Journal of Applied Pharmaceutical Science Vol. 11(08), pp 178-183, August, 2021
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2021.110823
ISSN 2231-3354

Recent studies on knowledge, attitude, and practice toward tuberculosis among university students

Lutfiah Yusuf[1], Irma Melyani Puspitasari[1,2*], Rano Kurnia Sinuraya[1,2]

[1]Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Universitas Padjadjaran, Jatinangor, Indonesia
[2]Center of Excellence in Higher Education for Pharmaceutical Care Innovation, Universitas Padjadjaran, Jatinangor, Indonesia

ARTICLE INFO

Received on: 16/04/2021
Accepted on: 23/05/2021
Available online: 05/08/2021

Key words:
Tuberculosis, knowledge, attitude, practice, university student.

ABSTRACT

According to the World Health Organization, tuberculosis (TB) remains the most dangerous infectious disease, causing a major problem for public health globally. Lack of knowledge and negative attitudes toward TB create immense challenges in the prevention, controlling, and curing of TB disease. Students have a high risk of contracting TB. This article summarizes the knowledge, attitudes, and practices regarding TB among university students, using a literature search conducted through a PubMed electronic database in March 2020 that yielded 12 articles from a total of 64. The studies were conducted worldwide, with 5,915 university student participants. This study revealed that students in 8 out of 12 studies had poor knowledge levels, students in two of six studies had a negative attitude, and 11.6% of the students in a study had poor practices toward TB. Curriculum innovation regarding infectious diseases is needed to improve TB knowledge, attitudes, and practice among students.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by an acid-resistant bacterium called *Mycobacterium tuberculosis* and is one of the 10 main causes of death (Ministry of Health Republic of Indonesia, 2018). TB symptoms are divided into respiratory and systemic symptoms (Indonesian Society of Respirologist, 2019). Respiratory symptoms consist of coughing up phlegm for more than 3 weeks, bleeding cough, and shortness of breath, while systemic symptoms include fever, decreased body weight, and night sweats (Indonesian Society of Respirologist, 2019).

According to the World Health Organization (WHO), TB remains the most dangerous infectious disease and a major problem for global public health (World Health Organization, 2019). In 2018, the WHO estimated that 10 million people suffered from TB, with 1 case being equivalent to 132 cases per 100,000 people (World Health Organization, 2019).

*Corresponding Author
Irma Melyani Puspitasari , Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Universitas Padjadjaran, SumedangJatinangor, Indonesia; Center of Excellence in Higher Education for Pharmaceutical Care Innovation, Universitas Padjadjaran, Jatinangor, Indonesia. E-mail: irma.melyani @ unpad.ac.id

Research about the knowledge, attitude, and practice (KAP) has been frequently used in health studies. KAP research was also used as a research tool to obtain information known and believed among research participants (Haq *et al*., 2012). Therefore, KAP studies play an important role in determining community ambiguity (Haq *et al*., 2012).

A previous study has reported that a high prevalence of TB occurred among students in a university in Ethiopia (Wolde *et al*., 2017). A crowded environment and high-contact person-to-person environment in the universities and schools can be potential sources of disease transmission including TB (Dorji *et al*., 2020). It has been shown that lack of knowledge and negative attitudes toward TB are major problems in the prevention, controlling, and curing of TB disease (Luba *et al*., 2019). It is important to research KAP toward TB among students because students have a high risk of TB spread (Zhang *et al*., 2018). Therefore, this article summarizes the TB knowledge, attitudes, and practice research among university students.

METHODS

Literature searches were conducted in March 2020 through the PubMed electronic database. PubMed is a free search engine that comprises more than 32 million citations for biomedical literature from MEDLINE, life science journals, and online books. The keywords for literature search are "Knowledge," "Attitude,"

"Practice," "University student," and "TB." The following are the search details: ("knowledge" [MeSH Terms] OR "knowledge" [All Fields]) AND ("attitude" [MeSH Terms] OR "attitude" [All Fields]) AND ("Practice [Birm]" [Journal] OR "practice" [All Fields]) AND ("TB" [MeSH Terms] OR "TB" [All Fields]) AND ("universities" [MeSH Terms] OR "universities" [All Fields] OR "university" [All Fields]) AND ("students" [MeSH Terms] OR "students" [All Fields] OR "student" [All Fields]) NOT ("review" [Publication Type] OR "review literature as topic" [MeSH Terms] OR "review" [All Fields]). The initial search results yielded 64 articles. Articles prior to 2010 and non-English language were excluded. From 64 articles, 12 articles of knowledge, attitudes, and practices toward TB among university students were obtained. The literature search flowchart is shown in Figure 1.

RESULTS AND DISCUSSION

Studies of knowledge, attitudes, and practices toward TB

Table 1 shows 12 articles about knowledge, attitudes, and practices toward TB among students globally. All articles are cross-sectional studies; 11 used questionnaires as research instruments, while an additional article used the method of direct interviews with respondents. Respondents who participated in the studies are university healthcare and nonhealthcare students. Respondents totaled 5,915 students globally, ranging from 60 to 2,220 with random, convenience, and stratified random sampling techniques.

TB knowledge among university students

Table 2 shows the 12 articles presenting students' knowledge of TB. Nine articles were studies on university healthcare students and three articles on nonhealthcare university students.

Research on nonhealthcare students conducted in Bangladesh, Sweden, and Serbia revealed that they have a poor level of TB knowledge (Nkulu *et al*., 2010; Pesut, 2014; Rana *et al*., 2015). Students in Sweden have an average TB knowledge score of TB 2.7 ± 1.3 (SD) (maximum = 8). Only 40 (15%) out of 268 respondents answered correctly for half of the questions (Nkulu *et al*., 2010). In general, nonhealthcare students'

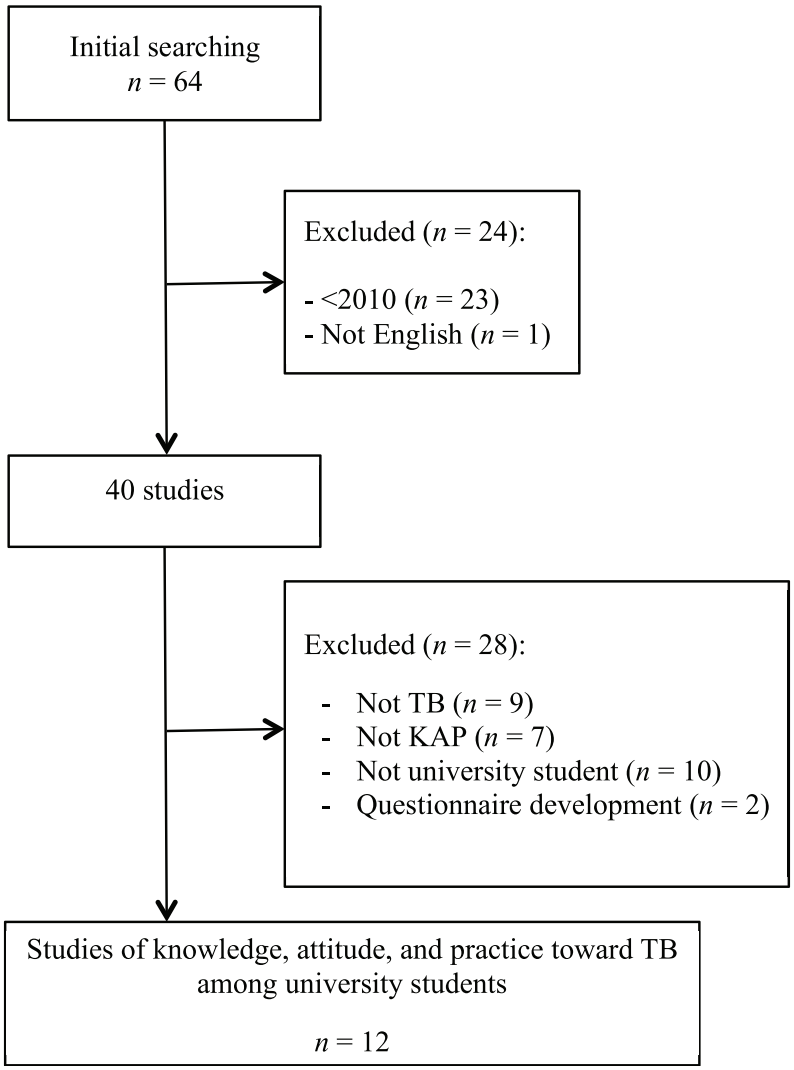

Figure 1. Flowchart of the literature search.

Table 1. List of articles.

Article no.	Author	Year	Country	Type of study	Participant type	Number of participants	Instrument	Sampling method
1	Nkulu *et al*. (2010)	2010	Sweden	Cross-sectional study of KA	Nonmedical students	*n* = 280	Questionnaire	Convenience sampling
2	Akin *et al*. (2011)	2011	Turkey	Cross-sectional study of KA	Nursing and midwifery students	*n* = 615	Questionnaire	Convenience sampling
3	Pesut *et al*. (2014)	2012	Serbia	Cross-sectional study of KA	Nonmedical students	*n* = 69	Questionnaire	NA
4	Traldi *et al*. (2012)	2012	Brazil	Cross-sectional study of K	Nursing students	*n* = 76	Questionnaire	NA
5	Laurenti (2013)	2013	Italy	Cross-sectional study of KA	Medical students	*n* = 186	Questionnaire	NA
6	Montagna *et al*. (2014)	2014	Italy	Cross-sectional study of K	Medical and nursing students	*n* = 2,220	Questionnaire	NA
7	Olakunle *et al*. (2014)	2014	Nigeria	Cross-sectional study of K	Medical students	*n* = 241	Questionnaire	Simple random sampling
8	Behnaz *et al*. (2014)	2014	Iran	Cross-sectional study of KAP	Medical students	*n* = 145	Questionnaire	NA
9	Rana *et al*. (2015)	2015	Bangladesh	Cross-sectional study of K	Nonmedical students	*n* = 839	Interview	Stratified random sampling
10	Mckennon and and J. Arnold (2016)	2016	America	Cross-sectional study of KA	Pharmacist students	*n* = 96	Questionnaire	NA
11	Ou *et al*. (2018)	2018	China	Cross-sectional study of K	Medical students	*n* = 1,088	Questionnaire	Randomized sampling methods
12	de Fátima Carvalho *et al*. (2019)	2019	Brazil	Cross-sectional study of K	Nursing students	*n* = 60	Questionnaire	Convenience sampling
						Total *n* = 5,915		

K = knowledge; A = attitude; P = practice.

knowledge level in Bangladesh and Serbia is poor, and there are misconceptions about TB disease (Pesut, 2014; Rana *et al*., 2015).

Research in China, Rome, Brazil, and Nigeria showed that healthcare students have a poor level of knowledge of TB, answering more than 50% of the questions incorrectly (Ou *et al*., 2018). Other questions that included basic inquiries relating to symptoms, diagnosis, and treatment were also answered incorrectly (de Fátima Carvalho *et al*., 2019; Laurenti, 2013; Olakunle *et al*., 2014; Ou *et al*., 2018; Traldi *et al*., 2012). The percentage of the total average correct answers regarding TB knowledge was 44.4% (SD 13.5%) for healthcare students in China, while students in Rome have a percentage of 56.6% (SD 11.6%) (Laurenti, 2013; Ou *et al*., 2018). Research in Iran showed that healthcare students have a medium to high level of knowledge (moderate to high) with a knowledge score of 16.13 ± 2.06 (low < 10, moderate 10–15, and high > 15) (Behnaz *et al*., 2014). Research in Italy compared the knowledge between medical and nursing students, revealing that medical students have better knowledge about TB compared to nursing students. The knowledge level of students in Italy was sufficient (>60% of students answered questions correctly) (Montagna *et al*., 2014). Research in Turkey compared the knowledge of nursing and midwifery students with 615 participants (Akin *et al*., 2011). The result found a poor level of student knowledge, with a score of 7.22 ± 1.92 (Akin *et al*., 2011). The American study of pharmacist students used the Student Pharmacists as Tuberculosis Screeners (SPATS) program created by the Washington State Pharmacy Association (Mckennon and Arnold, 2016). Students received training in TB epidemiology, pathophysiology, and treatment. Before and after conducting the training, students were asked to complete questionnaires about TB knowledge (Mckennon and Arnold, 2016). Before the SPATS program was conducted, the average score of students' knowledge about TB was 48.7% (SD 51.7%); after the SPATS program was implemented, the average score was 86.5% (SD 55.5%). This indicates that students' knowledge almost doubled following the SPATS program (Mckennon and Arnold, 2016).

Attitude toward TB among university students

Table 3 shows a list of articles discussing students' attitudes toward TB. Six articles discuss students' attitudes toward TB (two on nonhealthcare students and four on healthcare students). The nonhealthcare students in Sweden have an average score of 5.1 ± 3.3 (SD) (maximum = 12), which shows that most students have a negative attitude toward TB disease and its patients (Nkulu *et al*., 2010). In Serbia, six out of eight nonmedical students did not visit TB patients for fear of contracting it, and 61 out of 69 students never wanted to be close to TB patients (Pesut, 2014). Negative attitudes toward TB disease and patients are caused by adverse stigma and cultural barriers. These negative attitudes affect not only TB sufferers but also their family members and closest relatives (Nkulu *et al*., 2010).

Table 2. Knowledge among students.

Article no.	Author	Country	Participant	Knowledge score	Knowledge result	Other results
1	Nkulu *et al*. (2010)	Sweden	Nonmedical student	Average 2.7 ± 1.3 (SD) (maximum = 8)	In general, nonhealthcare students had poor knowledge and misconceptions about TB	Most students knew well about the symptoms, treatment, and risk factors for TB but had poor knowledge about the causes, transmission, diagnosis, and prevention
3	Pesut *et al*. (2014)	Serbia	Nonmedical student	NA	Students' knowledge about TB was at a poor level, especially related to the causes and transmission of TB disease	One in three students did not know the symptoms of TB
9	Rana *et al*. (2015)	Bangladesh	Nonmedical student	NA	In general, the level of TB knowledge in nonhealthcare students was poor	There is a significant relationship between gender and knowledge about the causes of TB
2	Akin *et al*. (2011)	Turkey	Nursing and midwifery Students	Average 7.22 ± 1.92	The level of student knowledge was poor	Students' knowledge about TB was poor at TB treatment and vaccination
4	Traldi *et al*. (2012)	Brazil	Nursing students	NA	Nursing students showed misconceptions about TB	Nursing students were vulnerable to TB contamination due to misunderstanding of knowledge about diagnosis, prevention, and biosafety
12	de Fátima Carvalho *et al*. (2019)	Brazil	Nursing students	NA	Nursing students lack knowledge about TB	Basic questions related to symptoms, diagnosis, and treatment were not answered correctly
5	Laurenti (2013)	Italy	Medical students	Average 56.6% (SD 11.6%)	The level of student knowledge was at the moderate level	More than half the questions about TB treatment knowledge were answered incorrectly, and there was a significant relationship between knowledge and clinical experience
6	Montagna *et al*. (2014)	Italy	Medical and nursing students	More than 60% of the students answered correct answer	Knowledge of TB in healthcare students was at a sufficient level	The level of knowledge of medical students was better than that of nursing students. Almost all students (up to 95%) correctly answered questions about TB knowledge in general (etiology, clinical symptoms, and antibiotic resistance)
7	Olakunle *et al*. (2014)	Nigeria	Medical students	NA	Medical students' knowledge in the final year was at a poor level for various aspects of TB	Only 34.5% were able to correctly identify regimen treatment duration according to standard guidelines
8	Behnaz *et al*. (2014)	Iran	Medical students	Average 16.13 ± 2.06 (low < 10, moderate 10–15, and high > 15)	The majority of students were at the medium to high knowledge level	43% of students did not know that sputum examination was the most important method for TB diagnosis. Two out of three students also did not know that they had to keep their distance from TB patients
11	Ou *et al*. (2018)	China	Medical students	Average correct answer 44.4% (SD 13.5%)	Students generally have poor knowledge about TB	More than 50% of the total questions about TB knowledge were answered incorrectly. Medical students over 23 years old had more accurate knowledge about TB diagnosis
10	Mckennon and Arnold (2016)	America	Pharmacist students	Before and after SPATS program: 48.7% (SD 51.7%) and 86.5% (SD 55.5%), respectively	The SPATS program significantly increases student knowledge about TB	Students' knowledge in therapy, identification of TB patients, and alternative methods of TB disease screening increased after the SPAT program

Iranian healthcare students have a score of 36.08 ± 3.76 (low 18–27, moderate 27–35, and high > 35), indicating that the level of student attitudes was medium to high (moderate to high) (Behnaz *et al*., 2014). A study in Turkey compared the attitudes of nursing students with midwifery students (Akin *et al*., 2011). The results showed that nursing and midwifery students generally have

Table 3. Attitude among students.

Article no.	Author	Country	Participant	Attitude score	Attitude result	Other results
1	Nkulu *et al.* (2010)	Sweden	Nonmedical students	5.1 ± 3.3 (SD) (maximum = 12)	Nonhealthcare students had a negative attitude toward TB disease and TB patients	Most respondents would hide if they have TB and were worried about the response of people around them
3	Pesut *et al.* (2014)	Serbia	Nonmedical students	NA	Students have a good attitude toward disease and TB patients	78% of the participants will visit TB patients without fear of contracting the disease
2	Akin *et al.* (2011)	Turkey	Nursing and midwifery students	NA	Nursing and midwifery students generally have a negative attitude	The attitude of nursing students is better than midwifery students
5	Laurenti (2013)	Italy	Medical students	NA	Half of the students had a positive attitude toward TB patients	57.6% of the students felt that they had a risk of contracting TB
8	Behnaz *et al.* (2014)	Iran	Medical students	36.08 ± 3.76 (low 18–27, moderate 27–35, and high > 35)	Student attitudes were at the medium to high level	60% of the students wear masks when in contact with TB patients
10	Mckennon and Arnold (2016)	America	Pharmacist students	NA	There was a significant change in attitude after the SPATS program	Students are willing to do TST and realize that pharmacists have an important role in conducting TSTs

Table 4. Practice among students.

Study no.	Author	Country	Participant	Practice score	Practice result	Other results
8	Behnaz *et al.* (2014)	Iran	Medical students	Average 22.77 ± 4.95 (low < 20, moderate 20–25, and high > 25)	Student practice was at the moderate level	Practice scores for female students were better than those for male students. One in four students had the habit of washing hands before and after contact with patients

a negative attitude, but nursing students' attitudes are better (Akin *et al*., 2011). The study of pharmacist students in the USA using the SPATS program resulted in significant changes in attitudes toward TB and the willingness to perform a tuberculin skin test (TST) (Mckennon *et al*., 2016). Students also realized that pharmacists are beneficial regarding TSTs (Mckennon *et al*., 2016).

Practice toward TB among university students

Table 4 presents an article discussing students' practice toward TB. The student practice study was only found in final year students conducted in Yazd, Central Iran (Behnaz *et al*., 2014). The mean practice score was 22.27 ± 4.95 (low < 20, moderate 20–25, and high > 25), and 11.9% of students had poor practice levels. The practice scores for female students were better than those for male students. In addition, one out of four students had the habit of washing hands before and after being in contact with patients. Students had an effective practice of wearing masks (70.2%), with 60% of the students wearing a mask when in contact with TB patients. Half of the students keep a distance from TB patients. The practice relating to medication is not yet evaluated, because the students are still guided by a supervisor. Nevertheless, 95.1% of the students have known that the standard TB medication is taken for 6 months (Behnaz *et al*., 2014).

Effort to increase KAP in students

This study revealed poor levels of knowledge for students in 8 of 12 studies; students had a negative attitude in two out of six studies, with one study revealing poor practices in 11.6% of students. KAP improvement must be carried out to help control and prevent TB (Hassan *et al*., 2017). Poor TB knowledge is one of the main problems in preventing, controlling, and curing TB disease (Luba *et al*., 2019). In students, poor knowledge was caused by a lack of literacy skills and misconceptions, indicating that curriculum innovation regarding infectious diseases is needed to increase students' TB knowledge (Laurenti, 2013). Training for pharmacy students in the USA, such as the SPATS program that comprises TB epidemiology, pathophysiology, and treatment, could be conducted to increase knowledge and attitudes among students (Gudeva *et al*., 2012; Mckennon and Arnold, 2016). The training program resulted in significant changes in students' knowledge and attitudes toward TB.

Limitation

There are limitations to this review. The literature search was only conducted in one electronic database; nevertheless, this article could provide an overview of knowledge, attitudes, and practice toward TB among students worldwide.

CONCLUSION

This article summarizes the knowledge, attitudes, and practices toward TB among university healthcare and nonhealthcare students. Students in 8 out of 12 studies had poor knowledge levels, students in two out of six studies had a negative attitude, and 11.6% of students in a study still have poor practices.

Curriculum innovation regarding infectious diseases is needed to improve students' TB knowledge, attitudes, and practices.

CONFLICT OF INTEREST

The authors report no conflicts of interest.

FUNDING

This work was supported by the Ministry of Research and Technology and Higher Education, Indonesia (grant number 1123j/UN6.O/LT/2019).

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the international committee of medical journal editors (ICMJE) requirements/guidelines.

ETHICAL APPROVALS

Not applicable.

PUBLISHER'S NOTE

This journal remains neutral with regard to jurisdictional claims in published institutional affiliation.

REFERENCES

Akin S, Gorak G, Unsar S, Mollaoglu M, Ozdilli K, Durna Z. Nurse education today knowledge of and attitudes toward tuberculosis of Turkish nursing and midwifery students. Nurse Educ Today, 2011; 31(8):774–9.

Behnaz F, Mohammadzade G, Mousavi-e-roknabadi RS, Mohammadzadeh M. Assessment of knowledge, attitudes and practices regarding tuberculosis among final year students in Yazd, central Iran. J Epidemiol Glob Health, 2014; 4:81–85.

de Fátima Carvalho C, Ponce MAZ, da Silva-Sobrinho RA, Mendez RDR, Santos MAD, Santos EMD, Wysocki AD. Tuberculosis: knowledge among nursing undergraduate students. Rev Bras Enferm, 2019; 72(5):1279–87.

Dorji T, Tshering T, Wangdi K. Assessment of knowledge, attitude and practice on tuberculosis among teacher trainees of Samtse College of Education, Bhutan. PLoS One, 2020; 15(11):e0241923.

Gudeva Nikovska D, Talevski S. How much knowledge is healthy? Result of KAP survey of TB patients in Republic of Macedonia. Eur Respir J, 2012; 40(56):2671.

Haq N, Hassali MA, Shafie AA, Saleem F, Farooqui M, Aljadhey H. A cross sectional assessment of knowledge, attitude and practice towards Hepatitis B among healthy population of Quetta, Pakistan. BMC Public Health, 2012; 12(1):1.

Hassan AO, Olukolade R, Ogbuji QC, Afolabi S, Okwuonye LC, Kusimo OC, Osho JA, Osinowo KA, Ladipo OA. Knowledge about tuberculosis: a precursor to effective TB control – findings from a follow-up national KAP study on tuberculosis among Nigerians. Tuberc Res Treat, 2017; 2017:6309092.

Indonesian Society of Respirologist. Guidelines for diagnosis and management tuberculosis in Indonesia. Indonesian Society of Respirologist, Jakarta, Indonesia, 2006.

Laurenti P. Knowledge, experiences, and attitudes of medical students in Rome about tuberculosis. Med Sci Monit, 2013; 19:865–74.

Luba TR, Tang S, Liu Q, Gebremedhin SA, Kisasi MD. Knowledge, attitude and associated factors towards tuberculosis in Lesotho: a population based study. BMC Infect Dis 2019; 19(96):1–10.

Mckennon SA, Arnold J. Student pharmacists as tuberculosis screeners. Am J Pharm Educ, 2016; 80(2):1–6.

Ministry of Health Republic of Indonesia. INFODATIN (Data and Information Center Ministry of Health) find TB cases treat until healed. Ministry of Health Republic of Indonesia, Jakarta, Indonesia, 2018.

Montagna MT, Napoli C, Tafuri S, Agodi A, Auxilia F, Casini B, Coscia MF, D'Errico MM, Ferrante M, Fortunato A, Germinario C, Martinelli D, Masanotti GM, Massenti MF, Messina G, Montuori P, Mura I, Orsi GB, Quaranta A, Sotgiu G, Stefanati A, Tardivo S, Torregrossa MV, Tortorano AM, Veronesi L, Zarrilli R, Pasquarella C. Knowledge about tuberculosis among undergraduate health care students in 15 Italian universities : a cross-sectional study. BMC Public Health, 2014; 14(970): 1–6.

Nkulu FKK, Hurtig A, Ahlm C, Krantz I. Screening migrants for tuberculosis – a missed opportunity for improving knowledge and attitudes in high-risk groups: a cross-sectional study of Swedish-language students in Umeå, Sweden. BMC Public Health, 2010; 10(349):1–12.

Olakunle OS, Oladimeji O, Olalekan AW, Olugbenga-Bello A, Akinleye C, Oluwatoyin OA. Knowledge of tuberculosis management using directly observed treatment short course therapy among final year medical students in South Western Nigeria. Pan Afr Med J, 2014; 18:32.

Ou Y, Luo Z, Mou J, Ming H, Wang X, Yan S, Tan A. Knowledge and determinants regarding tuberculosis among medical students in Hunan, China: a cross-sectional study. BMC Public Health, 2018; 18(730):1–7.

Pesut DP. Knowledge and attitudes towards tuberculosis in non medical students university of belgrade. Pneumologia, 2014; 61(2):87–91.

Rana M, Sayem A, Karim R, Islam N, Islam R, Zaman TK. Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh: a cross-sectional study. BMC Public Health, 2015; 15(716):1–7.

Traldi MC, Nery J, Talarico S. Knowledge as a factor in vulnerability students and professionals. Rev Esc Enferm USP, 2012; 46(3):696–703.

Wolde D, Tadesse M, Abdella K, Abebe G, Ali S. Tuberculosis among Jimma University undergraduate students: first insight about the Burden of tuberculosis in Ethiopia universities-cross-sectional study. Int J Bacteriol, 2017; 2017:9840670.

World Health Organization. Global tuberculosis report 2019. World Health Organization, Geneva, Switzerland, 2019.

Zhang S, Li Y, Li Y, Zhang T, Liu W, Jiang H. Development and psychometric testing of the knowledge, attitudes and practices (KAP) questionnaire among student Tuberculosis (TB) Patients (STBP-KAPQ) in China. BMC Infect Dis 2018; 18(213):1–10.

How to cite this article:
Yusuf L, Puspitasari IM, Sinuraya RK. Recent studies on knowledge, attitude, and practice toward tuberculosis among university students. J Appl Pharm Sci, 2021; 11(08):178-183.