Disease Prevention and Public Health Journal
Vol. 17, No. 2, Sept 2023, pp. 172-180

e-ISSN: 2720-9997

Knowledge, Attitudes, and Practices Related to Covid-19 in College Students

Nida Faradisa Fauziyah* and Miftakhul Ulum Mahfud
Faculty of Medicine, Universitas Muhammadiyah Surakarta, Central Java, Indonesia
*corresponding author: nff220@ums.ac.id

ARTICLE INFO

Article history
Received **3/15/23**
Revised **5/22/23**
Accepted **7/3/23**

Keywords
Knowledge
Attitude
Practice
Student
Covid-19

ABSTRACT

Background: The world is currently dealing with a new outbreak which is called Covid-19. As a consequence, understanding how students react to a public health emergency is crucial for a school or university. This study is aimed to learn about students' Covid-19 knowledge, attitudes, and practices. The goal of this study is to discover what students know about Covid-19, as well as their views and practices about it. **Methods:** This research was conducted at a private institution in Surakarta, Indonesia, using a cross-sectional survey with students as the participants adopting purposive sampling. The survey includes a questionnaire on Covid-19 Knowledge, Attitudes, and Practice (KAP) that students voluntarily complete. **Result:** A total of 476 people were involved in the study comprising 185 males and 291 females ranging in age from 17 to 26. It is found that medical female students had significantly higher knowledge, with $p<0.001$ and $p = 0.023$. Based on the overall KAP score, medical female students had better knowledge and a positive attitude (p 0.004). The total score for Knowledge, Attitude, and Practice was 18.95 ± 2,188 with knowledge scores of 3.80 ± 0.848 (range: 0 ~ 5), attitudes of 6.48 ± 1,425 (range: 0 ~ 10), and practice of 8.67± 1.133 (range: 0 ~ 10) respectively. **Conclusion:** The majority of students have a good understanding of Covid-19 and practice it regularly. However, the overall value of knowledge, attitudes, and practices varies significantly between gender, department, and level.

Introduction

In late 2019, pneumonia with an unknown cause was first diagnosed in Wuhan, the largest urban center in Hubei Province, China [1]. The new virus was named SARS-CoV-2 by the World Health Organization on February 11, 2020, and the disease was named Coronavirus Disease 2019 (Covid-19) [2]. The World Health Organization declared Covid-19 as a global pandemic on March 11, 2020. A large outbreak of respiratory sickness was caused by this Corona Virus [2]. Covid-19 was first reported in Indonesia on March 2, 2020, just approximately only 4 months apart after the first case was discovered in China [3]. The first occurrences in Indonesia were discovered in early March 2020 with two cases and two more cases were discovered on March 6. Covid-19 cases have continued to rise until now. Initially, the cases multiplied within hundreds but now it has reached up to thousands. There were 743,196 confirmed cases on December 31, 2020, and 1.3 million cases were reported in Indonesia on March 10, 2021 [2, 3]. The government has taken a number of attempts to deal with the Covid-19 pandemic, including national budgetary policy, health emergency documentation, as

well as social restrictions on large-scale [4]. Massive health campaigns were enforced to educate the public about the regulations, including preventive regulations, as well as to encourage all parties to follow the national prudence standards [5]. The World Health Organization (WHO) has established a number of restrictions as a means of preventing transmission, which has now become a collective responsibility. Furthermore, for general protection, specific measures should be followed, such as wearing masks, frequent hand washing, coughing and sneezing covered with the elbow, avoiding crowded places, keeping a safe distance from other people, and cleaning and disinfecting all objects and surfaces [6, 7]. The Indonesian government has mandated this practice to support the prevention of virus transmission [8, 9]. However, the success of the government-administered Covid-19- control program depends on everyone's involvement [5].

Obedience is crucial for the procedures taken to be effective and it is also determined by people's knowledge, attitudes, and practices (KAP) concerning Covid-19 [10, 11]. KAP entails beliefs that can induce preventative behaviors that differ among populations. Nevertheless, potential risks may emerge as a result of a lack of understanding or false medical assumptions [12]. According to a study conducted in Henan, China, higher levels of information were correlated with more positive attitudes toward Covid-19 preventative practices [12].

It is mentioned that college students are the leading group when it comes to innovative technologies and ideas [13, 14]. Therefore, the students play an important role as the main force in encouraging health education and promoting the dissemination of knowledge related to pandemics, which is crucial for the prevention and control of this Covid-19 pandemic [15]. It is also critical for the institution or university to understand how students react when confronted with public health emergency situations. In addition, to enhance preventive measures for Covid-19 in the community, the health authorities need KAP as well. The goal of this study is to compare students' knowledge, attitudes, and practices on Covid-19 among medical and non-medical students so that the institution or university can take more effective precautions to protect students' physical and mental health during the pandemic.

Materials and Method

This study used an observational analytic (non-experimental) research methodology with a cross-sectional survey study approach in June 2021. Purposive sampling procedures are used by applying inclusion and exclusion criteria. The sample included 476 students from a private university in Surakarta.

A demographic questionnaire, comprising of gender, major, level, age, and city of origin, is used as an instrument in this study; The questionnaire for knowledge comprises five variables of knowledge in relation to Covid-19; The questionnaire for attitudes comprises five variables in relation to Covid-19; The questionnaire for practices comprises five variables about the practices in relation to Covid-19. The questionnaire for knowledge was acquired from the Diagnosis and Treatment Protocol (Tentative Version Six) of The National Health Commission of China, while the attitudes and practices questionnaires were adapted from earlier research [16].

In the knowledge questionnaire, the assessment was conducted using a common method which is 1 point for correct response and 0 for incorrect response. Meanwhile, the questionnaire for attitude and practices applied different grading methods which is 2 for positive choices, 1 for neutral choices, and 0 for negative choices. Knowledge scores vary from 0 to 5, attitudes from 0 to 10, practices from 0 to 10, and the total KAP scores from 0 to 25.

The data for this study was collected by distributing Google Form surveys through WhatsApp in the first week of June 2021. Each participant was asked to complete and submit the questionnaire that they have received. The first page of the Google form contains a consent form describing the overall scope of the study also the assurance of personal data security. The researcher provides detailed instructions to all students who fill out the questionnaires to ensure the validity and quality of the data obtained for this study. The platform used on this survey was Google Form which automatically checked all incoming questions that has been filled. Each student can only fill out the questionnaires once.

The SPSS V.25 was used to analyze the research data and the T-test was performed to compare the value of the average variable. In the meanwhile, the Chi-square test was employed to establish whether or not the compared variable was categorical, as well as its ratio. To compare the correlation between the two variables, the Pearson or Spearmen correlation analysis was used. The result showed that the p-value was less than 0.05, therefore it was statistically significant. Ethical Clearance: The Health Research Ethics Committee FK UMS No. 3596/B.2/KEPK-FKUMS/IV/2021 approved and certified this study to be ethical.

Results and Discussion

Results

Demographic Characteristics

Table 1 describes the participants of this study which were 476 college students with 185 male students and 291 female students ranging in age from 17 to 26 years. There are 245 medicine students, 231 non-medical students, 85 freshman-year students, and 391 other-than-freshman-year students.

Table 1. Demographic Characteristics

Variables	Frequency	%
Sex		
Male	185	38.9
Female	291	61.1
Age (year)		
17	4	0.8
18	25	5.3
19	66	13.9
20	137	28.8
21	149	31.3
22	61	12.8
23	24	5
24	8	1.7
26	2	0.4
Major		
Medical	245	51.5
Non-Medical	231	48.5
Grade		
First Year	85	17.9
Other Grades	391	82.1

Knowledge Against COVID-19

Five variables questions were used to assess the student's knowledge of Covid-19. Table 2 lists each question and its response. Table 2 shows that out of 2380 responses, 1807 (75.92%) were answered correctly. Approximately 97.5% of participants accurately answered questions concerning the causes of Covid-19, and 97.9% successfully answered questions about the transmission of Covid-19. Furthermore, the percentage of accurate answers about the incubation period, people who are vulnerable to Covid-19, and clinical manifestation are 85.1%, 27.5%, and 71.6% respectively (Table 2). It found a significant relationship in which females scored higher on questions about virus transmission tracking, incubation period, and clinical manifestations. Moreover, the medical department received higher scores on questions about the cause of Covid-19, the main track of transmission, and clinical manifestations, indicating a significant relationship.

Table 3 shows a significant correlation in which females scored higher on K2 (p=0.016), K3 (p=0.001), and K5 (p=0.001). Meanwhile, the medical department scored higher on the K1 (p

0.001), K2 (p=0.009), and K5 scales, indicating a significant link (p=0.011). The first-year groups and the other grades had no statistical significance (Table 3).

Table 2. Knowledge Related to Covid-19

Variable Categories	Options	Score*	N (%)
K1 : What type of infectious disease is Covid-19?	Bacterial	0	7 (1.0)
	Viral	1	464 (97.5)
	I don't know	0	5 (1.5)
K2 : What is the main transmission route of Covid-19?	Respiratory droplets and close contact	1	466 (97.9)
	Water	0	1 (0.21)
	Food	0	0 (0.00)
	I don't know	0	9 (1.89)
K3 : How long is the Covid-19 incubation period?	1-14 days	1	405 (85.1)
	3-7 days	0	27 (5.7)
	More than 14 days	0	30 (6.3)
	I don't know	0	14 (2.9)
K4 : Who are susceptible to Covid-19?	The old and young	0	67 (14.1)
	People are generally susceptible	1	131 (27.5)
	Young adults	0	0 (0.0)
	People with pre-existing diseases	0	265 (55.7)
	I don't know	0	13 (2.7)
K5 : What are the main clinical manifestations of Covid-19?	Fever and dry cough.	1	341 (71.6)
	Fatigue	0	5 (1.1)
	Stuffy and runny nose.	0	35 (7.4)
	Sore throat and myalgia.	0	61 (12.8)
	Diarrhea	0	4 (0.8)
	I don't know	0	30 (6.3)

**) Note: 0: Incorrect; 1: Correct*

Table 3. Comparison of Knowledge Against Covid-19 in Each Group

Variables	Gender			Major			Grade		
	Male	Female	P	Medical	Non-Medical	P	First year	Other Grades	P
K1- Correct	178	286	0.229	245	219	<0.001	82	382	0.456
K2- Correct	177	289	0.016	244	222	0.009	82	384	0.394
K3- Correct	144	261	<0.001	214	191	0.154	77	328	0.116
K4- Correct	53	78	0.661	60	71	0.127	24	107	0.871
K5- Correct	115	226	<0.001	188	153	0.011	65	276	0.276

Attitude towards Covid-19

Five variables questions were used to assess the students' attitude toward Covid-19. Table 4 shows each question and answer relating to attitudes toward Covid-19. It shows that 1243 (52.26%) of the 2380 responses had a positive attitude.

Females showed more positive attitudes on the A1 (p=0.001) and A2 (p=0.001), as seen in Table 5 (p=0.036). There was also a significant relationship between medical students' positive attitudes on the A1 (p=0.001) and A4 (p=0.001). Furthermore, medical students showed more positive attitudes on A1 (p=0.001) and A4 (p=0.001). There was no statistical difference between first-year groups and other grades (Table 5). As many as 77.1% of respondents stated they feared human-to-human transmission, 96.4% expressed a positive attitude on questions about expecting the end of the pandemic so that they may return to campus and 69.1% had neutral attitudes towards wildlife consumption questions.

The students showed a neutral attitude (50.8%) on the topic of whether they would be better prepared to survive in an emergency and students who agreed that the outbreak was impacting their schoolwork (81.7%). Furthermore, it found a significant relationship in females that had more positive attitudes between the transmission of Covid-19 from human to human and the assumption that the pandemic would end soon so they could return to campus. While there was a significant relationship in which the medical students had more positive attitudes toward the transmission of Covid-19 and believed they would be able to survive longer.

Table 4. Attitudes of Students Against Covid-19

Variable Categories	Option	Score*	N (%)
A1 : Are you scared by human-to-human transmission of COVID-19?	No, I'm rational and I can protect myself.	2	367 (77.1)
	I don't care; I feel the same.	1	17 (3.6)
	Yes, I'd panic and don't know what to do	0	92 (19.3)
A2 : Do you hope the outbreak stops quickly so you can return to school soon?	Yes	2	459 (96.4)
	I don't care	1	11 (2.3)
	No, I want to stay at home as long as possible.	0	6 (1.3)
A3 : What's your attitude towards wild animal consumption?	I don't eat wild animals, and I will accuse consumers	2	136 (28.6)
	I don't eat personally, but I won't stop others	1	329 (69.1)
	I don't mind having a try	0	11 (2.3)
A4 : Do you think you will be more capable to endure such public health emergence?	Yes, I'm more educated and thus more capable	2	194 (40.8)
	I will be the same.	1	242 (50.8)
	No, I'm too scared to withstand it anymore	0	40 (8.4)
A5 : Do you think this outbreak has impacted your study?	Yes, it has	0	389 (81.7)
	No. I'm self-disciplined and my study was not affected at home	2	87 (18.3)

**) Note: 0: Negative; 1: Neutral; 2: Positive*

Table 5. Comparison of Attitudes Against Covid-19 in Each Group

Variables	Gender			Major			Grade		
	Male	Female	P	Medical	Non-Medical	P	First Year	Other Grades	P
A1-Positive	143	224	<0.001	206	161	<0.001	62	305	0.375
A2-Positive	176	283	0.036	238	221	0.593	79	380	0.102
A3-Positive	43	93	0.082	79	57	0.132	24	112	0.997
A4-Positive	66	128	0.189	118	76	<0.001	29	165	0.348
A5-Positive	32	55	0,659	52	35	0.087	18	69	0.445

Practice Against Covid-19

Five questions were assigned in practice against Covid-19. Table 6 shows that 1,804 (75.79%) of the 2,380 responses received were proactive. According to Table 7, females shows a significant relationship more proactive in P3 (p=0.001), while medical students were more proactive in P2 (p<0.001) and P3 (p=0.001). In addition, first-year students and the other grades students also showed significant indication at P5 (p=0.030) (Table 7).

It is about 97.5% of students were proactive when asked about what they should do if they had a fever and cough, 51.7% were proactive when asked if they were willing to help fight the pandemic on the front lines and 91.6% were proactive when asked what they should do if they had close contact with a confirmed case. As many as 48.1% of respondents selected proactive practice when asked what to do when someone who had already been recovered wished to meet them and 89.5% selected proactive behavior when asked what becomes a priority once the pandemic has ended. There was a significant relationship in which females had a more proactive practice of what they would do if they came into close contact with a confirmed Covid-19 patient, as well as medical students who responded more proactive if they were needed to help rescue on the front lines. Meanwhile, there was a significant indication in the first-year students with the other grade's students on the practice of the primary priorities once the pandemic ended.

Comparison of KAP Scores Related to Covid-19 Between Different Groups

The overall score for Knowledge, Attitude, and Practices is 18.95 ± 2.188, with the following values: Knowledge 3.80 ± 0.848 (range: 0 ~ 5), Attitude 6.48 ± 1.425 (range: 0 ~ 10), and Practice 8,67 ± 1,133 (range: 0 ~ 10). A positive correlation was found between attitude and practice (r=0.157, p=0.001) (Table 8). According to the statistical analysis shown in Table 8, it can be inferred that the level of knowledge was significantly higher in females (p<0.001) and departments of medicine (p=0.023). Medical students demonstrated a more positive attitude (p<0.001), as did

proactive practice (p<0.001) (Table 9). Knowledge, attitude, and practice did not show a significant indication in relation to the variable of student level (Table 9).

Table 6. Practice Related to Covid-19

Variable Categories	Option	Score*	N (%)
P1 : What would you do if you had a fever and dry cough?	I will analyze the situation rationally. Stay home for observation and self-quarantine or go to a hospital for a treatment	2	467 (97.5)
	I want to go to a hospital, but I'm afraid to be infected	1	7 (1.5)
	I feel panic and don't know what to do	0	5 (1.1)
P2 : If the country needs you, are you willing to help the frontline rescue?	Yes, every citizen shall bear the country's burden.	2	246 (51.7)
	I'm not sure and need suggestions from the family		
	No, it's too dangerous	1	224 (47.1)
		0	6 (1.3)
P3 : What would you do if you had close contact with confirmed cases?	Proactively report to the community and stay home in quarantine as required	2	436 (91.6)
	Same as before	1	33 (6.9)
	I feel panic and don't know what to do	0	7 (1.5)
P4 : What would you do if someone cured of COVID-19 wanted to meet you?	I will meet them and show more kindness	2	229 (48.1)
	I will meet them just like before.		
	I'll find an excuse to keep away from them	1	216 (45.4)
		0	31 (6.5)
P5 : What will be your top priority when the pandemic ends?	I will go back to school and restart normal study	2	426 (89.5)
	Same as before		
		1	45 (9.5)
	The outbreak is too scary. I need to enjoy my life as much as possible	0	5 (1.1)

**) Note: 0: Passive; 1: Neutral; 2: Proactive*

Table 7. Comparison of Practices Against Covid-19 in Each Group

Variables	Gender			Major			Grades		
	Male	Female	P	Medical	Non-Medical	P	First Year	Other Grades	P
P1-Proactive	178	286	0.385	241	223	0.308	81	383	0.299
P2-Proactive	91	155	0.065	150	96	<0.001	48	198	0.213
P3-Proactive	159	277	0.001	235	201	0.001	79	357	0.462
P4-Proactive	95	134	0.060	118	111	0.757	36	193	0.426
P5-Proactive	162	264	0.533	227	199	0.066	69	357	0.030

Table 8. Correlation Between Scores of Knowledge, Attitude, and Practice

Variables	P	r
Knowledge-Attitude	0.448	0.035
Knowledge-Practices	0.501	0.031
Attitude-Practices	0.001	0.157

Table 9. Comparison of KAP Scores Related to Covid-19 Between Different Groups

Variables	N	Knowledge		Attitude		Practice	
		T	P	T	P	T	P
Gender							
Male	185	- 3.977	<0.001	-1.188	0.235	-1.078	0.282
Female	291						
Major							
Medical	245	2.274	0.023	5.512	<0.001	4.357	<0.001
Non Medical	231						
Grade							
First Year	85	1.034	0.302	-0.915	0.361	-0.630	0.529
Other Grades	291						

Discussion

Students play an important role as the main force in encouraging health education and promoting the dissemination of knowledge related to pandemics, which is crucial for the prevention

and control of the Covid-19 pandemic. It is also critical for the institution to understand how to enhance preventive measures for Covid-19 in the community, the health authorities need KAP as well. The study aims to compare students' knowledge, attitudes, and practices about Covid-19 among medical and non-medical students so that institutions or universities can take more effective precautions to protect students' physical and mental health during the pandemic.

The majority of the 476 respondents in this cross-sectional study were female, medical students, and senior-level students, with an age range of 21-26 years. It's in line with the findings of other Chinese studies, which showed that the majority of respondents are female medical students, but that the majority of them are first-year students [16].

According to the findings of this study, students' knowledge of Covid-19 seems to be quite good, reaching 75.92%. According to a study conducted in China, students' knowledge of Covid-19 is 82.34% [16]. Other studies have found comparable findings to this one, with 82% of students having an adequate understanding of the current pandemic [17]. This result seems to be much better than a study conducted in India, in which students' knowledge was estimated to be as high as 66% [18].

Females scored higher on questions about the transmission track, incubation period, and clinical manifestation, which indicated a significant relationship. It is consistent with the findings of another study conducted in China by Gao that demonstrate female students have a greater comprehension of transmission and prevention than male students [19]. Furthermore, there is a substantial relationship in which the medical student receives a higher score on questions about the cause of Covid-19, the main transmission track, and clinical manifestations. Medical students have a high level of knowledge, which can be attributed to their clinical medicine and public health training. It is their job and responsibility to fight this pandemic because future medical professionals are encouraged to have a more positive attitude and proactive practice during this state of public health emergency [20]. In addition, this finding concurs with another study conducted in Indonesia by Muslin and Sari, which found that the majority of participants have adequate knowledge of Covid-19 [21, 22]. This is due to the fact that, since the first case of Covid-19 in Indonesia was discovered in March 2020, information about the disease has been widely published around the world; as a result, the people of Indonesia have sufficient knowledge about Covid-19 [22].

According to our findings, 52.26% of students had a good attitude toward Covid-19. This is consistent with earlier studies by Tamang in Nepal, which found that 54.7% of respondents have a positive attitude [23]. Meanwhile, according to a Chinese study, 73.81% of respondents have a positive attitude toward Covid-19 [16]. The participants had both negative and positive feelings regarding the epidemic, with the majority concerned that they or members of their families would become infected [24]. It is also consistent with what has been reported among college medical students in China by Peng and in Pakistan by Hasan [16, 25]. However, this finding contrasts with other studies in Indonesia, which demonstrate that the majority of individuals have a positive attitude toward Covid-19 [21, 22].

The proactive practice of 75.79% of the students in this study indicates that the practice of students related to Covid-19 is considered to be good. This is consistent with the findings of other studies, which show that respondents had good practice, with a value of 78.9% [23]. Another study by Peng in China showed that 87.94% of students had proactive practice toward Covid-19 [16]. According to Z. Gao's findings, although most of the students are fully aware of the serious risk caused by COVID-19, all students who engaged in the survey expressed optimism that COVID-19 will be under control [19]. A similar study found that Indonesians have better practices in dealing with the Covid-19 epidemic [21].

Similar to ours, the study was done during the early stages of the epidemic. Students in the health department are more knowledgeable about the Covid-19 epidemic and are more likely to wear masks than students in the non-health department, although having the same attitude [25]. According to a study of 10 Chinese universities, state universities, and medical departments had significantly knowledgeable about Covid-19 than private universities and non-medical departments [16]. Other studies from Japan [26] and India [18], on the other hand, find no differences between medical and non-medical students. Covid-19 is well-known among medical students, according to

studies [27, 28]. These medical students are frequently approached for medical advice by family members, who encourage them to study more about Covid-19 [29, 30].

Knowledge, attitude, and practice are all interconnected. People with good knowledge are required to put their knowledge into good practices and preventive measures. This study reveals a gap between knowledge that has been integrated into good practice but not into a positive attitude. Respondents with sufficient knowledge and practice do not necessarily have a positive attitude. This is due to a variety of factors that influence the construction of one's attitude, including personal experience, the influence of important persons, cultural influences, mass media, educational institutions, religious organizations, and the impact of emotional aspects. This finding is nearly identical to those of other Indonesian studies which show a disparity between knowledge that is not turned into a positive attitude and prevention related to Covid-19 [31].

We are aware that there are several limitations to this study. To begin with, our respondents are all from the same university. As a result, the findings may not apply to the entire population of Indonesian college students. Second, we depend on respondents to accurately describe and comprehend their feelings without the ability to investigate them because this is an online survey. This, however, is generally true of all online surveys. Despite these limitations, we feel that the findings will be valuable in providing further insight to policymakers in the fields of education and health. This study could provide useful information about public health education and preventive measures at Indonesian universities during the Covid-19 outbreak.

Conclusion

Although college students have good knowledge and proactive practice against Covid-19, only half of them still have a positive attitude toward the virus. In the fight against Covid-19, medical students are more knowledgeable, optimistic, and proactive. Our findings suggest that the majority of undergraduate students have developed a fundamental understanding of Covid-19, although their performance varies by gender, department, and level. It is still necessary to develop a strategy to help students cope with the pandemic more positively. This pandemic, which has been ongoing for over a year, has undoubtedly had serious psychological consequences for a large number of students. As a result, during the pandemic, psychological support and social proactive services for students should be considered vital.

Declaration

Acknowledgments: The authors would like to thank all participants for their time and excellent cooperation.

Conflicts of Interest: The authors declare no conflict of interest

References

1. WHO. Archived: *WHO timeline-COVID- 19*. 2020. doi: https://doi.org/10.46945/bpj.10.1.03.01
2. Bartoletti M, Azap O, Barac A, Bussini L, Ergonul O, Krause R, Paño-Pardo JR, Power NR, Sibani M, Szabo BG, Tsiodras S, Verweij PE, Zollner-Schwetz I, Rodríguez-Baño J. ESCMID COVID-19 living guidelines: drug treatment and clinical management. *Clin Microbiol Infect*. 2022 Feb;28(2):222-238. doi: 10.1016/j.cmi.2021.11.007. Epub 2021 Nov 22. PMID: 34823008; PMCID: PMC8606314.
3. Hasöksüz M, Kiliç S, Saraç F. Coronaviruses and SARS-COV-2. *Turk J Med Sci*. 2020 Apr 21;50(SI-1):549-556. doi: 10.3906/sag-2004-127. PMID: 32293832; PMCID: PMC7195990.
4. Djalante R, Lassa J, Setiamarga D, 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. doi: https://doi.org/10.37301/elect.v1i2.61
5. Kim HJ, Ko JS, Seo H, Kim TY. Guidelines for the control and prevention of coronavirus disease (COVID-19) transmission in surgical and anesthetic settings. *Korean J Anesthesiol*. 2020 Aug;73(4):271-274. doi: 10.4097/kja.20235. Epub 2020 May 12. PMID: 32392669; PMCID: PMC7403121.
6. Firth J. Covid-19 current advice for pathologists. *Pathologica*. 2020 Jun;112(2):55-56. doi: 10.32074/1591-951X-12-20. Epub 2020 Mar 17. PMID: 32292181; PMCID: PMC7931567.
7. Ciance KL. Protect Yourself From Peril. *Nurs Womens Health*. 2020 Feb;24(1):63-64. doi: 10.1016/j.nwh.2019.11.001. Epub 2019 Dec 28. PMID: 31887258.
8. Wibawa T. COVID-19 vaccine research and development: ethical issues. *Trop Med Int Health*. 2021 Jan;26(1):14-19. doi: 10.1111/tmi.13503. Epub 2020 Oct 19. PMID: 33012020; PMCID: PMC7675299.
9. Ajilore K, Atakiti I, Onyenankeya K. Huda F, Kumar P, Singh SK, Agrawal S, Basu S. Covid-19 and surgery: Challenging issues in the face of new normal - A narrative review. *Ann Med Surg (Lond)*. 2020 Dec;60:162-167. doi: 10.1016/j.amsu.2020.10.039. Epub 2020 Oct 23. PMID: 33133594; PMCID: PMC7583620.

10. Nwagbara UI, Osual EC, Chireshe R, Bolarinwa OA, Saeed BQ, Khuzwayo N, Hlongwana KW. Knowledge, attitude, perception, and preventative practices towards COVID-19 in sub-Saharan Africa: A scoping review. *PLoS One*. 2021 Apr 19;16(4):e0249853. doi: 10.1371/journal.pone.0249853.
11. Saka Laksmita A, Putu Risky Vidika Apriyanthi D, Putu Widayanti N. Community Knowledge, Attitudes and Behaviors towards Obesity Prone to COVID-19 Infection. *Disease Prevention and Public Health Journal* [Internet]. 2023 Feb 12;17(1):76–81. Available from: http://dx.doi.org/10.12928/dpphj.v17i1.6968
12. Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *J Hosp Infect*. 2020; 105:183-187. doi: https://doi.org/10.1016/j.jhin.2020.04.012. PMID: 32278701
13. Gao H, Hu R, Yin L, et al. Knowledge, attitudes and practices of the Chinese public with respect to coronavirus disease (COVID-19): an online cross-sectional survey. *BMC Public Health* 2020;20:1816. doi: https://doi.org/10.1186/s12889-020-09961-2
14. Yousaf MA, Noreen M, Saleem T, et al. A cross-sectional survey of knowledge, attitude, and practices (KAP) toward pandemic COVID-19 among the general population of Jammu and Kashmir, India. *Soc Work Public Health* 2020;35:569-78. doi: https://doi.org/10.1080/19371918.2020.1806983
15. Ferdous MZ, Islam MS, Sikder MT, et al. Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: an onlinebased cross-sectional study. *PLoS One* 2020;15:e0239254. doi: https://doi.org/10.1371/journal.pone.0239254
16. 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 Aug 26; 20(1):1292. doi: https://doi.org/10.1186/s12889-020-09392-z.
17. Alrasheedy A Alian, Suhaj Abdulsalim, Maryam Farooqui, Saud Alsahali, Brian Godman. Knowledge, attitude and practice about coronavirus disease (covid-19) pandemic and its psychological impact on students and their studies: a cross-sectional study among pharmacy students in Saudi Arabia. *Risk Management and Healthcare Policy* 2021:14 729-741. doi: https://doi.org/10.26650/eor.20200049
18. Singh Jagajeet Prasad, Anshuman Sewda, Shiv Dutt Gupta. Assessing the knowledge, attitude and practices of students regarding the covid-19 pandemic. *Journal of Health Management* 22(2) 281-290, 2020. doi: https://doi.org/10.1177%2F0972063420935669
19. Z Gao, Songsong Ying, Jun Liu, Huiqiu Zhang, Jinxin Li, Changling Ma. A cross-sectional study: Comparing the attitude and knowledge of medical and non-medical students toward 2019 novel coronavirus. *Journal of Infection and Public Health* 13 (2020) 1419-1423. doi: https://doi.org/10.1016/j.jiph.2020.06.031
20. Heung YY, Wong KY, Kwong WY, To SS, Wong HC. Daniel Wong. Severe acute respiratory syndrome outbreak promotes a strong sense of professional identity among nursing students. *Nurse Educ Today.* 2005;25(2): 112-8. doi: https://doi.org/10.1016/j.nedt.2004.11.003
21. Muslih, M.; Susanti, H.D.; Rias, Y.A.; Chung, M.-H. Knowledge, Attitude, and Practice of Indonesian Residents toward COVID-19: A Cross-Sectional Survey. *Int. J. Environ. Res. Public Health* 2021, 18, 4473. doi: https://doi.org/10.3390/ijerph18094473
22. Sari, D.K.; Amelia, R.; Dharmajaya, R.; Sari, L.M.; Fitri, N.K. Positive Correlation Between General Public Knowledge and Attitudes Regarding COVID-19 Outbreak 1 Month After First Cases Reported in Indonesia. *J. Community Health* 2021, 46, 182-189. doi: https://doi.org/10.1007/s10900-020-00866-0
23. Tamang Nira, Punam Rai, Siddhartha Dhungana, Binod Sherchan, Bikash Shah, Prajjwal Pyakurel, Saroj Rai. COVID-19: a National Survey on perceived level of knowledge, attitude and practice among frontline healthcare Workers in Nepal. *BMC Public Health* (2020) 20:1905. doi: https://doi.org/10.1186/s12889-020-10025-8
24. Baniyas N, Sheek-Hussein M, Al Kaabi N, Al Shamsi M, Al Neyadi M, Al Khoori R, et al. (2021) COVID-19 knowledge, attitudes, and practices of United Arab Emirates medical and health sciences students: A cross sectional study. *PLoS ONE* 16(5): e0246226. doi: https://doi.org/10.1371/journal.pone.0246226
25. 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; 104:75-84. doi: https://doi.org/10.4269/ajtmh.20-0857.
26. 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*. 2020; 15:e0244350. doi: https://doi.org/10.1371/journal.pone.0244350.
27. Noreen K, Rubab ZE, Umar M, Rehman R, Baig M, Baig F. Knowledge, attitudes, an practices against the growing threat of COVID-19 among medical students of Pakistan. *PLoS One.* 2020 Dec 11;15(12):e0243696. doi: https://doi.org/10.1371/journal.pone.0243696
28. Khasawneh AI, Humeidan AA, Alsulaiman JW, Bloukh S, Ramadan M, Al-Shatanawi TN, et al. Medical Students and COVID-19: Knowledge, Attitudes, and Precautionary Measures. A Descriptive Study From Jordan. *Front Public Health*. 2020; 8:253. doi: https://doi.org/10.3389/fpubh.2020.00253
29. Jairoun A, Hassan N, Ali A, Jairoun O, Shahwan M. Knowledge, attitude and practice of antibiotic use among university students: a cross sectional study in UAE. *BMC Public Health*. 2019; 19:518. doi: https://doi.org/10.1186/s12889-019-6878-y. Available from https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-6878-y. PMID: 31060543
30. Wati N, Oktarianita O, Sartika A. Community Personal Hygiene Knowledge and Attitude to Covid-19 Prevention Behavior. *Disease Prevention and Public Health Journal* [Internet]. 2023 Mar 7;17(1):116–23. Available from: http://dx.doi.org/10.12928/dpphj.v17i1.7098
31. Sulistyawati Sulistyawati, Rokhmayanti Rokhmayanti, Budi Aji, Siwi Pramatama Mars Wijayanti, Siti Kurnia Widi Hastuti, Tri Wahyuni Sukesi, Surahma Asti Mulasari. Knowledge, attitudes, practices and information needs during the covid-19 pandemic in Indonesia. *Risk Management and Healthcare Policy* 2021:14 163-175. doi: https://dx.doi.org/10.2147%2FRMHP.S28857