Knowledge, Attitude and Compliance with Precautionary Measures of Covid-19 among Medical and Non-Medical University Students in Egypt: A Comparative Cross-Sectional Study

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Abstract

Background: The coronavirus disease 2019 (COVID-19) is a public health emergency of international concern, it has no actual treatment, nevertheless early recognition of the disease symptoms, and looking for supportive care and the preventive measures will help to lessen the virus spread. **Aim of the study:** This study aimed to assess knowledge, attitude, and compliance with precautionary measures toward COVID-19 among medical and non-medical University students in Alexandria. **Study design:** An online cross-sectional exploratory survey research design. **Setting:** This study was conducted in eight faculties affiliated to Alexandria University. **Subjects:** Convenient sample of 1600 University students, 800 from medical and 800 from non – medical Faculties. **Tools:** Students socio -demographic characteristics and "COVID-19 Survey Structured Questionnaire" to assess students' knowledge, attitude, and precautionary preventive measures regarding COVID-19. **Results:** The results of this study showed that majority of the university students in both groups had good knowledge about COVID-19 from different sources, while the total attitude score of both study group students was statistically significant, on the other hand, the majority of nursing students had satisfactory performance Meanwhile, more than half only of the other students of both groups had satisfactory performance. **Conclusion:** The study concluded that university students in our survey had good knowledge about COVID-19, medical students who were enrolled to the faculty of Nursing, Pharmacy and Dentistry had a positive attitude regarding COVID -19 compared to nonmedical students who enrolled to faculty of Commerce and Art had negative attitude. **Recommendations:** It is essential to raise awareness among university students about Covid-19 by community mobilization campaigns to boost the community awareness about COVID-19 to maintain students 'positive attitude.

Keywords: knowledge, Attitude, precautionary Measures, COVID-19.

Introduction

Coronaviruses are a huge family of RNA viruses, which infect both animals and humans **(Hassan et al., 2020)**. This virus is innately comparable to that which causes an epidemic of Severe Acute Respiratory Syndrome (SARS) in 2003, therefore World Health Organization (WHO) termed this virus SAR-COV-2 on February 11, 2020, and the associated disease as COV-Disease-19 (COVID-19) (**Lagniton et al., 2020)**. It is considered one of the most unresolved pandemics that raises significant and novel challenges in the field of infectious diseases all over the world **(Anna, 2019).**

Currently, the WHO has declared the virus outbreak a public health emergency of international concern (PHEIC). It is one of the most important contagious diseases all over the world. Globally, according to WHO 2020, an estimated one in 10 people across the globe may have already been infected with the novel coronavirus **(WHO, 2020).** As of January 28, 2021, confirmed COVID-19 infections affected over 100.4 million individuals worldwide, resulting in over 2.1 million deaths. More than 220 countries have reported laboratory-confirmed cases of COVID-19 on all continents except Antarctica **(WHO, 2020).**

Current evidence suggests that the virus spreads mainly directly between people who are in close contact with each other, typically within 1 meter (a short distance). A person can be infected when aerosols or droplets containing the virus are inhaled or come directly into contact with the eyes, nose, or mouth, and indirectly by touching surfaces that have been contaminated by the virus when touching their eyes, nose, or

mouth without cleaning their hands **(WHO, 2021).** It is highly contagious with a clinical presentation like fever, cough, sore throat, myalgia, and fatigue, with more severe illness in older people and people with underlying conditions like hypertension, diabetes, cardiovascular disease, chronic respiratory disease, cancer, etc. (**Lagniton et al., 2020)** COVID-19 has no actual treatment, nevertheless early recognition of the disease symptoms and looking for supportive care and the preventive measures will help to lessen the virus spread. A severe case of the disease can lead to respiratory failure, acute respiratory distress syndrome, cardiac failure, and finally patient 's death **(Chen et al., 2020; Holshue et al., 2020).**

Knowledge and attitudes toward infectious diseases are related to the level of panic emotion among the population, which can further complicate attempts to prevent the spread of the disease. Moreover, academic years are a time when some health problems may be resolved, when new issues may emerge, and when risks for some long-term health problems may become evident. Students constitute a very important and influential population group, both for their peers and families. Hence, their perspective is important to evaluate current knowledge, attitude, and compliance with precautionary measures toward COVID-19 to provide recommendations for improvements in these areas. A lack of appropriate related knowledge and a positive attitude can make them overemphasize the situation, increase their anxiety and stress levels, and may interfere with the suitability of their medical judgments **(Kim & Choi, 2016 & Hassan, 2021).**

Evidence displays that public knowledge is important in confronting contagions **(Ajilore et al., 2017; Podder et al., 2019).** By assessing public alertness and knowledge about the virus, deeper insights into the existing public perception and practices can be gained, thereby helping to identify attributes that influence the public in adopting healthy practices and responsive behavior **(Person et al., 2004).** Thus, this pivotal developmental period offers special opportunities for preventive and health-promoting services **(McNeely, C, 2010).** Therefore, assessment of the knowledge, attitude, and precautionary measures of COVID-19 among university students, especially among medical and nonmedical students, would provide a better understanding to address the poor knowledge, attitude, and precautionary measures about the disease and develop preventive strategies to tackle further transmission of the disease.

Aim of the Study

This study aimed to:

- Assess knowledge, attitude and compliance with precautionary measures of COVID-19 among medical and non-medical university students in Egypt.
- Compare between medical and non-medical university students regarding COVID-19 knowledge, attitude and compliance with precautionary measures in Alexandria universities.

Research questions:

- What are knowledge, attitude and compliance with precautionary measures regarding Covid-19 among medical and non-medical university students in Alexandria?
- Are there differences in student's knowledge, attitude and compliance with precautionary measures regarding COVID-19 between medical and non-medical students in Alexandria University?

Significance of the study:

Significance of the study from the researcher's experience, it has been noticed that the findings of this study are expected to help in many aspects, such as better planning for mindfulness campaigns, guiding different health authorities accordingly to modulate their policies as needed and correct some inconvenient behaviors to stop the spread of the virus, which may result in rapid control and suppression of the current pandemic.

Materials and Method

Research Design: An online cross-sectional exploratory survey research design was adopted to carry out this study.

Setting:

The study settings were selected using a multistage random sampling technique. Accordingly, the study was carried out at Alexandria University, a governmental

university. Eight faculties out of the twenty-one faculties of Alexandria University were selected randomly to be included in the study, constituting one-third of the Alexandria Faculties. It included four medical faculties, namely "The Faculty of Nursing, Medicine, Pharmacy, and Faculty of Dentistry" and four non-medical faculties, namely "The Faculty of Law, Education, Arts, and Faculty of Commerce". With a total number of 1600 students, 800 from medical and 800 from non-medical faculties, 200 students/faculty, and 50 students/academic years in each faculty.

Subjects:

This study was conducted using an online survey. Egyptian young students of both genders were allocated through online advertisements to the above-mentioned faculties' official groups, using the snowball sampling method, as the first subject was recruited, and then he/she was multiple referrals. Each new referral then provides more data for referral, and so on, until there are enough subjects for the sample. The inclusion criteria were: university students, of both genders, living in Alexandria, and having a Facebook account. The exclusion criteria were: outside the study period and outside of Alexandria University. The sample size was calculated using EPI-Info 7 software. The calculations assumed that the probability of participants' knowledge, attitude, and precautionary measures was 50.0% at a 95% confidence interval, precision of 5%, with a design effect of 1, and then the calculated sample size was 1600 participants at least. Accordingly, the survey was closed and stopped at the end of the day when the number of participants exceeded the sample size.

Tools:

Tool I: **Students' socio -demographic characteristics:**

This tool was developed by the researchers based on review of related literature **(Gao et al, 2020 & Khasawneh et al., 2020 & Sohaira et al., 2020)**; it included two parts:

Part I: Students 'personal and Socio-demographic data; such as (age, gender, religion and residence).

Part II: Students' health profile: This part covered the following items; Past medical history as: history of any medical diseases including (Diabetes mellitus, heart diseases, respiratory diseases, etc.) In addition; to smoking habits and being infected with COVID-19 during the previous period.

Tool II: COVID-19 Survey Structured Questionnaire:

This tool was developed by the researchers based on a review of related literature **(Gao et al, 2020 & Khasawneh et al., 2020)**. It included three parts:

Part I: Students knowledge regarding COVID-19, which included data about COVID-19 symptoms, mode of transmission, prognosis, possibility of COVID-19 reinfection, treatment, vaccine or specific antiviral treatment, in addition to their knowledge source about COVID-19.

The scoring system was varied between (Zero) that was given for students answer (no) and score of (One) that was given for student's answer (yes). The total score ranged from 0 to 20. The total scores of student's responses were summed up, then converted into percent scores as follows; 75% -100% scores were considered "good knowledge", from 60% < 75 % scores were considered "fair knowledge ", and less than 60% were considered "poor knowledge ".

Part II: Students Attitude regarding COVID-19; which included questions reflected student's attitude toward preventive measures, following regular updates about COVID-19, visiting hospitals if symptoms developed or hiding that, being infected is a stigma, if his/ her immunity or religious beliefs will completely protect him/her from acquiring the infection **(Sohaira et al., 2020)**. The scoring system was varied between (zero), that was given for (No) answer, (one) that was given for (Not sure) and the score of (two) was given for (Yes) answer. The total score ranged from 0 to 26. The total scores of student's responses were summed up, then converted into percent scores as follows; 75% -100% scores were considered "Positive attitude", from 60% < 75 % scores were considered "Neutral

attitude ", and less than 60% were considered "Negative attitude. ".

Part III: Students' Compliance with Precautionary Preventive Measures regarding COVID-19; which included measures that the participant follows to prevent acquiring the infection such as;" hand washing, hand rub, covering nose and mouth with a tissue while sneezing or coughing, avoidance of hand shaking and eating or drinking herbal; etc.". The scoring system was varied between (zero) that was given for (Never) answer, (one) that was given for (Sometimes) answer and the score of (two) was given for (Always) answer. The total score ranged from 0 to 28. The total scores of student's responses were summed up, and then converted into percent scores as follows; less than 85% were considered UN-Satisfactory compliance with precautionary and preventive measures, 85% score or more were considered satisfactory compliance with precautionary and preventive measures.

Method

Approval from the Research Ethics Committee of the Faculty of Nursing, Alexandria University, was obtained. An official written letter was sent to the Vice Dean for Education and Student Affairs for each faculty member chosen for the study after the author got approval from the Research Ethics Committee. The researchers developed Tools (I and II) after reviewing the recent literature. The developed questionnaires were initially structured in English; thereafter, the content was validated by public health experts. The questionnaire was then translated into Arabic before distribution; then medical experts further reviewed the Arabic version**.** The content validity of the study tools was tested by a group of five (5) experts in the fields of medical-surgical nursing and community nursing who were asked to review the tools regarding their relevancy and content validation related to the aim of the study. A pilot study was carried out on 10% of students to test the clarity, feasibility, and applicability of the tools (200 students). Accordingly, the necessary modifications were made. These subjects were excluded from the total study subjects. The researchers used Cronbach's alpha coefficient to test the reliability of the study tools. The internal consistency reliability result was (0.758) for the students' health profile part in tool 1, and (0.904) for the COVID-19 Survey Structured Questionnaire. The survey included a cover page to clarify the purpose of the study and to gain the cooperation of the study participants during data collection (filling out the survey).

Data collection

The questionnaire link was posted among the above-mentioned faculties' official groups. The members who clicked the link were directed to the Google forms. To minimize the missing data, the participants were requested to fill in all the items in the online questionnaire or else they could not proceed to the next page; a notification box indicated a warning note that one or more items were not answered. On completion of the questionnaire, the participant was directed to click the submit option, and finally, the online questionnaire was sent to the drive. The data was collected from February 2021 to July 2021.

Ethical Considerations:

- Approval from the Research Ethics Committee of the Faculty of Nursing, Alexandria University was obtained. Then an official written letter was sent to the Vice Dean for Education and Student Affairs for each faculty chosen in the study.
- Written online consent after complete description of the research purpose was included at the start-up statement at the beginning of the online form.
- Anonymity of individual's response was ensured by using the online questionnaire without participant's names.
- Confidentiality of the collected data was assured.
- The study subjects had the right to withdrawal at any time of the research.

Statistical analysis:

After data were collected, they were coded and transferred into specially designed formats to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid any errors made during data entry. Frequency analysis, cross-tabulation, and manual revision were all used to detect any errors. The Statistical Package for Social Sciences (SPSS) version 25 was utilized

for both data presentation and statistical analysis of the results. Monte Carlo test, Chi square test and Fisher's exact test were used to compare between two groups. The level of significance selected for this study was P equal to or less than 0.05.

Results

Table 1 shows the distribution of both groups according to their socio-demographic characteristics. Out of the 1600 students, 800 were medical students, with a mean age of (20.75 ±2.251) years, while the other 800 were non-medical, with a mean age of (20.45 ±2.242) years. More than two-thirds of medical students (71.2%), and more than three-quarters of nonmedical students (91%) were female. A significant difference was detected as regards the gender among the participants of both groups ($\chi2$=101.895, P=0.001). Moreover, the vast majority of both medical and non-medical students were Muslims (98% and 97%, respectively), and the highest percent (90.5% and 86.5%) of them lived in urban areas.

There was a significant difference between students of both groups concerning residence ($\chi2$=9.288, P=0.012).

Concerning students ' health history, the highest percent (88.8% and 86.2% respectively) of both groups had no health problems, while respiratory disorders were reported by the minority (8.2% and 8.5% respectively) of them with a significant difference between both groups concerning the presence of health problems (Mc = 15.915, P = 0.003). It was also noticed from this table that more than two-thirds (68.5% and 71.0%, respectively) of medical and non-medical students were non-smokers. Regarding acquiring COVID-19 infection, more than two-thirds (77.5%, 85.8%) consecutively reported that they did not acquire COVID-19 infection with a significant difference ($\chi2$ = 18.151, P = 0.001).

Table (2) displays medical and non-medical students' sources of information about COVID-19. From the table, it is apparent that medical students who received their information from the academic field comprised (35%), then social media (82.75%), and TV (30 %). Regarding non-medical students, (59.5%) of students reported that they received their information from social media and then from TV (55%). Significance differences between both groups were observed regarding their source of information about COVID-19 (Mc=142.120, P=<0.001).

Table (3) denotes a comparison of both groups regarding their knowledge of COVID-19 symptoms, treatment, prognosis, and reinfection. As regards medical and nonmedical participants' knowledge about COVID-19 symptoms, the vast majority of both groups reported that dyspnea and headache were symptoms of COVID-19 with a significant difference between both groups ($\chi2$ = 4.113, P = 0.042 and $\chi2$ = 4.381, P = 0.036, respectively). Similarly, fatigue and personal oxygen desaturation were mentioned by the highest percentage of both medical and non-medical students (93%, 83.75%, and 96 %, 85.75%), with a significant difference between both groups ($\chi2$ = 33.313, P = 0.001 and $\chi2$ = 6.92, P = 0.008 respectively).

Concerning knowledge about treatment, it can be noticed that the highest percent of both medical and nonmedical students reported that COVID-19 has neither specific treatment nor vaccine with a significant difference between both groups **(**$\chi2$ = 8.588, P=<0.003 and $\chi2$ = 110.24, P=<0.001 respectively), and the currently COVID -19 treatment regimen didn't cure the virus, but relieved symptoms were reported by (77.75%) of medical students, and (71.75%) of non -medical students with a significant difference between both groups ($\chi2$ = 63.408**,** P=<0.001).

In addition, almost all the groups reported that COVID-19 can cause death. On the other hand, the vast majority of both groups stated that a person who is infected with COVID-19 does not gain immunity against COVID-19 and can be re-infected with COVID without a significant difference between both groups. Regarding knowledge about the COVID-19 mode of transmission, it was found that the highest percentage of both groups reported that coughing and sneezing, handshaking, taking public transportation, and touching eyes, nose, and mouth were modes of COVID-19 transmission with no significance except coughing and sneezing. Meanwhile, more than half of both groups mentioned that COVID-19 could be transmitted by air. All medical groups reported that COVID-19 couldn't be transmitted by blood transfusion compared with more than half of non-medical students who reported that COVID-19 could be transmitted with statistical significance ($\chi2$ = 669.504, P = 0.001).

Table 4 shows a comparison between students of both groups regarding their total knowledge score about COVID-19. The table displays that the majority of medical students and non-medical students have good knowledge of COVID-19 (85.5% and 74.5%, respectively), with a significant difference between both groups (Mc = 22.352, P=<0.001).

Table (5) conveys medical and non-medical students' attitudes toward COVID-19. It was noticed from the table that the vast majority of both student groups reported that hand washing (95.5% and 92.5%) and face masks (84% and 76.25%) were necessary for the prevention of COVID-19 infection and transmission, with a significant difference between both groups (Mc =8.451, P=0.014, and Mc =26.724, P=0.001, respectively). Additionally, smoking and antibiotics will not prevent COVID infection, which is represented by nearly the highest percentage of both groups. Coronavirus is not a stigma and was reported by the majority (89% and 90%) of both groups. Almost equal distribution (85.25% and 83%, respectively) of both groups reported that they would go to the hospital as advised if they get infected with COVID-19. The majority of the students in both groups reported that they could get infected when they contacted an infected patient despite their good immunity (89% and 85.25%, respectively). It is obvious from this table that there was a statistically significant difference between both groups concerning finding a credible source to learn more about COVID -19 (Mc=34.486, p=<0.001). The majority of both groups in the study reported that they preferred to stay at home, avoid going to college, and not report to faculty members if they got infected to complete their courses with a statistically significant difference (Mc = 16.281, p=0.001, and Mc = 15.104, p = 0.001, respectively).

Figure (1) shows the total attitude score of both groups toward COVID-19. The figure reveals that the majority of medical students reported a positive attitude toward COVID-19 (54.75%), compared to 47% of the non-medical students who reported a negative attitude toward COVID-19, and that these differences were found to be highly statistically significant (Mc = 133.232, P = 0.001).

Table (6) illustrates compliance of both medical and non-medical students toward COVID-19 concerning respiratory hygienic precautionary measures. More than two-thirds of both groups reported that they always cough and sneeze into tissue paper and then throw it in the waste bin. The same trend was observed concerning wearing a face mask. In addition, around half (48% and 52.5%) of both groups reported that they never change the facemask every 4 hours if they spend a long time outside their home, with a significant difference between both groups ($\chi 2$=13.373, P=0.001). The table also revealed that more than half of both groups reported that sometimes they avoid handshaking and avoiding touching the nose, eyes, and mouth, and the differences between both groups were found to be highly significant (p = 0.003 and p = 0.041, respectively).

It was found that more than half of medical students (53.25%) always use alcoholic hand rub regularly as compared with nonmedical students who sometimes use alcoholic hand rub regularly (45.75%), with a significant difference between both groups (Mc = 15.503, P = 0.002). This table also revealed that nearly half (49.25%) of the medical students sometimes keep the environment clean and well ventilated, in contrast to non-medical students (51.25%), who sometimes keep the environment clean and well ventilated with no significant.

The highest percent of both groups mentioned that they sometimes eat foods that strengthen their immunity and avoid eating outside their home, with significant differences found between both groups (Mc = 12.572, P = 0.010, Mc = 10.836, P = 0.015, respectively). As well as the highest percentage of both groups reported that they sometimes closely monitor personal physical health, pay more attention to their hygiene and clean /disinfect their phone screen regularly with significant differences found between both groups (Mc= 24.497, P=0.001, Mc= 12.244, P=0.041, Mc= 0.893, P=0.023) respectively).

Figure 2 shows the total compliance of both medical and non-medical students with COVID-19 precautionary measures. It was found that the majority of medical and non-medical students have satisfactory compliance (70.5% and 63.25%, respectively). Additionally, there was a significant difference between both groups regarding the total compliance with precautionary measures toward COVID-19 where (FET = 9.941, P = 0.002).

Table (1): Distribution of students of both groups according to their socio-demographic characteristics and their health history.

Socio-demographic characteristics		Medical Students N=800		Non -medical students N=800		Significance test
		No	%	No	%	
Age (X ± SD)		20.75± 2.25		20.45 ± 2.242		-----
Gender	Male	230	28.8	72	9.0	$\chi2$ = 101.895 P=<0.001*
	Female	570	71.2	728	91.0	
Religious	Muslim	784	98.0	776	97.0	FET = 1.641 P=0.200
	Christians	16	2.0	24	3.0	
Residence	Urban	692	86.5%	724	90.5	$\chi2$ = 9.288 P=0.012*
	Rural	108	13.5%	76	9.5	
Health history						
Presence of health problems	No	710	88.8	690	86.2	Mc= 15.915 P=0.003*
	Diabetes	6	0.75	14	1.75	
	Respiratory disease	66	8.2	68	8.5	
	Immunological disease	12	1.5	28	3.5	
	Anemia	6	0.75	0	0.0	
Smoking	Non-smoker	548	68.5	568	71.0	Mc= 1.374 P=0.503
	Current smoker	20	2.5	16	2.0	
	Passive smoker	232	29.0	216	27.0	
Acquiring COVID-19 infection	No	620	77.5	686	85.8	$\chi2$ = 18.151 P=<0.001*
	Yes	180	22.5	114	14.3	

Mc=Monte Carlo test χ^2: Chi square test *: Statistically significant at $p \leq 0.05$

Table (2): Comparison between students of both groups regarding to their Source of information about COVID-19.

** Source of information about COVID-19	Medical Students. (N=800)		Non -medical students. (N=800)		Significance test
	No	%	No	%	
Social media	230	28.75	476	59.5	Mc=142.120 P=<0.001*
Google	29	3.5	24	3	
TV	240	30	440	55	
Official sites	190	23.75	12	1.5	
Healthcare workers	35	4.5	2	0.25	
Academic field	280	35	2	0.25	

N.B: **More than one answer was allowed

Mc=Monte Carlo test *: Statistically significant at $p \leq 0.05$

Table (3): Comparison between students of both groups regarding to their knowledge about COVID -19 Symptoms, treatment, prognosis and reinfection.

Knowledge about COVID -19		Medical Students. (N=800)		Non -medical students. (N=800)		Significance Test
		No	%	No	%	
Knowledge about COVID -19 Symptoms						
Fever	No	32	4	38	4.75	$\chi2 = 0.537$
	Yes	768	96	762	95.25	P=0.463
Cough	No	56	7	68	8.5	$\chi2 = 1.258$
	Yes	744	93	732	91.5	P=0.261
Dyspnea	No	42	5.25	42	5.25	$\chi2 = 4.113$
	Yes	758	94.75	758	94.75	P=0.042*
Headache	No	106	13.25	136	17	$\chi2 = 4.381$
	Yes	694	86.75	664	83	P=0.036*
Diarrhea	No	114	14.25	138	17.25	$\chi2 = 2.713$
	Yes	686	85.75	662	82.75	P=0.099
Muscle pain	No	120	15	96	12	$\chi2 = 3.082$
	Yes	680	85	704	88	P=0.079
Fatigue	No	56	7	130	16.25	$\chi2 = 33.313$
	Yes	744	93	670	83.75	P=<0.001*
COVID -19 affect person's oxygen saturation.	No	32	4	113	14.25	$\chi2 = 6.926$
	Yes	768	96	687	85.75	P=0.008*
Knowledge about COVID -19 treatment						
COVID-19 has no specific treatment	No	100	12.5	142	17.75	$\chi2 = 8.588$
	Yes	700	87.5	658	82.25	P=0.003*
COVID-19 has no vaccine	No	334	41.75	388	48.5	$\chi2= 110.243$
	Yes	466	58.25	412	51.5	P=<0.001*
Current COVID-19 treatment just relives symptoms	No	178	22.25	226	28.25	$\chi2= 63.408$
	Yes	622	77.75	574	71.75	P=<0.001*
Knowledge about COVID -19 prognosis						
COVID-19 can cause death	No	0	0	26	3.25	$\chi2 = 26.429$
	Yes	800	100	774	96.75	P=<0.001*
Knowledge about COVID -19 reinfection						
person who gets infected with COVID gain immunity against it	No	736	92	730	91.25	$\chi2 = 0.293$
	Yes	64	8	70	8.75	P=0.558
Person who is infected with COVID can be re-infected.	No	736	92	730	91.25	$\chi2 = 0.293$
	Yes	64	8	70	8.75	P=0.558
Knowledge about COVID -19 mode of transmission						
Coughing and sneezing.	No	44	5.5	98	12.25	$\chi2 = 117.73$
	Yes	756	94.5	702	87.75	P=<0.001*
Handshaking.	No	58	7.25	54	6.75	$\chi2 = 0.153$
	Yes	742	92.75	746	93.25	P=0.695
Taking public transportation.	No	56	7	52	6.5	$\chi2 = 0.158$
	Yes	744	93	748	93.5	P=0.690
Touching eyes, nose and mouth.	No	14	1.75	24	3	$\chi2 = 2.695$
	Yes	786	98.25	776	97	P=0.100
From air.	No	310	38.75	294	36.75	$\chi2 = 0.680$
	Yes	490	61.25	506	63.25	P=0.409
Blood transfusion	No	800	100	328	41	$\chi2$ 669.504
	Yes	0	0	472	59	P=<0.001*

χ^2: Chi square test *: Statistically significant at $p \leq 0.05$

Medical students. (N=800) (Faculties of nursing, medicine, pharmacy, and dentistry

Non -medical students. (N=800)(Faculties of education, arts, law, and commerce)

Table (4): Comparison between students of both groups regarding to their total knowledge about COVID -19.

Total knowledge about COVID -19	Medical Students. (N=800)		Non -medical students. (N=800)		Significance Test
	No	%	No	%	
Poor knowledge	4	0.5	26	3.25	Mc=22.352 P=<0.001*
Fair knowledge	112	14	179	22.25	
Good knowledge	684	85.5	595	74.5	

Mc=Monte Carlo test *: Statistically significant at $p \leq 0.05$

Table (5): Comparison between students of both groups regarding to their Attitude

Attitude toward COVID -19		Medical Students. (N=800)		Non -medical students. (N=800)		Significance test
		No	**%**	**No**	**%**	
Hand washing is necessary for prevention of COVID infection.	No	4	0.5	14	1.75	Mc=8.451 P=0.014*
	Yes	764	95.5	740	92.5	
	Not sure	32	4	46	5.75	
Face mask can prevent COVID transmission	No	16	2	50	6.25	Mc=26.724 P=<0.001*
	Yes	672	84	610	76.25	
	Not Sure	112	14	140	17.5	
Smoking will not prevent COVID infection.	No	82	10.25	144	18	Mc=27.920 P=<0.001*
	Yes	588	73.5	496	62	
	Not sure	130	16.25	160	20	
Antibiotic will not prevent COVID infection	No	102	12.75	152	19	Mc=107.456 P=<0.001*
	Yes	568	71	368	46	
	Not sure	130	16.25	280	35	
Virus is not a stigma.	No	59	7.5	42	5.25	Mc=12.284 P=0.002*
	Yes	714	89	728	91	
	Not sure	27	3.5	30	3.75	
If getting infected I will go to hospital as advised.	No	42	5.25	56	7	Mc=2.343 P=0.309
	Yes	682	85.25	664	83	
	Not sure	76	9.5	80	10	
I can get infected if I contacted an infected patient despite my good immunity.	No	36	4.5	12	1.5	Mc=131.101 P=<0.001*
	Yes	712	89	682	85.25	
	Not sure	52	6.5	106	13.25	
Find a credible source to Learn more about COVID-19.	No	54	6.75	104	13	Mc=34.486 P=<0.001*
	Yes	650	81.25	550	68.75	
	Not sure	96	12	146	18.25	
Fear and worry about my own health and the health of my loved ones.	No	28	3.5	22	2.75	Mc= 0.773 P=0.679
	Yes	726	90.75	730	91.25	
	Not Sure	46	5.75	48	6	
Stay at home & avoid going to college and visiting family &friends.	No	80	10	96	12	Mc=16.281 P=<0.001*
	Yes	594	74.25	522	65.25	
	Not sure	126	15.75	182	22.75	
If I got infected, I would do anything to avoid isolation.	No	82	10.25	102	12.75	Mc= 5.391 P=0.067
	Yes	536	67	548	68.5	
	Not sure	182	22.75	150	18.75	
If I get infected, I will not report to my faculty members to complete my courses and exams.	No	514	64.25	556	69.5	Mc=15.104 P=<0.001*
	Yes	86	10.75	106	13.25	
	Not sure	200	25	138	17.25	
I think about death from COVID.	No	82	10.25	108	13.5	Mc=4.074 P= 0.130
	Yes	428	53.5	416	52	
	Not sure	290	36.25	276	34.5	

Table (6): Comparison between students of both groups regarding their compliance with COVID -19 precautionary preventive measures.

Compliance with COVID -19 precautionary preventive measures		Medical Students. (N=800)		Non -medical students. (N=800)		Significance test
		No	%	No	%	
Cough and sneeze in a tissue paper and throw it in waste bin.	Never	34	4.25	30	3.75	$\chi2$=0.978 P=0.613
	Sometimes	206	25.75	222	27.75	
	Always	560	70	548	68.5	
Wear face mask	Never	14	1.75	8	1	Mc=4.822 P=0.089
	Sometimes	216	27	250	31.25	
	Always	570	71.25	542	67.75	
Change the facemask every 4 hours, with long time outside.	Never	384	48	420	52.5	$\chi2$=13.373 P=0.001*
	Sometimes	292	36.5	304	38	
	Always	124	15.5	76	9.5	
Avoid hand shaking.	Never	54	6.75	76	9.5	$\chi2$=11.222 P=0.003*
	Sometimes	572	71.5	596	74.5	
	Always	174	21.75	128	16	
Avoid touching nose, eyes, and mouth	Never	50	6.25	76	9.5	$\chi2$=6.183 P=0.041*
	Sometimes	484	60.5	478	59.75	
	Always	266	33.25	246	30.75	
Wash hands with water and soap regularly.	Never	16	2	8	1	Mc= 6.084 P=0.439
	Sometimes	240	30	238	29.75	
	Always	524	65.5	554	69.25	
Use alcoholic hand rubs regularly.	Never	14	1.75	48	6	Mc= 15.503 P=0.002*
	Sometimes	360	45	386	48.25	
	Always	426	53.25	366	45.75	
Keep the environment clean and well ventilated.	Never	78	9.75	54	6.75	Mc= 4.228 P=0.370
	Sometimes	394	49.25	410	51.25	
	Always	328	41	300	37.5	
Eat foods that strength my immunity.	Never	20	2.5	40	5	Mc= 12.572 P=0.010*
	Sometimes	548	68.5	592	74	
	Always	212	26.5	168	21	
Avoid eating outside.	Never	102	12.75	136	17	Mc= 10.836 P=0.015*
	Sometimes	512	64	516	64.5	
	Always	186	23.25	166	20.75	
Maintain social distance with others.	Never	68	8.5	72	9	Mc= 8.419 P=0.061
	Sometimes	492	61.5	530	66.25	
	Always	220	27.5	198	24.75	
Closely monitor personal physical health.	Never	60	7.5	132	16.5	Mc= 24.497 P=<0.001*
	Sometimes	432	54	454	56.75	
	Always	274	36.25	214	26.75	
Pay more attention to personal hygiene.	Never	0	0	0	0	Mc= 12.244 P=0.041*
	Sometimes	488	61	536	67	
	Always	292	36.5	264	33	
Clean /disinfect my phone screen regularly.	Never	198	24.75	254	31.75	Mc=0.893 P=0.023*
	Sometimes	376	47	352	44	
	Always	226	28.25	194	24.25	

Mc=Monte Carlo test χ^2: Chi square test *: Statistically significant at $p \leq 0.05$
Medical students. (N=800) (Faculties of nursing, medicine, pharmacy, and dentistry
Non -medical students. (N=800)(Faculties of education, arts, law, and commerce)

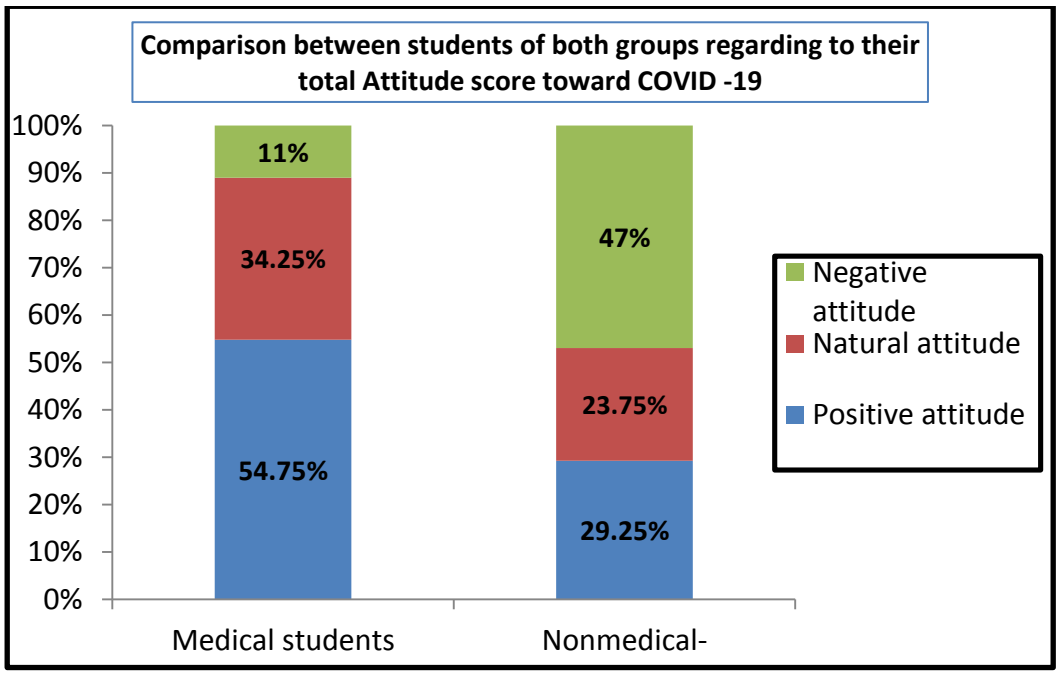

Figure (1): Comparison between students of both groups regarding to their total Attitude score toward COVID -19.

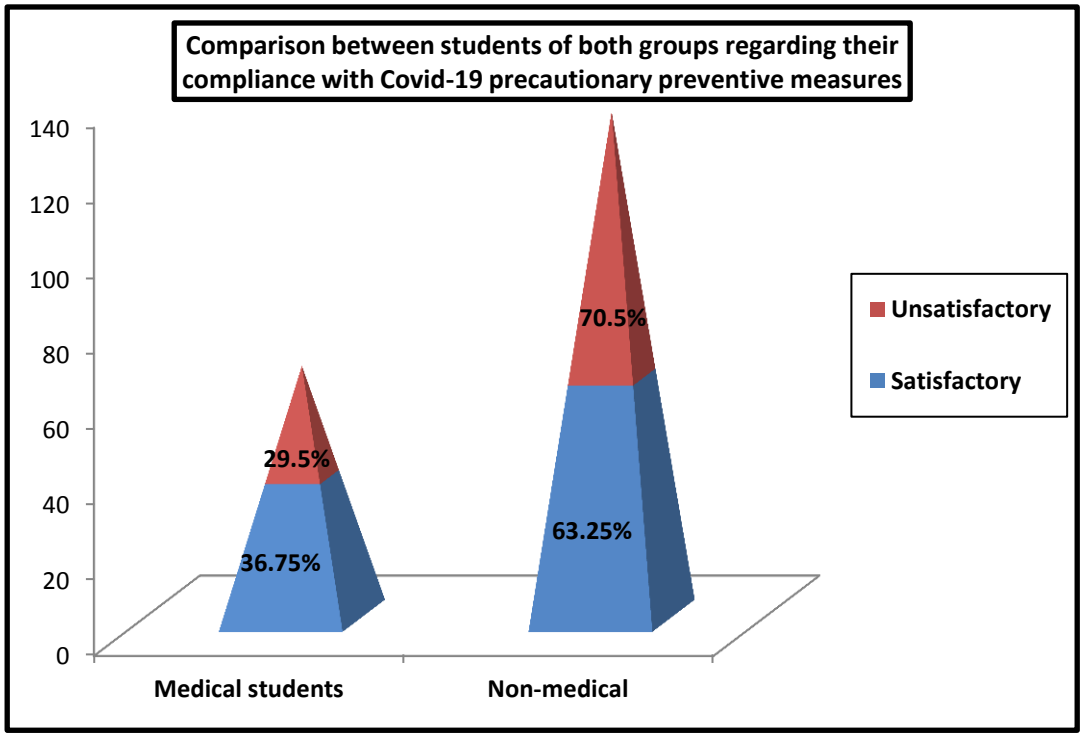

Figure (2): Comparison between students of both groups regarding their compliance with Covid-19 precautionary preventive meaures.

Discussion:

The COVID-19 outbreak was considered the sixth public health emergency of international concern on January 30, 2020, and a pandemic on March 11, 2020 **(Lai et al., 2020 & Zhong et al., 2020)**. Worldwide efforts have been made to prevent the spread of this virus. These efforts comprise governmental efforts, together with personal attitudes and behaviors, which depend on the alertness of the general public regarding the disease. Here we present the results of a cross-sectional study about the knowledge, attitude, and precautionary measures of COVID-19 among medical and non-medical university students in Alexandria.

The present study revealed that the majority of the university students in both groups had good knowledge of COVID-19 from different sources such as social media, TV, and academic courses. These findings were supported by the results of **(Vorderer et al. (2016) in** their studies about explorations into university students' use of social media and mobile smart devices, they found that the highest percentage of their students relied on the internet and social media as the main source of information as opposed to more traditional sources such as newspapers, television channels, radio, or scientific websites. This could be attributed to the fact that the student population is young and has their mobile devices with internet availability almost all the time. Moreover, more than one-third of Facebook users in Egypt are in the youth age group between "18 and 40" years. In 2019, Facebook platform users increased from 33 million in 2016 to more than 40 million **(Facebook Users, 2019)**. In contrary to our findings, **(Hasan et al; 2021)** in their studies about knowledge, attitudes, and practices toward COVID-19 in the United Arab Emirates found that their students demonstrated moderate knowledge

Moreover, few studies have specifically assessed the medical and non-medical students' knowledge, attitudes, and precautionary measures in relation to COVID-19. Results have been only loosely similar and generally unclear. Findings have been relatively ambiguous, and only comparable to a limited extent. Moreover, trend analysis revealed that differences in knowledge level by education level were stable over the course of the pandemic **(Abate and Mekonnen 2020)**.

Results drown from current study revealed that, the majority of medical students and non-medical students have good knowledge of COVID-19 (85.5% and 74.5%, respectively), with a significant difference between both groups in favor to medical students (Mc = 22.352, P=<0.001). These results can be attributed to a number of factors. The first is the scientific background that medical students may have acquired during their academic training and the requirement that they be aware of infectious diseases due to the nature of their studies. Additionally, medical students may search specialized websites to obtain information about COVID-19 and they have unusual opportunity to ask their academic staff to gain the most scientific and update information. All these sources may provide a lot of necessary information for students and positively impact their level of knowledge about COVID 19.

This finding was supported by the result of **(Salem M et al. 2021)** who found that the majority of respondents received information about COVID-19 symptoms (93.9%). Similar findings were reported by **Alzoubi et al (2020)**, who reported that the highest percentage of their participants knew the COVID-19 symptoms. In addition, findings of a Pakistani study conducted by **(Hasan et al., 2021)**, illustrated that the majority of students were aware of the common COVID-19 symptoms, as well as the channels of transmission.

Attitudes often reflect stereotypes about persons; they are a reflection of the person who has a certain attitude and they also have an impact on the perception of the individual who is part of the group **(Hinton, 2017).** Every human being holds thousands of attitudes, including ones concerning our loved ones, those about family and friends, political leaders, abortion rights, terrorism, preferences for music, and much more. Each of our attitudes has its own distinguishing features, and no two attitudes come to us or influence us in quite the same way.

According to, the theory of planned behavior (TPB) the attitude to behavior is defined as the degree of a person's positive or negative feelings or predisposition towards carrying out the behavior. So, the situation is traced through an assessment of one's beliefs about the consequences of behavior and an evaluation of the desirability of these consequences **(Ajzen, 1991)**.

In this context, the current study findings revealed that the majority of medical students reported a positive attitude toward COVID-19 (54.75%), compared to 47% of the non-medical students who reported a negative attitude toward COVID-19, and that these differences were found to be highly statistically significant (Mc = 133.232, P = 0.001). The positive attitude regarding COVID-19 among medical groups may be due to students' belief that the pandemic state was dangerous but would be successfully controlled and they had confidence in the government in winning the battle against COVID19. Furthermore, good knowledge demonstrated by both medical and non-medical students about a given COVID19 consequently affects the student's attitude. Similar findings were reported by **(Salem et al., 2021)** in their study about knowledge, attitude and precautionary actions among medical students found that, positive attitude towards the use of protective measures, which were necessary to limit the spread of the disease.

Furthermore, COVID-19 has become a part of everyday life that is easily spread from one person to another, either directly or indirectly. The severity of this contagious disease is dependent on the individual's sensitivity to infection and perception of danger **(Paul et al., 2021)**. Regarding the total score of both medical and non-medical students' compliance with COVID-19 precautionary preventive measures, the current study found that the majority of both groups have satisfactory performance (70.5% and 63.25%, respectively). Additionally, there was a significant difference between both groups regarding the total compliance with COVID-19 precautionary measures where (FET = 9.941, P = 0.002). This finding may be attributed to that one of the major issues for medical students is connecting theoretical material with practical applications and their use in the clinic, which might enhance their practical skills, background knowledge of the students in their curricula and hospital experience about the disease process, infection cycle, and the importance of adopting such preventive measures for protecting themselves and preventing transmission to other people. Similar findings were reported by (**Prasad et al., 2020**) in a study about precautionary practices regarding COVID-19, which found that more than half of medical students adhere to precautionary preventive measures for COVID-19. In the same line, the findings of **(Elhadi et al., 2020)** in a study about knowledge, preventive behaviors and risk perception among university students.

Furthermore, the satisfactory compliance regarding Covid-19 precautionary preventive measures may be enhanced by the great efforts at all levels by the government, including public awareness campaigns. WHO has conducted an intensive awareness campaign and communicated via its website, television, and various social media. In addition, Alexandria University's efforts as it produced a guide and posters about COVID-19 to provide students with facts and precautionary messages. Similar findings were reported by **(Karachi et al., 2020)** in their study upon the comparison of the students' practice of COVID-19, which found that a greater number of their medical students said that they use alcoholic hand rubs as compared to the smallest number of nonmedical students.

Conclusion

Based on the current study findings, it can be concluded that university students in our survey had good knowledge about COVID-19, medical students have positive attitude regarding COVID-19 compared to nonmedical students. This knowledge is mainly acquired through social media platforms and the internet, which has both advantages and disadvantages. On the other hand, the majority of both groups had satisfactory compliance with precautionary preventive measures toward Covid-19 concerning changing the face mask every 4 hours if they spend a long time outside their house and keeping the environment clean and well ventilated. Meanwhile, more than half of the other students in both groups had satisfactory compliance with

precautionary preventive measures toward Covid-19.

Recommendations

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

- Apply community mobilization campaigns to boost community awareness about COVID-19 to maintain this positive attitude.
- Establish a university-based health education program about COVID-19 and protective behaviors and keep constant observation to fight misinformation. These might include posters, seminars, information via social channels on good respiratory etiquette, hand washing practices, and physical distancing to enhance safer lifestyles and prevent COVID-19 transmission.
- Emphasis should be on encouraging formal sources of information to counter reluctance generated through social media use.

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