

■ Basic Research

Effect of Guidelines for Preparatory Students on Prevention and Combatting COVID -19

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Abstract

Background: The protection of students and educational facilities is particularly important. Precautions are necessary to prevent the potential spread of COVID-19 in school settings, so, guidelines for prevention, early detection and control of COVID-19 in schools are very essential. **Aim:** This study was carried out to evaluate the effect of guidelines for preparatory students on prevention and combatting COVID-19. **Research design:** A quasi-experimental design was used. **Setting:** The study was conducted at two governmental preparatory schools namely Omar Ibn Al-Khattab and Zahraa Helwan affiliated to Wady Hof District in Helwan, Cairo Governorate, Egypt. **Sampling:** A multi-stage random sample was used. **Sample size:** 605 students both boys and girls. **Tools:** Three tools were used in this study: **Tool one:** An interview questionnaire which consisted of the following parts: a) Characteristics' data of studied students. b) Knowledge of studied students about COVID-19. **Tool two:** Attitude as reported by students using Likert Scale toward COVID-19. **Tool three:** Students' Preventive Behavior Likert Scale regarding to COVID-19. **Results:** The current study showed that 58.3% of studied students had poor knowledge, 69.1% of them had negative attitude and 64.3% of them had inadequate preventive behavior at pre guidelines about prevention of COVID-19. However, highly statistically significant improvements were detected after the implementation of guidelines in good knowledge (76%), positive attitude (94.2%) and adequate preventive behavior (85.5%). There were highly statistically significant positive correlations between students' total knowledge scores and total attitude and total preventive behavior scores at $P < 0.001$. **Conclusion:** Guidelines about prevention of COVID-19 improved preparatory students' knowledge, attitude and preventive behavior at the posttest than pretest, with highly statistically significant differences. **Recommendation:** Guidelines and well-planned educational program should be undertaken to enhance the awareness of preparatory school students about COVID-19 **Key words:** Guidelines, Preparatory Students, Prevention, Combating, COVID-

Introduction

COVID-19 (Coronavirus disease) is a highly infectious respiratory disease caused by a new corona virus. Which was discovered in China in December 2019 and then spread around the world, causing an unprecedented public health crisis disease. COVID-19 consider a health emergency that affects the respiratory system and have social effects all over the world. This rapid rise in confirmed cases and deaths has caused anxiety especially among school students [1].

The time span following the onset of symptoms is classically approximately five days but may range from two days to two weeks. On March 11, 2020, the WHO declared COVID-19 a pandemic, more than 4.35 million cases have been reported across 185 countries and territories, more than 1.55 million people have recovered and more than 297,000 deaths [2].

The clinical symptoms of COVID-19 include fever, which is the most common symptom, cough, fatigue, malaise and shortness of breath. A recent systematic review estimated that 16% of children with COVID-19 infection are asymptomatic, but evidence suggests that as many as half of pediatric infections may be asymptomatic. The signs and symptoms of COVID-19 in children are similar to those of other infections and noninfectious processes, including influenza, streptococcal pharyngitis, and allergic rhinitis [3].

Global concerns about the virus have risen due to high transmission capability, which may be coupled with morbidity and mortality. Children are more likely to be infected and additionally more prone to serious complications, which may be associated with acute respiratory distress syndrome (ARDS) and cytokine storm [4].

The psychological effects may last for a long period and will require much more time to recover from COVID-19 strikes quickly are very contagious causing a negative

psychological effect on overall health and increasing the risk of fear and worry especially among children as a result of the quick increase in verified cases and deaths. Strong infection control measures are the primary intervention to minimize the spread of the virus in the community particularly in school siting. Public awareness of dealing with highly infectious respiratory diseases plays a vital role in limiting the spread and outbreaks of the infection [5 & 6].

Knowledge, attitude and practice (KAP) are the capital of health promotion to achieve health prevention success. Poor knowledge, bad attitudes and unhealthy practices in relation to disease protection are shared to elevate the risk of transmission and unfavorable impacts of the disease. To ensure effective preventive practice and optimum preparedness regarding respiratory tract infection prevention during COVID-19 pandemic knowledge, attitude, and healthy practices (KAP) are essential [7].

Information about COVID-19 is considered of significant value in providing the required strategies to be carried out. Moreover, these would enhance and evaluate the presently available programs as well as recognize possible interventions to improve the behavioral changes. Better awareness of these diseases along with positive attitudes and behavioral changes are driven by the level of knowledge and perceptions towards preventive practices. Therefore, knowledge and awareness related to prevention are crucial in the school student group [8].

Preventive measures for COVID-19 include physical or social distancing, avoiding crowded place, avoid close contact settings, ensuring good ventilation of indoor spaces, covering sneezes and coughs with a tissue or bent elbow, cleaning hands regularly and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmissions of infection. Well-

fitting mask that covers the nose and mouth is recommended when interacting with individuals at public places [9].

A guideline is a statement by which to determine a course of action. A guideline aims to streamline particular processes according to a set routine or sound practice. Guidelines may be issued by any organization (governmental or private) to make the actions of patient more predictable and presumably of higher quality. Guidelines improve the quality of care received, reduce morbidity, mortality, improve quality of life and also ensure consistency of care [7].

Nurses have an important role as a teachers and advisors in educating service users and caregivers, in providing health education in society and in facilitating the development of other multidisciplinary team members. Nurses should teach children to apply the ideal hand washing technique, follow the social distance, use the disinfectant materials such as alcohol, put a tissue when coughing or sneezing on the mouth and nose and wearing mask to prevent the infection transmission. Also, educating child not to touch the eyes, nose and mouth when hands were contaminated and should discard tissue after sneezing or coughing in safety basket [2].

Significance of the study:

In Egypt, from January 2020 to August 2021, there have been 285,465 confirmed cases of COVID-19 with 16,625 deaths, reported to WHO. COVID-19 has hit everyone hard, especially preparatory school-age student. The current global pandemic has seen 91% of the world's students affected by the current school and university closures [10].

Nurses play a critical role in ensuring students understand the precautions must be taken to protect themselves and others from COVID-19. Also, nurses can improve the

behavioral and attitudinal changes. Positive attitude and behavioral changes are driven by the level of knowledge and perceptions towards preventive practices [11]. So, the current study aimed to evaluate the effect of guidelines for preparatory students on prevention and combatting COVID -19.

Aim of the study

The study aimed to evaluate the effect of guidelines for preparatory students on prevention and combatting COVID-19.

Research hypothesis

Preparatory students' knowledge, attitude and preventive behavior will be improved after implementing guidelines about prevention and combatting COVID -19.

Subjects and Methods

Research design

A quasi-experimental research design was used in this study.

Setting

The study was carried out in two governmental preparatory schools namely Omar Ibn Al-Khattab and Zahraa Helwan affiliated to Wady Hof District in Helwan, Cairo Governorate, Egypt.

Sampling

Sample technique: A multi-stage random sample was used for selection of preparatory school students according to the following stages:

First stage: The total number of governmental preparatory schools at Wady Hof District is four schools, two schools were chosen randomly for the conduction of the study, these were Zahraa Helwan and Omar Ibn Al-Khattab preparatory schools

Second stage: Three classes from each of the grades 1st, 2nd and 3rd were selected randomly from each school. Total classes included in the study were 18 classes.

Third stage: All preparatory students in the selected classrooms were included in the study.

Sample size:

A pilot study had been performed to obtain data in order to calculate the sample size. Considering level of significance of 5%, and power of study of 80%, and based on data from literature, the sample size can be calculated using the following formula: Sample size = $[(Z_{1-\alpha/2})^2 \cdot SD^2] / d^2$, Where, $Z_{1-\alpha/2}$ = is the standard normal variate, at 5% type 1 error it is 1.96, SD = standard deviation of variable and d = absolute error or precision. So, sample size = $[(1.96)^2 \cdot (2.76)^2] / (0.22)^2 = 604.6$. Based on the above formula, the sample size required for the study is 605.

Tools for data collection:

Tool one: An Interview Questionnaire.

It was designed by the researchers after reviewing related literature to collect the required data. It was written in simple Arabic language, and it consisted of two parts.

Part 1: Characteristics data of studied preparatory students and their parents which include: Age, gender, educational grade, parent's level of education and occupation.

Part 2: Knowledge of studied preparatory students about COVID-19: It was developed by the researchers based on **Zhong et al., [12]**. It consisted of 25 questions which include 10 open-ended questions and 15 closed-ended questions to assess the studied students'

knowledge. Open questions included items as: meaning, signs, symptoms, risk factors, mode of transmission of COVID-19, complications of COVID-19, preventive measures and management. Closed questions included items as: Dry cough is signs and symptoms of COVID-19 , currently no effective treatment for COVID-19 , eating or contacting wild animals would result in infection by the COVID-19 virus, persons with COVID-19 virus cannot transmit the virus to others when a fever is not present, Isolation of infected person with the COVID-19 is an effective way to reduce the spread of the virus and People who have contact with someone infected with the COVID-19 should be isolated for 14 days.

Scoring system for knowledge:

Knowledge obtained from the studied children was checked with a model key answer. The open-ended question scored as the following: Correct answer takes "one", while Incorrect answer takes "zero". Closed-ended question was answered by True or False, a score of "one" was given for every true answer and score of "zero" was given for every false answer. It includes 25 items with total scores equal 25 marks. Total scores was converted into percentage and interpreted as follows: < 50% is considered poor score which score ranged from 0-<13, 50-< 75% is considered fair which score ranged from 13<19 and $\geq 75\%$ is considered good which score ranged from 19-25.

Tool two: Preparatory Students' Attitude Likert Scale about COVID-19. It was developed by **Yesuf and Abdu [13]**, it consisted of ten statements to assess the studied students' attitude about COVID-19, for example: Wearing face masks is effective in preventing the COVID-19 virus, social distance can reduce COVID-19 infection transmission, handwashing can prevent spread of infection, collective efforts are required to combat the COVID-19 virus and COVID-19 is a fatal disease. The Likert Scale was rated from 1- 3, while Agree equals (3), Neutral equals (2) and disagree equals (1).

Scoring system:

The total attitude score was ranged from 10-30 . The negative attitude (<60%) with score ranged from 10 -< 18 and the positive attitude (≥ 60) with score ranged from 18 - \leq 30.

Tool three: Preparatory Students' Preventive Behavior Regarding to COVID-19 virus.

Developed by Clements [14], it consisted of 12 statements related to studied students' preventive behavior about COVID-19 virus, for example, wash hands with soap for at least 20 seconds after I have been in a public place, avoid touching face with unwashed hands, avoid close contact with sick people, cover mouth and nose with a tissue when I cough or sneeze, and clean and disinfect touched surfaces daily.

The Likert scale was rated from 1-3 with (1) never (2) sometimes and (3) always.

Scoring system:

The total preventive behavior score ranged from 12– 36. The inadequate preventive behavior (<60%) with score ranged from 12 - < 22 and the adequate preventive behavior (≥ 60) with score ranged from 22- ≤ 36 .

Data collection procedures:

- **Study period:** The study was conducted over a period of 6 months started from 15th of October 2021 to 15th of April 2022.

- **Approval:** Approval was taken from the Ministry of Education to carry out of the study, official letters were addressed to the directors of the schools. Each director was informed about the study title, aim, time and date of data collection.

Ethical considerations: Oral consent was obtained from the studied students and their parents to participate in the study. Participants were assured that all collected data taken from them would be treated confidentially and used for the research purpose and their benefit only. Participants' anonymity, confidentiality, privacy, safety and protection were secured.

Tool development:

- **Validity:** Tools were reviewed and tested for validity by 3 experts in Pediatric Nursing and Community Health Nursing. Modifications were done accordingly to ascertain relevance and completeness.

- **Reliability:** Reliability coefficients were calculated for the questionnaires of preparatory students' knowledge about COVID-19 virus, Cronbach's Alpha was 0.87, while attitude of preparatory students toward COVID-19, Cronbach's Alpha was 0.92, and preventive behavior of them, Cronbach's Alpha was 0.96.

- **Pilot study:** A pilot study was carried out on 10% (61) students of the study sample from different schools to evaluate tools for clarity, applicability and to estimate the time required for filling in the tools before starting the actual data collection. Data obtained from the pilot study were analyzed and the necessary modifications and rearrangement on the study tools were done. Students who participated in the pilot study were excluded from the main study sample.

Field work

The study was conducted over a period of 6 months started from 15th of October 2021 to 15th of April 2022, where the researchers were available in the study setting three times/week from 9.00 a.m. to 12.00 mid-day. The researchers started by introducing themselves to the studied students and a verbal consent was obtained from each one. The studied students were fully informed about the aim of the study prior to the completion of questionnaire in convenient time, which was not interfering with their class schedule. The studied students were interviewed separately and the answers were marked by the researchers. Filling in the questionnaire took about 20-30 minutes.

The study was conducted through four phases: Assessment, planning, implementation, and evaluation.

1) Assessment phase: The preliminary stage was done by utilizing the assessment tools after being revised and tested for general information about COVID-19. Time expended for answering the study sheets ranged from 20-30 minutes.

2) Planning phase: Based on the outcome acquired from the assessment phase, the educational sessions were designed after reviewing of related literature. Detected needs, requirements and deficiencies were converted into aim and objectives of the educational sessions.

3) Implementation phase: Students under study were 605, they were divided into 31 groups and each group consisted of 20 students. The intervention was implemented in the form of three sessions: one session for theory and 2 sessions for practice. The length of every session was distinctive according to studied students' response and time accessible. At the beginning of each session, the researchers started by a summary about what was given through the previous session and objectives of the new one, taking into consideration using simple and clear Arabic language to suite the educational level of the studied students.

The theoretical session covers the part, which included: meaning of COVID-19, symptoms and signs, mode of transmission, risk factors, incubation period, isolation period, diagnostic test to confirm, complications, preventive measures, nursing management and treatment of COVID-19

Two practical sessions cover practices regarding preventive behavior example technique of hand washing and wearing mask.

The studied students were interviewed in a private room. Different teaching methods were used including small group discussions, lectures, brainstorming, handouts, role playing and demonstration. The teaching aids used were brochures, colored posters and laptop screen show. At the end of each session, studied students were informed about the time and content of the next session.

The intervention was guided by illustrated leaflet offered to the studied students as reference; it was developed by the researchers based on the related literature review [15, 16 &17], containing necessary information and hints about COVID-19.

4) Evaluation phase: Evaluation of the educational sessions was done immediately after intervention by comparing the changes in studied students' levels of knowledge, attitudes and preventive behaviors through applying the same tools of pretest as posttest.

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 24. The first part of data was descriptive data, which were coded, revised, tabulated and statistically analyzed using numbers, percentages, mean, standard deviations; variables were compared using paired t-test. The second part of data dealt with correlations between different variables as performed using the correlation co-efficient test. Degrees of significance of the results were non-significant (NS) if $p > 0.05$, significant (S) if $p \leq 0.05$ and highly significant (HS) if $p \leq 0.001$.

Results

Table (1) shows that 59.2% of studied students were girls. Regarding age, 63.8% of them were in age group between 12-<14 years with a Mean \pm SD of 13.7 ± 1.6 . As for educational grade, 33.6% were in the 3rd preparatory grade. Concerning level of mother and father education, 61.7% and 58.8 % had secondary education respectively. As regards mothers and fathers' employment status, 65.0% were housewives, and 60.0% of fathers were employees.

Figure (1) clarifies that, highly statistically significant improvement was found among the studied children pre/post guidelines about prevention of COVID -19 in total knowledge scores, where 58.3% had poor knowledge and only 13.7% had good knowledge at pre

guidelines which improved to 76% of studied students had good knowledge at post guidelines ($X^2 = 506.139$ at $P < 0.001$).

Figure (2) Illustrates that, 69.1% of studied students had a negative attitude at pre guidelines toward prevention of COVID -19, while at post guidelines most of them (94.2%) changed to positive attitude ($X^2 = 517.594$ at $P < 0.001$).

Figure (3) Demonstrates that, 64.3% of studied students had inadequate preventive behavior at pre guidelines about prevention of COVID -19, which improved to 85.5% of them had adequate preventive behavior at post guidelines ($X^2 = 313.542$ at $P < 0.001$).

Table (2) shows highly positive statistically significant correlation between total knowledge scores and total attitude scores regarding prevention of COVID -19 at post guidelines ($r = 0.573$ at $p < 0.001$).

Table (3) reveals highly positive statistically significant correlation between total knowledge scores and total preventive behavior scores regarding prevention of COVID -19 at post guidelines ($r = 0.655$ at $p < 0.001$).

Table (4) presents highly positive statistically significant correlation between total attitude scores and total preventive behavior scores regarding prevention of COVID -19 at post guidelines as ($r = 0.668$ at $p < 0.001$).

Table (5) demonstrates associations between total knowledge, total attitude and total preventive behavior scores of studied students with their characteristics. The study shows that there were highly significant associations between the knowledge, attitude and preventive behavior scores of studied students with their age and gender. In addition, there were highly statistically significant associations with mother and father educational level and employment status.

Table 1. Characteristics Data of the Studied Preparatory School Children (n=605)

Variables	No.	%
Age (Years)		
12- < 14	386	63.8
14- ≤ 16	219	36.2
Mean ±SD	13.7 ±1.6	
Gender		
Boys	247	40.8
Girls	358	59.2
Educational grade		
1 st	201	33.2
2 nd	201	33.2
3 rd	203	33.6
Mother education		
Illiterate	3	0.5
Read / write	23	3.8
Basic	37	6.1
Secondary	373	61.7
University	169	27.9
Father education		
Illiterate	14	2.3
Read and write	29	4.8
Basic	46	7.6
Secondary	356	58.8
University	160	26.4
Mother Employment status		
Unemployed (housewives)	393	65.0
Employed	212	35.0
Father employment status		
Unemployed or professionals	242	40.0
Employed	363	60.0

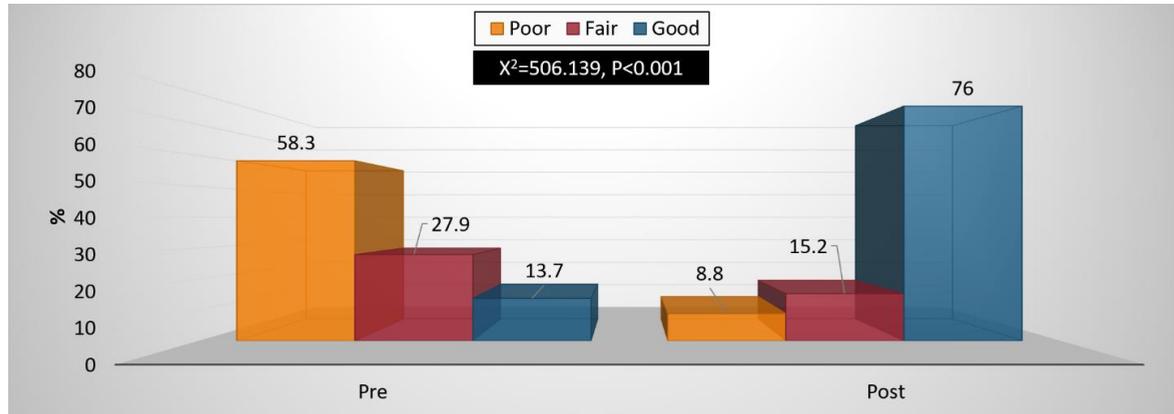


Figure (1): Total Knowledge Scores of Studied Sample at Pre/Post Guidelines (n= 605).

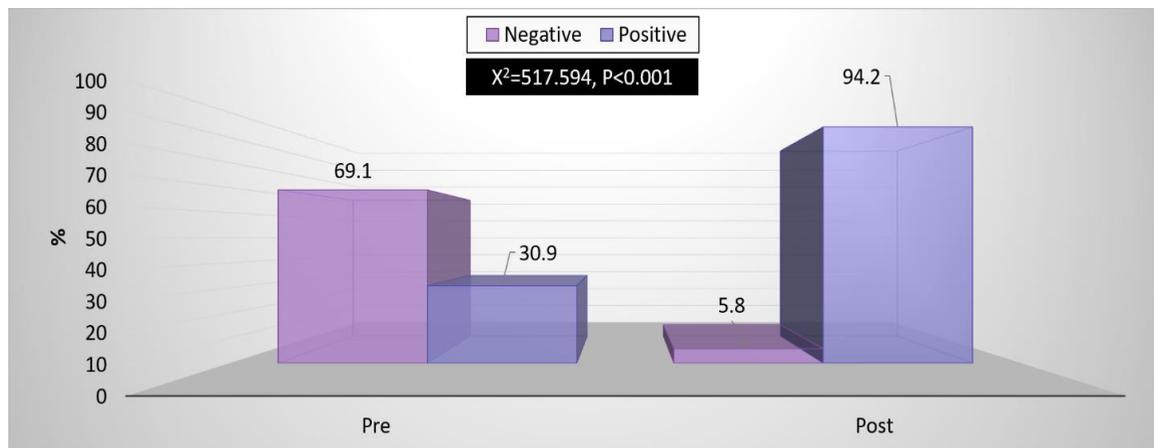


Figure (2): Total Attitude Scores of Studied Sample at Pre/Post Guidelines about Prevention of COVID -19 (n= 605).

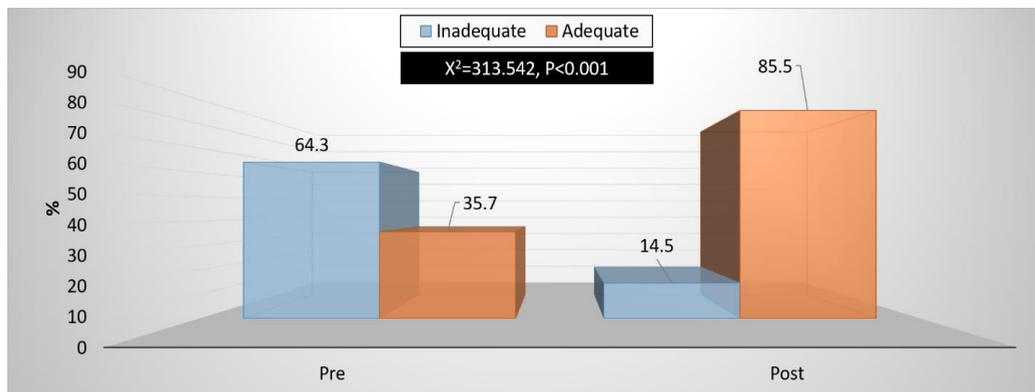


Figure (3): Total Preventive Behavior Scores of Studied Sample at Pre/Post Guidelines about Prevention of COVID -19 (n= 605).

Table 2. Correlation between Total Knowledge Scores and Total Attitude Scores of Studied Sample at Post Guidelines about Prevention of COVID -19 (n=605).

Total attitude scores	Total knowledge scores						r- test	p-value
	Poor (n=53)		Fair (n=92)		Good (n=460)			
	No	%	No.	%	No.	%		
Positive (n=570)	35	66.0	75	81.5	460	100.0	0.573	<0.001**
Negative (n=35)	18	34.0	17	18.5	0	0.0		

P <0.001** = very highly significant

Table 3. Correlation between Total Knowledge Scores and Total preventive behavior Scores of Studied Sample at Post Guidelines about Prevention of COVID -19 (n= 605).

Total preventive behavior scores	Total Knowledge Scores						r- test	p-value
	Poor (n=53)		Fair (n=92)		Good (n=460)			
	No.	%	No.	%	No.	%		
Inadequate (n=88)	53	100.0	35	38.0	0	0.0	0.655	<0.001**
Adequate (n=517)	0	0.0	57	62.0	460	100.0		

P <0.001** = very highly significant

Table 4. Correlation between Total Attitude and Total Preventive Behavior Scores of Studied Sample at Post Guidelines about Prevention of COVID -19 (n= 605).

Total attitude scores	Preventive behavior scores				r- test	p-value
	Adequate (n=517)		Inadequate (n=88)			
	No.	%	No.	%		
Positive Attitude (n=570)	517	100.0	53	60.2	0.668	<0.001**
Negative Attitude (n=35)	0	0.0	35	39.8		

P <0.001** = very highly significant

Table 5. Associations between Total Knowledge Scores, Total Attitude, Total Preventive Behavior Scores and Characteristics Data of Studied Students at Post Guidelines about Prevention of COVID -19 (n= 605).

Characteristics	Total Knowledge Scores			Total Attitude Scores		Total Preventive Behavior Scores	
	Poor (n=53)	Fair (n=92)	Good (n=460)	Negative (n=35)	Positive (n=570)	Inadequate (n=88)	Adequate (n=517)
Age (Years)	X ² =16.063 P <0.001			X ² =19.965 P <0.001		X ² =18.958 P <0.001	
Gender	X ² =18.463 P <0.001			X ² =23.597 p<0.001		X ² =20.023 p <0.001	
Educational Grade	X ² =108.199 p<0.001			X ² =21.077 p<0.001**		X ² =58.426 p <0.001**	
Mother education	X ² =573.881 p<0.001			X ² =86.341 p<0.001**		X ² =239.341 p<0.001**	
Father education	X ² =696.801 p<0.001			X ² =117.581 p<0.001**		X ² =176.921 p<0.001**	
Mother Employment	X ² =102.875 p<0.001			X ² =20.040 p<0.001**		X ² =55.551 p<0.001**	
Father Employment	X ² =136.238 p<0.001			X ² =55.724 p<0.001**		X ² =15.638 p<0.001**	

P <0.001** = very highly significant

Discussion

COVID-19 clinical frame infection is milder in children and adolescents. This section of the population can act as vectors and reservoirs and play a key role in the transmission of the infection. Children and young adults need to take COVID-19 prevention measures [18].

Countries around the world continue to suffer from COVID-19, the prevention and control of the pandemic cannot be ignored. Schools are a highly intensive place and have a wide range of sources and great mobility of students; thus, schools need to focus on the prevention and control of the pandemic. Therefore, this study aimed to evaluate the effect of guidelines for preparatory students on prevention and combatting COVID-19.

Regarding to characteristics of studied students and their parents, the current study findings revealed that, less than two thirds of the studied students were in the age range from 12- < 14 years. However, almost three fifths of them were girls. These study results are in the same line with those of **Makarabhirom [19]**, who in a study entitled "Knowledge, attitude, and preventive behavior toward COVID-19 of school students in Bangkok, Thailand: A study among students in Harrow International School" reported that, 58% of participants were female students and all of participants under study aged year 12 and 13 years.

However, this study result disagrees with that of **Wang et al., [20]**, who in a study entitled "Impact of health education on knowledge and behaviors toward infectious diseases among students in Gansu Province, China", and found that more than half of the sample were males. In addition, **Wang and Fang [21]**, who studied "The effect of health education on knowledge and behavior toward respiratory infectious diseases among students in Gansu, China: A quasi-natural experiment" reported that, more than half of sample were male and age between 10–13 years old. This may be related to different studied students' sample, area, environmental characteristics and variable classification.

As regards mothers' and fathers' education in the present study more than half had secondary education, concerning employment status, slightly less than two thirds of mothers were housewives, while three fifths of fathers were employees. These results are incongruent with those of a very recent study carried out by **Feleke et al. [22]**, entitled "Knowledge, attitudes, and misconceptions about COVID-19 prevention practices among high and preparatory school students in Dessie City, Ethiopia", and found that 48.9% of the participants' mothers were housewives and 33.8% of the fathers were government employees. This may be due to changes in the studied sample personal and environmental characteristics, sample size, and study period.

COVID-19 is mainly based on symptomatic and supportive treatment [23]. Therefore, prevention and control should be the focus to combat the pandemic [24] knowledge, attitude and practice of the public is crucial towards the containment of Covid 19 disease and in implementing directives such as social distancing, isolation, maintaining personal and community hygiene to fight against COVID-19 [25].

Children need to take COVID-19 prevention measures, neglecting this group of the population may create good opportunities for the transmission of the disease. The present study finding revealed that, more than half of studied students had poor knowledge at pre guidelines implementation, which improved to more than three quarters had good knowledge after guidelines. This result is congruent with that of a study carried out by **Wang et al. [20]**, who stated that, the baseline survey results of their study showed that before the health education, both the accuracy rate of respiratory infectious diseases' knowledge and behaviors in the intervention and control groups were located in a low range. After health education program there were improvements in school aged students' knowledge and behaviors towards various types of infectious diseases in the intervention

group. As well, **Makarabhirom [19]**, found that international school students had a lower level of COVID-19 general knowledge.

Poor knowledge of the students under study at pre guidelines was due to a lack of health education toward infectious disease as COVID-19. In addition to that student in these schools are usually busy with various exams and lack the awareness and enthusiasm for learning about COVID-19. However, after guidelines implementation, the improvement in knowledge could be attributed to the positive effects of guidelines' intervention on studied school age students. In addition to that student at this age are receptive to guidance and familiar with learning environment and culture.

Studies have shown that positive attitude and health practice regarding COVID-19 are vital to the effective prevention and control of the pandemic [26 & 27]. The adaption of prevention practices is the only solution to control the COVID-19, as to date, there is no specific treatment for the novel coronavirus [11]

The current study results showed that, more than two thirds of studied students had a negative attitude at pre guidelines about prevention of COVID -19, while at post guidelines, the most of them changed to positive attitude. As well, findings demonstrated that, less than two thirds of studied students had inadequate preventive behaviors at pre guidelines about prevention of COVID -19, which improved to majority of them had adequate preventive behaviors at post guidelines. The difference between pre and post guidelines was a highly statistically significant difference ($P < 0.001$).

These results are to some extent nearly in the same line with those of **Makarabhirom [19]**, who reported that, their results clarified that the Harrow International School students had moderate level of attitude and preventive behavior because students prioritize on other aspects over the risk of infecting COVID-19. As well, **Makarabhirom [19]** recommended that, attitudes of the Harrow International School students can be improved by the assistance

of the school and parents to always building the awareness and providing safety to the students by reminding them with rules that should be followed to secure them from risking of being infected with COVID-19.

The negative attitude and inadequate preventive behavior at pre guidelines about prevention of COVID -19 may be due to the variation in the accessibility of the internet and culture of the participants, in addition to that those students have prioritized on other aspects over the risk of infecting COVID-19. However, the detected improvement in attitudes and preventive behaviors about prevention of COVID -19 may be attributed to the effect of guidelines intervention in raising the students' knowledge and awareness about the disease which led to improve their attitudes and preventive behaviors.

Hence, the above-mentioned results justified the research hypothesis which revealed that preparatory students' knowledge, attitude and preventive behavior will be improved after implementing guidelines about prevention and combatting COVID 19.

Regarding the correlation between total knowledge scores and total attitude scores, this study result showed a positive statistically significant correlation between total knowledge scores and total attitude scores regarding prevention of COVID -19 at post guidelines. This result agreed with that of **Yesuf and Abdu [13], in Ethiopia**, who studied "Knowledge, attitude, prevention practice, and associated factors toward COVID-19 among preparatory school students in Southwest Ethiopia, 2021", and revealed that increase in knowledge and improved attitude regarding COVID -19 occurred after implementation of a program about corona virus and a positive correlation was found between total knowledge scores and total attitude scores. This finding indicated that information plays a large and effective role in changing attitude.

The results of the current study indicated that there was a positive statistically significant correlation between total knowledge scores and total preventive behavior scores

regarding prevention of COVID -19 at post guidelines. This result was congruent with that of the study done by **Darren et al. [28], in Australia**, entitled "Health-education to prevent COVID-19 in school children" and clarified that increase in knowledge leads to enhancement in practices. This may be due to that an increase in knowledge plays an important role to promote practices, which in turn leads to preventive behaviors toward COVID-19

The present study findings revealed that a positive statistically significant correlation was detected between total attitude scores and total preventive behavior scores regarding prevention of COVID -19 at post guidelines. This result is in accordance with that of the study conducted by **Abdeldaim and Elghazally [29], in Egypt**, to study "Outcome of COVID-19 awareness program for students and teachers" and reported that differences were observed to pre and post- awareness program scores between attitude and practices. As well, they found a positive correlation between total attitude scores and total practices scores among studied students and teachers.

Similarly, this study result was supported by those of a very recent study carried out **in Ethiopia by Yesuf and Abdu [13]**, which revealed that a positive significant correlation was found between total attitude scores and total preventive behavior scores regarding COVID-19.

Regarding relationships between total knowledge scores, total attitude scores, total preventive behavior scores and demographic data of the studied sample regarding prevention of COVID -19 at post guidelines, the current study results showed that, there were significant associations between the knowledge, attitude and preventive behavior scores of studied samples with their age and gender, mother and father educational level. These results were in consistence with those of **Nicholas et al. [30], in European**, they studied "Socio-Demographic Factors Associated with Self-Protecting Behavior during the

COVID-19 Pandemic among school students", and found significant relationships between age, gender of students and educational level of parents, and knowledge, attitude and practices about prevention of COVID-19 at post guidelines and mentioned that, good knowledge, positive attitudes and adequate practices were associated with age, gender of students and positive attitudes and adequate practices were also associated with higher educational level of parents.

The current study results were also supported by those of **Ariyo et al. [31], in Nigeria**, who studied "Socio-demographic determinants of children home learning experiences during COVID 19 school closure", and stated that statistically significant associations were detected with demographic variables such as, gender of child and parent educational level and their knowledge and attitudes and practices. In addition, **Hastuti et al. [32], in Indonesia**, studied "Relationship of socio-demographic factors, knowledge, attitude, and food consumption behavior among vocational high school students during COVID-19 pandemic", and reported that parents with lower education had lower level of knowledge and practices.

Conclusion

The study findings implied that more than half of studied students had poor level of knowledge, had a negative attitude and inadequate preventive behavior toward COVID-19 before guidelines implementation. The guidelines helped in improving the studied students' knowledge, attitude and preventive behavior toward prevention of COVID-19. As well, there were positive correlations between their total knowledge, attitude and preventive behavior toward COVID-19

Recommendations

Based on the findings of the current study, the following recommendations are suggested:

- Guidelines and well-planned educational program should be undertaken to enhance the awareness of preparatory school students about COVID-19
- Continuous assessment of knowledge, attitude and preventive behavior of preparatory school students about COVID-19.
- Simple educational pamphlets and posters can be displayed at preparatory schools on the importance of prevention of COVID-19 by increasing students' knowledge, attitudes and healthy behaviors toward COVID-19.
- Further research on a larger sample and in other settings is needed to generalize the results, using a multidisciplinary approach.

References:

1. **Bai, Y., Yao, L., Wei, T., Tian, F., Jin, Y., Chen, L., & Wang, M. (2020):** Presumed asymptomatic carrier transmission of COVID-19. *JAMA*, 323(14), 1406-1407.
2. **World Health Organization (2020):** Coronavirus disease (COVID-19) Situation Report– 82. Available at: <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200411-sitrep-82-covid-19.pdf?sfvrsn=74a5d15>
3. **Huang, C., Wang, Y., & Li, X. (2020):** Clinical features of patients infected with 2019 novel coronavirus in Wuhan China. *The Lancet*, 395(520), 497–506.
4. **Guo, Y., Cao, Q., & Hong, Z. (2020):** The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. *Military Medical Research*, 7(1), 11.
5. **Larson, E., Bryan, J., Adler, L., & Blane, C. (2020):** Multifaceted approach to changing handwashing behavior. *Am. J. Infect. Control*; 7(25), 3-10.
6. **Wang, C., Horby, P., Hayden, F., & Gao, G. (2020):** A novel coronavirus outbreak of global health concern. *Lancet*, 395(10223), 470-473.

7. **Wahab, F., Abdullah, S., Abdullah, J., Jaafar, H., Noor, S., Mohammad, W., Yusoff, A., Tharakan, J., Bhaskar, S., & Sangu, M. (2021):** Updates guidelines about knowledge, attitude and preventive practices on coronavirus among healthcare workers. *Malays. J. Med Sci. MJMS*, 3(12), 23-25.
8. **Azlan, A., Hamzah, R., Sern, J., Ayub, S., & Mohamad, E. (2020):** Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *Plos one*, 15(5), e0233668.
9. **Birihane, B., Bayih, W., Alemu, Y., & Belay, M. (2021):** Perceived barriers and preventive measures of COVID-19 among healthcare providers, North Central Ethiopia, 13(17), 699-706. Available at <https://doi.org/10.2147/rmhp.s287772>
10. **Ministry of Health and Population, Egypt. "MOHP" (2020):** COVID-19 in Egypt. Available at: [https://www.care.gov.eg/Egypt Care/ index.aspx](https://www.care.gov.eg/Egypt%20Care/index.aspx)
11. **Saqlain, M., Munir, M., Rehman, S., Gulzar, A., Naz, S., Ahmed, Z., & Mashhood, M. (2020):** Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: A cross-sectional survey from Pakistan. *Journal of Hospital Infection*, 105(3), 419-423.
12. **Zhong, L., Luo, W., Li, M., Zhang, Q., Liu, G., Li, T., & Li, Y. (2020):** Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *Int J Biol Sci.*, 16 (10):1745-1752. doi:10.7150/ijbs.45221. eCollection 2020. PMID: 32226294
13. **Yesuf, M., & Abdu, M. (2022):** Knowledge, attitude, prevention practice, and associated factors toward COVID-19 among preparatory school students in Southwest Ethiopia, 2021. *PLoS ONE* 17(1): e0262907. Available at <https://doi.org/10.1371/journal.pone.0262907>.
14. **Clements, J. (2020):** Knowledge and preventive behaviors toward COVID-19 among US residents during the early days of the pandemic: Cross-sectional questionnaire. *JMIR Public Health and Surveillance*, 6(2), 191-197.
15. **Centers for Disease Control and Prevention (CDCP). (2021):** Health Department-Reported Cases of Multisystem Inflammatory Syndrome in Children (MIS-C) in the United States United States: CDC; [updated Aug 22; cited 2021 Sept 7]. Available from: <https://covid.cdc.gov/covid-data-tracker/#mis-national-surveillance>.
16. **Center for Disease Control and Prevention. (2020):** How to protect yourself. Available at: [https://www.cdc.gov/coronavirus/2020-ncov/prevent-getting-sick/prevention.html?CDC_AA_refVal= https://www.cdc.gov/coronavirus/2020-ncov/prepare/prevention.html](https://www.cdc.gov/coronavirus/2020-ncov/prevent-getting-sick/prevention.html?CDC_AA_refVal=https://www.cdc.gov/coronavirus/2020-ncov/prepare/prevention.html)
17. **Brooks, S., Webster, K., Smith, L., Woodland, L., Wessely, S., Greenburg, N., & Rubin, G. (2020):** The psychological impact of quarantine and how to reduce it:

- Rapid review of the evidence. SSRN Electron J; 395(10227):912–920.. doi:10.2139/ssrn.3532534.
18. **Malcangi, G., Inchingolo A., Inchingolo, M., Fabio Piras, F., Settanni V., & Garofoli G. (2022):** COVID-19 infection in children and infants: Current status on therapies and vaccines, children, 249, Available at: <https://doi.org/10.3390/children9020249> <https://www.mdpi.com/journal/children>
 19. **Makarabhirom, T. (2021):** Knowledge, attitude, and preventive behavior toward COVID-19 of school students in Bangkok, Thailand: A study among students in Harrow International School. International Journal of Medical Science and Public Health, 10 (2), 264-266.
 20. **Wang, M., Han, X., Fang, H., Xu, C., Lin, X., Xia, S., Yu, W., Jiang, S., & Tao, H. (2018):** Impact of health education on knowledge and behaviors toward infectious diseases among students in Gansu Province, China. Biomed Research International, 1–12.
 21. **Wang, M., & Fang, H. (2020):** The effect of health education on knowledge and behavior toward respiratory infectious diseases among students in Gansu, China: A quasi-natural experiment, BMC Public Health, 20,681. Available at: <https://doi.org/10.1186/s12889-020-08813-3> 4-13
 22. **Feleke, A., Adane, M., Embrandiri, A., Berihun, G., Walle, Z., Keleb, A., & Kloos, H. (2022):** Knowledge, attitudes, and misconceptions about COVID-19 prevention practices among high and preparatory school students in Dessie City, Ethiopia. Journal of Multidisciplinary Healthcare, Dove Press 15, 1035–1055. <https://doi.org/10.2147/JMDH.S325636>.
 23. **McCaffery, K., Dodd, R., Cvejic, E., Ayrea, J., Batcup, C., Isautiera, J., Coppa, T., & Bonnera, C. (2020):** Health literacy and disparities in COVID-19-related knowledge, attitudes, beliefs and behaviours in Australia. Public Health Res Pract, 30(4), 30342012. doi:10.17061/phrp30342012
 24. **Yimenu, D., Demeke, C., Kasahun, A., Asrade, S., & Mekuria, A. (2020):** COVID-19: What should health professionals know? Assessment of knowledge, attitude, and practice of community pharmacists in a developing country. SAGE Open. ed.;8:2050312120973498.doi:10.1177/2050312120973498
 25. **Walle, Z., Berihun, G., Keleb, A., Teshome, D., & Berhanu, L. (2021):** COVID-19 prevention practices and determinant factors among healthcare professionals working in hospitals of South Gondar Zone, Northwestern Ethiopia. Journal of Multidisciplinary Healthcare, 14, 2287-2298 228 <https://www.dovepress.com/> by 156.219.241.187 on 13-Nov-2021
 26. **Yousaf, M., Noreen, M., Saleem, T., & Yousaf, I. (2020):** A cross-sectional survey of knowledge, attitude, and practices (KAP) toward pandemic COVID-19 among

- the general population of Jammu and Kashmir, India. *Soc Work Public Health*, 35(7), 569-578. doi:10.1080/19371918.2020.1806983
27. **Al Ahdab, S. (2021):** Across-sectional survey of knowledge, attitude and practice (KAP) towards COVID-19 pandemic among the Syria residents. *BMC Public Health*, 21(1),296. doi:10.1186/s12889-021-10353-3.
 28. **Darren, J., Gray, J., Gail, M., Williams, C., Matthew, F., Kelly,W., & Donald, P. (2021):** Health-education to prevent COVID-19 in school children. *Research School of Population Health, Australian National University, Canberra, Australia*, 22(2), 281-290.
 29. **Abdeldaim, D., & Elghazally, M. (2021):** Outcome of COVID-19 awareness program for students and teachers. *Egyptian Family Medicine Journal (EFMJ)*,5 (2), 49-63.
 30. **Nicholas, W., Papageorge, J., Matthew, V., & Julian, C. (2021):** Socio-demographic factors associated with self-protecting behavior during the COVID-19 pandemic, *European University Institute*. 29(4), 201-225
 31. **Ariyo, E., Micheal, B., Olaleye, Y., Ogunsanmi, E., Ajike, T., Lasode, F., & Daniel, H. (2021):** Socio-demographic determinants of children home learning experiences during COVID 19 school closure. *International Journal of Educational Research Open, Nigeria*, 21(3), 100-111.
 32. **Hastuti, N., Nurdjannah, S., Suryani, D., Suyitno, S., & Tukiyo, W. (2022):** Relationship of socio-demographic factors, knowledge, attitude, and food consumption behavior among vocational high school students during COVID-19 pandemic, *Indonesia. Public Health of Indonesia*, 8(1),1-8. Available at: <https://doi.org/10.36685/phi.v8i1.502>.

الملخص العربي

تأثير المبادئ التوجيهية لطلاب المرحلة الإعدادية على الوقاية من كوفيد-19 ومكافحته

الخلفية:

حماية الطلاب والمرافق التعليمية لها أهمية خاصة. تعتبر الاحتياطات ضرورية لمنع الانتشار المحتمل لـ COVID-19 في البيئات المدرسية ، لذا فإن الإرشادات الخاصة بالوقاية والاكتشاف المبكر والسيطرة على COVID-19 في المدارس ضرورية للغاية. الهدف: أجريت هذه الدراسة لتقييم تأثير المبادئ التوجيهية لطلاب المرحلة الإعدادية على الوقاية من كوفيد-19 ومكافحته. تصميم البحث: تم استخدام تصميم شبه تجريبي. الإعداد: أجريت الدراسة في مدرستين إعداديتين حكوميتين هما عمر بن الخطاب وزهراء حلوان التابعة لمديرية وادي حوف في حلوان ، محافظة القاهرة ، مصر. أخذ العينات: تم استخدام عينة عشوائية متعددة المراحل. حجم العينة: 605 طلاب وطالبات. الأدوات: تم استخدام ثلاث أدوات في هذه الدراسة: الأداة الأولى: استبيان المقابلة الذي يتكون من الأجزاء التالية: أ) بيانات خصائص الطلاب الذين تمت دراستهم. ب) معلومات طلاب المرحلة الإعدادية عن COVID-19. الأداة الثانية: الاتجاهات المبلغ عنها من قبل الطلاب باستخدام مقياس ليكرت عن COVID-19. الأداة الثالثة: مقياس ليكرت للسلوك الوقائي للطلاب فيما يتعلق بـ COVID-19.

النتائج: أظهرت الدراسة الحالية أن 58.3% من الطلاب الذين خضعوا للدراسة لديهم معلومات ضعيفة ، و 69.1% منهم لديهم اتجاهات سلبية ، و 64.3% منهم لديهم سلوك وقائي غير كافٍ في الإرشادات المسبقة حول الوقاية من COVID-19. ومع ذلك ، تم الكشف عن تحسينات ذات دلالة إحصائية عالية بعد تنفيذ المبادئ التوجيهية في المعلومات الجيدة (76%) ، والاتجاهات الإيجابية (94.2%) والسلوك الوقائي الكافي (85.5%). كانت هناك ارتباطات إيجابية ذات دلالة إحصائية عالية بين مجموع درجات معلومات للطلاب وإجمالي درجات السلوك الوقائي عند $P > 0.001$.

الخلاصة: أدت المبادئ التوجيهية حول الوقاية من COVID-19 إلى تحسين معلومات الطلاب في المرحلة الإعدادية واتجاهاتهم وسلوكهم الوقائي في الاختبار البعدي عن الاختبار القبلي ، مع وجود فروق ذات دلالة إحصائية عالية.

التوصية: يجب تنفيذ إرشادات وبرنامج تعليمي جيد التخطيط لتعزيز وعي طلاب المدارس الإعدادية عن COVID-19

الكلمات الأساسية: المبادئ التوجيهية ، طلاب المرحلة الإعدادية ، الوقاية ومكافحة COVID-19