and may affect some patients include: loss of taste or smell, nasal congestion, conjunctivitis (also known as red eyes); Sore throat, headache, muscle or joint pain, different types of skin rash, nausea or vomiting, diarrhea, chills or dizziness. Symptoms of severe COVID-19 disease include: shortness of breath, loss of appetite, confusion, persistent pain or pressure in the chest, high temperature (above 38 °C) ***(Davies, 2020).***

Preventive measures playing important role to reduce the chances of infection include staying at home, wearing a mask in public, avoiding crowded places, keeping distance from others, washing hands with soap and water often and for at least 20 seconds, practice good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands ***(Aydin, 2019).***

The CDC recommends wearing the most protective mask possible that you'll wear regularly, fits well and is comfortable, Cover your mouth and nose with your elbow or a tissue when you cough or sneeze. Throw away the used tissue. Wash your hands right away, Avoid touching your eyes, nose and mouth, Clean and disinfect often-touched surfaces regularly ***(CDC, 2020).***

Community health nurse working within communities to help prevent the spread of the disease through prevention, health education for pregnant woman, and screening. The Association of Community Health Nurses collaborated with other healthcare organizations to identify the numerous responsibilities of public health professional nurse during the disease outbreak. The list includes: providing information on COVID-19 and non-pharmaceutical interventions for pregnant woman, reassuring residents that fears are valid, but that panic should be avoided; offering the flu vaccine; providing education about prevention ***(Bennett, 2020).***

Significance of the study:

Pregnant women infected with covid19 viruses have had a higher mortality rate than non-pregnant women. Pregnant women are somewhat immune suppressed and thus may be at higher risk from developing severe disease from COVID-19, pneumonia and respiratory failure ***(WHO, 2020).***

Egypt reported the first instance of COVID-19. WHO received reports of 515,264 lab- confirmed of COVID-19 in Egypt between 3 January 2020 and 4 September 2022, with a total of 24,791 fatalities , the percentages of corona virus in Egypt are estimated to all cases 98, 062 and death 5, 342, recovered 69, 612 august 28 2020 **(Minstry of Health, 2020).**

Aim of the Study

The aim of the study is to assess knowledge and practices of pregnant women regarding COVID 19 in rural area through:

1- Assessing pregnant women's knowledge about COVID 19.

2- Assessing pregnant women's practices toward the application of preventive measures of COVID 19.

Research questions:

1- What is the pregnant women's knowledge regarding COVID 19 disease?

2- What are the pregnant women's reported practices toward preventive measures toward COVID 19?

3- Is there relation between pregnant women's knowledge and their practices toward preventive measures of COVID 19?

Subjects and Methods

I. Technical Design:

The technical design for the present study included: research design, research setting, study subjects, and tools of data collection.

Research Design:

A descriptive analytical research design used to conduct this study fulfill and answer the research question.

Research Setting:

The study was conducted in maternal and child health (MCH) centers at Bany-Suief governorate; which included 9 center chosen three of them Al Fashn, Baba, and Alwasta these centers represent highest density and provide more services for pregnant woman at rural area.

Subject of study:

A purposive sample composed of 350 pregnant women attending the previous mentioned setting according the following criteria.

Criteria of sample selection:

Age from 18-40 years old pregnant woman first, second, third trimester and free from chronic disease resident at rural area.

Sample size calculation:

The estimated sample size is **350** Pregnant Women out from **4000** Pregnant Women who attend the previous mentioned setting, at confidence level 95%, according to the following formula ***(Thompson, 2012)***.

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]} \text{—35}$$

0

3999*(.0025 / 3.8416) = 3999*.000651= 2.603+0.25= **2.853**

Which:

n= Sample size 350

N= Total size 4000

Z= the standard value corresponding to confidence level 95% which is (1.96).

d= Error level 5%.

p= 0.50.

Tools of Data Collection:

Two tools were used for data collection:

First Tool: Structured Interview Questionnaire Sheet

It was designed by the investigator written in simple Arabic language after reviewing the recent and relevant literature, and consisted of three parts:

Part I:

Sociodemographic characteristics of pregnant women include: age, marital status, educational level, occupation, crowding index and family income, it includes 7closed ended question from **(Q 1-7).**

Part II:

Obstetrics and gynecological history of pregnant women; which include 12 questions: number of children, number of previous pregnancies, Previous birth method, history of abortion, previous fetus death, previous new born death,previous pre-eclampsia before, previous high blood pressure during pregnancy, previous diabetes mellitus during pregnancy, previous a respiratory disease during pregnancy, history of COVID-19 infection& gestational age (**Q 8-19).**

Part III:

Knowledge of pregnant woman regarding COVID 19 adopted from ***CDC (2020), WHO (2020)*** and modified by investigator include knowledge about COVID 19 open end questions

9 questions concerning knowledge about COIVED 19 included: meaning of corona various, incubation period, modes of transmission, high risk people, sign and symptoms, complications, preventive methods, treatment protocol covid19, isolation steps at home. **(Q 19-28).**

Scoring system of pregnant women's knowledge

The Pregnant women's answers give were score "2" for complete correct answers, give "1" for incomplete correct answers, give score "zero" for incorrect answers and don't know.

The total score was 30 grads, the score of the items were summed up and the total divided to:

- Satisfactory level of knowledge score ≤ 50% 9-or more)
- Unsatisfactory score > 50% (less than 9 grades).

Tool II: Self-reported pregnant women practices.

Adopted from ***WHO and CDC (2019, 2020)*** to assess pregnant women's practices Include **7** items: hand washing include **5** question , doing and doffing mask include **11** question, rubbing hands with alcohol include question for **9** question **WHO, 2020**, cough etiquette includes 4 question **WHO, 2020**, social distance includes **7** question **WHO, 2020**, cleaning and disinfection surfaces include **17** question **WHO, 2020**, home isolation toward COVID 19 include 10 question **WHO, 2020**

Self reported practices include:

- Hand washing **Q1-5Q**
- Doing and doffing mask **Q6-Q16Q**
- Hand rub with alcohol **Q16-24Q**
- Cough etiquette. **Q25-28Q**
- Social distance. **Q29-35Q**
- Cleaning and disinfection **Q36-52Q**
- Pregnant women practices during home isolation. **Q53-62Q**

Scoring system of pregnant women's Self-reported

Self-reported pregnant women's practices about corona virus preventive measures, each item were scored "two" for" Always" and "one" for "sometimes" and "zero' for Never. The total score was 39 grads, the score of the items were summed up and the total divided according to the following:

- Follow 60% or more (74-124 grades).
- Unfollow less than 60%. (Less than 74 grades).

II. Operational Design:

The operational design of this study included preparatory phase, validity and reliability of the developed tools, pilot study, field work, and ethical and administrative considerations.

A-Preparatory Phase:

It included reviewing the recent and relevant literatures covering various aspects of the study problem using books, articles, periodicals, magazines and internet in order to get acquainted with the various aspects of the research problem and to develop the required tools for data collection.

Content Validity:

The developed study tools were tested and evaluated for validity by a panel of three experts "Jury" in the field of Community health nursing department, Faculty of Nursing, Ain Shams University, to ascertain relevance, clarity and completeness of the tools, experts' elicited responses were either "agree" or "disagree" for the face validity".

The developed tools were modified according to the experts' opinion. These modifications were in the form of omission or addition of some questions or rephrasing some statements.

Reliability of the tool:

Testing the reliability of the tools through Alpha Cronbach reliability analysis.

Items	Alpha Cronbach
Knowledge about covid19	0.793
Self reported practices	0.822

The internal consistency was measured to identify the extent to which the items of the tools measured the same concepts and correlated with each other for reliability, test-retest was done.

B-Pilot Study:

The pilot study involved 25 pregnant women (10% of total sample size), to ensure the clarity of questions and applicability of the tools, and to determine the time needed to fill the study

tools. The pregnant women involved in the pilot study included from the stud sample.

C-Ethical Considerations:

Ethical approval was obtained from the Scientific Research Ethical Committee of the Faculty of Nursing, Ain Shams University. In addition, infomal consent was obtained from every participant who agreed to share in the study. The participants were assured that anonymity, confidentiality and the right to withdraw from the study at any time would be guaranteed. Ethics, values, cultural backgrounds and beliefs were respected.

Ethical code: 24.12.433

III. Administrative Design:

An official approval to carry out the study was obtained through an issued letter from the Dean of the Faculty of Nursing, Ain Shams University to and undersecretary of the Ministry of Health, general director of MCH center in Beni Suif governorate to carry out this study.

Field Work:

The actual field work and data collection was achieved throughout a period of six months; from the beginning of December 2021, till the end of May 2022.

Data collection was done 3 days per week one center every day from 9am to 12by investigator and took time for each 10: 15 minutes meeting average from 12 to 13 pregnant women per day.

The investigator introduced herself firstly and the purpose of study was simply explained to pregnant woman who agreed to participate in the study.

The investigator role in completing the questionnaire was to facilitate the understanding of any confusing or difficult question for the pregnant woman.

The investigator interviewed individually the pregnant women who agreed to participate in the study. The investigator explained the aim and objectives of the study to each pregnant woman.

IV. Statistical Design:

The collected data were organized, coded and analyzed by using appropriate statistical tests. The statistical analysis of data was performed using the Statistical Package for Social Science (SPSS), version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as means± standard deviation. Qualitative data were expressed as frequency and percentage.

- P-value <0.05 was considered significant.

- P-value >0.05 was considered insignificant.

Results

Table (1) showed that, 40.0% of the studied pregnant women their age were 25-<30 years, the Mean SD of age was 26.41±4.31 years. As regard to marital status, 98.8% of the studied pregnant women were married. Also, 51.4% of them had secondary education. Moreover, 68.0% of them don't work. Furthermore, 56.0% of the studied pregnant women had 4-6 family members and < 3 rooms in their house, respectively. Likewise, 64.0% of them their crowding index were 1-2. Also, 50.6% of them reported that, family income were not enough.

Table (4) revealed that, 68.3% and 68.9% of the studied pregnant women had incomplete correct answer regarding the prevention methods from COVID-19 disease and isolation steps inside the house, respectively. Also, 64.3% and 65.1% of them had incomplete correct answer regarding the high-risk people and symptoms of COVID-19 disease, respectively. While, 86.0% of them didn't know the incubation period for COVID-19 disease.

Figure (1) showed that, 74.3% of the studied pregnant women had unsatisfactory level of total knowledge about COVID-19 disease. While, 25.7% of them had satisfactory level of total knowledge.

Figure (2) shows that, 70.% and 73.4% of the studied pregnant women were unsatisfactory level of total reported practices toward hand washing and wearing and taking off the mask, respectively.

Figure (3) shows that, 71.4% of the studied pregnant women have satisfactory practices toward preventive measures toward covid 19. While, 28.6% of them were unsatisfactory practices.

Figure (5) shows that, 77.7% of the studied pregnant women have unsatisfactory level of total reported practice toward preventive measures toward COVID 19. While, 22.3% of them have satisfactory level of total reported practice.

Table (12) displays that, there is highly statistically significant relation between the knowledge of the studied pregnant women and their socio-demographic characteristics as education level at (P= < 0.01). Also, there is statistically significant relation with their age and occupation at (P= < 0.05). While, there is no statistically significant relation with their marital status, crowding index and family income at (P= > 0.05).

Table (13) shows that, there is highly statistically significant relation between the reported practice of the studied pregnant women and their socio-demographic characteristics as age, education level crowding index and family income at (P= < 0.01). Also, there is statistically significant relation with their occupation at (P= < 0.05). While, there is no statistically significant relation with their marital status at (P= > 0.05).

Table (15) showed that, there is a highly statistically significant relation between total knowledge of the studied pregnant women and reported practice toward preventive measures toward COVID 19 at (P < 0.01).

Table (16) indicate that, there is highly significant positive correlation between total knowledge, and total reported practice toward preventive measures toward COVID 19 among studied pregnant women at (P= < 0.01).

Table (1): Frequency distribution of the studied pregnant women according to their socio-demographic characteristics (n = 350).

Socio-demographic characteristics		No.	%
Age (years)			
18-< 20		52	14.9
20-<25		86	24.6
25-<30		**140**	**40.0**
30-<35		54	15.4
35-<40		18	5.1
Mean SD	26.41 ± 4.31		
Marital status			
Married		**346**	**98.8**
Divorced		2	0.6
Widowed		2	0.6
Education level			
Not read and write		22	6.3
Read and write		38	10.9
Basic education		55	15.7
Secondary education		**180**	**51.4**
High education		55	15.7
Occupation			
Working		112	32.0
Hose wife		**238**	**68.0**
Number of family members			
1- 3		92	26.3
4 - 6		**196**	**56.0**
>6		62	17.7
Number of rooms in the house			
< 3		**186**	**53.1**
3-5		132	37.7
>5		32	9.2
Crowding index			
<1		45	12.9
1-2		**224**	**64.0**
>2		81	23.1
Family income			
Not enough		**177**	**50.6**
Enough		105	30.0
Enough and save		68	19.4

Table (2): Assessing Covid19 knowledge of pregnant women about COVID-19 disease. Frequency distribution of the studied pregnant women according to their knowledge about COVID-19 disease **(n = 350).**

Items	Complete Correct answer		Incomplete Correct answer		Don't know	
	No.	%	No.	%	No.	%
Meaning of COVID-19 disease	63	18.0	120	34.3	167	47.7
The incubation period for COVID-19 disease	49	14.0	0	0.0	301	86.0
Modes of transmission	72	20.6	213	60.8	65	18.6
High risk people	64	18.3	225	64.3	61	17.4
Symptoms of COVID-19 disease	56	16.0	228	65.1	66	18.9
Complications from COVID-19 disease	50	14.3	205	58.6	95	27.1
Prevention methods from COVID-19 disease	70	20.0	240	68.6	40	11.4
Treatment protocol for the treatment of corona virus infection	46	13.1	239	68.3	65	18.6
Isolation steps inside the house	59	16.8	241	68.9	50	14.3

According to research question number 1 what the pregnant woman knowledge regarding Covid 19 disease?

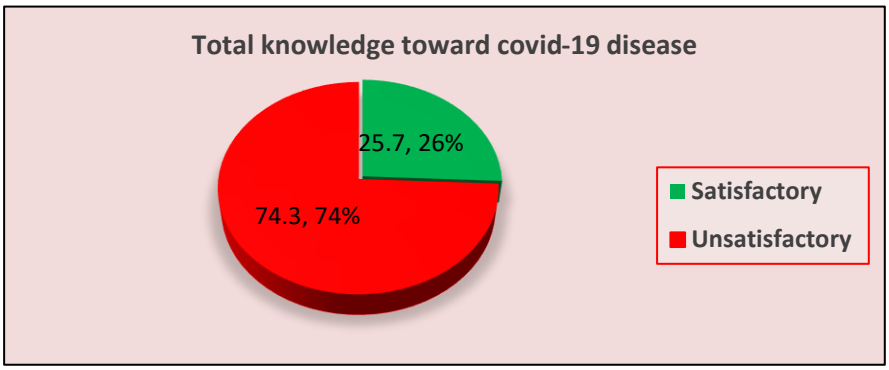

Figure (1): Percentage distribution of the studied pregnant women according to their total knowledge toward COVID-19 disease (n = 350).

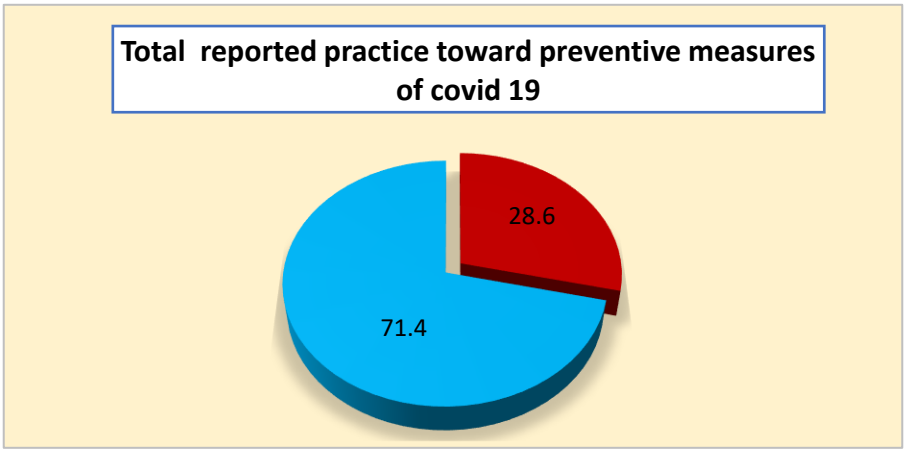

Figure (2): Percentage distribution of the studied pregnant women according to their total reported practices toward preventive measures of covid 19 (n = 350).

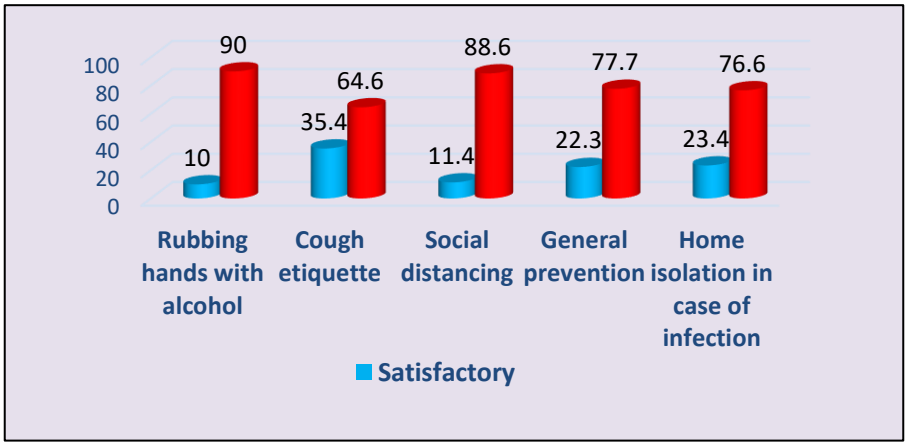

Figure (3): Percentage distribution of the studied pregnant women according to their total subscales of reported practice toward preventive measures toward COVID 19 **(n = 350).**

Table (3): Relations between socio-demographic characteristics of the studied pregnant women and their total knowledge about covid-19 disease **(n=350).**

Socio-demographic characteristics		Total knowledge about covid-19 disease				X^2	P-Value
		Satisfactory (n=90)		Unsatisfactory (n=260)			
		No.	%	No.	%		
Age (years)	< 20	0	0.0	52	20.0	10.69	0.024*
	20-<25	16	17.8	70	26.9		
	25-<30	64	71.1	76	29.3		
	30-<35	10	11.1	44	16.9		
	35-<40	0	0.0	18	6.9		
Marital status	Married	89	98.9	257	98.8	1.005	0.596
	Divorced	1	1.1	1	0.4		
	Widowed	0	0.0	2	0.8		
Education level	Illiterate	0	0.0	22	8.5	46.93	0.000**
	Read and write	0	0.0	38	14.6		
	Basic education	0	0.0	55	21.1		
	Secondary education	35	38.9	145	55.8		
	High education	55	61.1	0	0.0		
Occupation	Working	85	94.4	27	10.4	11.37	0.032*
	Not working	5	5.6	233	89.6		
Crowding index	<1	40	44.5	5	1.9	2.471	0.235
	1-2	39	43.3	185	71.2		
	>2	11	12.2	70	26.9		
Family income	Not enough	0	0.0	177	68.1	8.027	0.027%
	Enough	18	20.0	87	33.5		
	Enough and save	62	80.0	6	2.4		

X^2 =chi-square test. No significant at p > 0.05. *Significant at p ‹ 0.05. ** Highly significant at p ‹ 0.01.

Table (4): Relation between socio-demographic characteristics of the studied pregnant women and their practices (observational check list) toward preventive measures toward covid 19 **(n=350).**

Socio-demographic characteristics		Total practices (observational check list) toward preventive measures toward Covid 19				X^2	P-Value
		Correct done (n=100)		Incorrect done (n=250)			
		No.	%	No.	%		
Age (years)	< 20	0	0.0	52	20.8	24.63	0.000**
	20-<25	20	20.0	66	26.4		
	25-<30	70	70.0	70	28.0		
	30-<35	10	10.0	44	17.6		
	35-<40	0	0.0	18	7.2		
Marital status	Married	99	99.0	247	98.8	1.000	0.522
	Divorced	1	1.0	1	0.4		
	Widowed	0	0.0	2	0.8		
Education level	Illiterate	0	0.0	22	8.8	31.099	0.000**
	Read and write	0	0.0	38	15.2		
	Basic education	0	0.0	55	22.0		
	Secondary education	45	45.0	135	54.0		
	High education	55	55.0	0	0.0		
Occupation	Working	92	92.0	20	8.0	14.30	0.017*
	Not working	8	8.0	230	92.0		
Crowding index	<1	45	45.0	0	0.0	43.099	0.000**
	1-2	55	55.0	169	67.6		
	>2	0	0.0	81	32.4		
Family income	Not enough	0	0.0	177	70.8	20.33	0.000**
	Enough	37	37.0	68	27.2		
	Enough and save	63	63.0	5	2.0		

X^2 =chi-square test. No significant at p > 0.05. *Significant at p ‹ 0.05. ** Highly significant at p ‹ 0.01.

Table (5): Relationship between total knowledge, total practices (observational check list) and total reported practice toward preventive measures toward COVID 19 among studied pregnant women **(n=350).**

Variables		Level of knowledge				X^2	P-Value
		Satisfactory (n=90)		Unsatisfactory (n=260)			
		No.	%	No.	%		
Level of practices (observational check list)	Correct done	90	100.0	10	3.8	44.33	0.000**
	Incorrect done	0	0.0	250	96.2		
Level of reported practice	Satisfactory	78	86.7	0	0.0	46.28	0.000**
	Unsatisfactory	12	13.3	260	100.0		

****Highly statistically significant at p ‹ 0.01.**

Table (6): Correlation between total knowledge, total practices (observational check list) and total reported practice toward preventive measures toward COVID 19 among studied pregnant women **(n=350).**

Variables	Total knowledge		Total practices (observational check list)	
	r	P-value	r	P-value
Total knowledge			0.752	0.000**
Total reported practice	0.615	0.000**	0.501	0.000**

r= correlation coefficient test. **highly significant at p ‹ 0.01.

Discussion

Regarding to characteristics of the studied pregnant women, the finding of the present study showed that less than half of pregnant woman were at the 25-<30 years, the Mean SD of age is 26.41±4.31 years also majority of them married. **(table) 1.**This finding was agreed with **Javier & Garin, (2022)** who conducted study entitled "Knowledge, Attitudes, and Practices of Pregnant Women in the Prevention of COVID-19." found that there are 79% of them were at the 25-<30 years. Mean SD of age is 26.41±4.31 years. And 85% of them married.

As regarding the educational level of studied pregnant women, the result of the present study reveals that more than half of them have secondary education and don't work**.(Table 1).**This result is in agreement with a study done by **Alam et al; (2021)** who conducted study entitled " Knowledge, Attitudes, and Practices towards COVID-19 of Pregnant Women at a Primary Health Care Facility in South Africa." and found about 66% of them have secondary education and 75% of them don't work.

This result is in disagreement with **Johnbosco et al. (2020)** who conducted study entitled "Knowledge, Attitudes, and Practices of Pregnant Women in the Prevention of COVID-19." and found 60 % have high education and 28.2 % of them secondary school 11.8% were primary education.

This result is in disagreement with **Hoque et al. (2021)** who studied "knowledge, attitudes, and practices towards COVID-19 of pregnant women at a primary health care facility in South Africa" and reported that the majority of the respondents had low education (can read and write only).

As regarding the number of family member rooms the result of the study reveals that more than half of the studied sample were 4-6 family members and more than half< 3 rooms in their house, and regarding of crowding index of studied pregnant women the result of the study reveals that less than tow third of them the studied sample were 1-2 crowding index. Also, reported that, family income were not enough**. (Table 1).**

This result is in agreement with a study done by **Ibrahim et al. (2023)** who conducted study entitled " Pregnant Women's Knowledge, Attitude and Self-Protective Measures Practice regarding Corona virus prevention: Health Educational Intervention." that found 66% of the studied sample had has 4-6 family members and < 3 rooms in their house, Also 50.2% of the

studied sample has family income is not enough.

Part (II): Obstetrics and gynecological history of the studied pregnant women

As regarding the number of children, the present study shows that less than two fifth of the studied sample were have one child, regarding woman of previous pregnancy one third of them were one previous pregnancy, the majority of them didn't have a history of pre-eclampsia. Moreover, one fifth of the studied pregnant women have high blood pressure and less than one tenth of them have diabetes mellitus during pregnancy **(Table 2-A).**

This result is in agreement with a study done by **West et al. (2021)** Who conducted study entitled "Knowledge, attitudes and practices of pregnant women attending the antenatal clinic of Rivers State University Teaching Hospital, Nigeria towards the Coronavirus (COVID-19) pandemic infection" and found that 36.9% of studded sample has sample has one children and 33.9% of them one previous pregnancy. Also, most of of them didn't have a history of pre-eclampsia. Moreover, one fifth and 6.2% of the studied pregnant women had high blood pressure and diabetes mellitus during pregnancy.

Concerning the obstetric history of the studied pregnant women, the findings of the current study revealed that showed that more than two fifth of the studied pregnant women had a respiratory disease during pregnancy, the majority of them had influenza. Also, less than one fifth of the studied pregnant women had a history of COVID-19 infection as, more than three quarters of them had COVID-19 infection before pregnancy **(Table 2-B).**

This result is in agreement with a study done by **Javier & Garin, (2022)** who conducted study entitled "Knowledge, Attitudes, and Practices of Pregnant Women in the Prevention of COVID-19. Puissant" and found that only 30.5% of the studied sample have a respiratory disease during pregnancy, 80.3%. of them have influenza. Also, the minority of the studied pregnant women have a history of COVID-19 infection as, more than three quarters of them have COVID-19 infection before pregnancy.

Part (III): Assessing knowledge of pregnant women toward COVID-19.

Regarding to the knowledge of pregnant women toward COVID-19 revealed that, more than two third of the studied pregnant women had incomplete correct answer regarding the prevention methods from COVID-19 disease and more than two third incomplete correct answer isolation steps inside the house, less than two third of them had incomplete correct answer regarding the high-risk people and less than two third symptoms of COVID-19 disease,. and the majority of them didn't know the incubation period for COVID-19 disease. **(Table 4)**

This result is in agreement with a study done by **Asadi,et al, (2020**) who conducted study entitled "Knowledge and Attitude regarding COVID-19 among Pregnant Women in Southwestern Iran in the Early Period of its Outbreak: A Cross-Sectional Study". knowledge about define and spread of coronavirus among the pregnant women., nearly one third of them (32.6%) have correct knowledge about "definition and preventive measures toward coronavirus among the pregnant women.

This result is in agreement with a study done by **Sayed (2023)** who conducted study entitled "Pregnant Women's Knowledge and Practice Regarding Preventive Measures toward Coronavirus The risk for coronavirus infection, more than half of them (56.2%) mention pregnant women. Concerning prevention of coronavirus, about two fifth of them (40.4%) report Maintaining self-quarantine.

Regarding to the total knowledge of pregnant women toward COVID-19 the present study showed that less than three quarters of the studied pregnant women have unsatisfactory level of total knowledge about COVID-19 disease.and almost one quarters of them have satisfactory level of total knowledge **(figure 1)**

This result is in agreement with a study done by **Liu, Wang et al. (2020)** who conducted study entitled "Why are pregnant women susceptible to viral infection: an immunological viewpoint?" and found that 72.4% of the studied pregnant women have unsatisfactory level of total knowledge about COVID-19 disease. While, 27.6% of them have satisfactory level of total knowledge about COVID-19 disease.

This result is in agreement with a study done by **Allotey et al., (2020)** who conducted study entitled "Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis.," and found that about almost three quarters of the studied pregnant women have unsatisfactory level of total knowledge about COVID-19 disease of them have satisfactory level of total knowledge.

Part IV: Assessing practices of pregnant women toward preventive measures of COVID-19

Regarding the pregnant woman total practices to their reported practices towards cough etiquette, social distancing, general prevention and home isolation. the present studied showed that the majority of the studied pregnant have inappropriate of total reported practices toward cough etiquette, social distancing, Moreover, almost three quarters and almost three quarters of them have inappropriate of total reported practices toward general prevention and home isolation in case of infection. **(Figure 4)**

These results were agreed with those **Asadi,et al, (2020)** who conducted study entitled "Knowledge and Attitude regarding COVID-19 among Pregnant Women in Southwestern Iran in the Early Period of its Outbreak: A Cross-Sectional Study". and found that, 65% and 87.5% of the studied pregnant women inappropriate of total reported practices toward cough etiquette, social distancing, and 76.9% & 76.3% of them have inappropriate of total reported practices toward general prevention and home isolation in case of infection.

Also the present study agrees with those of **Yazdi, M., et al. (2022)** who conducted study entitled "Latent class analysis of knowledge, attitude, and practice of a population-based sample of Iranian pregnant women toward COVID-19. Advanced Biomedical Research," and found that 63.4% and 88.2% of the studied pregnant women inappropriate of total reported practices toward cough etiquette, social distancing, and 77.2% & 76.5% of them have inappropriate of total reported practices toward general prevention and home isolation in case of infection.

Regarding the pregnant women's total reported practice toward preventive measures COVID 19. the present studied showed that, more than three quarters of the studied pregnant women have inappropriate of total self-reported practice of preventive measures toward COVID 19. and one fifth of them have appropriate of total self-reported practice of preventive measures toward COVID 19**. (Figure 5)**

This result was agreed to those of Nwafor, et al. (2020) who conducted study entitled "Pregnant women's knowledge and practice of preventive measures against COVID-19 in a low-resource African setting" and found that, 78.4% of them were inappropriate practices and 21.6% appropriate practices.

Part (IV): Statistical relation and correlation between the studied variable

Concerning the relationships between pregnant woman socio-demographic and total knowledge the results of current study indicated that there is highly statistically significant relation between the knowledge of the studied pregnant women and their socio-demographic characteristics as education level at ($P = < 0.01$). Also, there is statistically significant relation with their age and occupation at ($P = < 0.05$). While, there is no statistically significant relation with their marital status, crowding index and family income at ($P = > 0.05$). Table (12).

In agreement with these results, a study by **Ibrahiem et al. (2021)** revealed that

knowledge, preventive practice measures and attitude were significantly associated with maternal higher educational level respectively; educational level, Women's occupation; sector of occupation and family size for women associated significantly with maternal knowledge and preventive practices.

Concerning the relationships between practices and socio-demographic characteristics shows that, there is highly statistically significant relation between the practices toward preventive measures toward covid 19 of the studied pregnant women and their socio-demographic characteristics as age, education level, crowding index and family income at (P= < 0.01). Also, there is statistically significant relation with their occupation at (P= < 0.05). While, there is no statistically significant relation with their marital status at (P= > 0.05). (**Table 13)**

This result is similar to the result of a study performed by **Sabry, et al., (2021)** entitled Effect of What Sapp Educational Program Reminder on Pregnant Women's Knowledge, Attitude and Practice Regarding COVID-19 pandemic Although non-enough income participants reported higher level of knowledge (p = 0.033), they reported a lower level of attitude and practice (p < 0.001).

Concerning the relationships between total knowledge and total reported practice the results the finding of the present study showed that, there is a highly statistically significant relation between total knowledge of the studied pregnant women and their reported practice toward preventive measures toward COVID 19 at P < 0.01. **(Table 14)**

This result is similar to the result of a study performed by **Ronald et al., (2021)** entitled "Pregnant women's knowledge and practice of preventive measures against COVID-19 in a low-resource African setting. was reported among 70.2%, positive attitude was reported among 75.9% and good practice was reported among 49.2% reported the higher knowledge and practice levels and lower attitude (p < 0.001 and p = 0.041).

Conclusion

After conducting the present study, it concluded the following:

The present study concluded that the mean ± SD of age is 26.41±4.31 years, regard the total knowledge of the studded pregnant women's, the less than three quarters of them had unsatisfactory level of knowledge about COVID-19 disease. Moreover, it was found more than three quarters of them had unfollow level of total self-reported practices of preventive measures toward COVID 19. the present studied showed that, more than three quarters of the studied pregnant women have inappropriate of total self-reported practice of preventive measures toward COVID 19.The current study showed that there is a highly statistically significant relation between total knowledge of the studied pregnant women and their reported practice toward preventive measures toward COVID19 at (P<0.01).

Recommendations

In the light of the present study findings, the following recommendations are suggested:

1.Conduct heath education programs regarding preventive measures of COVID 19 for all pregnant women at MCH centers.

2.Increasing woman awareness toward preventive measures of covied 19 through educational session at MCH centers at rural area.

Future research conducting about

1.Comparative study to assess pregnant woman of preventive measures regarding Covid 19 in urban and rural areas.

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