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Systematic Review (Pages: 363-373)

Knowledge, Attitudes, and Practices toward COVID-19 among University Students Worldwide: A Systematic Review

Amer Yazdanparast[1], Zahra Emami Moghadam[2], *Masumeh Saeidi[3]

[1]Assistant Professor of Pediatric Cardiology, Department of Pediatrics, Faculty of Medicine, Bushehr University of Medical Sciences, Bushehr, Iran.

[2]Assistant Professor, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

[3]Department of Medical Education, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

Abstract

Background: Lack of accurate information about epidemic diseases or lack of a comprehensive clinical picture of the disease and its ways of transmission in the past decades have resulted in high fatalities. This study was designed to determine the knowledge, attitude, and practice (KAP) of students worldwide toward COVID-19.

Materials and Methods: In this systematic review, a systemic search of online databases (Medline, EMBASE, Scopus, Web of Science, Cochrane Library, CIVILICA, and Google Scholar search engine) was conducted for related studies with no time limit up to Nonmember 2021. Two reviews evaluated the quality of eligible studies and carried out the selection procedure.

Results: A total of 33 studies from 19 countries across all continents assessing the COVID-19 KAP of 28,081 participants were included. The overall correct answers for knowledge, good attitude, and good practice across worldwide studies ranged from 29.8-97.2%, 28.1-91.15%, and 51.5-99.5%, respectively. The highest and lowest knowledge scores were related to Indian and Indonesian students. The highest positive attitude was related to Indian students, and the lowest positive attitude was related to Malaysian students. The results also showed that the highest positive performance was related to Indian students, and the lowest rate was related to Indonesian students. In addition, gender, university year, level of education, and field of study were determined as factors associated with the overall KAP of students ($P<0.05$).

Conclusion: The results showed that medical students had higher knowledge and attitude on COVID-19, but non-medical students had more acceptable performance. KAP scores were higher in Indian students than students in other countries.

Key Words: Attitude, Knowledge, Practice, Students, Worldwide.

*Please cite this article as: Yazdanparast A, Emami Moghadam Z, Saeidi M. Knowledge, Attitudes, and Practices toward COVID-19 among University Students Worldwide: A Systematic Review. Med Edu Bull 2022; 3(1): 363-73. DOI: **10.22034/MEB.2021.321832.1046**

Corresponding Author:

Masumeh Saeidi, Department of Medical Education, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

Email: Masumeh_saeedi@yahoo.com

Received date: Dec. 06, 2021; Accepted date: Jan.12, 2022

1- INTRODUCTION

From mid-December 2019, a new type of coronavirus was identified in Wuhan, China. This type of coronavirus has not been seen in humans before. The virus spread around the world due to its high rate of transmission and spread, so that on March 11, 2020, it was announced as a pandemic by the Secretary-General of the World Health Organization (1-3). Lack of accurate information about epidemic diseases or lack of a proper clinical picture of the disease and its ways of transmission in the past decades have resulted in high fatalities (4). These events show how a new disease can spread with incredible speed and also the necessity of epidemiological studies and scientific research. Public awareness of infectious diseases plays an important role in controlling these diseases. Lack of proper and sufficient knowledge of infectious diseases, especially emerging and new diseases leads to poor diagnosis, discontinuation of treatment, discrimination and stigma associated with the disease (5).

Epidemiological studies show that the transmission of COVID-19 is very high compared to other infectious diseases (6). The most important solution to control pandemics is to increase the awareness and attitude of people towards infectious diseases because, in addition to determining the effect of previous awareness activities, it provides valuable information for new interventions (7). Experts believe that attitudes and beliefs can form behaviors over time as the level of knowledge, attitude, and practice (KAP) of individuals are three influential factors. So, in studies, all these three options are assessed. The WHO places special emphasis on preventing the spread of the disease; in other words, cutting the transmission chain. This is only possible by increasing the knowledge, attitude, and positive practice of people about coronavirus. On the other hand, students are an influential group in society and can play a positive role in educating the general public and preventing stress in different sections of society against COVID-19. Therefore, examining their KAP level toward COVID-19 can help the community health policy-makers develop strategies to prevent and combat this contagious disease. This study was designed to determine the knowledge, attitude, and practice (KAP) of students worldwide toward COVID-19.

2- MATERIALS AND METHODS

The Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) checklist was used as the template for this review (8).

2-1. Eligibility criteria

2-1-1. Participants: University students worldwide.

2-1-2. Included studies: The review included studies that reported any form of quantitative assessment, measurement, and evaluation of KAP regarding COVID-19 in the general population in any country or region of the world. The inclusion criteria were the focus on knowledge and/or attitude and/or practice towards COVID-19, being published up to November 2021, written in English and Persian, and published articles that had full-text available.

2-1-3. Exclusion criteria: The exclusion criteria were abstracts not linked to the full article, articles written not in English and Persian, reviews or meta-analyses, letters to the editor, editorials, short reports, case reports, and briefs.

2-2. Information sources

A systemic search of electronic databases Medline (via PubMed), EMBASE, Scopus, Web of Science, and CINAHL was conducted. The search was done independently and in duplication by two

reviewers, and any disagreement between the reviews was dissolved by the supervisor.

2-3. Search

Search words were a combination of (COVID-19 OR SARS-CoV-2) AND (KAP OR Knowledge OR Attitude OR Practice) AND (Students OR University Students).

2-4. Study selection

Database search was done for possible studies, study abstracts were screened for eligible studies, full-text articles were obtained and assessed, and a final list of included studies was made. This process was done independently and in duplication by two reviewers and any disagreement was resolved by the third reviewer. References were organized and managed using EndNote software (version X8).

2-5. Data collection process

A researcher form was developed and followed for each study. Two reviewers collected the data independently. The collected data were combined and compared for accuracy, and any discrepancies were solved by a third reviewer.

2-6. Risk of bias in individual studies

Risk of bias assessment was done following the standard tool of Hoy et al. (9). It is a valuable tool to evaluate the quality of observational studies. The checklist, consisting of ten items plus a summary assessment, addresses two dimensions, i.e., external validity by means items 1 – 4 (domains: selection and nonresponse bias), and internal validity by means items 5– 10 (domains: measurement bias and item bias related to the analysis). The assessment was done by two reviewers independently and in duplication, and any discrepancies were resolved by the third reviewer.

3- RESULTS

Finally, 33 studies from 19 countries or territories, including 28,081 participants' KAP towards COVID-19, were selected. The main characteristics of the selected studies are summarized in following:

3-1. Iran

1. A descriptive-analytical web-based study was conducted on 463 students of Mashhad University of Medical Sciences aimed to assess their knowledge about COVID-19. The results showed that the mean score of students' knowledge in epidemiology was 87.15$\pm$ 56.31, clinical questions 53.06$\pm$20.12, prevention and transmission 58.91$\pm$ 22.20, virology and basic information was 55.40$\pm$ 24.74, and in total 63.44$\pm$ 12.09 out of 100. Women's knowledge about prevention and transmission of COVID-19 was significantly better than men's ($p < 0.05$) (10).

2. The results of a cross-sectional study on 241 medical students in Jahrom examining their knowledge, attitude, and practice about COVID-19 showed that the mean score of knowledge, attitude, and practice of students about coronavirus was above average; 73.84, 79.62, and 77.09 (out of 100 points), respectively. There was a significant relationship between the field of study, marital status, academic year, and the number of family members and students' performance (11).

3. The results of a cross-sectional descriptive study on 111 dental students in Yazd assessing their knowledge, attitude, and understanding about COVID-19 showed that the mean knowledge and attitude of students were 33.4$\pm$ 55.19 and 6.1$\pm$ 23.61 (moderate status). There was no statistically significant difference between knowledge, attitude, and gender variables and semester (12).

4. In a study on 381 medical students in Ardabil aimed to determine the attitude and knowledge of medical students about COVID-19, results showed that the mean and standard deviation for students' attitudes toward COVID-19 were 58.75± 5.56, and their knowledge was 41.61 ± 6.27. There was also a significant relationship between students' knowledge scores and age ($p < 0.001$). Based on the results, students had an acceptable knowledge and attitude towards the disease. In this study, 112 students (29.4%) were studying medicine, 129 (33.9%) were studying nursing, and 115 (30.2%) were studying in paramedical fields (13).

3-2. Bangladesh

In a study on 952 public university students in Bangladesh aimed to evaluate their health behavior toward COVID-19, results showed that students had an exemplary COVID-19 knowledge (moderate: 42.12%) and positive attitudes (moderate: 51.05%) and preventive practices (moderate: 54.73%) toward COVID-19. Gender, university year, and major were associating factors with their overall KAP (14).

3-3. Bulgaria

A descriptive cross-sectional study on 169 Bulgarian preclinical dental students aimed to investigate their knowledge and attitude towards COVID-19 precautions showed that dental students demonstrated satisfactory levels of knowledge on basic precautions in the context of dental work. However, their knowledge required further improvement (15).

3-4. China

A cross-sectional survey in China on 872 students from ten universities in Shaanxi Province aimed to investigate the knowledge, attitude, and practice (KAP) associated with COVID-19 among university students showed that the knowledge, attitude, and practice were 82.34%, 73.81%, and 87.94%, respectively. It means most university students possessed the necessary knowledge, positive attitude, and proactive practice towards COVID-19, but their KAP scores significantly varied by gender, major, and school type (16).

3-5. Egypt

A study on 439 undergraduate medical students in Egypt aimed to assess their knowledge, attitude, and preventive practices regarding COVID-19 showed that students had an acceptable level of knowledge (74.3%), positive attitude (64.2%), and good practices (76.8%) of preventive measures regarding the disease (17).

3-6. Japan

A study on 362 students in Japan aimed to evaluate their KAP toward COVID-19 showed that the overall KAP of university students was high. It means that university students in Japan lean toward safety and health preservation during the COVID-19 crisis. Gender, study subjects, education level, nationality, residence, private self-consciousness, and extroversion have all been associated with knowledge and attitudes toward COVID-19 (18).

3-7. Jordan

1. A cross-sectional study was conducted on 2,083 undergraduate and postgraduate students at different Jordanian universities to assess their knowledge about COVID-19 and determine their information source. The results showed that the average knowledge score of students was 80.1%, indicating that most students have sufficient knowledge about this pandemic (19).

2. In a study on 592 medical and non-medical university students in Jordan to assess their knowledge, practice, and attitude, results revealed good knowledge

(mean ± standard deviation = 0.81 ± 0.15), practice (mean ± standard deviation = 0.78 ± 0.2), and attitude (mean ± standard deviation = 0.82±0.07) among the study population towards COVID-19 (20).

3-8. India

1. In a cross-sectional study on 529 university students in India aimed to evaluate the knowledge, attitudes, practices, and the essential behavioral determinants of clinical outcomes, results showed that 70% of students had good knowledge of COVID-19 symptoms, mode of transmission, and preventive measures, and 66% were familiar with treatment approaches. Most students showed a willingness to follow social distancing and lockdown guidelines. More than one-fourth of the students believed that they were at risk of getting infected with COVID-19 (21).

2. In a cross-sectional study on 213 nursing student nurses in India, results showed that 56.8% of students had adequate knowledge regarding the present COVID-19 pandemic and 41.8% had moderate knowledge (22).

3. In a study on 354 medical students, results showed that the majority of the participants had good knowledge (97.2%), a positive attitude (more than 80%), and sufficient practice (23) toward COVID-19.

4. A cross-sectional study among 231 university students evaluating their knowledge, attitudes, practices, and essential behavioral determinants of clinical outcomes showed that the average knowledge score was 9.97 (±2.27; range, 0–15), suggesting an overall average level (66% or [9.97/15] × 100) of COVID-19 knowledge. Most students showed a willingness to follow social distancing and lockdown guidelines. However, only 27% perceived the risk of infection (24).

5. A cross-sectional study on 1,252 students from 22 states in India aimed to assess the KAP of higher education students towards COVID-19 showed that 65.5% of students possessed a high level of knowledge about the disease, 71.0% had a positive attitude towards COVID-19, and 66.7% exhibited desirable practices to COVID-19 (25).

6. In a cross-sectional study on 287 Indian dental students and professionals, aimed to assess their knowledge, attitude, and practice toward COVID-19, results showed that the knowledge of both dental students and professionals were satisfactory and that the attitude and practice were in accordance with good clinical practice (26).

7. A cross-sectional web-based study was conducted on 1,220 Indian nursing students to compare the knowledge, attitude, and practice of the students of Odisha and West Bengal toward COVID 19. Results showed that 64.8% of students had good knowledge, 91.15% had a positive attitude, and 99.5% had good practice toward COVID-19 (27).

3-9. Indonesia

1. In a study on 1,427 students from 24 provinces in Indonesia aimed to explore their knowledge, attitude, and practice to COVID-19, results showed that the students had a basic knowledge about COVID-19 and a proper attitude, but they were not consistent on practice in a particular measure (28).

2. In a study on 4,870 undergraduate medical students aimed to assess their knowledge, attitude, and practice toward COVID-19, results showed that 64.9% and 51.5% of students had a positive attitude and practice toward COVID-19 while only 29.8% had adequate knowledge (29).

3-10. Italy

A study on 575 nursing students of the University of Palermo in Italy aimed to evaluate their knowledge, attitude, and practices toward COVID-19, showed that

94.6% of students had good knowledge, 21 (90.6%) had a positive attitude, and 88.9% of students reported good practice (30).

3-11. Saudi Arabia

1. In a cross-sectional study on 3,030 university undergraduates in Saudi Arabia during the COVID-19 pandemic aimed to investigate the knowledge, attitude, and practices toward COVID-19, results showed that 85.8% of students had good knowledge. Regarding attitude toward COVID19, participants were approximately divided between the positive and negative attitudes. Regarding practice, the mean score was 3.52 (SD = 0.96), with 44.6% and 55.4% compromising inactive and proactive approaches, respectively. It means that most of the students were well-informed and had positive attitudes and proactive practices toward COVID-19 (31).

2. In a study on 124 nursing students in Saudi Arabia aimed to assess KAP towards COVID-19, results showed that the average knowledge score for participants was 10.8 (ranged: 0-15), suggesting that Saudi nursing students have an acceptable level of knowledge and a positive outlook towards COVID-19 (32).

3. A cross-sectional study on 232 pharmacy students of Unaizah College of Pharmacy, Qassim University, Saudi Arabia, aimed to evaluate their knowledge, attitude, and practice toward the pandemic showed that pharmacy students had good knowledge (82%) as well as positive attitudes and good practices towards COVID-19 and the preventive measures (33).

3-12. Malaysia

In a cross-sectional study on 524 university students in Malaysia aimed to assess their knowledge, attitude, and practice regarding COVID-19, results showed that that majority of respondents had an unsatisfactory level of knowledge (43.7%), and attitude (28.1%) regarding COVID-19 but displayed a positive behavior (51.9%) (34).

3-13. Nigeria

1. In a study on 300 nursing students in southwest Nigeria aimed to assess their perception of clinical practices amidst the coronavirus pandemic, results showed that the majority (71%) had good knowledge of coronavirus, and 57.7% had a positive perception about presenting in the clinical setting (35).

2. In a descriptive cross-sectional study on 552 medical students at the Enugu State University College of Medicine, Enugu State, in Nigeria, results showed that 65.4% of the students had good knowledge of COVID-19, 48.6% of them had a good attitude, and 77.6% had good practice towards the disease (36).

3-14. Pakistan

In an online cross-sectional study on 353 university students in Pakistan aimed to examine their knowledge, attitudes, and practices, results showed that 68% of students had good knowledge about COVID-19. Assessing the respondents' attitudes, 53.5% stated that they were satisfied with the facilities provided by the government of Pakistan. The students' mean practice score was 5.08 ± 1.312 (range 1–6), meaning the students have better practices against the pandemic (37).

3-15. Philippines

In a cross-sectional study on 314 nursing students in Manila, Philippines aimed to investigate their knowledge, attitude, and practice towards COVID-19, results showed that the students had a mean knowledge score of 18.76 (SD = 1.64, ranged: 0-22), a mean attitude score of 26.58 (SD = 2.71, ranged: 0-30), and a mean practice score of 4.26 (SD = 0.93, ranged 0-10) (38).

3-16. Turkey

In a cross-sectional study on 530 medical students in Turkey, results showed that the students had a mean score of knowledge and attitude of 7.83±1.27 (out of 10), and 45.18±5.12 toward COVID-19, respectively (out of 50). It means medical students had sufficient knowledge and a positive attitude towards the COVID-19 outbreak (39).

3-17. USA

In a study on 1,136 students in a Midwestern city, USA, results showed that less than half of the students had a high health literacy level toward COVID-19 (43%, n = 365/855) (40).

3-18. UAE

In a cross-sectional study on 1,012 students (481 studying health-related (HR), 531 not health-related) from the 14 colleges of the University of Sharjah, UAE, aimed to assess their KAP, results showed that the level of knowledge was 72.4%. HR majors had a higher knowledge score (76%) than NHR students (69%). Regarding attitudes, both HR and NHR students demonstrated positive attitudes to slowing down the spread of the disease. Regarding practices, more NHR students used masks (92.3%) almost all the time than HR students (88.4%). On the other hand, students demonstrated adequate knowledge, and possessed good attitudes and low-risk practices toward COVID-19 (41).

3-19. Vietnam

In an online-based cross-sectional study on 2,351 students at the University of Medicine and Pharmacy in Ho Chi Minh City (UMP), Vietnam aimed to evaluate the knowledge, attitude, and preventive practices towards COVID-19, results showed that 86.6% of students had sufficient knowledge and good preventive practices (92.8%) towards COVID-19 and positive attitude at 68.8%. The multivariable logistic regression analysis showed that the female participants and those receiving information from official websites reported a significantly higher level of good practice (42).

4- DISCUSSION

COVID-19 is an emerging viral disease that, as a pandemic, has infected a large number of people worldwide and resulted in the death of many. Since the best way to deal with and control this virus is to improve the knowledge, attitude, and practice of people towards COVID-19, this study aimed to investigate and compare the KAP of world students toward COVID-19.

The results showed that according to the conditions and training provided in each country and their level of conflict with COVID-19, KAP levels of students and the effective factors were different. Students' knowledge, attitude, and performance toward COVID-19 were generally acceptable and above average (excluding Malaysian and Indonesian students). Differences in different countries can be due to sampling time, target group, and study method. Studies have shown that knowledge, attitude, and perceived threat are important predictors of health behaviors in society (43).

Epidemics affect all aspects of life in all parts of society, and the lifestyle and daily behaviors of people can affect the extent and manner of the spread of the virus and infection. Therefore, in all epidemics, especially at the beginning, it is necessary to examine the level of awareness of people in the community and its relationship with their social characteristics. The results of these studies can be of great help in formulating strategies and taking steps for health policy-makers in a community. The results of this study also showed that the level of knowledge and attitude in medical students were higher than other students, but non-medical students performed better in practice against COVID-19 (use of mask,

social distance, use of gloves, etc.). Therefore, it is necessary to increase the knowledge and attitude of this group of students as an important part of the medical community of each country towards COVID-19, and the educational authorities of medical universities should, according to the current situation, design and implement relative programs. Also, planning and preparedness to face the COVID-19 crisis is a national and international necessity, and taking preventive measures at the community level to control the COVID-19 epidemic should be considered by policy-makers and health officials (44). On the other hand, publishing the correct news and providing timely educational and informational recommendations to keep people informed about preventive measures and reduce the infection can be a measure against the spread of the disease.

In this unprecedented global crisis, one factor that increases the vulnerability of society is the access to and understanding of inaccurate, sometimes misleading health information, lack of informed decision-making, and not taking appropriate measures (preventive behaviors and health literacy). The study and evaluation of students' knowledge, attitude and practice towards COVID-19 helps determine their level of knowledge, attitude, and readiness to accept secondary health care measures. In this regard, interventions are needed to change misconceptions, promote knowledge, and develop prevention strategies and health promotion programs. Such assessments are important in promoting education and awareness and have been highly effective during previous viral epidemics and pandemics such as SARS, MERS, and Ebola (45, 46).

4-1. Study Limitations

The present study had some limitations. This study was conducted at the student level, and the results apply only to this group of people. Another limitation is that most studies are performed on medical students. It is recommended that studies with a higher test power and using random sampling are conducted considering the appropriate number of samples from non-medical disciplines and comparing the results.

5- CONCLUSION

The results showed that according to the conditions and training provided in each country and their level of conflict with COVID-19, KAP levels of students and the effective factors were different. Students' knowledge, attitude, and performance toward COVID-19 were generally acceptable and above average (excluding Malaysian and Indonesian students). On the other hand, medical students possessed more knowledge and were more attentive than other students, but non-medical students performed better in practice against COVID-19.

6- AUTHORS' CONTRIBUTIONS

Study conception or design: AY, and MS; Data analyzing and draft manuscript preparation: MS, and ZE; Critical revision of the paper: MS, and ZE; Supervision of the research: MS and AY; Final approval of the version to be published: AY, ZE, and MS.

7- CONFLICT OF INTEREST: None.

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