



# The Effect of Health Education Program on Pregnant Women's Knowledge and Practice Regarding Preventive Measures toward Coronavirus

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## Abstract

Coronavirus is emerging infection has been shown a fatal impact on pregnant women and fetuses so health education program to improve pregnant women's knowledge and practice to applying preventive measures to control coronavirus infection is the most critical intervention

**Aim:** the current study aimed to evaluate the effect of health education program on pregnant women's knowledge and practice regarding preventive measures toward coronavirus.

**Design:** a Quasi-experimental design (pre, post-test and follow up) was used to achieve the aim of the study.

**Setting:** the study was conducted at outpatient antenatal clinic in Helwan general hospital, Egypt.

**Sample:** Purposive sample of 89 pregnant women selected according to inclusion criteria.

**Tools of data collection:** three tools were used.

**First tool:** structured interviewing questionnaire which used to assess socio-demographic characteristics of the pregnant women and obstetric history.

**Second tool:** assess the level of pregnant women's knowledge regarding preventive measures toward coronavirus. **Third tool:** assess of pregnant women's practice regarding preventive measures toward coronavirus.

**Results:** the findings of this study showed that after two weeks and one month of health education program application, the majority of pregnant women had satisfactory level of total knowledge about the preventive measure toward coronavirus. Highly statistically significant relation between total pregnant women's knowledge pre health education program implementation and pregnant women's educational level and diagnosed of coronavirus previously before pregnancy.

**Conclusion:** this study concluded that the health education program is effectively improving pregnant women knowledge and practice regarding preventive measures toward the Coronavirus and this is supported by the research hypothesis.

**Recommendations:** pregnant women should be given continuous education to raising awareness about the preventive measure of coronavirus.

**Keyword:** Coronavirus, Health education, Knowledge, Practice, Pregnant women & Preventive Measures.

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## I. INTRODUCTION

Coronavirus disease is an emerging respiratory disease that is caused by a novel coronavirus, which was first diagnosed in December 2019 in Wuhan, China, and subsequently spread to many other countries. Numerous countries have reported increasing numbers of confirmed cases and deaths per day; therefore, on March 11, 2020, the WHO declared COVID-19 a pandemic (**WHO, 2020**)

Increased the pregnant women morbidity and even mortality, the cumulative effect of the coronavirus disease on the pregnant woman is likely to have a detrimental effect on pregnant women and the developing fetus (**Thorlund et al., 2020**). It could predispose a developing fetus to intrauterine growth restriction (IUGR), preterm delivery with immediate and long-term complications, abortion, and stillbirth. Even though vertical transmission is yet to be confirmed. Fear and anxiety associated with infection could lead to increased demand for abortion and operative deliveries (**Makoni, 2020 and Vogel et al., 2020**).

The coronavirus is highly infectious, and its main clinical symptoms include fever, dry cough, fatigue, myalgia, and dyspnea. In China, 18.5% of the patients with coronavirus develop to the severe stage, which is characterized by acute respiratory distress syndrome, septic shock, difficult-to-tackle metabolic acidosis, and bleeding and coagulation dysfunction (**Xie et al., 2020**).

Preventive measures are including frequent hand washing, refraining from excessive outdoor activities unless an emergency, and avoiding infected individuals, crowded places and public gatherings. Check the pregnant women's temperature regularly and immediately inform experience shortness of breath, cough or fever (**Chavez et al., 2020**). Moreover, pregnant women have a travel history or coronavirus symptoms should be kept in isolation for at least 14 days (**Hu et al., 2020**).

Nursing consultations during the pregnancy is the ideal time to educate pregnant women regarding their health to prevent coronavirus infection. At this stage a woman has constant contact with various health professionals and is encouraged to improve the knowledge and practice regarding preventive measures against coronavirus. The nurse should investigate coronavirus signs and symptoms, nurse can guide pregnant women about perform right

preventive measures against coronavirus (**World Health Organization, 2020**).

### Significance of the study:

An immune compromised state, as seen in pregnancy with its physiological changes, could predispose a pregnant woman to increased risk of SARS-COVID-19 infection (**Li et al., 2020**) compared to the general population. Increased the morbidity and even mortality, the cumulative effect of the coronavirus on the pregnant woman is likely to have a detrimental effect on pregnant woman and the developing fetus (**Thorlund et al., 2020 and Chen et al., 2020**). Prevalence of coronavirus in the world is 50,676,072 confirmed cases and 1,261,075 deaths. Americas is 21,842,460 confirmed cases, Europe is 13,576,687 confirmed cases, South-East Asia is 9,743,751 confirmed cases, Eastern Mediterranean is 3,368,738 confirmed cases, Africa is 1,368,904 confirmed cases, and Western Pacific is 774,791 confirmed cases. Prevalence of coronavirus in Egypt, from Jan 3 to 10 November 2020, there have been 109,422 confirmed cases of coronavirus with 6,380 deaths (**World Health Organization, 2020**).

### Aim of the study:

The aim of current study was to evaluate the effect of health education program on pregnant women's knowledge and practice regarding preventive measures toward coronavirus. This aim was achieved through the following objectives:

- 1- Assess the pregnant women's knowledge regarding preventive measures toward coronavirus. 1339
- 2- Assess the pregnant women's practice of preventive measures toward coronavirus.
- 3- Design health education program to pregnant women regarding preventive measures toward coronavirus.
- 4- Implement health education program to pregnant women regarding preventive measures toward coronavirus.
- 5- Evaluate the effectiveness of health education program through comparing the result of pre, post-test and follow up.

### Research Hypothesis:

The health education program will be effective in improving pregnant women's knowledge and practice regarding preventive measures toward coronavirus.



## 2. SUBJECTS AND METHODS

### 1- Technical design:

#### Research Design:

A Quasi-experimental design was used to achieve the aim of the study.

#### Research setting:

The study was conducted at the outpatient antenatal clinic in Helwan general hospital.

#### Subjects (sampling):

**Sample type:** A Purposive sampling was used to collect the study subjects according to the following inclusion criteria.

#### Inclusion criteria:

- 1- Pregnant women at any age.
- 2- Didn’t suffer from coronavirus.

**Sample size:** The estimated sample size is **89** pregnant women out from **115** pregnant women who visit at the previous mentioned setting, at confidence level 95% (**Thompson, 2012**).

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

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$$n = \frac{115 \times (0.5 \times 0.5) = 28.75}{114 \times (.0025 / 3.8416) = 114 \times .000651 = 0.07421 + 0.25 = .3242} = 89$$

#### Which:

n= Sample size

N= Total size

Z= 1.96

d= Confidence level 95%

p= 0.5.

**Sampling technique:** Pregnant women were collected from hospital registration book in outpatient antenatal according to the inclusion criteria till reach the determined sample size.

#### Tools of data collection:

Threetools were used for data collection in the present study:

#### First tool: A structured interviewing questionnaire.

This tool was adapted from (**Mohamed et al., 2020**) and modified by the researcher. Tool was written in Arabic language in the form of close and open-ended questions and the questionnaire. This tool composed of two parts:

**Part I:** Pregnant women demographic data used to assess general characteristics of pregnant women consisted of ten questions as; age, residence, education level, occupation, family monthly income, diagnosis of chronic health problem, type of chronic health problem, previously diagnosed of coronavirus before pregnancy and when diagnosed before pregnancy.

**Part II:** Obstetric history of pregnant women used to assess the obstetric history of pregnant women consisted of six questions such as; gravidity, parity, number of abortion, living children number, gestational age, and regular attendance of antenatal care visit.

**Second tool:** Assessment the level of pregnant women’s knowledge regarding preventive measures toward coronavirus. This tool was adapted from (**Mohamed et al., 2020**) and modified by the researcher following review of literatures on the (**WHO, 2020**) & (**CDC, 2020**) and it written in Arabic language in form of close and open-ended question. The tool was consist of twenty eight questions such as believed the present of coronavirus, define the coronavirus, how is coronavirus spread, symptoms of coronavirus, incubation period of coronavirus, risk for coronavirus infection and prevention of coronavirus in Arabic language. (**Pre, Post-test& follow up**)



**Knowledge scoring system:** The tool was consist of 28 question were measured by giving subjects responses a score of (2) for the correct answer and (1) for the incorrect answer .The total knowledge score was ranged from **28 to 56 and classified into two categories:**

- **Satisfactory** knowledge if the percentage score was equal or more 60% of the total score ( $\geq 33$  score).

- **Unsatisfactory** knowledge if the percentage score was less than 60% of the total score ( $< 33$  score).

**Third tool:** Assessment of pregnant women's Practice regarding preventive measures toward coronavirus. This tool was adapted from (**Mohamed et al., 2020**)and modified by the researcher following review of literatures on the (**WHO, 2020**) & (**CDC, 2020**) and written in Arabic language. The tool was consist of twenty two question such as pregnant women washing hands frequently with soap and water or alcohol-based sanitizers, wear face mask, maintain at least 1-2 meter distance between pregnant women and others during antenatal visit, in recent days, have pregnant women avoided gone to any crowded place, use tissues during coughing and sneezing, eating healthy food during pregnancy, sources of information of preventive measure toward coronavirus and pregnant women learned others preventive measures that learned. (**Pre, Post-test& follow up**)

**Practice scoring system:**The tool was consisting of **twenty two** questions, the items adequately done were scored "2" and the items not done were scored "1". For each point, the scores of the items were summed-up and the total practice score was ranged from 22-44 and classified into 2 categories:

- **Adequate** if the percentage score was equal or more 60% of the total score ( $\geq 26$  score).

- The practice was considered **not done** if the percent score was less 60% of the total score ( $< 26$  score).

#### **Tools validity and reliability:**

The data collection tools were reviewed by a panel of three expert's professors one from maternal and newborn health nursing department and one from psychiatric nursing at Helwan University; and one professor from Ain shams University to ensure applicability, comprehensiveness, understanding and ease of implementation of the tools. Each of the experts

was asked to examine tools for content coverage, relevance, clarity, wording, length, format and overall appearance. Modifications were done according to the expert's comments and recommendations; minor modifications had been made such as rephrasing and rearrangements of some sentences such as the question of definition of corona virus the answer was complete and incomplete then modified to correct and in correct.

The reliability was done by Cronbach's Alpha test which revealed that each of the two tools consisted of relatively homogenous items as indicated by the moderate to high reliability of each tool, it was (0.91) for obstetric history, it was (0.93) for knowledge tool and (0.94) for self-preventive measures, (0.945).

#### **Ethical consideration:**

The research approval was obtained from a scientific, ethical committee in the Faculty of Nursing, Helwan University before starting the study. The researcher was obtained verbal consent from pregnant women. The researcher clarified the aim and objectives of the study to each pregnant woman. The researcher was assured anonymity and confidentiality of subject's data. Pregnant women were informed that allowed to choose to participate or not in the study and that they have right to withdrawal from the study at any time.

#### **II- Operational design:**

##### **Pilot study:**

A pilot study was carried out on 10% (9) pregnant women and was conducted to test the applicability of the tools and feasibility of the study. According to the result of the pilot study, items was corrected, modified, omitted or added. It also helped in determined the time needed for interviewing and evaluating the suitability of settings to perform the interview. All modification was done and women participated in the pilot study were excluded from the study sample.

**Field of work:**The actual field work was carried out from beginning of January 1, 2021 to June 30, 2021.The researcher was visit the study setting two days/week, from 8.30 AM to 2.00 PM. The researcher introduced herself to the pregnant women in the previously mentioned setting, and explained the nature and the purpose of the study to gain their cooperation. The current study was achieved through four phases: Preparatory phase



assessment phase, implementation phase and evaluation phase:

**1-Preparatory phase:** During this phase the researcher reviewed the current, local and international related literatures of various aspects of the study using books, periodicals journals, magazines and internet. This helped the researcher to be more acquainted with the study, and with the process of tools' designing. Then tools were designed and tested for being valid and reliable.

**2-Assessment Phase:** The researcher met each pregnant woman individually before obstetric examination, the researcher welcomed the pregnant woman, introduced herself to the pregnant woman and obtains written consents after explaining the purpose of the study .Pregnant women's demographic data and obstetric history was taken. Then the researcher assesse the pregnant women's knowledge level and practice toward coronavirus (pretest). A total (3-4) pregnant woman was interviewed daily. The data obtained during this phase were constituted the base line for further comparison to evaluate the effect of the health educational program.

**3-Planning phase:** The researcher prepared an educational material about health education program to pregnant women's knowledge and practice regarding preventive measures toward coronavirus and print it in the form of booklet in Arabic language and the researcher used the different methods of teaching, and instructional media like video film & demonstration were utilized to explain health education program to studied that include definition of coronavirus, symptoms of coronavirus, comparison between coronavirus and a cold, or the flu symptoms, causes of coronavirus, coronavirus risk factors, modes of transmission of coronavirus among pregnant women, incubation period of coronavirus, complication of coronavirus during pregnancy for baby and pregnant women, ways of prevention from coronavirus, preventive measures toward coronavirus among pregnant women e.g hand washing technique, taking temperature, wearing and removing face covering.

**4-Implementation phase:** The researcher provided five educational sessions about preventive measures toward Coronavirus. Each session lasting 20 minutes 30 minutes. The five sessions (three session theory and two session practice) was given during waiting pregnant woman in antenatal clinic: illustrated by using booklet and educational videos.

The total group per day was two groups each group contain(3-4)pregnant woman.**First session:**Each pregnant woman was given comprehensive knowledge about the purpose of the program and program agenda, definition of coronavirus, symptoms of coronavirus, comparison between coronavirus, a cold, or the flu symptoms and the session was done for a period of 20 to 30 minutes.**Second session:** The researcher explain to the pregnant women that causes of coronavirus, coronavirus risk factors, modes of transmission of coronavirus among pregnant women and the session was done for a period of 20 to 30 minutes.

**Third session:** The researcher explains to the pregnant women that the incubation period of coronavirus, complications of coronavirus during pregnancy for baby and pregnant women and the session was done for a period of 20 to 30 minutes.

**Fourth Session:** - Practice session about preventive measures toward coronavirus among pregnant women during outbreak which included the, **Hand washing in right Way:** Wet the hands with clean, running water (warm or cold), turn off the tap, and apply soap. Lather hands by rubbing them together with the soap. Lather the backs of hands, between fingers, and under nails. Scrub hands for at least 20 seconds. Rinse hands well under clean, running water. Dry hands using a clean towel or air-dry them.

**How to wear and remove cloth face coverings (Mask) correctly:** Wash hands before putting on face covering. Put it over nose and mouth and secure it under chin. Try to fit it snugly against the sides of face. Make sure can breathe easily .**To remove cloth face coverings (Mask) correctly,**untie the strings behind head or stretch the ear loops. Handle only by the ear loops or ties. Fold outside corners together. Be careful not to touch eyes, nose, and mouth when removing and wash hands immediately after removing. **Fifth Session:** - The researcher summarizes the program to the pregnant women and the session was done for a period of 20 to 30 minutes.

**4-Evaluation phase:** **Pretest** evaluation to assess pre requisite data. The **post-test** evaluation of knowledge and practice after two weeks of sessions that using the same format of tool. **Follow-up** test was done after one month of implementation among the study group subjects using the same format of tools that used to evaluate knowledge, practice.

**Administrative design:**

Official letters, including the title and aim of the study were issued from the Faculty of Nursing Helwan University, a letter which was issued from Ministry of health approval after ethics committee and submitted to the director of Helwan General Hospital for conducting the study.

**Statistical design:**

Data was analyzed using the Statistical Package for Social Science (SPSS) version 22. Qualitative data

was presented as numbers and percentages. Relations between different qualitative variables were tested using Chi-square test (X<sup>2</sup>) and Cochran's Q test. Relation between quantitative variables was tested using Pearson correlation coefficient (r). Probability (p-value) < 0.05 was considered significant and < 0.001 was considered highly significant.

**3-RESULTS**

**Table (1): Distribution of the pregnant women according to their demographic characteristics n=89.**

Variables	No	%
<b>Age</b>		
• 18 - < 20 year	28	31.5
• 20 - < 25 year	41	46.0
• 25 - < 40 year	20	22.5
<b>Mean± SD 21.68±3.45</b>		
<b>Residence :</b>		
• Rural	80	89.9
• Urban	9	10.1
<b>Educational Level :</b>		
• Can't read and write	29	32.6
• Can read and write	53	59.6
• University	7	7.8
<b>Occupation :</b>		
• Employed	8	9.0
• Unemployed	81	91.0
<b>Family monthly income :</b>		
• Adequate	67	75.3
• Inadequate	22	24.7
<b>Chronic health problem:</b>		
• Yes	21	23.6
• No	68	76.4
<b>Chronic health problem of pregnant women n=21</b>		
• Diabetes	7	33.3
• Hypertension	12	57.1
• Renal failure	1	4.8
• Heart disease	1	4.8
<b>Pregnant women diagnosed of coronavirus previous n=20</b>		
• <1 years	2	10.0
• 1 year	12	60.0
• 2 years	6	30.0
<b>Mean± SD 1.80±1.63</b>		

**Table (1)** shows that less than half of pregnant women (46.0%) aged from 20 to less than 25 years old; with mean SD= 21.68±3.45 years old. Most of pregnant women (89.9%) are from rural area.

Regarding their Level of education, more than half of pregnant women (59.6%) can read and write. The majority of pregnant women (91.0%) are unemployed; about three quarters of pregnant women (75.3%) have adequate family monthly



income. In addition, less than one quarter of pregnant women (23.6%) have chronic health problem and more than half of pregnant women (57.1%) have hypertension.

**Table (2): Distribution of the pregnant women according to their obstetric history (n=89).**

Obstetric history	No	%
<b>Gravidity</b>		
• 1-2	62	69.7
• 3-4	19	21.3
• 5-7	8	9.0
<b>Mean± SD 2.35±1.28</b>		
<b>Parity</b>		
• Zero	21	23.6
• 1-2	58	65.2
• 3-4	10	11.2
<b>Mean± SD 1.15±0.96</b>		
<b>Number of abortion</b>		
• Zero	77	86.5
• 1	5	5.6
• 2	7	7.9
<b>Mean± SD 0.21±0.57</b>		
<b>Number of living children</b>		
• Zero	21	23.6
• 1-2	58	65.2
• 3-4	10	11.2
<b>Mean± SD 1.15±0.96</b>		
<b>Gestational age</b>		
• 10-<20 weeks	42	47.2
• 20-<30 weeks	36	40.4
• 30-<40 weeks	11	12.4
<b>Mean± SD 20.96±5.69</b>		
<b>Regular attendance of antenatal care visits</b>		
• Yes	83	93.3
• No	6	6.7

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**Table (2)** illustrates that more than two thirds of the pregnant women's regarding the gravidity (69.7%) have from 1 to 2. Concerning parity, nearly two thirds of them (65.2%) have from 1 to 2. Most of them (86.5%) haven't abortion. Nearly two thirds of

them (65.2%) have from 1 to 2 living children. As regard gestational age, less than half of them (40.4%) have from 20 to less than 30 weeks. Moreover, the majority of them (93.3%) attend antenatal care visits regularly.

**Table (3): Distribution of the pregnant women’s knowledge regarding coronavirus pre, post and follow up of health education program (n=89).**

Items	Pre program (n=89)		Post program (n=89)		Follow up program (n=89)		Cochran's Q test
	No	%	No	%	No	%	



Knowledge related to define and spread of coronavirus:								
• Believed the present of Coronavirus	Correct	57	64.0	89	100.0	89	100.0	17.54
	Incorrect	32	35.9	0	0	0	0	<0.01**
• Definition the Coronavirus	Correct	29	32.6	82	92.1	80	89.9	16.11
	Incorrect	60	67.4	7	7.9	9	10.1	<0.01**
Coronavirus spread among pregnant women :								
• Direct transmission during coughing from infected person	Correct	63	70.8	88	98.9	89	100.0	16.85
	Incorrect	26	29.2	1	1.1	0	0	<0.01**
• Touching contaminated surfaces with coronavirus	Correct	46	51.7	86	96.6	85	95.5	17.02
	Incorrect	43	48.3	3	3.4	4	4.5	<0.01**
• Contact with infected animals	Correct	49	55.1	10	11.2	11	12.4	18.67
	Incorrect	40	44.9	79	88.8	78	87.6	<0.01**
• Close contact with an infected person	Correct	52	58.4	87	97.8	87	97.8	15.95
	Incorrect	37	41.6	2	2.2	2	2.2	<0.01**
• Through eating infected animal products (e.g., meat, milk)	Correct	55	61.8	9	10.1	13	14.6	16.02
	Incorrect	34	38.2	80	89.9	76	85.4	<0.01**
• Through vertical transmission from pregnant women to fetus	Correct	65	73.0	5	5.6	10	11.2	16.88
	Incorrect	24	27.0	84	94.4	79	88.8	<0.01**

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\*\* : *Highly statistically significant P<0.01*

*Cochran’s test*

**Table (3)** represents knowledge about define and spread of coronavirus among the pregnant women at pre, post and follow up health education program. The table clarified that, there is a marked improvement in their knowledge with a highly statistically significant difference ( $P < 0.01$ ) between

phases of health education program regard all features registered. As evidence, nearly one third of them (32.6%) have correct knowledge about "Define the Coronavirus" pre health education program, while changed to be the most of them (92.1% and 89.9%) post and follow up respectively.

**Table (4): Distribution of the pregnant women’s knowledge regarding symptoms of coronavirus pre, post and follow up of health education program (n=89).**

Knowledge related to symptoms of coronavirus		Pre (n=89)		Post (n=89)		Follow up (n=89)		Cochran's Q test
		No	%	No	%	No	%	
Fever	Correct	58	65.2	88	98.9	89	100.0	16.75
	Incorrect	31	34.8	1	1.1	0	0	<0.01**
Cough	Correct	42	47.2	85	95.5	82	92.1	16.71
	Incorrect	47	52.8	4	4.5	7	7.9	<0.01**
Headache	Correct	33	37.1	83	93.3	80	89.9	17.14
	Incorrect	56	62.9	6	6.7	9	10.1	<0.01**
Difficult of breathing	Correct	53	59.6	87	97.8	86	96.6	17.05
	Incorrect	36	40.4	2	2.2	3	3.4	<0.01**
Runny nose	Correct	49	55.1	83	93.3	83	93.3	17.11
	Incorrect	40	44.9	6	6.7	6	6.7	<0.01**



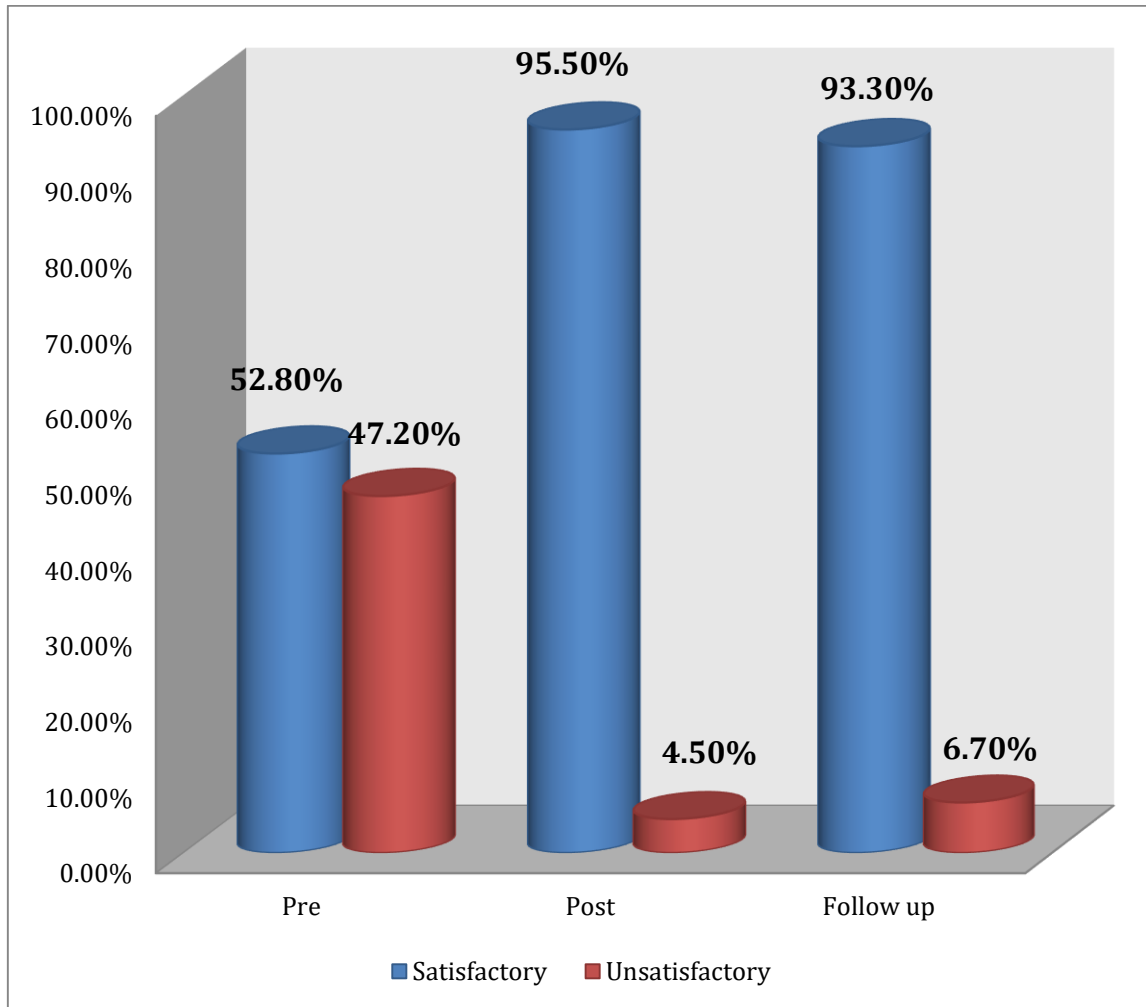
Lost sense of taste	Correct	62	69.7	87	97.8	84	94.4	16.65
	Incorrect	27	30.3	2	2.2	5	5.6	<0.01**
Lost sense of smell	Correct	60	67.4	89	100.0	88	98.9	16.57
	Incorrect	29	32.6	0	0	1	1.1	<0.01**
Sore throat	Correct	50	56.2	82	92.1	80	89.9	16.95
	Incorrect	39	43.8	7	7.9	9	10.1	<0.01**
General Fatigue	Correct	51	57.3	84	94.4	81	91.0	17.51
	Incorrect	38	42.7	5	5.6	8	9.0	<0.01**
Diarrhea	Correct	35	39.3	85	95.5	80	89.9	17.86
	Incorrect	54	60.7	4	4.5	9	10.1	<0.01**

**\*\*:** Highly statistically significant  $P < 0.01$  Cochran’s test

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**Table (4)** clarifies that there is a marked improvement in all knowledge items about symptoms of coronavirus among the pregnant women at post and follow up health education program phases compared to pre health education program phase with a highly statistically significant

difference ( $P < 0.01$ ). As evidence, about two thirds of them (65.2%, 67.4%) mention fever and loss of sense of smell at pre health education program phase compared to approximately all of them (98.9%, 100.0%) at post phase and (100.0%, 89.9%) at follow up respectively.



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**Figure (1):** Distribution of the pregnant women’s regarding total knowledge about preventive measures toward coronavirus pre, post and follow up of health education program (n=89).

**Figure (1)** illustrates that, more than half (52.80%) of the pregnant women have satisfactory level of total knowledge about preventive measures toward coronavirus pre health education program while improved to be the majority of them (95.50%) post health education program implementation and slightly decreased to 93.30% at follow-up phase.

**Table (5):** Distribution of the pregnant women’s practice regarding preventive measures toward coronavirus pre, post and follow up of health education program (n=89).

Items		Pre (n=89)		Post (n=89)		Follow up (n=89)		Cochran's Q test
		No	%	No	%	No	%	
Pregnant women maintain at least 1-2 meter distance when treats with others during antenatal visit	Done	35	39.3	82	92.1	81	91.0	16.30 <0.01**
	Not Done	54	60.7	7	7.9	8	9.0	
Pregnant women avoid touching eyes, nose and mouth with contaminated hands	Done	30	33.7	85	95.5	82	92.1	15.82 <0.01**
	Not Done	59	66.3	4	4.5	7	7.9	



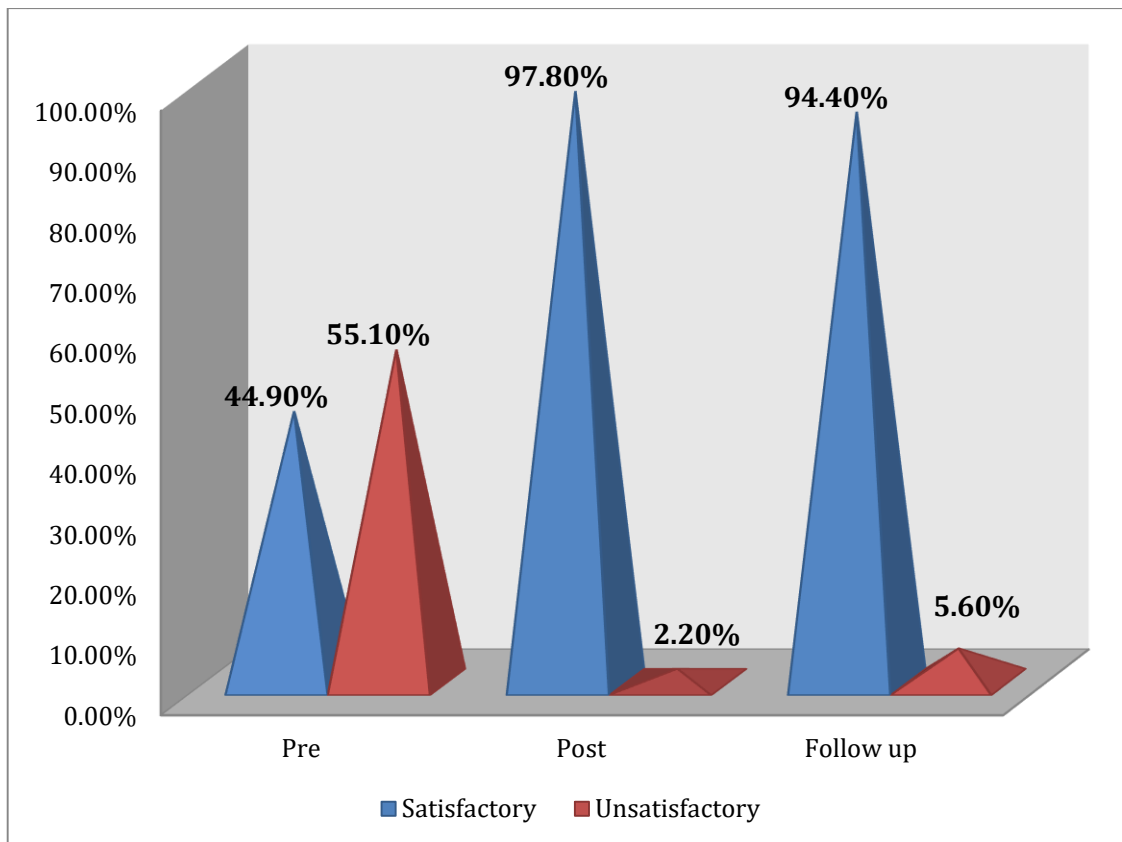
Pregnant women stay at home when fell with symptoms like flu	Done	45	50.6	87	97.8	80	89.9	15.64
	Not Done	44	49.4	2	2.2	9	10.1	<0.01**
In recent days, have pregnant women avoided gone to any crowded place	Done	39	43.8	86	96.6	85	95.5	15.76
	Not Done	50	56.2	3	3.4	4	4.5	<0.01**
Pregnant women use tissues during coughing and sneezing	Done	48	53.9	89	100.0	88	98.9	16.02
	Not Done	41	46.1	0	0	1	1.1	<0.01**
Pregnant women eat healthy food during pregnancy	Done	65	73.0	89	100.0	84	94.4	15.96
	Not Done	24	27.0	0	0	5	5.6	<0.01**
Pregnant women obey all government rules related to preventive measures of pregnant women toward the coronavirus	Done	42	47.2	88	98.9	87	97.8	15.48
	Not Done	47	52.8	1	1.1	2	2.2	<0.01**
Pregnant women learn others preventive measures that pregnant women learned	Done	21	23.6	82	92.1	80	89.9	15.74
	Not Done	68	76.4	7	7.9	9	10.1	<0.01**

**\*\*:** Highly statistically significant  $P < 0.01$

Table (5) indicates that there is a marked improvement in the studied pregnant women's practice regarding all features of preventive measures at post and follow-up health education program phases compared to pre health education program phase with highly statistically significant

difference ( $P < 0.01$ ). As evidence, less than one quarter of them (23.6%) mention "Pregnant women learn others preventive measures that you learned" at pre health education program phase compared to most of them (92.1%, 89.9%) at post and follow up phases respectively.

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**Figure (2):** Distribution of the pregnant women’s regarding total practice about preventive measures toward coronavirus pre, post and follow up of health education program (n=89).

**Figure (2)** illustrates that less than half (44.90%) of the pregnant women have satisfactory level of total practice about preventive measures toward coronavirus pre health education program while improved to be the majority of them (97.80%) post health education program and slightly decreased to 94.40% at follow-up phase.

**Table (6): Relationship between demographic characteristics of pregnant women and their total knowledge about preventive measures toward coronavirus post health education program implementation (n=89).**

Items		Total knowledge post education program				X <sup>2</sup>	P-Value
		Satisfactory N=85		Unsatisfactory N=4			
		N	%	N	%		
• Age	18 - < 20	27	31.8	1	25.0	12.74	.001**
	20 - < 25	40	47.1	1	25.0		
	25 - < 40	18	21.1	2	50.0		
• Residence	Rural	77	90.6	3	75.0	4.315	.012*
	Urban	8	9.4	1	25.0		
• Educational level	Can't read and write	26	30.6	3	75.0	14.05	.002**
	Can read and write	52	61.2	1	25.0		
	University	7	8.2	0	0		
• Occupation	Employed	8	9.4	0	0	13.66	.000**
	Unemployed	77	90.6	4	100.0		
• Family monthly income	Adequate	64	75.3	3	75.0	1.175	.058
	Inadequate	21	24.7	1	25.0		
• Chronic health problem	Yes	19	22.4	2	50.0	1.320	.067
	No	66	77.6	2	50.0		
• Diagnosed of coronavirus previously before pregnancy	Yes	20	23.5	0	0	15.31	.000**
	No	65	76.5	4	100.0		

\*Significant at p <0.05. \*\*Highly significant at p <0.01. Not significant at p>0.05

**Table (6)** illustrated that there is a highly statistically significant relation between total pregnant women's knowledge post health education program implementation and their age, educational level, occupation and "Diagnosed of coronavirus previously before pregnancy" with (p < 0.01). Additionally, there is a statistically significant relation with their residence (p < 0.05). Furthermore, there is no statistically significant relation with their Family monthly income and chronic health problem with (p > 0.05).



**Table (7): Distribution of relationship between socio-demographic characteristics of pregnant women at and their total practice about preventive measures toward coronavirus follow up health education program implementation (n=89).**

Items		Total practice follow up education program				X <sup>2</sup>	P-Value
		Satisfactory N=84		Unsatisfactory N=5			
		N	%	N	%		
• Age	18 - < 20	27	32.1	1	20.0	10.415	.009**
	20 - < 25	40	47.6	1	20.0		
	25 - < 40	17	20.3	3	60.0		
• Residence	Rural	76	90.5	4	80.0	5.851	.010*
	Urban	8	9.5	1	20.0		
• Educational level	Can'tread and write	24	28.6	5	100.0	9.987	.007**
	Can read and write	53	63.1	0	0		
	University	7	8.3	0	0		
• Occupation	Employed	7	8.3	1	20.0	6.740	.019*
	Unemployed	77	91.7	4	80.0		
• Family income	Adequate	65	77.4	2	40.0	13.20	.008**
	Inadequate	19	22.6	3	60.0		
• Chronic health problem	Yes	20	23.8	1	20.0	10.49	.033*
	No	64	76.2	4	80.0		
• Previously diagnosed for coronavirus	Yes	20	23.8	0	0	15.66	.000**
	No	64	76.2	5	100.0		

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\*Significant at p <0.05. \*\*Highly significant at p <0.01. Not significant at p>0.05

Table (7) displays that there is a highly statistically significant relation between total pregnant women's practice at follow up phase of health education program implementation and their age, educational level, family monthly income and "diagnosed of coronavirus previously before pregnancy" with (p < 0.01). In addition, there is a statistically significant relation with their residence, occupation and chronic health problem with (p < 0.05).

**Table (8): Correlation between pregnant women’s total knowledge and total practice post health education program implementation (n=89).**

		Total practice
Total knowledge	R	0.685
	p	0.002**

(\*\*) Statistically significant at p<0.01. r Pearson correlation

Table (8) shows that, there is a highly significant statistical positive correlation between the pregnant women's total knowledge and total practice at post health education program implementation phase with (p < 0.01).

**Table (9): Correlation between pregnant women’s total knowledge and total practice follow-up health education program implementation (n=89).**

		Total practice
Total knowledge	R	0.596
	p	0.001**

(\*\*) Statistically significant at p<0.01. r Pearson correlation



Table (9) clarifies that, there is a highly significant statistical positive correlation between the pregnant women's total knowledge and total practice at follow up health education program implementation phase with ( $p < 0.01$ ).

#### 4. DISCUSSION

Regarding the residence of the studied pregnant women, the current study revealed that most of pregnant women were from rural area. This result is in accordance with **Mohamed et al., (2020)** in their study which entitled "Pregnant women's knowledge, attitude and self-protective measures practice regarding corona virus prevention: health educational intervention" who revealed that more than two thirds of the studied pregnant women were lived in rural area and weren't work. The result is in agreement with the study achieved by **Nwafor et al., (2020)** which entitled "knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting" who found that more than half of the studied subjects reside in urban area. This result may be due to lack of health services in rural area and pregnant women come to the general hospitals to obtain their health services.

Related to the educational level of the studied pregnant women, it was found that more than half of the studied pregnant women can read and write. The present study is consistent 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). But, this result is in difference with **Ayele et al., (2021)** who studied "Knowledge and practice to prevent COVID-19 and its associated factors among pregnant women in Debre Tabor Town Northwest Ethiopia, a community-based cross-sectional study" and showed that near to half of the studied pregnant women had high level of education (college and above). This finding may be due to most of pregnant women were from rural area and the culture of rural areas do not concerned with the education of females.

Regarding to pregnant women's knowledge about symptoms of coronavirus at pre, post and follow up health education program, the current study results illustrated that there was a marked improvement in all knowledge items about symptoms of coronavirus among the pregnant

women at post and follow up health education program phases compared to pre health education program phase with a highly statistically significant difference. As evidence, about two thirds of them mentioned fever and loss of sense of smell at pre health education program phase compared to approximately all of them at post phase

These results are similar with the results of study performed by **Mohammed et al., (2020)** who stated that the majority of the study group had correct answer regarding COVID 19 is viral infection and affect respiratory system respectively and fever & dyspnea as signs and symptoms of COVID 19. This result is contraindicated with **Helmy et al., (2021)** at their study entitled "Effect of telehealth nursing program regarding Covid-19 among pregnant women" who illustrated that the studied sample had adequate information about COVID-19 signs, symptoms, prevention and treatment pre-implementation of educational program. From the researcher point of view, this finding may be due to the lower level of education of the most studied sample so the pregnant woman not search about the virus and read more about its effect on women health and pregnancy. So, the educational program enhance their level of knowledge about the coronavirus.

In relation to knowledge of the studied pregnant women about preventive measures toward coronavirus at pre, post and follow up health education program, the current findings clarified that there is a marked improvement in all knowledge features about preventive measures toward coronavirus among the pregnant women at post and follow up health education program phases compared to pre health education program phase with a highly statistically significant difference. Regarding risk for Coronavirus infection, more than half of them mentioned pregnant women at pre health education program phase compared to all of them at post and follow-up phase. Concerning prevention of coronavirus, about two fifth of them reported maintaining self-quarantine at pre health education program phase compared to most of them at post and follow-up phase.

On the same line, these finding agree with a survey by **Zhong et al., (2020)** conducted in China about "Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak" which found that the majority of the pregnant women had

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acceptable levels of knowledge about COVID-19 as its risk groups and prevention methods post educational program.

Also, these results agree with a study done by **Clements, (2020)** in the United States, about "Knowledge and behaviors toward COVID-19 among US residents during the early days of the pandemic" which revealed that the majority of the pregnant women had acceptable levels of knowledge of COVID-19 post educational program. These results may be explained by that the educational program was effective in improving level of the studied pregnant women level of information about COVID-19.

According to total knowledge about preventive measures toward coronavirus among the studied pregnant women, the findings of the current study illustrated that more than half of the pregnant women had satisfactory level of total knowledge about preventive measures toward coronavirus pre health education program while improved to be the majority of them post health education program and slightly decreased to a follow-up phase. This result is supported with a study done by **Goudah&Elshenoufy (2021)** which entitled " Maternal awareness about Covid -19 among pregnant women and their children with counseling during the pandemic to reduce women and child infection" who stated that more than three quarters of the studied women' had adequate knowledge regarding COVID-19 post-implementation versus half of the studied women pre-implementation. Also, the total knowledge score regarding COVID-19 was improved after implementation than pre-implementation. Additionally, this result is in the same context with **Helmy et al., (2021)** who declared that a high improvement in knowledge about COVID-19 post-implementation program. This finding reflects the importance of the educational program which increased the pregnant women's' awareness in promoting health, especially during infectious diseases and pandemics crisis.

As regard to practice regarding preventive measures toward coronavirus regarding washing hands and wear face mask among the studied pregnant women, the present study found that there was a marked improvement in the studied pregnant women's practice regarding all items of washing hands and wear face mask at post and follow-up health education program phases compared

to pre intervention phase with a highly statistically significant difference. Regarding washing hands, more than half of them mentioned, "After treating with others in hospital" at pre health education program phase compared to all of them at post and follow-up phase. Concerning wear facemask, more than one third of them reported "Treat with others outside the home" at pre health education program phase compared to most of them at post and follow-up phase. These results were similar with the results of a study performed by **Hanon& Ali (2022)** which entitled "Effectiveness of Instructional Program on Women Practices about Prevention of Covid 19 in Kirkuk City" who showed that there was highly statistical significance difference between both study and control group regarding hand washing & mask wearing which more than three quarters of the study group had highly satisfactory practices post educational interventions compared to pre-educational program.

Additionally, these findings agree with **Madappuram&Kamel (2020)** at their study entitled "Covid19 and Pregnancy" who stated that the greatest tool to prevent COVID- 19 infection in pregnant women is social distancing and maintaining hygiene. However, these findings disagree with **Nwafor et al., (2020)** who carried out a study entitled "Pregnant women's knowledge and practice of preventive measures against COVID-19 in a low-resource African setting" and found that the minority of the participants practiced frequent hand washing with soap and water and only more than one quarter of them used facemask in public. These results might be due to that educational program help to improve pregnant women skills including wearing mask and recognizing the importance of self-protection and recognizing that COVID 19 may be avoided by demonstrating protective measures as educated during educational intervention.

In relation to practice of the studied pregnant women regarding preventive measures toward coronavirus, the current study results demonstrated that there was a marked improvement in the studied pregnant women's practice regarding all features of preventive measures at post and follow-up intervention phases compared to pre intervention phase with highly statistically significant difference. As evidence, less than one quarter of them mentioned "Pregnant women learn



others preventive measures that learned" at pre health education program phase compared to most of them at post and follow up phases.

Concerning total practice about preventive measures toward corona virus of the pregnant women at pre, post and follow up health education program, the findings of the current study revealed that less than half of the pregnant women had satisfactory level of total practice about preventive measures toward coronavirus pre intervention while improved to be the majority of them post health education program and follow-up phase. This result is in the same line with a study done by **Sabry et al., (2021)** which entitled "Effect of What Sapp Educational Program Reminder on Pregnant Women's Knowledge, Attitude and Practice Regarding COVID-19 pandemic" who clarified that there was highly statistical significance difference between women's practice pre and post educational program, the majority of women of the women followed incorrect practice about covid-19 pre educational program compared with more than two third of women follow a correct practice post educational program.

Also, this finding is in agreement with **Mahmoud et al., (2022) & Helmy et al., (2021)** who illustrated that there was a statistically significant difference between the total score of practices and the total score of attitudes regarding COVID-19 at the pre and post-implementation phase which the majority of the studied pregnant women reported satisfactory level regarding preventive measures practice of corona virus post-implementation compared to less than half of them pre-educational program implementation. From the researcher point of view, this result may be due to the educational program was effective in improving the women practice regarding preventive measures of coronavirus.

For relationship between socio-demographic characteristics of the studied pregnant women and their total knowledge about preventive measures toward coronavirus pre health education program implementation, the results of the current study clarified that there was a highly statistically significant relation between total pregnant women's knowledge pre health education program implementation and their educational level and "Diagnosed of coronavirus previously before pregnancy". In addition, there was a statistically significant relation with their age, residence and

occupation. Moreover, there was no statistically significant relation with their family monthly income and chronic health problem.

These results are consistent with a study done by **Apanga & Kumbeni (2021)** which entitled "Adherence to COVID-19 preventive measures and associated factors among pregnant women in Ghana" who represented that a significant relationship between women's educational level, age and their overall level of knowledge. These findings can be attributed to increasing educational level and age are associated with increased level of knowledge and practice than younger age and low level of education.

As regarding to relationship between socio-demographic characteristics of pregnant women at and their total knowledge about preventive measures toward coronavirus post health education program implementation, the current study found that there was a highly statistically significant relation between total pregnant women's knowledge post health education program implementation and their age, educational level, occupation, "Diagnosed of coronavirus previously before pregnancy" and their residence. Furthermore, there was no statistically significant relation with their family monthly income and chronic health problem. These results are similar with the results of **Fakhriyah et al., (2022)** who studied "The influence of education using virtual audiovisual media on pregnant women's knowledge about Covid 19 prevention" and concluded that there was a statistically significant relationship between demographic data of the studied women as age, education and place of residence and their total level of knowledge post education.

From the researcher point of view, these results could be due to the personal factors one of the most important factors that control the acceptance of obtaining information about specific topic or not and the studied women had low educational level that make need to learn more about the pandemic disease. Also, the present study results clarified that there was a highly statistically significant relation between total pregnant women's knowledge at follow up phase of health education program implementation and their age, educational level, occupation and "Diagnosed of coronavirus previously before pregnancy" and their residence. Moreover, there was no statistically significant relation with their family monthly



income and chronic health problem. On the same line, these results like with the results of **Hatemzadeh et al., (2022)** who performed a study entitled "Investigating the effect of virtual education and multimedia based on the health belief model in preventing COVID-19 among pregnant women" and demonstrated that highly statistically significant relation between total pregnant women's knowledge at follow up phase of education based on health belief implementation and the pregnant women age and educational level was found.

Regarding relationship between socio-demographic characteristics of the studied pregnant women and their total practice about preventive measures toward corona virus pre health education program implementation, the results of the present study revealed that there was a highly statistically significant relation between total pregnant women's practice pre health education program implementation and their educational level, "Diagnosed of coronavirus previously before pregnancy" their age, residence and family monthly income. Moreover, there was no statistically significant relation with their occupation and chronic health problem.

These results are consistent with a study done by **Metwally&Desouky (2020)**, which entitled "Knowledge, practice and attitudes of preventive measures against Coronavirus infection among pregnant women in Egypt" and reported that there were statistically significant relations between the studied women's level of practice about preventive measures against COVID-19 infection and their age, education level and parity.

Also, these results are in agreement with a study achieved by **Ali et al., (2022)** which entitled "Frequency of urinary incontinence and its associated risk factors in pregnant population" and illustrated that there was a relationship between personal data of the studied women and their level of preventive measures practice regarding corona virus. These results may be because of the personal data have an influence on ability to perform any practice.

Concerning correlation matrix between the study variables post- health education program implementation among the studied pregnant women, the current results illustrated that there was a highly significant statistical positive

correlation between the pregnant women's total knowledge and practice at post health education program implementation phase.

This finding is similar with the results of studies performed by **Helmy et al., (2021) & Sabry et al., (2021)** which they reported that there was a strong relationship between the level of knowledge, attitude, and practice regarding the coronavirus. This result may be explained by that a good educational program may scale up women' insight and awareness which lead to improve the overall practices of preventive measures to reduce transmission of COVID-19. Satisfactory knowledge promotes the day-to-day practice of COVID-19 prevention.

Finally, the results of the current study revealed that the educational program was effective in improving level of knowledge and practice regarding preventive measures against COVID-19 among the studied pregnant women. This view is validated by all studies in Egypt and other countries investigated the effect of educational program in pregnant women's knowledge, perception, practices and attitudes concerning preventive measures regarding COVID-19 as a global crisis as **Apanga and Kumbeni, (2021), Anikwe et al., (2020), Helmy et al., (2021), Mohamed et al, (2020), Mahmoud et al., (2022) & Sabry et al., (2021).**

## 5. CONCLUSION

Based on the findings of the study, this study concluded that the health education program is effectively improving pregnant women knowledge and practice regarding preventive measures toward the Coronavirus and this is supported by the research hypothesis.

## 6. RECOMMENDATION

In the light of the finding of this study, the following recommendations are suggested;

- Health educational intervention regarding prevention of coronavirus should be provided for all pregnant women at all MCH centers until the total management of coronavirus cases.
- Health education programs to improve coronavirus knowledge are helpful for encouraging an optimistic attitudes and maintaining safe practices.



- Pregnant women should be given continuous education to raise their awareness about the preventive measures for coronavirus.

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