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## Assessment of knowledge, attitudes, and precautionary actions against COVID-19 among medical students in Egypt



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### ABSTRACT

**Background:** The COVID-19 pandemic has become a significant public health threat. Therefore, the purpose of this survey was to assess knowledge, attitudes, and precautionary measures related to COVID-19 among college students.

**Methods:** A convenient sample of 3263 volunteers responded to a self-administered electronic questionnaire during the period from October to December 2020. The knowledge, attitude, and practice (KAP) score level was calculated with a range of 0–34 points.

**Results:** The mean age of the participants was 21 (+/–1.2) years, 69% were female, and 60.3% were urban. The majority of respondents received information about COVID-19 symptoms (93.9%), how to protect yourself (92.5%), and how it is transmitted (86.8%). The most cited sources of information were social media (75.7%), and the most credible were government websites and international organizations. More than half (65%) expressed concern regarding contracting COVID-19, and 89.2% believed that COVID-19 is a dangerous infection due to the rapid spread of the virus. The mean total KAP score was 26.1 (+/–4.2), which differed significantly between gender groups and residential areas. Logistic regression analysis showed that volunteers with good knowledge were 1.3 and 1.0 times more willing to volunteer and maintain a physical distance than those with less knowledge. Female students were 40% less likely to volunteer than males, yet they were 1.8 times more cautious about practicing protective measures such as washing their hands with soap and water than male students. Classifying the COVID-19 pandemic as a serious infection, urban communities have twice been careful to wear masks outdoors and maintain a social distance of at least 2 m from one another compared to rural inhabitants.

**Conclusion:** The current survey revealed that medical students have good knowledge regarding COVID-19, a positive attitude towards the use of protective measures, which were necessary to limit the spread of the disease. However, improvement is still required, and community education should occur as usual with a commitment to utilizing all the strategies that can support knowledge to improve and change attitudes as well as practices of the population.

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### Introduction

Coronavirus disease (COVID-19) is much more than a health problem that is stressing everyone in all countries around the globe, resulting in devastating educational, social, economic, and politi-

cal crises [1]. The novelty of the virus and the overabundance of information circulating on social media have contributed to an infodemic epidemic, which makes it hard for people to identify which information is reliable and trustworthy. Rumors and misinformation travel fast and can undermine risk communication efforts preventing people from adopting preventive measures that can keep them safe [2].

Adolescents and youth should not only be considered as affected populations but also as highly effective partners in COVID-19 prevention efforts. They can engage meaningfully to be educators and agents of change among their peers and in their communities [3].

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Young people should collaborate with health authorities to help break the chain of infection by providing the appropriate training on the disease and its spread. Despite the digital disparities, this generation of youth is more connected through technology, media, and the internet. They will play a valued role in disseminating reliable information about COVID-19, as well as risk prevention, national preparedness, and response efforts [2]. Using and actively engaging with the vast networks of youth organizations not only to promote compassion, raise awareness of and protection against the virus, but also to encourage safe conduct in their communities, and sharing accurate information [4,5]. Behaviors like underestimation, stigmatization, panic emotions, false measures to avoid infection affect the battle against such uncommon situation [6].

According to the Knowledge, Attitude and Practices (KAP) theory, the state of the society, behaviors, understanding, and habits have a significant impact on willingness to consider behavioral improvement and adherence to preventive strategies [7].

Increased knowledge about transmission mode, understanding of preventive strategies, addressing myths and misconceptions, and development of preventive strategies can all contribute to the successful implementation of preventive strategies [7,8].

The Egyptian Youth Initiative (EYI) targets youth and students in universities. Follow engagement schematics in order to investigate the participation of volunteers in program campaigns, and thus determining when to provide them opportunities to take ownership.

The purpose of this assessment survey was to assess knowledge, attitudes, and precautionary actions related to COVID-19 among a sample of the Student Union Networks Alliance of medical students.

## Materials and methods

### Study design and setting

The researchers conducted an online electronic survey among a sample of medical students in 25 Egyptian universities through the Student Union Networks Alliance representing the following affiliations: Medical School: International federation of Medical Students Association (IFMSA), Physical Therapy: Egyptian Union of Physical Therapy (EUPTS), Pharmacy: Egyptian Pharmaceutical Students' Federation (EPSF), Nursing faculties: Egyptian Novice Nursing and Students Scientific Associations (ENNSSA), through an online electronic self-administered questionnaire during October–December 2020. We conducted the study following the Checklist for Reporting Results of Internet E Surveys (CHERRIES) guidelines.

### Participants and data collection

Among the 6000 Student Union volunteers (total population), a convenient sample of 3263 participants (54.3%) responded to the online survey. Students representing the Student Union Networks Alliance used a purposive sampling technique by researching social networks and social media groups that link the Student Union together.

Once the groups were located, they posted announcements about the study and provided a link for these groups. This link has been made accessible to some groups for one week. Questionnaire development based on the COVID-19 Rapid Quantitative Assessment Tool as part of the Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 preparedness and response. This tool was developed by the China International Famine Relief Commission publication, United Nations Children's Fund (UNICEF) and World Health Organization (WHO) [2], to create, implement, and track a plan of action for effective communication and community engagement. During the early response to COVID-

19, this tool aided in the preparation and protection of individuals, families, and their health [2].

The online tool included five sections with closed and open-ended questions.

- Background characteristics and demographics of the study participants (age, gender, residence, regions, affiliation, and universities).
- Awareness and knowledge of COVID-19 (10 items) including ever heard about COVID-19, information received, information to know, source of information, credible sources of information, high-risk groups, knowledge of COVID-19 mode of transmissions, symptoms, preventive measures adopted to avoid contracting COVID-19, and actions in case of illness.
- Attitude and perceptions towards COVID-19 (5 items): rating COVID-19 as dangerous infection, perceived infection risk, complaining of misconceptions, volunteering to raise awareness and prevent the spread, stigma towards specific people, and the group of people to avoid in your community due to COVID-19.
- Fears, worries, and actions towards COVID-19 (4 items): fears and worries during the pandemic, feeling more worried during curfew and coping with anxiety and stress.
- Practices and preventive measures against COVID-19 (4 items): wearing mask outdoor, adequate distance from others in public places, staying at home and going out when necessary, hand washing habits with soap and water.

The questionnaire developed in Arabic using a simple local language and was previously tested in a pilot study with 300 participants of the four affiliations (beyond those studied). The questionnaire reliability was confirmed by applying a reliability test using Cronbach alpha (0.73).

The application was developed by a UNICEF IT specialist on Google drive, and the online form was designed to accommodate the multiple response questions. After the tool was developed, the application was tested by the EYI executive team at National Population Council (NPC)/UNICEF to verify and confirm skip patterns and follow them to guarantee the accuracy of data collection. To ensure the validity and accuracy of the data collected, the investigators settle detailed instructions regarding study objectives for all student counselors who distributed the questionnaire to the subjects in advance. The survey tool automatically verifies that all questions had to be filled before submission and cannot be submitted twice.

### Scoring system

Questions with multiple correct responses were coded and include eight items:

At least three correct types of information received from three different sources, listing three top credible channels for awareness about COVID-19 (Government websites, Radio and TV stations, and international organizations).

- Three properly declared modes of transmission (droplets, direct contact, and touching contaminated surfaces).
- Three main symptoms of infection (fever, feeling tired, dry cough). Three correct preventive measures (wearing masks, washing hands, cleaning surfaces with chlorine).
- At least three correct procedures to encounter COVID-19 infection (stay in quarantine, call the hotline, check samples, go to the nearest hospital or health unit).
- Identify at least three high-risk groups (persons with chronic diseases, health care workers, and older population).

In multiple responses, we create a separate variable for each valid answer to the question. Using dichotomy sets, each variable

**Table 1**  
Distribution of the surveyed students by affiliations, gender, residences, and regions, COVID-19 Rapid Assessment for RCCE 2020, the Egyptian Youth Initiative.

Characteristics	IFMSA	EUPTS	EPSF	ENNSSA	Total
Gender %					
Male	43.4	22.2	30.4	29.8	31.0
Female	56.6	77.8	69.6	70.2	69.0
Residence %					
Urban	67.5	65.6	69.4	51.9	60.3
Rural	32.5	34.4	30.6	48.1	39.7
Regions %					
Cairo	55.6	19.0	29.3	15.2	24.6
Lower Egypt	22.3	30.8	21.6	53.0	37.8
Northern upper Egypt	6.2	8.6	24.6	4.6	11.3
Southern upper Egypt	5.7	24.7	11.4	12.4	12.4
Suez canal	10.1	16.8	13.1	14.7	13.9
Total number	385	279	1005	1594	3263

IFMSA: International Federation of Medical Students Associations EPSF: Egyptian Pharmaceutical Students' Federation EUPTS: Egyptian Union of Physical Therapy. ENNSSA: Egyptian Novice Nursing and Students Scientific Associations.

has two possible scores, which indicate the response selection by the survey recipient.

The calculated total score for KAP included five variables in the Knowledge section of COVID-19 (mode of transmission, symptoms, high-risk groups, preventive measures, and actions in case of illness).

- Five items on the COVID-19 Attitude Section (Severity rating of COVID-19 infection, perceived risk of getting an infection, misconceptions, willingness to volunteering, stigma, and discrimination).
- Four variables in the practice section relate to COVID-19 preventives measures (wearing a mask, adequate distance from others in public places, staying at home and going when necessary, hand-washing habits with soap and water).

For KAP variables, a standard scoring system was used: 1 point for correct answers and 0 for incorrect answers in the knowledge section, 2 points for positive, 1 point for neutral, and 0 for negative options in the attitude section, and 1 point for constructive and 0 for passive options in the practice section. Awareness range was 0–22, Attitude had a score range of 0–8, Practice had a score range of 0–4, and complete KAP had a score range of 0–34.

#### Data processing and analysis

The data were analyzed using the Statistical Package for the Social Sciences SPSS 22.0 software (IBM Microsoft), for quantitative variables, mean, and standard deviation, median and interquartile range were used to express the results. While the Mann–Whitney and \*Kruskal–Wallis tests of significance were used for comparison when applicable. For qualitative variables percentage and proportion were used to expressing the results. Binary logistic regression models were utilized to determine possible significant predictors (independent variables including knowledge, gender, residence and geographic location of students) of positive attitudes and practices toward the prevention and control of COVID-19 (dependent variables). The tests are statistically significant at  $p < 0.05$ .

#### Ethical considerations

The researchers obtained ethical approval from the Research Ethics Committee, Faculty of Medicine, Cairo University. The Executive Board of the Egyptian Youth Initiative (NPC & UNICEF) approved the study as part of the project framework activity. Prior to data collection, participants signed a written informed consent after illustrating the study aim and the importance of the online form. Only participants who agreed to participate were included in

the study and those who declined were excluded from the study, by submitting an empty form after answering “Not willing to participate”. Data is kept confidential in accordance with the revised Helsinki decelerations of biomedical ethics.

#### Results

Of the total members representing the four affiliations, 3263 volunteers responded to the survey. The mean age of the participants was  $21 \pm 1.2$  SD years, 69% were female, and 60.3% were urban. Table 1 depicts the sociodemographic characteristics of the students surveyed.

#### Awareness and knowledge of COVID-19

The majority of respondents received information about COVID-19 symptoms (93.9%), how to protect self (92.5%), and how it is transmitted (86.8%). We need more information about actions in case of illness, complications, home isolation measures, treatment, COVID-19 sequelae, places providing services, and emergency management according to the stages of the disease, COVID-19 hotlines. Regarding information sources, the most frequently mentioned and respondents were social media (75.7%). However, the most credible sources were government websites and international organizations (Fig. 1).

#### Multiple responses

Nearly all respondents who had heard of COVID-19 (88.5%) reported that they had received at least three types of information about COVID-19. More than half relied on more than three sources of information. The majority recorded three correct symptoms (77.1%), stated three exact modes of transmission, and (76.8%) identified at least three high-risk groups at higher risk of infection than others. The majority stated three preventive measures to be safe from COVID-19, and approximately half mentioned actions that were followed in case of infection with COVID-19 (Fig. 2).

Among the students surveyed, 65% were concerned about contracting COVID-19. Eighty percent believe that COVID-19 is a dangerous infection due to the rapid spread of the virus (89.2%), the ability of a person having but transmit the disease is equal to (77%), whereas the severity of manifestations is about (65.3%).

Misconceptions represented by almost half of the respondents (55.5%) complained of misconceptions and misinformation about COVID-19. Analysis of open-ended questions exploring misconceptions and rumors revealed the following: coronavirus is not a dangerous illness as previously declared; the virus will die in the hot weather or sun exposure, and claim that infection can

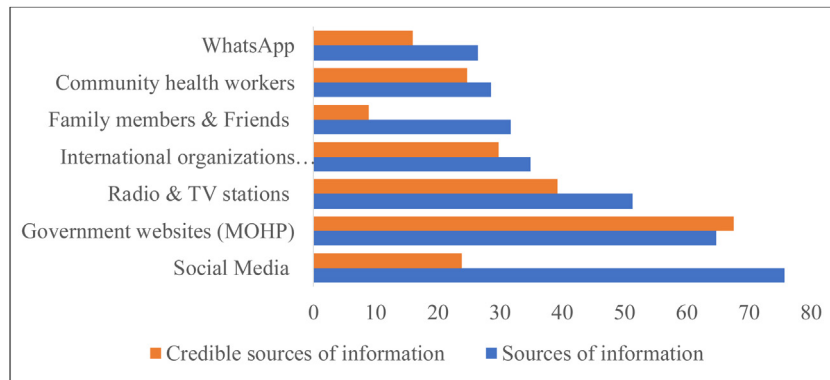


Fig. 1. Percent distribution of reported sources of information versus credible channels.

MOHP: Ministry of health and population.

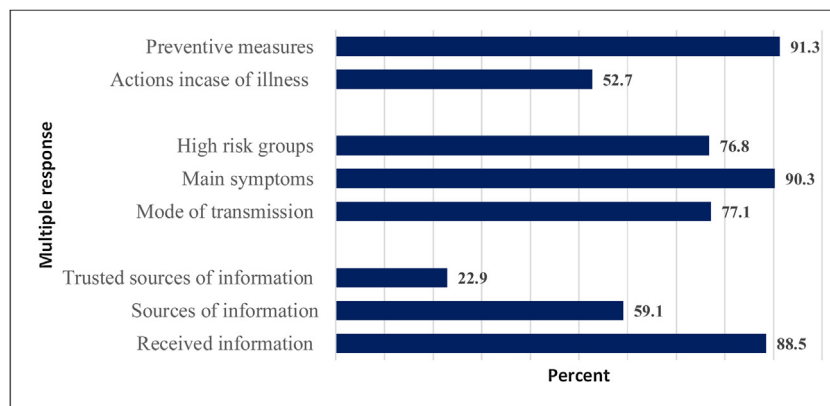


Fig. 2. Multiple responses regarding COVID-19 awareness and knowledge.

Attitudes and perceptions about COVID-19.

occur only once. Overprotective measures such as the use of an excessive amount of Dettol and disinfectants, drinking hot drinks, taking many multivitamins and minerals, and prophylactic antibiotics without medical consultation. Others referred to it as a “fatal illness” that to the extent they panicked at the news, leaving them with weakened immune systems. In addition to following different treatment protocols due to the presence of multiple sources of information. The students surveyed reported experiencing stigma as health care workers. It is significant to act against the widespread rumors and misconceptions, and credible channels should have a unified message for communication and awareness. Health and risk communication information and approaches remain static and unresponsive to reflect the changes and address communities’ concerns. Questions and suggestions will be irrelevant, less credible, and the epidemic response will fail. More than eighty percent of the respondents were willing to take action to prevent the spread of misconceptions and rumors in their communities against COVID-19 and showed their willingness to volunteer to raise community awareness. Respondents assumed that the poor and the illiterate community segment suspected to be the least responsive to health interventions, especially those who work for daily income.

*Fears, worries, and coping mechanism about COVID-19*

Fig. 3 illustrates the perceived panic of the respondents during the pandemic. Mentioned worries were in the form of: “unable to see my family and friends” (48.1%), “Making sure that my family has the needed food and medicines” (39%). They try to cope by staying at home and going out only for necessity (80.5%), praying and fasting (44.7%), checking social media for news (33.7%), calling friends and family (32.1%), (26.1%) exercising whereas (18.5%) stopped hearing news.

*Practices and preventive actions against COVID-19 infection*

Reported preventive measures to avoid contracting COVID-19 and the specific measures adopted during the past two-week prior to the survey shown in Fig. 4. When respondents were asked to add some requests in their own words, a considerable percentage of respondents recommended herbal remedies such as drinking hot drinks, taking recipes to strengthen immunity, eating garlic, and gargle with water and salt.

Table 2 illustrates multiple responses, knowledge of COVID-19 by background characteristics.

The percentage of participants who reported the three most common symptoms could report at least two correct modes of transmission, identify at least three high-risk groups and report three actual preventive measures to avoid contracting COVID-19 were significantly higher among female participants.

Table 3 demonstrates the KAP of COVID-19 by background characteristics. Females were more knowledgeable compared to male participants with a P value (<0.001). These respondents residing in urban communities showed higher significant practice score than those in rural communities.

Comparison of affiliations detected that there was a significant difference of means (H = 18.53, P < 0.001). Then post hoc tests to test pairwise comparisons found a significant difference between affiliations regarding KAP scores as shown in Table 4.

Logistic regression analysis showed that volunteers with good knowledge were more ready to volunteer and maintain a physical distance 1.3 and 1.0 times more than those with less knowledge, respectively. Female students were less likely to volunteer than males by 40%, nonetheless, they were more cautious about practicing protective measures like wash-

**Table 2**  
Multiple response, knowledge of COVID-19 by background characteristics.

Characteristics	Reported the three most common symptoms of COVID-19		Mentioned at least two correct mode of transmission			Correctly identified at least three high risk groups for COVID-19			Reported three correct preventive measures to avoid contracting infection			Certain actions taken if respondents experiences symptoms			
	Not reported	Reported	P value	Not mentioned	Mentioned	P value	Not identified	Identified	P value	Not reported	Reported	P value	Not Responding	Responding	P value
Gender															
Male	12.4	87.6	0.001	26.4	73.6	0.001	26.1	73.9	0.008	12.6	87.4	0.000	48.5	51.5	0.372
Female	8.6	91.4		21.3	78.7		21.9	78.1		7.0	93.0		46.8	53.2	
Residence															
Urban	10.3	89.7	0.214	22.0	78.0	0.141	22.7	77.3	0.354	9.4	90.6	0.080	46.1	53.9	0.069
Rural	9.0	91.0		24.2	75.8		24.1	75.9		7.6	92.4		49.3	50.7	
Affiliation															
IFMSA	8.8	91.2	0.088	23.4	76.6	0.261	22.3	77.7	0.765	9.1	90.9	0.139	49.9	50.1	0.000
EUPTS	14.0	86.0		22.6	77.4		25.4	74.6		11.8	88.2		57.3	42.7	
EPSF	9.8	90.2		20.8	79.2		23.6	76.4		7.5	92.5		51.9	48.1	
ENNSSA	9.2	90.8		24.2	75.8		22.8	77.2		8.8	91.2		42.1	57.9	

IFMSA: International Federation of Medical Students Associations EPSF: Egyptian Pharmaceutical Students' Federation EUPTS: Egyptian Union of Physical Therapy.  
ENNSSA: Egyptian Novice Nursing and Students Scientific Associations.



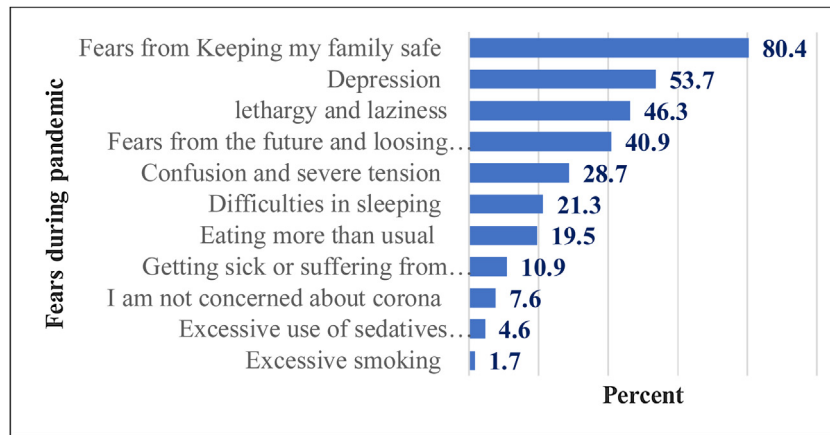


Fig. 3. Perceived Fears during the COVID-19 pandemic.

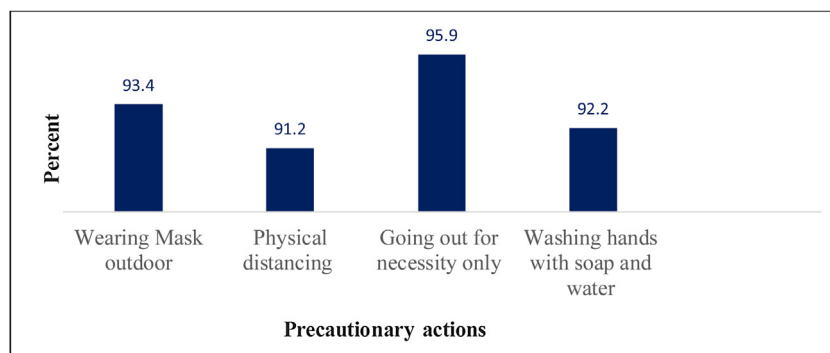


Fig. 4. Specific precautionary actions against COVID-19.

**Table 3**  
Knowledge, attitude, and practices of COVID-19 by background characteristics.

KAP scores	Males Mean ± SD	Females Mean ± SD	Mean ± SD	Z	*P value	Urban Mean ± SD	Rural Mean ± SD	Mean ± SD	Z	*P value
Knowledge score	15.4 ± 4.4	16.1 ± 3.6	15.9 ± 3.9	-3.202	<0.001	15.9 ± 4.0	15.8 ± 3.7	15.9 ± 3.9	-1.797	0.072
Attitude score	6.5 ± 1.5	6.4 ± 1.3	6.5 ± 1.3	-1.164	0.245	6.5 ± 1.3	6.4 ± 1.3	6.5 ± 1.3	-0.960	0.337
Practice score	3.7 ± 0.6	3.7 ± 0.6	3.7 ± 0.6	-0.662	0.508	3.7 ± 0.6	3.6 ± 0.6	3.7 ± 0.6	-2.813	0.005
KAP score	25.1 ± 4.7	26.3 ± 3.96	26.1 ± 4.2	-2.291	0.022	26.2 ± 4.3	26.0 ± 4.1	26.1 ± 4.2	-1.933	0.053

\* Mann–Whitney test.

**Table 4**  
Knowledge, attitude, and practices of COVID-19 by affiliation.

KAP scores	IFMSA Mean ± SD	EUPTS Mean ± SD	EPSF Mean ± SD	ENNSSA Mean ± SD	Mean ± SD	Chi- square	P value	Adjusted significance	P value
Knowledge score	12.6 ± 5.9	15.6 ± 3.9	15.9 ± 3.6	15.9 ± 4.0	15.9 ± 3.9	14.02	0.03	EUPTS- ENNSSA	0.004
Attitude score	5.8 ± 1.2	6.5 ± 1.5	6.5 ± 1.3	6.4 ± 1.2	6.5 ± 1.3	27.81	<0.001	EUPTS- IFMSA	<0.001
Practice score	3.7 ± 0.5	3.7 ± 0.5	3.6 ± 0.6	3.7 ± 0.5	3.7 ± 0.6	24.06	<0.001	EPSF-EPSF	0.01
								ENNSSA-IFMSA	<0.001
								EPSF- IFMSA	0.03
KAP score	22.2 ± 5.8	25.9 ± 4.2	26.21 ± 4.0	26.2 ± 4.2	26.1 ± 4.2	18.53	<0.001	IFMSA-ENNSSA	0.005
								EPSF-ENNSSA	<0.001
								EUPTS- EPSF	0.02
								EUPTS-ENNSSA	<0.001
								EUPTS-IFMSA	0.002

\*Kruskal–Wallis test and pairwise multiple comparison.

ing their hands with soap and water 1.8 times more frequently than male students. Urban communities rated the COVID-19 pandemic as a serious infection were more cautious about wearing masks outdoors and maintaining a social distance of at least 2m from each other 2 times than rural inhabitants (Table 5).

### Discussion

The current online survey analysis aims to determine the level of KAP among medical students concerning COVID-19. People are combating COVID-19 by adhering to preventive measures however, but it is primarily influenced by their KAP against the pandemic [9].

**Table 5**

Possible predictors of favorable attitudes and practices toward COVID-19 prevention among the included students using multivariate logistic regression models.

Variables	Attitudes			Practices		
	COVID-19 is a serious infection	Importance of preventive measures	Volunteerism and community share	Wearing mask outdoor	Physical distancing	Washing hands with soap and water
Knowledge score (<75%)	1.05 (0.86–1.22)	1.28 (0.93–1.38)	1.37 (0.95–1.44)	0.62 (0.59–1.06)	1.03 (0.79–1.31)	0.95 (0.75–1.27)
Gender (Male)	0.79 (0.74–1.07)	0.83 (0.74–1.12)	0.60 (0.54–1.82)*	0.90 (0.70–1.29)	0.60 (0.59–1.02)	1.84 (1.01–1.82)*
Residence (rural)	1.45 (1.01–1.44)*	0.70 (0.69–1.02)	0.98 (1.02–1.56)*	2.03 (1.08–1.88)*	2.04 (1.12–1.82)*	0.76 (0.67–1.14)
Region (other than Cairo)	1.23 (0.91–1.35)	0.88 (0.75–1.18)	1.02 (0.80–1.28)	1.21 (0.79–1.53)	1.08 (0.78–1.39)	1.16 (0.80–1.45)
Constant	1.298	1.815	1.82	2.96	2.67	2.39

The total knowledge score had a 25th of 15 points, a median of 17 points, and 75th percentile of 18, those scored 18 points or more were assigned more knowledgeable.

\* Statistically significant at  $P < 0.05$ .

The satisfactory level of knowledge observed in the present study is consistent with the findings of these studies [10–13].

Media plays a significant protective role through raising public awareness about protective measures and through countering rumors [14]. Most students, as expected, used social media as their primary source of knowledge. Only one-fourth of the respondents mentioned healthcare staff, who can be a source of accurate and reliable information. The previous researches [14], besides the current research, emphasize the value of social media as a source of knowledge. The improvement of the social media platform health system and visibility by better disseminating information to the public [15].

There is also evidence that the COVID-19 crisis has accelerated the uptake of digital resolution tools and services, accelerating the global transition towards a digital economy, in addition to exposing the wide gap between those who enjoy access to the internet and those who do not [16].

Knowledge is a prerequisite for forming positive attitudes and promoting optimistic behaviors. The optimistic behaviors of students attributed to the unprecedented COVID-19 control measures have halted the spread of the infection.

With the COVID-19 pandemic, the Cabinet of Ministers, Ministry of Health and Population, (MOHP), along with other related ministers and stakeholders, including United Nations (UN organizations), have launched public awareness campaigns to share necessary information and possible risks to the public.

In addition, the government as well as UN organizations have taken the initiative to reduce myths, rumors, and stigmatization [4]. Stigma towards COVID-19 is due to the fear of mortality and high communicability, and thus can be resolved through proper education and transparent healthcare policies.

Most participants rated COVID-19 as a dangerous infection because of its mode of transmission and severity of manifestations. According to Singh et al. [15], those with limited knowledge of disease transmission had a higher perception of risk, implying that correct and adequate knowledge is the key to the preservation of self and others. Non-pharmaceutical public health initiatives are encouraged the reduction of the risk and effect of epidemic and pandemic influenza [14,17].

The practices of university students toward the virus have been cautious as most of the recruited sample, more than ninety percent, avoided crowded places and wore masks when going out of the home during the outbreak. In accordance with a study in China [10] reported higher scores of practices. Several studies suggested that age and gender might influence the pattern of risky behaviors [18,19].

Results of the present study indicated that female participants had significantly higher KAP scores than males [10].

Public health education is a beneficial tool for preventing and controlling health emergencies, along with being prepared in such situations. It will encourage people to gain adequate information, reduce anxiety and seek a positive mindset, besides following

aligned and desired practices. All these KAP elements have been deemed essential to successful pandemic prevention and control [2].

Risk Communication and Community Engagement (RCCE) [2] is an essential part of health emergency preparedness and response action plan. Consequently, it is necessary to design, develop and implement targeted communication initiatives and campaigns for youth for more endorsing, contribution, engagement, and empowering youth volunteers in COVID-19 responses. The EYI is targeting youth and students in universities and following the engagement pyramid as a way of diagnosing how volunteers are participating in programs and campaigns.

Because of their lifestyle and proximity to other students, students are more likely to spread infection. Furthermore, many students serve as information providers for their families, and they play a paramount role in information dissemination. As a result, this survey aimed to provide policy makers with reasonable guidelines for facilitating efficient disclosure of accurate information to other sections of the population [14].

According to the multiple logistic regression analyses of this study, female students were 1.8

times more careful about implementing protective measures such as hand washing with soap and water than male students. This finding could be crucial, as targeting women during public awareness initiatives can lead to increased community awareness [20,21]. The current study findings are consistent with those of another study conducted in Bangladesh by Ferdous et al. [22], as it was found that urban residents are more cautious about wearing masks outside and maintaining a social distance of at least 2 m from each other than rural residents. This finding is compatible to previous findings from China [23].

Finally, the present study suggests further research on COVID-19 to investigate the barriers that contribute to the quick distributions and the preventive methods of the pandemic virus.

## Conclusion and recommendations

In general, the medical students in our survey had good knowledge of COVID-19. A positive attitude towards the use of protective measures was a significant issue to limit the spread of the disease. Social media platforms and the internet were the sources of information. Meanwhile, many social media platforms were essential to confirm and improve the quality of information. We concluded that respondents residing in urban communities showed a higher significant practice score than those in rural communities. Thus, a comprehensive and contextually congruent awareness-raising strategy and communication initiatives suits the need of the rural population. Communication is urgently needed to combat COVID-19 and prevent the spread of misinformation, which dilutes the effectiveness of health policies.



Finally, the present study suggested further research on COVID-19 to investigate the barriers that contributed to the quick distributions and the preventive methods of the pandemic virus.

### Limitations of the study

Due to the COVID-19 critical situation to achieve social distance, the researchers employed an online data collection method. Therefore, there was a possibility of bias since we could not approach the students with an internet connectivity issue. However, the majority of the targeted students were available in the selected groups.

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### Competing interests

None declared.

### Ethical approval

Not required.

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