



## HEALTH PROMOTION

# Lebanese University Students and COVID-19: A Survey on their Related-Knowledge, Practice, and Behaviors

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## Keywords

University Students • COVID-19 • Knowledge • Practice • Behavior

## Summary

**Introduction.** Young adults are at the epicenter for preventing the progression of COVID-19 pandemic and must be targeted for education to impede any potential transmission of the disease. This study aimed to assess the knowledge, practice and behaviors of Lebanese university students regarding COVID-19.

**Methods.** A cross-sectional study was carried out among university students at the Lebanese University between March 30, 2020, and April 4, 2020. Information on socio-demographic data, knowledge, practice, and additional information concerning COVID-19 were collected.

**Results.** Our survey showed that the majority of the students had good knowledge 90.8%, and more than two third of the respondents 78.6% reported good practice regarding COVID-19. Gradu-

ate students were more knowledgeable compared to undergraduate students (unstandardized beta 0.349 with a 95% confidence interval (CI) of 0.165 to 0.533;  $p$ -value  $< 0.0001$ ). Moreover, male students had a negative impact on good practice compared to females (unstandardized beta -0.280 with a 95% confidence interval (CI) of -0.402 to -0.159;  $p$ -value  $< 0.0001$ ). Nearly half of the students (55.2%) reported that their food intake has increased, and 82.5% of the students didn't practice sport during the quarantine. The most common information source of the students was the television (63.3%) followed by social media (53.9%).

**Conclusions.** This study offers useful insights into the knowledge and practices of Lebanese university students towards COVID-19. Our findings support the importance to deliver health education campaign by the ministry of public health through television and social media to improve the knowledge on disease transmission and preventive measures.

## Introduction

Coronavirus disease 2019 (COVID-19) first emerged in December 2019 in Wuhan, in China, and then rapidly spread all over the world [1]. In late January 2020, the World Health Organization (WHO) declared COVID-19 as a public health emergency of international concern [2]. At present, no COVID-19 vaccine has been successfully developed and no effective treatment has been established. Hence, implementation of protective measures such as good hygienic practices including washing hands with soap and water or using hand sanitizers frequently, avoiding touching the face, mouth, nose, eyes with hands, and maintaining social distance is of utmost importance to reduce the spread of the disease. Public adherence to these preventive measures is affected by their knowledge, attitudes, and practices (KAP) towards this pandemic. Thus, assessment of KAP is important in identifying gaps and can guide decision makers in implementing adequate educational interventions to limit the spread of this outbreak.

Lebanon is one of the countries fighting the novel virus. The first Lebanese case was reported on February 21, 2020. Since then, the number of COVID-19 cases has

risen considerably. As of November 5<sup>th</sup> 2020, this outbreak resulted in 87097 cases [3] with the highest incidence of COVID-19 occurring among young adults aged 20-29 years old (26.9%) [4] who are often an asymptomatic carrier of the SARS-COV-2 [5]. As a consequence, a high transmission of COVID-19 to the vulnerable group could occur and cause potential outbreak. In addition, the virus has high fatality rates in the elderly people with underlying health conditions [6, 7]. Thus, young adults are at the epicenter for preventing the progression of COVID-19 pandemic and must be targeted for education to impede any spread or potential transmission of the disease.

Given that a large number of young adults are enrolled in Lebanese public and private universities, assessment of their KAP levels will roughly reflect their awareness regarding COVID-19 which will constitute a general reference to guide the local authorities in identifying gaps, strengthening ongoing prevention efforts and planning the required educational interventions. Thus, there is an urgent need to understand the students' awareness of COVID-19 at this critical moment. Therefore, it is essential to evaluate their knowledge, practice, and behavior response towards COVID-19.

## Methods

### STUDY DESIGN AND POPULATION

A cross-sectional study was carried out among university students at the Lebanese University between March 30, 2020, and April 4, 2020. It includes Lebanese students from 15 faculties (Faculty of Letters and Human Sciences, Faculty of Law and Political and Administrative Sciences, Faculty of Sciences, Faculty of Fine Arts and Architecture, Faculty of Pedagogy, Faculty of Information, Faculty of Economics and Business Administration, Faculty of Engineering, Faculty of Agronomy, Faculty of Public Health, Faculty of Medical Sciences, Faculty of Dental Medicine, Faculty of Pharmacy, Faculty of Tourism and Hospitality Management, and Faculty of Technology). All eligible Bachelor, Masters and Doctor of Philosophy Ph.D. students registered at Lebanese University for the academic year 2019-2020 are enrolled in our study.

### ETHICAL CONSIDERATION

The study protocol was reviewed and approved by the scientific committee of the Neuroscience Research Center (NRC), Faculty of Medical Sciences at the Lebanese University (Reference number 240/2020). The study was conducted following the Declaration of Helsinki [8]. Students had to answer a yes-no question to confirm their willingness to participate voluntarily.

### SAMPLE SIZE CALCULATION

The sample size was calculated using the online Raosoft sample size calculator designed specifically for population surveys. Assuming 80000 students are registered in the Lebanese university, the required calculated sample size was 383 with a confidence level of 95% and a 5% margin of error. A total number of 2140 of students were recruited in the present study. The response acceptance was closed in April 4, 2020.

### DATA COLLECTION

The questionnaire was created and designed by the authors after a thorough search in the literature and a link was sent to the participants including a brief introduction on the background, the aim of the study, voluntary nature of participation, declarations of confidentiality and anonymity, and instructions for filling in the questionnaire. Content validity of the resulting version was assessed by a panel of three experts with expertise in public health and epidemiology. They were asked to evaluate the relevance of the items in assessing the knowledge and practices of university students towards COVID-19. A consensus was reached after omitting three items that were rated irrelevant. Then, the items were translated and adapted to the Arabic language by three translators. A final questionnaire was generated and was divided into five sections:

1. socio-demographic characteristics included: Age, gender, faculty, level of education, marital status (single, married, divorced, or widowed);

2. the knowledge section consisted of 11 questions of triple choice response (true, false, and don't know) to assess the knowledge of students about symptoms, mode of transmission, and the current treatment of COVID-19, as well as the management of people who have been in contact with COVID-19 positive cases. A correct answer was assigned 1 point and an incorrect/don't know answer was assigned 0 points. The total knowledge score was 11 ranged from 0 to 11 with a higher score indicating a better knowledge. Students with knowledge score above 60% were regarded as having good knowledge, while those who scored below 60% were considered having poor knowledge based on Bloom's cut off point [9]. In addition to one question regarding their main sources of information regarding COVID-19. On this question, multiple responses from the participants were allowed;
3. the practice section included 8 questions regarding their protective measures to prevent getting the infection such as avoiding crowded places, using hand sanitizer, washing their hands, wearing a mask and gloves and avoiding shaking hands and kissing when meeting other peoples.

The answer (always) was assigned 1 point while answers (occasional and never) were assigned 0 points. The overall practice score, obtained by the sum of the scores, ranged between 0 and 8. Participants with scores >80% were classified as having acceptable preventive practice, while those with scores < 80% were considered having an unacceptable preventive practice based on Bloom's cut off point [10].

Behavior section included questions focusing mainly on the change in their daily habits and behavior during the quarantine, for example religion practices, smoking, sports and eating habits, and behavior.

### STUDY PROCEDURE

As the Lebanese Government closed the public and private universities, the potential respondents were electronically invited to participate. The data was collected using an online survey. After adding the questionnaire into the Google forms, a link was sent to eligible students for responding to the questionnaire. To assess the clarity and readability of the questionnaire it was piloted on a total number of 30 participants sampled from the target population and subsequently excluded from the data analysis. The estimated time required for the completion of the survey was 5 minutes.

### STATISTICAL ANALYSIS

Statistical analysis was carried out using the statistical software SPSS (Statistical Package for Social Sciences), version 22.0. Descriptive statistics were reported using means and standard deviations (SD) for continuous variables and frequency with percentages for categorical variables. Multivariate linear regression was used to identify factors associated with knowledge and practice scores as dependent variables. Unstandardized regression coefficients ( $\beta$ ) and their 95% confidence

**Tab. I.** Demographic characteristics of the study participants (N = 2140).

Variable	Frequency	Percentage
Age (mean $\pm$ SD) <sup>a</sup> years (20.8 $\pm$ 3.9)		
Gender		
Male	488	22.8
Female	1652	77.2
Education		
Undergraduate	1785	83.4
Graduate	355	16.6
Marital status		
Single	1856	86.7
Others	284	13.3

<sup>a</sup> SD: Standard Deviation.

intervals (CIs) were reported. All tests were two-tailed, with a significance level of  $p < 0.05$ .

## Results

### DEMOGRAPHIC CHARACTERISTICS OF THE STUDY PARTICIPANTS

The demographic data is shown in Table I. A total of 2140 students were recruited from 15 faculties at Lebanese University. Their mean age was  $20.8 \pm 3.9$  years and 77.2% of them were females. Among them, the majority 83.4% was undergraduate and 86.7% were single.

### STUDENT'S KNOWLEDGE TOWARDS COVID-19

Out of the 2140 students, the majority 90.8% had good knowledge. Table II describes students' answers towards COVID-19 knowledge items. Poor knowledge was more apparent in the 2 items related to the transmission of the

disease in which the correct responses rates were low 31.3%, and 33.3 % respectively. The result indicates that the overall understanding about the virus was good, knowledge about the major symptoms namely fever, cough and difficulty in breathing was appreciated by 95.9% the students. Moreover 85.0% and 96.0% of the students were aware about the unavailability of specific treatment and about the management of COVID-19 positive contact respectively. The mean total knowledge score was  $8.54 \pm 1.54$ .

### SOURCE OF INFORMATION

Table III showed the various sources of knowledge about COVID-19 among the students. Television 63.3% was the commonest source followed by Social media 53.9%, internet 49.1%, World Health Organization (WHO) 44%, Ministry of Health 42.7%, and friends 29.4%.

### PRACTICE RELATED TO COVID-19 AMONG UNIVERSITY STUDENTS

In order to assess the practices followed by the students to prevent COVID-19 infection, 8 items were used. Table IV shows the answers collected from the students regarding their practice during the epidemic. The overall mean practice score was  $7.15 \pm 1.23$  and more than half of the studied sample 78.6% reported good practice and 21.4 % reported poor practice toward COVID-19. Most of the students practiced appropriate protective measures in their daily life. The majority 96.6% agreed to avoid going to crowded places, 98.3% abided by cleaning hands with soap and water when back to home, 84.8% supported washing hands frequently, 93.5% shared their agreement on avoiding handshaking and 96.8% reported abiding by the lockdown rules. A negative practice of not wearing face masks while going out in public places was observed among 31.8% of the students.

**Tab. II.** COVID-19 knowledge among university students.

Knowledge items	Students' answers		
	Correct	Wrong	Do not know
K1. The main symptoms of Corona are fever $> 38^{\circ}\text{C}$ , cough, sore throat, runny nose and shortness of breath	2052 (95.9)	37 (1.7)	51 (2.4)
K2. There is no currently effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	1820 (85.0)	109 (5.1)	211 (9.9)
K3. Only the elderly, or who suffer from chronic diseases or obesity (overweight) are more likely to severe infection	1706 (79.7)	257 (12.0)	177(8.3)
K4. Contact of COVID-19 positive case must be isolated immediately for 14 days. If symptoms appear during this period, the patient must undergo a PCR <sup>a</sup> test	2055 (96.0)	50 (2.3)	35 (1.6)
K5. The disease will be transmitted from pets to the human	137 (6.4)	1674 (78.2)	329 (15.4)
K6. Coronavirus spreads via respiratory droplets of infected individuals	1726 (80.7)	184 (8.6)	230 (10.7)
K7. No need for children and young adults to take action to prevent Coronavirus	20 (0.9)	2076 (97.0)	44 (2.1)
K8. The disease cannot be transmitted from asymptomatic patients	77 (3.6)	1907 (89.1)	156 (7.3)
K9. The coronavirus can survive for many hours or many days in the environment	1525 (71.3)	202 (9.4)	413 (19.3)
K10. COVID-19 can be transmitted through eating undercooked meat/chicken	832 (38.9)	669 (31.3)	639 (29.9)
K11. COVID-19 can be eliminated with at least 60% alcohol (Yes)	712 (33.3)	1081 (50.5)	347 (16.2)

<sup>a</sup> PCR: polymerase chaine reaction.

**Tab. III.** Source of information regarding COVID-19.

Source of information*	n (%)
TV	1355(63.3)
Social media	1154(53.9)
Internet	1051(49.1)
WHO	941(44.0)
MOPH	913(42.7)
Friends	629(29.4)

\* Multiple Responses, TV television, WHO World Health Organization, MOPH Ministry of Public health, n frequency, % percentage.

**Tab. IV.** Good Practice Related to COVID-19 among university students.

	n	%
P1. I don't visit a crowded place	2067	96.6
P2. I take a hand sanitizer with me when I go out	1730	80.8
P3. I wash my hands with soap and water when I am back home	2104	98.3
P4. I Frequently wash my hands	1815	84.8
P5. I put on mask when I go out	1460	68.2
P6. I avoid shaking hands	2001	93.5
P7. I avoid kissing	2054	96.0
P8. Abide by the lockdown rules	2071	96.8

n: frequency; %: percentage.

### BEHAVIORS OF UNIVERSITY STUDENTS TOWARDS COVID-19 DURING QUARANTINE

Of all the university students, only 6.9% of them reported that they increased their amount of smoking and 41.9% of them reported that they increased their religion practice since the start of the corona pandemic. On the other hand, near half of the students reported that

their food intake has increased and agreed to cook their own food to minimize the risk to contract the infection during the quarantine 55.2% and 89.4% respectively. Our results showed that 82.5% of the students didn't practice sport during the quarantine (Tab. V).

### FACTORS ASSOCIATED WITH KNOWLEDGE AND PRACTICES REGARDING COVID-19

Results of multiple linear regression analysis showed that graduated students were more knowledgeable compared to ungraduated students (unstandardized beta 0.349 with 95% CI of 0.165 to 0.533; p-value < 0.0001). Our results also showed that knowledge is positively associated with age (unstandardized beta 0.032 with 95% CI of 0.014 to 0.049; p-value < 0.0001) and male students were less knowledgeable compared to female students (unstandardized beta -0.281 with 95% CI of -0.435 to -0.126; p-value < 0.0001).

Multiple linear regression also showed that high level of knowledge and age were highly associated with good practice (unstandardized beta 0.172 with 95% CI of 0.138 to 0.205; p-value < 0.0001, unstandardized beta 0.014 with 95% CI of 0.002 to 0.027; p-value < 0.0001 respectively). On the other hand, male students had a negative impact on good practice (unstandardized beta -0.280 with 95% CI between -0.402 to 0.159; p-value < 0.0001) compared to female (Tab. VI).

### Discussion

In this survey, we provided an insight to the knowledge, preventive measures of the students of Lebanese university towards COVID-19. The study also highlighted

**Tab. V.** Student's behavior during quarantine.

	Frequency	Percentage
Do you smoke (cigarettes, waterpipe, vape)? If you answered yes, how did quarantine affect your smoking pattern?		
I don't smoke	1678	78.4
I reduced my smoking after the start of the corona epidemic	217	10.1
I still smoke the same amount since the start of the corona epidemic	147	6.9
I increased the amount since the start of the corona epidemic	98	4.6
Does quarantine affect your Religion practice		
Yes, my religion practice has increased	896	41.9
Yes, my religion practice has decreased	32	1.5
No, my religion practice did not change	1212	56.6
Does quarantine affect your food intake?		
Yes, my food intake has increased	1181	55.2
Yes, my food intake has decreased	285	13.3
No, my food intake did not change	674	31.5
Does quarantine affect the number of food deliveries that you order?		
Yes, food deliveries have decreased	1913	89.4
Yes, food deliveries have increased	20	0.9
No change	207	9.7
Have you practice sport during the quarantine?		
No	375	82.5
Yes	1765	17.5



**Tab. VI.** Results of linear regression analysis on factors significantly associated with good knowledge and practices towards COVID-19 (N = 2140).

	Unstandardized $\beta$	Standardized $\beta$	95% CI	P-value
Knowledge				
Level of education (graduate vs undergraduate)	0.349	0.084	0.165-0.533	< 0.0001*
Age	0.032	0.081	0.014-0.049	< 0.0001*
Gender (male versus female)	-0.281	0.076	-0.435--0.126	< 0.0001*
Practice				
Knowledge score	0.172	0.214	0.138-0.205	< 0.0001*
Gender (male vs female)	-0.280	-0.095	-0.402--0.159	< 0.0001*
Age	0.014	0.047	0.002-0.027	< 0.0001*

\* p-value < 0.05 is considered significant, 95% CI 95% confidence interval.

the behavior of university students towards COVID-19 during quarantine. To the best of our knowledge, this is the first cross-sectional survey conducted in Lebanon. Our results showed that the majority of the university students had good knowledge about the disease, and more than half of the participants had good practice regarding COVID-19. The main common information source was the television. Our results also showed that graduate students were more knowledgeable compared to undergraduate students. However, male students had a negative impact on good practice.

Our findings of good level of knowledge is in line with a study conducted in Iran by Taghrir et al., who reported that appropriate knowledge was acquired by 86.96 % of medical university students [11]. This could be explained by the seriousness of the disease and the importance of media to increase the public's adherence to the safety measures to combat the spread of COVID-19, in addition to the effectiveness of different awareness campaigns conducted in Lebanon especially after the declaration of COVID-19 as a pandemic by the WHO [9].

We also found that students used TV 63.3% and social media 53.9% as sources of information. Although these platforms provide an easy way to get the information, they can also be a source of fake news. Thus, it is highly recommended to deliver effective health education campaign by the ministry of public health through TV and social media to improve the knowledge and the preventive measures of the students against COVID-19 epidemic in Lebanon. Moreover, reliable health information on local news media and public health messages should be disseminated to the Lebanese community to increase COVID-19 knowledge and disease prevention strategies.

With respect to practice, more than two third of the respondents 78.6% practiced appropriate protective measures in their daily life. However, putting on a mask when going out had the lowest score, highlighting the importance of governmental intervention to implement daily mask use.

Regarding the behavior, near half of the students reported that their food intake has increased and agreed to cook their own food to minimize the risk to contract the infection during the quarantine. It might be a reflection of the large amount of information circulated in the community and perceived by them, which necessitate for further awareness campaigns in order to minimize the

panic aroused among the population. Our results showed also that 82.5% of the students didn't practice sport during the quarantine. Physical activity and relaxation techniques can be valuable tools to help students remain calm and continue to protect their health during this time. We recommend online exercise classes. Many of these are free and can be found on YouTube to reduce sedentary behavior while at home in self-quarantine. One of the most interesting finding is that the females in this study were more aware of the importance of COVID-19. Our result is similar with a study conducted in Bangladesh which found the female students were superior to man in terms of knowledge and practice [12]. Another Chinese study supports the finding Chinese women residents have appropriate practices towards COVID-19 [13].

#### LIMITATIONS

Our study had some limitations. Our sample was not based on a random selection and it is only from the Lebanese University which is a public university in Lebanon. Thus, the findings did not reflect the whole picture of all students enrolled in private and public universities in Lebanon. We should also mention the information bias; some participants might have provided socially desirable responses rather than their actual opinions. Finally, the cross-sectional nature of the study can only demonstrate association and not a cause-effect relationship.

#### Conclusions

Most Lebanese university students study revealed a good knowledge and possessed a good practice towards COVID-19. As the global threat of COVID-19 continues to emerge, findings support continued education and reinforcement of COVID-19 known facts to address the abundance of misinformation available online and on social media sites.

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## Conflict of interest statement

The authors have no potential conflicts of interest to declare.

## Authors' contributions

LAA and ZN developed the project idea. AS, YJ and OI formulated the questionnaire. LAA and ZN organized and analyzed the survey. LAA, ZN, and RD drafted and critically reviewed the paper. YF reviewed the manuscript for important intellectual content. All authors read and agreed on the final version.

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