

## Pregnant Women's Knowledge, Attitude and Self-Protective Measures Practice regarding Corona virus prevention: Health Educational Intervention

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### Abstract

**Background;** Boosting pregnant women knowledge attitude and practice regarding COVID19 are key elements that ensure pregnant women health and safety. Pregnant women's adherence to control measures is affected by their knowledge, attitudes, and practices (KAP) towards COVID-19. **Aim:** this study aimed to evaluate the effect of health educational intervention on pregnant women knowledge, attitude and self-protective measures practice toward prevention of COVID 19. **Setting:** the current study was conducted at six maternal and child health centers affiliated at Kalioubia governorate. **Research Design:** a quasi-experimental design was used. **Sample:** simple random sample included 340 pregnant women, recruited as (160) in control group and (180) study group. **Tools:** three tools were utilized for data collection; A structured interviewing questionnaire, knowledge assessment sheet, COVID 19 related attitude assessment tool, and COVID 19 preventive measures practice assessment. **Results:** the present study revealed a highly statistical significant improvement of knowledge attitude and practice between subjects at both study and control group. In addition study group subjects indicated high satisfaction level regarding the study guideline. **Conclusion:** health educational guideline is effectively improving pregnant women knowledge, attitude and self-protective measures practice regarding prevention of COVID 19.

**Keywords:** Heath education, Guideline, knowledge, attitude, practice &COVID19.

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### Introduction

Coronavirus disease 2019 (COVID-19 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). COVID 19 is highly infectious disease and its main clinical symptoms vary from fever, dry cough, fatigue, myalgia, and dyspnea to acute respiratory distress syndrome, difficult-to-tackle metabolic acidosis, septic shock, and bleeding and coagulation dysfunction (The Novel Coronavirus Pneumonia Emergency Response

**Epidemiology Team, 2020) & (Chen et al., 2020).** Pregnant women might be at increased risk for severe illness from COVID-19 compared to non-pregnant people. Additionally, there may be an increased risk of adverse pregnancy outcomes, such as preterm birth, among pregnant people with COVID-19 (CDC, 2020). The anatomical and physiological changes occurring during pregnancy make the pregnant women more vulnerable to severe infections as an increase in the transverse diameter of the thoracic cage and an elevated level of the diaphragm, decrease maternal tolerance to hypoxia. Lung volume changes and vasodilation can lead to mucosal edema and increased secretions in the upper respiratory tract. In addition, alterations in cell-mediated immunity contribute to the increased susceptibility of pregnant women to be infected by intracellular organisms such as viruses (Schwartz & Graham, 2020). After initial studies suggested that pregnant mothers were not at a higher risk of complications of COVID-19 infection, recently Sweden and the US investigations have indicated that both pregnant and postpartum mothers are at increased risk of severe complications associated with COVID-19 (Collin, 2020) & (Ellington, 2020). In an analysis of 8207 cases of COVID-19 in the obstetric population, the Centers for Disease Control and Prevention (CDC) reported a higher risk of ICU admission and mechanical ventilation compared to no pregnant women, although no higher risk of mortality was identified (CDC, 2020). Health education programs play an important role in improving COVID-19 knowledge and also are helpful for encouraging an optimistic attitudes and maintaining safe practices (Zhong et al., 2020).

During antenatal visits nurse is the primary health care provider that provide health education regarding pregnant

women needs, so the aim of the current study is to evaluate the effect of educational intervention on pregnant women knowledge, attitude and practice toward COVID19 prevention.

### **Significance of the study**

Pregnancy is a time full of excitement and anticipation. But for expectant women encountering the outbreak of the coronavirus disease (COVID-19), fear, anxiety and uncertainty are clouding this otherwise happy time. The battle against COVID-19 is still continuing all over the world. To guarantee the final success, people's adherence to these control measures are essential, which is largely affected by their knowledge, attitudes, and practices (KAP) towards COVID-19 in accordance with KAP theory<sup>(9,10)</sup>. Moreover different study added that from the Lessons learned from the SARS outbreak in 2003 that knowledge and attitudes towards infectious diseases are associated with level of panic emotion among the population especially pregnant women and risk group, which can further complicate attempts to prevent the spread of the disease<sup>(11,12)</sup>. To facilitate outbreak management of COVID-19 among pregnant women there is an urgent need to understand pregnant women's awareness of COVID-19 at this critical moment. Various research studies clearly indicate the importance of improving residents' COVID-19 knowledge via health education, which may also result in improvements in their attitudes and practices towards COVID-19<sup>(13, 14)</sup>. These findings further suggest that the health education intervention would be more effective if it targets certain demographic groups, for example, the COVID-19 knowledge may be greatly increased if the health education programs are specifically designed for pregnant women.

### **Aim of the research**

The aim of the current study was to evaluate the effect educational intervention guideline on knowledge, attitude and self –protective measures practice of pregnant women regarding COVID 19 prevention.

#### **Research Objectives:**

1. Assess pregnant women knowledge, attitude and self-protective measures practice regarding COVID 19 prevention before implementation of educational intervention.

2. Validate the designed educational intervention guideline for pregnant women regarding COVID 19 prevention.

3. Evaluate effect of educational intervention guideline on pregnant women knowledge, attitude and self-protective measures practice toward COVID 19 prevention.

#### **Research Hypothesis:**

Educational intervention guideline exhibit improvement in knowledge, attitude and self-protective measures practice regarding COVID 19 prevention.

#### **Subjects and Methods Research design**

A quantitative quasi -experimental nonequivalent groups design was utilized in the current study in order to decrease time of contact with pregnant women to avoid risk for transmission of COVID 19 infection.

#### **Setting**

Study was conducted at 6 different maternal and child health centers were randomly selected at Benha city where pregnant women go to have their antenatal care including (immunization, follow up),and where health related educational intervention were given.

#### **Subjects**

**Type:** The research sample was randomly selected using simple random sample technique as, 3 or 4 women were randomly selected daily from total women admitted to the study setting all the pregnant women.

**Size:** a total 340 pregnant women (160) were included in the control group and (180) in the study group.

#### **Recruitment strategy:**

Pregnant women were directly asked to participate in the study after explanation of the purpose of the study. For the control group subjects were recruited from three MCH centers for a period of first month, and the study group subjects were recruited from other three MCH centers.

**Tools of data collection**  
three tools were used for collecting data:

#### **First tool:**

An interviewing questionnaire; it was divided into two Parts 1) personal data, and obstetrical history such as (gravida parity and gestational age);2) knowledge related (COVID-19). This questionnaire area was developed following review of literatures on the (WHO,2020) & (CDC ,2020).It was consisted of six closed ended questions , for each question a number of correct answer was given for: definition of COVID -19 (2 ) correct answers, for

signs and symptoms of COVID -19 (9) correct answers, for mode of transmission & factors increase risk for COVID -19 (5) correct answers, for risk group for COVID -19 (10) correct answers and finally for Protective measures against COVID-19 question (8) correct answers . The study subject was asked if it is correct or incorrect).The study subjects answers were scored as (1) score for correct answer & (0) score of incorrect answers. The total knowledge correct answers number was (34).

The total knowledge score was calculated as the following:

Poor knowledge <60% of total knowledge score (20 score).

Fair knowledge 60-75 of total knowledge score (21-25 score).

Good knowledge > 75% of total knowledge score (>25 score).

### Second tool:

A three point Likert scale contains (9) items was designed by the researchers after reviewing related literatures (**Zhang, et al.,2020**) ,( **Chen et al.,2020**) to evaluate the study subjects attitude toward COVID -19 infection &prevention .This Likert scale 9 items were verified to assess attitude toward COVID -19 infection, prevention and their attitude if they had a COVID-19 infection. The current study Likert scale was scored as the following (1) for disagree, (2) for uncertain, and (3) agree .The total attitude score was (27).

The total attitude score was calculated as the following:

Negative attitude .....<60% of total attitude score (16 score).

Uncertain attitude ...60-75 of total practice score (17-20 score).

Positive attitude .....> 75% of total practice score (>20 score).

### Third tool:

A practice questionnaire concerning self-protective measures regarding prevention of COVID -19, it was developed following review of literatures on the World Health Organization recommendations on the measures to prevent human-to-human transmission of COVID-19 infection (**WHO, 2020**). This questionnaire had (7 main practice topics to reduce COVID -19 infection among pregnant women). Each of these 7 had a practice items.1) the hand washing topics included (5 items) concerning with technique of hand washing, times for hand washing, frequency of hand washing 2) The mask wearing topics included (5 items) concerning with techniques of wearing, removing and getting rid of the mask, in addition times of wearing the mask and frequency for wearing the mask per day. 3)The environmental cleaning topic included (4 items) concerning with keep home environment clean and well ventilated, clean home surface with antiseptic solution, keep home environment calm and reduce stressful situations. 4)The social distance topic contained (4 items) concerning world health organization recommendations including keep a distance of 3meter at least, avoid crowded places, isolation in case of having minor symptoms as cough ,sneeze or headache , maintain away from persons who has a minor symptoms as cough ,sneeze or headache. 5) The nutrition for pregnant woman contained (4 items) including increase intake of food rich in protein, iron and calcium intake , increase intake of vitamins and fluids ,decrease intake of fat

and salty foods, decrease intake of chocolate and confine .6) Rest and sleep topic included (3 items) Develop a relaxing bedtime routine, Keep a regular bed and wake time, and Limit breathing problems by elevating your head when you sleep.7) Adherence of intake of supplementation and follow up topic contained (3 items ) concerning take iron , calcium and vitamins supplementation as prescribed by the physician, attendance at times of antenatal visits, and don't hesitate to seek medical attention in case of having minor signs as cough, sneeze and fever. For each practice item; the study subjects were asked to select if they do the practice rarely (done 1 or 2 times per day), sometimes (done 2 or 3 times per day) or usually ((done more than 3 times per day).the practice questionnaire scored as the following (1) for rarely done, (2) for sometimes done, and (3) for usually done.

The total self-protective measures practice score was (93).

The total self-protective measures score was calculated as the following:

Unsatisfactory self-protective measures practice .....<60% of total practice score (55 score)

Satisfactory self-protective measures practice .....60-75 of total practice score (56-69 score)

Highly satisfactory self-protective measures practice .....> 75% of total practice score (>69 score).

### **Content validity**

The tools of data collection were submitted to a panel of 3 nursing experts in the field of Obstetrics and Gynecology & 4 medical expertises in the field of community health and pandemic disease

to test the content validity. The result of content validity index (CVI) delineated strongly accepting tools, it measured (0.89). In addition, the content of educational guideline was reviewed by the panel of expertise and the guideline contents were reviewed critically and validated its contents.

### **Reliability**

The reliability was done by Cronbach's Alpha test which revealed that each of the three tools consisted of relatively homogenous items as indicated by the moderate to high reliability of each tool, it was (0.93) for knowledge tool, (0.94) for self-protective measures, (0.945) and (0.87) attitude tool .

### **Ethical Considerations**

An official permission was granted from directors of 6 Maternal and Child Health care centers, to facilitate data collection process. Written informed consents were obtained from women before data collection and after explaining the purpose of the research. Anonymity was assured as the filled questionnaires were given a code number. The researchers informed women that the information obtained will be confidential. The research maneuvers do not entail any risk effects on women. The women were informed about having the right to withdraw at any time without giving any reason.

### **A Pilot Study:**

The pilot study was carried out on 20 women, which was taken in 10 % of the estimated total duration to collect the data (3 days). It is mainly established to test the simplicity, clarity and applicability, ascertain the relevance and content validity of the tools, as well as estimation of the time needed to fill the

tools .According to the results of the pilot study, the tools were clear and applicable, relevant and valid; however, few words were modified and no problem interfered with the process of data collection. The estimated time needed to fill the data collection tools was 15 minutes. Following this pilot study the tools were made ready for use. Women involved in the pilot excluded from the study to avoid contamination of the sample. procedure:

Data of the current study was collected during a period of 5 months from the beginning January 2020 and completed at the end of May, 2020. The researcher visited the previously mentioned setting 5 days/week, from 9.00 am to 12.00 pm. To fulfill the aim of this research, the following phases were adopted, preparatory phase, interviewing and assessment phase, planning phase, implementation of the educational intervention phase and evaluation phase.

**A-Preparatory phase:** The researchers conducted this phase through reviewing international related literature concerning the various aspects of the research problem. This phase helped the researchers to be familiar with the seriousness of the problem, and the researchers be directed by sample information help them to prepare adequately the required data collection tools.

**B-Interviewing and assessment phase:** In this phase the researcher interviewed the women in the control group to collect baseline data (pre-test). At the beginning of the interview, the researchers welcomed the participating women, explained the purpose of the research and familiarized them with all information about the research (purpose, duration, and activities) and obtained their written to participate in the research.

A total (3-4) women were interviewed daily. The data obtained during this phase were constituted the base line for further comparison to evaluate the effect of the educational guideline.

**C- Planning phase:** Based on results obtained from control group during assessment phase, the educational guideline was developed by the researchers in a form of printed Arabic booklet to improve the studied women's deficit knowledge, attitude and practice regarding COVID -19. Different methods of teaching, and instructional media like video & demonstration were utilized to explain guideline to studied women.

Objectives of educational guideline were constructed and included the following:

General Objectives aimed to equip the studied women with the essential required knowledge and self- practice concerning COVID -19 preventive measures.

Specific Objectives aimed to familiarize the studied women with abundant knowledge and self-care protective measures practice concerning COVID -19 of; its definition, signs and symptoms, characteristics, risk factors, preventive measures, etc....

**D- Implementation of the educational intervention phase.**

The designed educational guideline was provided for the women through 2 different sessions.1) one theoretical session was done for a period of 30 minutes, and the researchers gave attention that each woman follow precaution measures to avoid COVID 19 infection as (wearing gloves & mask and maintain social distance.2) one practical session was done for a period of 15

minutes, the researches educate women techniques of hand washing, wearing face mask, removing and how to get rid of the mask. Total educational intervention time reached 140 hours / 9 weeks, with (20 hours /week-4 hours /daily) for all women recruited in study group. Women were gathered in the waiting room of MCH centers. Women in the study group received the educational intervention, the educational intervention was provided through two scheduled sessions. These sessions were repeated to each studied women. Each session took about 15-20 minutes. At the end of each session, women' questions were discussed to correct any misunderstanding.

E- Evaluation phase: this phase was evaluated one month after implementation among the study group subjects using the same format of tools that used to evaluate knowledge, practice and attitude, each was phoned to assure attendance to next antenatal visit that is after one month form educational intervention.

III- Statistical Design: Data analysis was performed using IBM SPSS statistical software version 22. The data were explored. Descriptive statistics was used for continuous variables [mean and standard deviation (SD)] and frequency for categorical variables. Qualitative variables were compared using qui square test ( $X^2$ ) as the test of significance. Correlation coefficient (r) Pearson was used to evaluate association between studied variables. A significant level value was considered when  $p\text{-value} \leq 0.05$ .

## Results:

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Table (1): Shows no statistically difference was detected between both groups related to personal characteristics,

which mean that the two groups under study are homogenous.

Table (2): Illustrates that there was no statistically difference was detected between both groups related to obstetric history, which means that the two groups under study are homogenous.

Table (3): Reveals that there was a highly statistically significant difference was observed in knowledge between two groups post guidelines at  $p\text{-values} < 0.001$ .

Table (4): Indicates statistical and a highly statistical significant difference found in knowledge between two groups post guidelines at  $p\text{-values} < 0.05$ .  $< 0.001$ .

Table (5): Denotes that, a highly statistical significant difference was found in knowledge regarding risk group for COVID 19 between two groups post guidelines.

Table (6): Shows that there was a highly statistical significant difference found in knowledge between the two groups post guidelines at  $p\text{-values} < 0.001$ .

Table (8): Reveals that there was a highly statistical significant difference was found in attitude between the two groups post educational guidelines at  $p\text{-values} < 0.001$ .

Table (7): Shows that there was a highly statistical significant difference found in practices of self protective measures between the two groups post educational guidelines at  $p\text{-values} < 0.001$ .

Table (9): denotes that 76.7% of the study group disagreed that guidelines prepared with easily language and 83.3% of them agreed that guidelines prepared in the way that help you to improve your practices.

## Discussion

Pregnant women are particularly vulnerable to infectious diseases that can cause both maternal and fetal adverse outcomes, compared to the non-pregnant counterparts. During pregnancy, women experience a series of immunological transformations that allow the immune system to tolerate and support the growing fetus while still maintaining antimicrobial defense and tissue repair. (Bouaziz et al., 2020).

Regarding personnel characteristics of studied subjects, more than half of study subjects aged 25 to <30 years with a mean age of  $27.84 \pm 3.75$  &  $26.97 \pm 2.76$  years, also more than half of studied subjects had secondary education, while more than two thirds of them were lived in rural area and weren't work. These findings were in the same line with **Nwafor et al. (2020)**, who studied "Knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting", as the mean age of the study subjects was  $24.6 \pm 6.3$  years, ranged from 18 to 42 years, more than one third had secondary education and more than half reside in urban area. In addition nearly half of studied subjects were primigravida, and at gestational age of 20-<30 weeks. On the other hand **Yassa, et al (2020)**, studied the Near-term pregnant women's attitude toward, concern about and knowledge of the COVID-19 pandemic in Turkey, added that median gestational week of the women were  $35 \pm 11$  weeks

As regarding the effect of educational intervention on pregnant women knowledge regarding COVID 19; highly statistical significance difference was indicated between both study and control group ( $p < 0.001$ ). The majority of studied subject included in the study

group had a good level of knowledge as compared with more than two third of control group's subjects that had a poor level of knowledge. This might be due to the educational guidelines succeeding in increasing the study group knowledge. These finding agreed with **Zhang et al. (2020)** who added that health education regarding infectious disease prevention is highly effective.

Concerning the studied subjects knowledge regarding COVID 19 definition, the present study revealed that, more than two fifth of the control group and 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. These results were agreed with **Bekele et al. (2020)** who indicated that the vast majority of study sample knowing that COVID 19 is a viral and infectious diseases and knowing different COVID 19 signs & symptoms.

Concerning risk group for COVID- 19, the present study revealed that more than two thirds of control group had incorrect answer regarding patient with heart disease, chronic kidney diseases, chronic lung diseases and obesity. This might be due to inadequate knowledge they had and lack of educational program before. While on the other hand the majority of the study group had correct answer regarding liver disease and severe obesity are more risk group for COVID- 19. These findings matched by **Miller, (2020)**, who stated that more risk factors for a more severe course of COVID-19 currently include people who are or have liver disease and body mass index of 40 or greater.

Concerning the study groups' knowledge regarding protective measures against COVID 19, more than two thirds



had correct answer regarding regularly and thoroughly clean hands with an alcohol-based hand rub or wash them with soap and water, maintain at least 1 meter (3 feet) distance between yourself and others, avoid going to crowded places, avoid touching eyes, nose and mouth, and wear a mask to avoid infecting others. These findings agreed with **Nwafor et al. (2020)**, who found that study participants had the following level of knowledge regarding COVID 19 preventive measures ;washing hands frequently with soap and water or rubbing hands with alcohol-based sanitizers (93.7%), maintaining at least 1 meter distance between yourself and others (87.7%), avoiding touching eyes, nose and mouth with hands (75%), covering mouth and nose when coughing or sneezing (97.5%), wearing facemask in public (98.6%) and staying indoor (74.3%).

Concerning the effect of educational intervention on pregnant women attitude toward COVID 19titude toward, there was a highly statistical significant difference was found in attitude between the two groups post educational guidelines. This might be due to educational guidelines was effective in changing pregnant women` attitude because improve knowledge and practice is highly associated with change attitude positively.

The highly positive attitude toward COVID 19 was concerning that there is no evidence that COVID-19 may cause congenital anomalies for fetus and women with COVID-19 can breastfeed her baby, by following precaution during breast feeding. This might be due to the limited information available indicates that there is no evidence of the virus spreading through breast milk, as studies of SARS have indicated that the virus does not exist in breast milk and this virus is compared to other viruses and the

infection is associated with a rise in the body temperature bike in the first period of pregnancy, it may be associated with some birth defects of the fetus. According to **Karimi-Zarchi et al.(2020)**, who conducted study on `vertical transmission of Coronavirus Disease 19 (COVID-19) from infected pregnant mothers to neonates, who found that currently there was no evidence for intrauterine vertical transmission of COVID-19 from infected pregnant mothers to their fetuses. However, infected mothers may be at increased risk for more severe respiratory complications. It is well known that an infected mother can transmit the COVID-19 virus through respiratory droplets during breastfeeding. While these findings disagreed with **Yassa, et al (2020)**, who reported that half of the women were reported that they either had no idea about or think the breastfeeding is not safe during the outbreak. Greater part of the participants does not know if COVID-19 cause birth defects (76%) or preterm birth (64.5%).

As regarding the effect of educational intervention on pregnant women self-protective measures practice for prevention of COVID- 19, there was highly statistical significance difference between both study and control group ( $p<0.001$ ). This might be due to that educational guideline 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. These findings supported by **Miller. (2020) & Madappuram& Kamel (2020)** who recommended that improving residents` COVID-19 knowledge via health education, which may also result in improvements in their attitudes and practices towards COVID-19.

Regarding hand washing, & mask wearing more than three quarters of the study group had highly satisfactory practices, in addition less than three quarters of them had highly satisfactory reported practices regarding social distance. These findings agreed with **Madappuram & Kamel (2020)** <sup>(20)</sup>, who stated that the greatest tool to prevent COVID- 19 infection in pregnant women is social distancing and maintaining hygiene. However these findings disagreed with **Nwafor et al. (2020)**, who found that only 26.8% participants

practiced frequent hand washing with soap and water while 20.4% practiced social distancing of at least 1 meter between them and others, and 32.7% of the participants used facemask in public.

As regarding study group subjects evaluation of prepared educational guideline, the majority of them added that guideline answer all of their questions and were useful in prevention .these findings may be due to that guideline was prepared with simple Arabic language and had a proper pictures for clarification.

Table (1): Distribution of personnel characteristics of the studied subjects (n=340)

Variables	Control group N=160		Study group N=180		Chi square test	P value
	No	%	No	%		
<b>Age in years</b>					1.51	>0.05
20-	38	23.7%	35	19.4%		
25-	82	51.3%	100	55.6%		
30-	38	23.7%	41	22.8%		
35-40	2	1.3%	4	2.2%		
<b>Mean ±SD</b>	27.84±3.75		26.97±2.76			
<b>Educational qualification</b>					5.26	>0.05
Read and write	23	14.4%	34	18.9%		
Secondary education	100	62.4%	102	56.7%		
University	34	21.3%	44	24.3%		
Postgraduate	3	1.9%	0	0.0%		
<b>Residence</b>					0.899	>0.05
Urban	52	32.5%	50	27.8%		
Rural	108	67.5%	130	72.2%		
<b>Occupational status</b>					0.950	>0.05
Yes	55	34.4%	53	29.4%		
No	105	65.6%	127	70.6%		

Table (2) : Distribution of obstetric history of the studied subjects(n=340 )

Variables	Control group N=160		Study group N=180		Chi square test	P value
	No	%	No	%		
<b>Gravida</b>						
Primigravida	81	50.6%	89	49.4%	0.959	>0.05
2-3	44	27.5%	44	24.4%		
>3	35	21.9%	47	26.2%		
<b>Times of labor</b>						
Nulliparous	81	50.6%	89	49.4%	0.941	>0.05
2-3	52	32.5%	66	36.7%		
>3	27	16.9%	25	13.9%		
<b>Gestational age</b>						
20-<30	93	58.1%	90	50.0%	2.25	>0.05
30-40	67	41.9%	90	50.0%		
<b>Mean ±SD</b>						
<b>Regular attendance of antenatal care visits</b>					0.112	>0.05
Yes	90	56.3%	98	54.4%		
No	70	43.7%	82	45.6%		

**Table (3): Distribution of studied subjects knowledge regarding definition, signs and symptoms of COVID 19 (n=340 )**

Signs and symptoms of COVID 19	Control group N=160				Study group N=180				Chi square test	P value
	Incorrect No	%	Correct No	%	Incorrect No	%	Correct No	%		
<b>Definition of COVID 19</b>										
Viral infection	82	51.2	78	48.8	36	20.0	144	80.0	36.50	<0.001**
Affect respiratory system	79	49.4	81	50.6	24	13.3	156	86.7	52.10	<0.001**
<b>Signs and symptoms of COVID 19</b>										
Fever	82	51.2	78	48.8	23	12.8	157	87.2	58.73	<0.001**
General fatigue	64	40.0	96	60.0	30	16.7	150	83.3	23.05	<0.001**
Sore throat	81	50.6	79	49.4	56	31.1	124	68.9	13.40	<0.001**
Lost sense of smell	86	53.8	74	46.2	61	33.9	119	66.1	13.61	<0.001**
Lost sense of taste	61	38.1	99	61.9	33	18.3	147	81.7	16.58	<0.001**
Diarrhea	90	56.2	70	43.8	60	33.3	120	66.7	18.04	<0.001**
Vomiting	80	50.0	80	50.0	22	12.2	158	87.8	57.56	<0.001**
Headache	50	31.2	110	68.8	16	8.9	164	91.1	27.07	<0.001**
Dyspnea	77	48.1	83	51.9	54	30.0	126	70.0	11.74	<0.001**

**Table (4): Distribution of studied subjects knowledge regarding mode of transmission & risk factors of COVID 19 (n = 340 )**

Mode of transmission & risk factors	Control group N=160				Study group N=180				Chi square test	P value
	Incorrect No	%	Correct No	%	Incorrect No	%	Correct No	%		
<b>Direct transmission</b>										
flying spit from patient while coughing or sneezing	62	38.8	98	61.2	53	29.4	127	70.6	3.27	<0.05*
<b>Indirect transmission</b>										
Touching contaminated surfaces and tools, and then touching the mouth, nose, or eye.	78	48.8	82	51.2	56	31.1	124	68.9	11.03	<0.001**
<b>Factors increase risk for COVID 19 infection</b>										
Sharing food and drink utensils	86	53.8	74	46.2	47	26.1	133	73.9	27.17	<0.001**
Eat foods without cooking, especially meat and eggs	77	48.1	83	51.9	33	18.3	147	81.7	34.35	<0.001**
crowded places like the train and transportation	57	35.6	103	64.4	37	20.6	143	79.4	9.61	<0.05*

**Table (5): Distribution of studied subjects knowledge regarding risk group for COVID 19 (n=340).**

Risk group for COVID 19	Control group N=160				Study group N=180				Chi square test	P value
	Incorrect No	%	Correct No	%	Incorrect No	%	Correct No	%		
Diabetic patient	72	45.0	44	24.4	88	55.0	136	75.6	15.92	<0.001**
Patient with heart disease	127	79.4	42	23.3	33	20.6	138	76.7	106.41	<0.001**
Chronic kidney disease being treated with dialysis	114	71.3	53	29.4	46	28.8	127	70.6	59.23	<0.001**
Chronic lung disease	108	67.5	62	34.4	52	32.5	118	65.6	37.02	<0.001**
Hemoglobin Disorders	87	54.4	38	21.1	73	45.6	142	78.9	40.31	<0.001**
Immune-compromised	75	46.9	50	27.8	85	53.1	130	72.2	13.28	<0.001**
Pregnant mothers	89	55.6	54	30.0	71	44.4	126	70.0	22.82	<0.001**
Liver disease	82	51.2	27	15.0	78	48.8	153	85.0	51.10	<0.001**
People aged 65 years and older	76	47.5	47	26.1	84	52.5	133	73.9	16.78	<0.001**
Severe obesity	118	73.8	34	18.9	42	26.2	146	81.1	103.13	<0.001**

Table (6) : Distribution of studied subjects knowledge regarding Protective measures against COVID 19 (n=340 )

Protective measures against COVID19	Control group N=160				Study group N=180				Chi square test	P value
	Incorrect		Correct		Incorrect		Correct			
	No	%	No	%	No	%	No	%		
Regularly and thoroughly clean hands with an alcohol-based hand rub or wash them with soap and water.	119	74.4	41	25.6	50	27.8	130	72.2	73.57	<0.001**
Maintain at least 1 meter (3 feet) distance between yourself and others.	99	61.9	61	38.1	45	25.0	135	75.0	47.17	<0.001**
Avoid going to crowded places.	112	70.0	48	30.0	53	29.4	127	70.6	55.77	<0.001**
Avoid touching eyes, nose and mouth.	118	73.8	42	26.2	58	32.2	122	67.8	58.50	<0.001**
Covering mouth and nose with bent elbow or tissue when cough or sneeze. Then dispose of the used tissue immediately and wash hands.	125	78.1	35	21.9	68	37.8	112	62.2	56.18	<0.001**
<b>If have minor symptoms such as cough, headache, mild fever</b>										
Stay home and self-isolate even with minor symptoms	121	75.6	39	24.4	43	23.9	137	76.1	90.80	<0.001**
Wear a mask to avoid infecting others	111	69.4	49	30.6	52	28.9	128	71.1	55.63	<0.001**
Seek medical attention	120	75.0	40	25.0	57	31.7	123	68.3	63.73	<0.001**

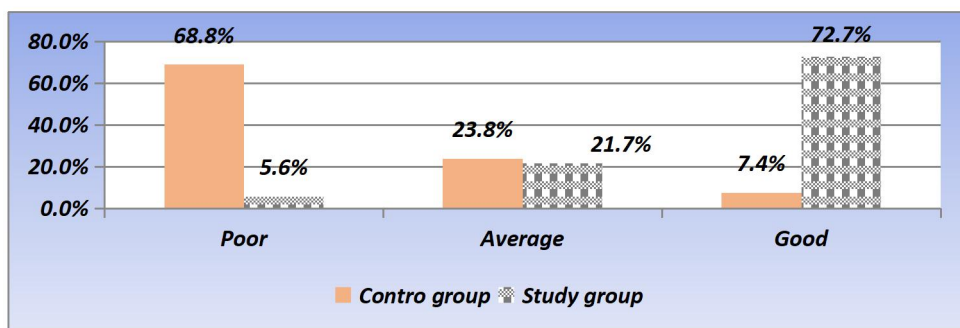


Figure (1): percentage distribution of total knowledge score of the studied subjects regarding COVID 19 infection.

Table (7): Distribution of studied subjects attitude regarding COVID 19 (n=340).

Attitude	Control group N=160						Study group N=180						Chi square	P value
	Disagree		Uncertain		Agree		Disagree		Uncertain		Agree			
	No	%	No	%			No	%	No	%				
COVID-19 can easily prevented	67	41.9%	76	47.5%	17	10.6%	9	5.0%	38	21.1%	133	73.9%	145.96	<0.001*
COVID-19 will finally be successfully controlled	69	43.1%	67	41.9%	24	15.0%	9	5.0%	33	18.3%	138	76.7%	137.23	<0.001***
I am worry to be affected with COVID-19	74	46.3%	64	40.0%	22	13.8%	5	2.8%	30	16.7%	145	80.5%	162.54	<0.001***
There is no evidence that COVID-19 transmitted to fetus from mother	55	34.4%	82	51.2%	23	14.4%	11	6.1%	48	26.7%	121	67.2%	104.10	<0.001***
There is no evidence that COVID-19 may cause congenital anomalies for fetus	68	42.5%	69	43.1%	23	14.4%	4	2.2%	63	35.0%	113	62.8%	115.94	<0.001***
Women with COVID-19 can breastfeed her baby, by following precaution during breast feeding	71	44.4%	64	40.0%	25	15.6%	6	3.3%	79	43.9%	95	52.8%	96.43	<0.001***

Frequent hand washing reduce COVID-19 infection	51	31.9%	85	53.1%	24	15.0%	9	5.0%	55	30.6%	116	64.4%	95.43	<0.001**
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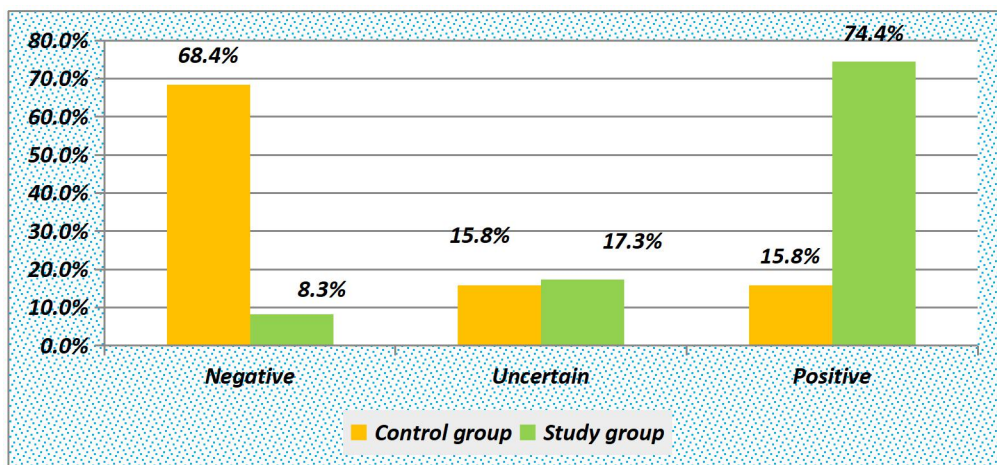


Figure (2): percentage distribution of total attitude of the studied subjects regarding COVID 19 infection.

Table (8): Distribution of studied subjects self-protective measures for prevention of COVID 19 (n=340 )

Practice	Control group N=160						Study group N=180						Chi square test	P value
	Unsatisfactory done (<50%)		Satisfactory done 50-75%		Highly satisfactory done >75%		Unsatisfactory done (<50%)		Satisfactory done 50-75%		Highly satisfactory done >75%			
	N	%	N	%	N	%	No	%	N	%	N	%		
Hand Washing (5 items)	7	49.4%	6	41.3%	1	8.7%	5	28.0%	3	20.0%	3	76.6%	174.42	<0.001**
Mask Wearing(6 items)	7	48.1%	6	40.0%	1	11.9%	7	39.0%	3	17.2%	4	78.3%	164.10	<0.001**
Environmental Cleaning (6 items)	8	51.3%	6	38.1%	1	10.6%	3	16.7%	2	15.4%	5	83.3%	194.85	<0.001**
Social Distance (4 items)	6	39.4%	8	50.0%	1	10.6%	8	44.4%	3	21.4%	3	73.2%	145.76	<0.001**
Nutrition for Pregnant Woman (6 items)	8	50.0%	6	40.0%	1	9.4%	2	11.1%	6	35.3%	1	63.3%	150.49	<0.001**
Rest and	8	51.3%	6	38.1%	1	9.3%	3	16.7%	7	40.0%	1	58.3%	141.00	<0.001**



sleep (6 items)	3	9%	2	8%	5	%	7	2	0%	0	3%	98	1**
Supplementation and follow up	5	36.9%	8	53.8%	1	9.3%	5	2.8%	5	27.0%	1	69.8%	<0.001**

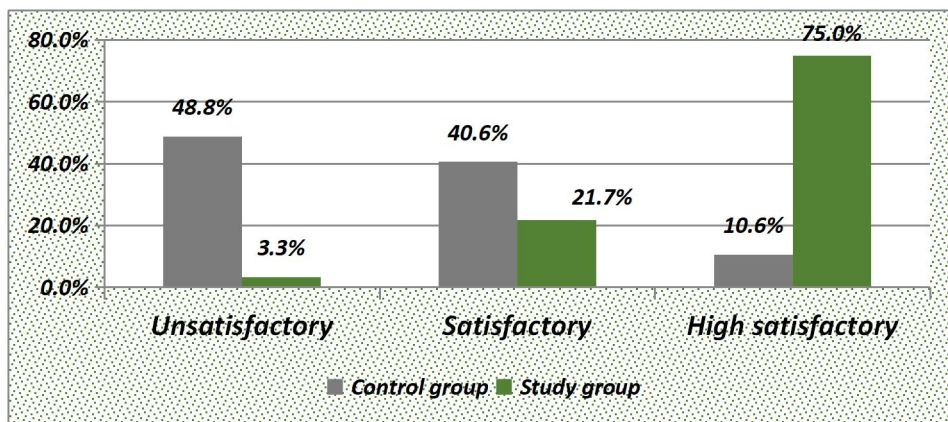


Figure (3): percentage distribution of self-protective measures score of the studied subjects regarding COVID 19 infection.

Table (9) : Distribution of study group subjects opinion regarding COVID 19 prevention guideline (n=180 ).

Study group opinion regarding guideline	Disagree		Uncertain		Agree	
	No	%	No	%	No	%
Guideline answer all of your questions	3	1.7	39	21.6	138	76.7
Guideline help in reducing your anxiety and stress	5	2.8	34	18.9	141	78.3
Guidelines prepared in the way that help you to improve your practices	3	1.7	27	15.0	150	83.3
Guidelines prepared with easily language	6	3.3	41	22.8	133	73.9
Guidelines are useful for prevention of COVID 19	2	1.1	63	35.0	115	63.9

**Conclusion:**

The findings of the current study supported the stated hypothesis that health educational intervention is effectively improving pregnant women knowledge, attitude and practice regarding prevention of COVID 19.

**Recommendation:**

Based on the findings of this study the following should be recommended:  
 1. Health educational intervention regarding prevention of COVID 19 should be provided for all pregnant women at all MCH centers until the total management of COVID 19 virus.  
 2. Antenatal health care should have a plan to communicate online with pregnant women to manage such these crisis situations.

### Limitation of the Research

The current research study has some limitations, as follow:

Firstly, the lack of national and international researches that study the current research topic.

Thirdly, sometimes the sessions were protracted due to noise and other individuals' interruption and lastly, challenging to facilitate group place and sessions.

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### Conflict of interest

No

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