Scientific Foundation SPIROSKI, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2022 Apr 23; 10(E):714-719.
https://doi.org/10.3889/oamjms.2022.9218
eISSN: 1857-9655
Category: *E - Public Health*
Section: *Public Health Education and Training*

Impact of Educational Leaflet Dissemination on University Students' Knowledge, Attitude, and Practice toward COVID-19 in Indonesia

Yelly Oktavia Sari*, Lailaturrahmi Lailaturrahmi, Dita Permatasari

Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Universitas Andalas, Padang, Indonesia

Edited by: Sasho Stoleski
Citation: Sari YO, Lailaturrahmi L, Permatasari D. Impact of Educational Leaflet Dissemination on University Students' Knowledge, Attitude, and Practice toward COVID-19 in Indonesia. Open-Access Maced J Med Sci. 2022 Apr 23; 10(E):714-719. https://doi.org/10.3889/oamjms.2022.9218
Keywords: COVID-19; Knowledge, attitude, practice; Educational intervention; University students
***Correspondence:** Yelly Oktavia Sari, Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Universitas Andalas, Indonesia. E-mail: yellyoktavia@phar.unand.ac.id
Received: 06-Mar-2022
Revised: 04-Apr-2022
Accepted: 13-Apr-2022

Funding: This study is sponsored by Universitas Andalas, Indonesia, through the research grant under the Foundational Research Scheme (based on research contract No. T/39/UN.16.17/PT.01.03/IS-RD/2020, the fiscal year of 2020).
Competing Interest: The authors have declared that no competing interest exists.

Abstract

BACKGROUND: The COVID-19 pandemic has become a public health problem at the global level. Knowledge, attitude, and practice (KAP) toward COVID-19 has an essential role in improving the prevention and control of infectious diseases. University students are expected to have positive knowledge, attitudes, and practice toward COVID-19 not only for themselves but also for their community.

METHODS: A one-group pretest-posttest study was conducted on undergraduate students at Universitas Andalas, Indonesia, from October 2020 to January 2021 to explore the impact of an educational leaflet on university students' KAP toward COVID-19.

RESULTS: An amount of 407 students participated in this study. Most of the participants were female (N = 308; 75.68%), aged 20 years and above (N = 251; 61.67%), and were non-health professional students (N = 337; 82.80%). Female students had significantly better knowledge, while female and health sciences students had better preventive practice related to COVID-19. The median KAP scores were retained after the intervention. After the intervention, only attitude scores significantly differed from the pre-intervention score (p = 0.004), yet the scores were lower.

CONCLUSION: The educational leaflet is not effective in improving students' KAP toward COVID-19. Careful design of the educational method is needed to improve university students' KAP.

Introduction

The coronavirus disease-19 (COVID-19) pandemic has become a public health problem at the global level [1]. Since the first cases of COVID-19 were detected in Indonesia on March 2, 2020, the number of cases and deaths is still rising recently. As of March 4, 2022, more than 440 million COVID-19 cases were reported worldwide, while more than 5.6 million were from Indonesia [2]. The Indonesian government has imposed measures to control the disease transmission, including the implementation of large-scale social distancing, increasing the capacity of COVID-19 diagnostic testing, and enforcing the tracing efforts [3]. Governments also carried out educational initiatives along with journalists and the media industry to raise people's awareness of COVID-19 [3].

Although much information related to COVID-19 was readily available, the public might perceive that COVID-19 was not a serious disease. During the early phase of the COVID-19 outbreak, many scientific terminologies were introduced through mass media, creating confusion among the public. Besides, some hoaxes were rapidly disseminated through social media, causing false preventive practices [3]. Increasing public health literacy may effectively reduce the spread of infectious diseases, including COVID-19. Health literacy has an essential meaning in improving the prevention and control of infectious diseases, while knowledge, attitudes, and practice (KAP) is essential components of health literacy [4].

KAP for certain infectious diseases can be influenced by the severity of the disease, the transmission rate, and the death rate. KAP toward COVID-19 has also developed until this day [5]. Public understanding of COVID-19 reflects a correlation between the depth of their knowledge and information available in both literature and media [6]. Meanwhile, attitude and practice aspects generally reflect appropriate precautions, compliance with new rules during a pandemic, and what to do if contracting COVID-19 [5]. Therefore, research on KAP related to COVID-19 is vital to explore public perceptions of the attributes that influence their behavior, which is useful for determining interventions in the form of preventive strategies and health promotion related to COVID-19 [7], [8].

University students tend to have higher autonomy. They are engaged in many activities that make them frequently in contact with others. These characteristics are among the importance of analyzing the KAP of students [9], [10]. University students also have an important role as information providers for their families and surrounding communities [11]. Thus, student education is expected to positively impact knowledge, attitudes, and behavior toward COVID-19 not only for themselves but also for their community.

Although many studies have been conducted about the KAP of university students toward COVID-19 in different countries, very few studies have been published about the impact of an educational intervention to improve the KAP. The digital educational leaflet is one of the media that can be used for health promotion purposes, as it can reach a wide audience [12], [13]. Therefore, this study aimed to explore the association between educational leaflets and university students' KAP toward COVID-19.

Table 1: Questionnaire items

Item	Question	Answer options
K1	COVID-19 is caused by a virus	True/false
K2	Fever, cough, and breathing difficulties are COVID-19 symptoms	
K3	Myalgia (muscle pain), sore throat, and diarrhea are also COVID-19 symptoms	
K4	Washing hands with soap and water can help prevent COVID-19 transmission	
K5	Wearing mask is one of the effective prevention strategies against COVID-19	
K6	At present, the specific drug for COVID-19 has already available	
K7	At present, there is a COVID-19 vaccine that has passed clinical trials	
A1	COVID-19 patients can be treated at home without any medical help	Strongly agree Agree
A2	If I were a COVID-19 patient, I could not conceal the information	Neutral Disagree
A3	If I contract COVID-19, I will go to the hospital to get treatment	Strongly disagree
A4	I will self-isolate after local traveling	
P1	I gather as usual without following COVID-19 protocol	Always Often
P2	I avoid touching my face (eyes, nose, or mouth) with contaminated hands	Sometimes Seldom
P3	I self-isolate after coming back from local traveling	Never
P4	I bring hand sanitizer if I go outside	
P5	I bring personal belongings to prevent COVID-19	
P6	I wash my hands after doing activities or touching anything	
P7	I wear masks when I am in a crowd	

Materials and Methods

Study design

A one-group pretest-posttest study was conducted on undergraduate students at Universitas Andalas, Indonesia, in 2020. The inclusion criteria were undergraduate students from any class year and faculty who agreed to participate in this study and filled out the informed consent form. The minimum sample size was calculated at a confidence interval level of 5% and a degree of error of 5%, resulting in 384 samples. The predictive sample size was then added by 10%, resulting in 422 samples in total to accommodate a low response rate.

Questionnaire

An instrument was developed to measure the KAP of university students toward COVID-19. This instrument was adapted from several studies [5], [14] and adjusted to the Indonesian context (Table 1). The validity test of the instrument was performed using a correlation test, while the reliability test was performed using Cronbach alpha. Only question items with an r coefficient >0.3 were included in the questionnaire. The Cronbach alpha value for the questions was 0.717 that considered reliable.

The questionnaire assessing knowledge consists of seven items, as described in Table 1. The participants were asked to choose whether each statement was true or false. Except for the K6 and K7, "true" answers were considered correct. At the time, when this study was conducted, other antivirals and antibiotics were still the mainstays of COVID-19 treatment. Meanwhile, the COVID-19 vaccine had not passed clinical trials [15]. Every correct answer was scored 1, and the wrong answer was scored 0. Thus, the maximum score would be 7.

Questionnaire items for attitude consist of four items with a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). The seven-question items of practice also had a 5-point Likert scale related to frequency (always, often, sometimes, seldom, and never). The maximum score for attitude was 20, while for practice was 35. Then, the scores for KAP were classified into three categories: Good (>75%), moderate (50–75%), and poor (<50%).

The pre-intervention survey was administered using the Google Forms® platform. Two months after the pre-intervention survey was administered, an educational leaflet was delivered to students using an online messenger application (WhatsApp®). The education leaflet consists of the symptoms, preventive measures, and advice for people who feel common symptoms of COVID-19. The post-intervention survey was administered 2 weeks after the intervention.

Statistical methods

Demographic data were analyzed descriptively. From the normality test using Kolmogorov–Smirnov, the KAP scores were not normally distributed ($p<0.05$). The difference in KAP scores distribution according to the sociodemographic characteristics was analyzed using the Chi-square test. The difference in KAP scores before and after the intervention was analyzed using Wilcoxon signed-rank test.

Ethical approval

This study obtained ethical approval from the Research Ethics Committee, Faculty of Medicine, Universitas Andalas, Indonesia (No. 186/UN.16.2/KEP-FK/2020).

Results

Four hundred and seven students participated in this study. Most of the participants were female (N = 308; 75.68%), aged 20 years and above (N = 251; 61.67%), and were non-health sciences students (N = 337; 82.80%), as described in Table 2.

Table 2: Sociodemographic characteristics of participants

Participants' characteristics	N (%)
Gender	
Female	308 (75.68)
Male	99 (24.32)
Age	
< 20	156 (38.33)
20-22	233 (57.25)
> 22	18 (4.42)
Faculty	
Health sciences	70 (17.20)
Non-health sciences	337 (82.80)

At the baseline, most of the students showed good knowledge (N = 398, 97.8%), good attitude (N = 359, 88.2%), and good practice (N = 264, 64.9%) toward COVID-19 (Table 3). More than one-third of participants had a moderate level of preventive practices related to COVID-19. The mean score for KAP was 6.22 ± 0.810, 16.83 ± 2.006, and 28.17 ± 4.066, respectively.

Table 3: KAP profile of participants before the intervention

Variable	N	Percentage
Knowledge		
Good	398	97.8
Moderate	7	1.7
Poor	2	0.5
Attitude		
Good	359	88.2
Moderate	47	11.5
Poor	1	0.2
Practice		
Good	264	64.9
Moderate	142	34.9
Poor	1	0.2

Table 4 shows the KAP profile according to the sociodemographic characteristics. Female participants had better knowledge (p = 0.037) and better practice (p = 0.000) than male participants. It is also evident that students from health sciences majors had better practice compared to their fellows from non-health sciences disciplines (p = 0.006). There was no difference in KAP across different age groups.

From Table 5, it was evident that the proportion of participants who possessed good knowledge was unchanged after the intervention, which was 97.8% (N=398). Meanwhile, more participants had a good attitude (91.9% vs. 88.2%) and good practice (79.4% vs. 64.9%) than before (Table 3). Yet, more participants had poor attitudes (8.1% vs. 0.2%) and poor practices (2.2% vs. 0.2%) after the intervention compared to before the intervention.

It is also evident that the mean score of knowledge and attitude after educational intervention was slightly lower than before the intervention (6.14 ± 0.799 and 16.48 ± 2.059, respectively). In contrast, the mean practice score after the intervention was higher than the practice score before the intervention (Table 6). On the other hand, the median of KAP was retained after the intervention. Only the interquartile range of post-intervention attitude score was greater than pre-intervention, while the IQR of the knowledge and practice score was unchanged. After the further analysis was conducted, only students' attitudes between pre- and post-intervention were significantly different (p = 0.004), as shown in Table 6. However, it seems that the attitude score was slightly lower, so the difference could not be seen as an improvement. It suggested that the educational leaflet dissemination was ineffective in improving students' KAP related to COVID-19.

Discussion

As described in Table 2, most of the participants are female, aged 20 years and above, and belong to non-health sciences majors. The gender proportion reflected the actual proportion of female and male undergraduate students at Universitas Andalas. In 2020, female undergraduate students were also greater than male students (13,993 and 9834, respectively) [16].

The typical university students in Indonesia started their undergraduate education at 18 [17]. As the

Table 4: Participants' characteristics and KAP profile

Participants' characteristics	Knowledge				Attitude				Practice			
	N (%)			p	N (%)	Moderate	Poor	p	N (%)	Moderate	Poor	p
	Good	Moderate	Poor		Good				Good			
Gender												
Female	302 (74.20)	6 (1.47)	0 (0.00)	0.037*	276 (67.81)	32 (7.86)	0 (0.00)	0.088	227 (55.77)	81 (19.90)	0 (0.00)	0.000*
Male	96 (23.59)	1 (0.25)	2 (0.49)		83 (20.39)	15 (3.69)	1 (0.25)		37 (9.09)	61 (14.99)	1 (0.25)	
Age												
< 20 years	150 (36.86)	4 (0.98)	2 (0.49)	0.343	145 (35.63)	11 (2.70)	0 (0.00)	0.137	97 (23.83)	59 (14.50)	0 (0.00)	0.612
20–22 years	230 (56.51)	3 (0.74)	0 (0.00)		200 (49.14)	32 (7.86)	1 (0.25)		153 (37.59)	79 (19.41)	1 (0.25)	
> 22 years	18 (4.42)	0 (0.00)	0 (0.00)		14 (3.44)	4 (0.98)	0 (0.00)		14 (3.44)	4 (0.98)	0 (0.00)	
Faculty category												
Health sciences	67 (16.46)	3 (0.74)	0 (0.00)	0.158	61 (14.99)	9 (2.21)	0 (0.00)	0.842	57 (14.00)	13 (3.19)	0 (0.00)	0.006*
Non-health sciences	331 (81.33)	4 (0.98)	2 (0.49)		298 (73.22)	38 (9.34)	1 (0.25)		207 (50.86)	129 (31.70)	1 (0.25)	

KAP: Knowledge, attitude, and practice, *p < 0.05 and the difference between groups was statistically significant

Table 5: KAP profile of participants after the intervention

Variable	N	Percentage
Knowledge		
Good	398	97.8
Moderate	3	0.7
Poor	6	1.5
Attitude		
Good	374	91.9
Moderate	0	0.0
Poor	33	8.1
Practice		
Good	323	79.4
Moderate	75	18.4
Poor	9	2.2

KAP: Knowledge, attitude, and practice.

undergraduate program requires 4 years to complete, the students are expected to graduate at 22. Sometimes, students need longer time to complete their studies, which explain the small proportion of participants aged 22 years and above.

Table 6. The differences between KAP scores (pre- and post-intervention)

Variable	Pre-intervention	Post-intervention	p
Knowledge			0.057
Mean ± SD	6.22 ± 0.810	6.14 ± 0.799	
Median	6	6	
Interquartile range	6–7	6–7	
Attitude			0.004*
Mean ± SD	16.83 ± 2.006	16.48 ± 2.059	
Median	17	17	
Interquartile range	16–18	15–18	
Practice			0.056
Mean ± SD	28.17 ± 4.066	28.51 ± 4.738	
Median	29	29	
Interquartile range	25–31	26–32	

KAP: Knowledge, attitude, and practice, *p < 0.05 and the difference between groups was statistically significant

When this study was conducted, there were 15 faculties at Universitas Andalas [18]. Only five of them belong to health sciences, which are medicine, pharmacy, nursing, public health, and dentistry. At the same time, the rest of faculties are not related to health sciences (e.g., animal science, engineering, and economics). Thus, non-health sciences students who participated in this study had larger proportions than health sciences students.

At the baseline, most of the students showed good knowledge (N = 398, 97.8%), good attitude (N = 359, 88.2%), and good practice (N = 264, 64.9%) toward COVID-19. The mean score for KAP was 6.22 ± 0.810, 16.83 ± 2.006, and 28.17 ± 4.066, respectively. This finding is consistent with the previous studies in China, India, Saudi Arabia, and Jordan, which reported that students had appropriate knowledge, positive attitudes, and proactive practice [5], [10], [19], [20]. Other studies in Pakistan found that despite having good knowledge and attitude, most students did not have good preventive practices related to COVID-19. This phenomenon raised concern since the educated population was expected to have a good practice. If the health sciences students had poor practice related to COVID-19, people who have limited access to information might have inadequate KAP as well [21].

Female participants had better knowledge than males (p = 0.037). This finding is similar to the previous studies in Japan and a study on medical students in Indonesia, which suggested female gender positively influences the knowledge related to COVID-19 [9], [22]. One possible explanation for the findings is that women want more disease prevention information than men [23].

Besides, female participants and health sciences students also had better practice (p < 0.05). This result is also aligned with the previous studies in Malaysia [19], [24], [25]. Women have more likelihood to practice preventive behaviors related to respiratory pandemics [26]. Meanwhile, health students have better practices because they learn about preventive behaviors during their formal education [27].

The previous studies on KAP of university students suggest the importance of education, information, and communication strategies to improve students' KAP [21], [25], [28]. Some studies also proposed methods such as health campaigns through social media, posters, and phone messages to enhance the KAP of the students [21], [29]. Thus, in this study, we tried to employ an educational leaflet delivered through WhatsApp to improve the students' KAP related to COVID-19.

Despite the greater proportion of participants who had a good attitude and practice after disseminating educational leaflets, there was no significant difference in students' knowledge and practice after the intervention. Students' attitudes after the intervention were significantly different (p<0.05), yet they tended to be lower than before the intervention. This result suggested that educational leaflets may not be effective in improving students' KAP. A study conducted in Indonesia suggested that other educational methods were more suitable than informational leaflets. A community-based education significantly improves public knowledge and attitude compared to information leaflets [30]. Other studies also showed that presentation and audio-visual media improve knowledge, either as an alternative or combined with leaflets [13], [31], [32].

One of the reasons for the absence of improvement in KAP after the dissemination of leaflets is the possible overload of leaflets or information that participants received. Compared to a poster that stays in one place for a long time, leaflets may not allow long-term knowledge retention and positive attitudes [12]. There was a 2-week gap between the leaflet dissemination and the post-test survey in this study. This gap makes the intended effect of the educational leaflet was not observed in this study.

Another reason is explained by a previous study that explores the public adoption of COVID-19 information. This study combines two existing theories about using the information to prevent disease: The information adoption model (IAM) and the health belief model (HBM). According to the IAM model, the usefulness of information mediates the influence of processes and information adoption [33]. Meanwhile, the HBM core concept is that the action depends on the perceptions of benefits and barriers related to

health behavior. HBM comprises six tenets, including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy. If the perception of benefits outweighs the barrier perception, encouraged by a cue to action and self-efficacy, the behavior will likely change [34]. According to this study, it is essential to improve the quality of information available and the capability to get information to fight false news and save lives [35].

Despite our inability to suggest an effective educational method to improve the students' knowledge and practice related to COVID-19, this study was one of the few studies exploring educational approaches for undergraduate students in Indonesia. We would recommend that the educational method be designed appropriately, considering the media, frequency, and duration to deliver information regarding COVID-19.

Conclusion

The students generally had good KAP toward COVID-19. Female was associated with good knowledge, while female and health sciences students were related to good practice. The educational leaflet is not effective in improving students' KAP toward COVID-19.

Acknowledgment

The authors would like to thank Universitas Andalas, Indonesia, for supporting this study through the research grant under the Foundational Research Scheme (based on research contract No. T/39/UN.16.17/PT.01.03/IS-RD/2020, the fiscal year of 2020). We also thank Amerta Nugraha Candra and Yulia Kurnia Putri for their assistance during the data collection and analysis stages.

References

1. Jing JL, Yi TP, Bose RJ, McCarthy JR, Tharmalingam N, Madheswaran T. Hand sanitizers: A review on formulation aspects, adverse effects, and regulations. Int J Environ Res Public Health. 2020;17(9):3326. https://doi.org/10.3390/ijerph17093326
   PMid:32403261
2. World Health Organization. WHO Coronavirus (COVID-19) Dashboard; 2022. Available from: https://covid19.who.int/ [Last accessed on 2022 Mar 05].
3. Djalante R, Lassa J, Setiamarga D, Sudjatma A, Indrawan M, Haryanto B, *et al*. Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020. Prog Disaster Sci. 2020;6:100091. https://doi.org/10.1016/j.pdisas.2020.100091
   PMid:34171011
4. Wang M, Han X, Fang H, Xu C, Lin X, Xia S, *et al*. Impact of health education on knowledge and behaviors toward infectious diseases among students in gansu province, China. Biomed Res Int. 2018;2018:6397340. https://doi.org/10.1155/2018/6397340
   PMid:29707573
5. Alzoubi H, Alnawaiseh N, Al-Mnayyis A, Abu-Lubad M, Aqel A, Al-Shagahin H. Covid-19 - Knowledge, attitude and practice among medical and non-medical university students in Jordan. J Pure Appl Microbiol. 2020;14:17-24. https://doi.org/10.22207/JPAM.14.1.04
6. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497-506. https://doi.org/10.1016/S0140-6736(20)30183-5
   PMid:31986264
7. Al-Hanawi MK, Angawi K, Alshareef N, Qattan AM, Helmy HZ, Abudawood Y, *et al*. Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: A cross-sectional study. Front Public Health. 2020;8:1-10. https://doi.org/10.3389/fpubh.2020.00217
   PMid:32574300
8. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. PLoS One. 2020;15(5):1-15. https://doi.org/10.1371/journal.pone.0233668
   PMid:32437434
9. Hatabu A, Mao X, Zhou Y, Kawashita N, Wen Z, Ueda M, *et al*. Knowledge, attitudes, and practices toward COVID-19 among university students in Japan and associated factors: An online cross-sectional survey. PLoS One. 2021;15(12):1-19. https://doi.org/10.1371/journal.pone.0244350
   PMid:33347488
10. Peng Y, Pei C, Zheng Y, Wang J, Zhang K, Zheng Z, *et al*. A cross-sectional survey of knowledge, attitude and practice associated with COVID-19 among undergraduate students in China. BMC Public Health. 2020;20(1):1292. https://doi.org/10.1186/s12889-020-09392-z
    PMid:32847554
11. Ismail FH, Rohmah R, Ibrahim IN, Wen CK. International student collaboration in efforts to raise public awareness of COVID-19 prevention. ASEAN J Community Engagem. 2021;5(2):269-288. https://doi.org/10.7454/ajce.v5i2.1125.
12. Hasanica N, Ramic-Catak A, Mujezinovic A, Begagic S, Galijasevic K, Oruc M. The effectiveness of leaflets and posters as a health education method. Mater Sociomed. 2020;32(2):135-9. https://doi.org/10.5455/msm.2020.32.135-139
    PMid:32843863
13. Sabarudin S, Mahmudah R, Ruslin R, Aba L, Nggawu LO, Syahbudin S, *et al*. Efektivitas pemberian edukasi secara online melalui media video dan leaflet terhadap tingkat pengetahuan pencegahan Covid-19 di kota baubau. J Farm Galen (Galenika J Pharmacy). 2020;6(2):309-18. https://doi.org/10.22487/j24428744.2020.v6.i2.15253
14. Salman M, Mustafa Z, Asif N, Zaidi HA, Shehzadi N, Khan TM, *et al*. Knowledge, attitude and preventive practices related to COVID-19 among health professionals of Punjab province of Pakistan. J Infect Dev Ctries. 2020;14:707-12. https://doi.org/10.3855/jidc.12878
    PMid:32794458
15. World Health Organization. WHO Issues Its First Emergency

Use Validation for a COVID-19 Vaccine and Emphasizes Need for Equitable Global Access; 2020. Available from: https://www.who.int/news/item/31-12-2020-who-issues-its-first-emergency-use-validation-for-a-covid-19-vaccine-and-emphasizes-need-for-equitable-global-access. [Last accessed on 2022 Mar 06].

16. Directorate General of Higher Education, Ministry of Education and Culture Indonesia. Higher Education Statistics 2020. Jakarta: Secretariat Directorate General of Higher Education; 2020.
17. Paramita GV. Studi Kasus Perbedaan Karakteristik Mahasiswa di Universitas 'X'-Indonesia dengan Universitas 'Y'-Australia (A Case Study of The Difference in Characteristics of Students at University 'X'-Indonesia and Univerity 'Y'-Australia). Humaniora. 2010;1:629. https://doi.org/10.21512/humaniora.v1i2.2904
18. Universitas Andalas. Daftar Fakultas dan Program Studi - Penerimaan Mahasiswa Baru Universitas Andalas (List of Faculties and Programs - New Students Admission Universitas Andalas); 2021. Available from: https://pmb.unand.ac.id/new/daftar-program-studi/. [Last accessed on 2022 Apr 03].
19. Maheshwari S, Gupta P, Sinha R, Rawat P. Knowledge, attitude, and practice towards coronavirus disease 2019 (COVID-19) among medical students: A cross-sectional study. J Acute Dis. 2020;9:100. https://doi.org/10.4103/2221-6189.283886
20. Al-Batanony MA, Al-Batanony MA, Mansour AE. A questionnaire-based survey perspective of university students from health and non-health colleges on COVID-19 pandemic: A questionnaire-based survey. Am J Public Health Res. 2020;8:176-83. https://doi.org/10.12691/ajphr-8-5-6
21. Salman M, Mustafa ZU, Asif N, Zaidi HA, Hussain K, Shehzadi N, *et al*. Knowledge, attitude and preventive practices related to COVID-19: A cross-sectional study in two Pakistani university populations. Drugs Ther Perspect. 2020;36:319-25. https://doi.org/10.1007/s40267-020-00737-7

    PMid:32395069
22. Adli I, Widyahening IS, Lazarus G, Phowira J, Baihaqi LA, Ariffandi B, *et al*. Knowledge, attitude, and practice related to the COVID-19 pandemic among undergraduate medical students in Indonesia: A nationwide cross-sectional study. PLoS One. 2022;17:e0262827. https://doi.org/10.1371/journal.pone.0262827

    PMid:35061848
23. Deeks A, Lombard C, Michelmore J, Teede H. The effects of gender and age on health related behaviors. BMC Public Health. 2009;9:213. https://doi.org/10.1186/1471-2458-9-213

    PMid:19563685
24. Jia Y, Ma S, Bai L, Xiao Q, Wu Y, Gao Y, *et al*. Health literacy and disparities in knowledge, attitude and practice regarding COVID-19 among college students during the COVID-19 outbreak in China: A cross-sectional study. Risk Manag Healthc Policy. 2021;14:4477-88. https://doi.org/10.2147/RMHP.S319331

    PMid:34754254
25. Sazali MF, Rahim SS, Mohamed MH, Omar A, Tze Ping Pang N, Saffree Jeffree M, *et al*. Knowledge, attitude and practice on COVID-19 among students during the early phase of pandemic in a university in Borneo, Malaysia. J Public Health Res. 2021;10(3):2122. https://doi.org/10.4081/jphr.2021.2122

    PMid:33759447
26. Moran KR, Del Valle SY. A meta-analysis of the association between gender and protective behaviors in response to respiratory epidemics and pandemics. PLoS One. 2016;11(10):e0164541. https://doi.org/10.1371/journal.pone.0164541

    PMid:27768704
27. Ahmad A, Sann LM, Rahman HA. Factors associated with knowledge, attitude and practice related to hepatitis B and C among international students of Universiti Putra Malaysia. BMC Public Health. 2016;16:611. https://doi.org/10.1186/s12889-016-3188-5

    PMid:27443276
28. Jarab AS, Al-Qerem W, Mukattash TL, Al-Hajjeh DM. Pharmacy and Pharm.D students' knowledge and information needs about COVID-19. Int J Clin Pract. 2021;75(3):1-8. https://doi.org/10.1111/ijcp.13696

    PMid:32891073
29. Hasan H, Raigangar V, Osaili T, Neinavaei NE, Olaimat AN, Aolymat I. A cross-sectional study on university students' knowledge, attitudes, and practices toward COVID-19 in the United Arab Emirates. Am J Trop Med Hyg. 2021;104(1):75-84. https://doi.org/10.4269/AJTMH.20-0857

    PMid:33236710
30. Suprayitno E, Hidayat S, Mumpuningtias ED, Permatasari D, Wardita Y. Community-based health education improve knowledge and attitudes of COVID-19 prevention. J Nurs Pract. 2021;5(1):136-45. https://doi.org/10.30994/jnp.v5i1.164.
31. Singh N, Ramakrishnan T, Khera A, Singh G. Impact evaluation of two methods of dental health education among children of a primary school in rural India. Med J Dr DY Patil Univ. 2016;9:66-71. https://doi.org/10.4103/0975-2870.167988
32. Gupta R, Ingle NA, Kaur N, Ingle E, Charania Z. Evaluation of the impact of different health education methods in undergraduate students of dental college, Mathura City. J Adv Oral Res. 2016;7:7-11. https://doi.org/10.1177/2229411220160102
33. Sussman SW, Siegal WS. Informational influence in organizations: An integrated approach to knowledge adoption. Inf Syst Res. 2003;14:47-65. https://doi.org/10.1287/isre.14.1.47.14767
34. Champion V, Skinner C. The health belief model. In: Glanz K, Rimer B, Viswanath K, editors. Health Behavior and Health Education. San Fransisco, CA: Jossey-Bass; 2008, p. 45-65.
35. Han Y, Jiang B, Guo R. Factors affecting public adoption of COVID-19 prevention and treatment information during an infodemic: Cross-sectional survey study. J Med Internet Res. 2021;23(3):e23097. https://doi.org/10.2196/23097

    PMid:33600348