ORIGINAL ARTICLE / ÖZGÜN MAKALE

THE EVALUATION OF AWARENESS AND LEVEL OF KNOWLEDGE RELATED TO TUBERCULOSIS OF PHARMACY FACULTY STUDENTS: A FOUNDATION UNIVERSITY EXAMPLE

ECZACILIK FAKÜLTESİ ÖĞRENCİLERİNİN TÜBERKÜLOZA İLİŞKİN FARKINDALIK VE BİLGİ DÜZEYLERİNİN DEĞERLENDİRİLMESİ: BİR VAKIF ÜNİVERSİTESİ ÖRNEĞİ

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ABSTRACT

Objective: *Tuberculosis (TB) is an infectious disease that is among the leading causes of death. TB can easily spread by aerosols from pulmonary TB patients. Pharmacists are unique among healthcare professionals because patients can easily and directly access them. Therefore, they have to take responsibility for management and early detection of TB. The aim of this study was to evaluate TB related awareness and level of knowledge of pharmacy students in a foundation university.*

Material and Method: *This cross-sectional study was conducted to evaluate the knowledge and attitudes of undergraduate pharmacy students about TB. A face-to-face survey was made to students in their classrooms after ethical committee's approval was received and verbal consent of participants obtained. A total of 238 students answered the survey. Descriptive statistical methods and Pearson Chi-Square test are used for the evaluation of the data.*

Result and Discussion: *We found that all of the students knew tuberculosis, but some of them lacked knowledge on some topics such as the symptoms of the disease, risk factors, definitive diagnosis, and drug resistance rates. Pharmacists who have an important role in public health should be informed and advised to be updated about TB during their undergraduate education. In addition, it should be ensured that they take responsibility to raise public awareness of TB which causes thousands of deaths each year.*

Keywords: *Awareness, pharmacy students, survey, tuberculosis*

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ÖZ

Amaç: *Tüberküloz (TB), önde gelen ölüm nedenleri arasında yer alan bir enfeksiyon hastalığıdır. TB, akciğer tüberkülozlu hastalardan aerosoller aracılığı ile kolayca yayılabilir. Eczacılar, hastaların onlara doğrudan ve kolayca ulaşabildiği tek sağlık çalışanlarıdır. Bu nedenle, TB'nin yönetimi ve erken teşhisi için sorumluluk almak zorundadırlar. Bu çalışmanın amacı, bir vakıf üniversitesindeki eczacılık öğrencilerinin tüberküloz ile ilgili farkındalık ve bilgi düzeylerini değerlendirmektir.*

Gereç ve Yöntem: *Bu kesitsel çalışma, eczacılık lisans öğrencilerinin tüberküloz hakkındaki bilgi ve tutumlarını değerlendirmek amacıyla yapılmıştır. Etik kurul onayı ve katılımcıların sözlü onamları alındıktan sonra öğrencilere sınıflarında yüz yüze uygulanmıştır. Toplam 238 öğrenci anketi cevapladı. Verilerin değerlendirilmesinde tanımlayıcı istatistiksel yöntemler ve Pearson Ki-Kare testi kullanılmıştır.*

Sonuç ve Tartışma: *Öğrencilerin tamamının tüberkülozu bildiğini ancak bir kısmının hastalığın belirtileri, risk faktörleri, kesin tanı, ilaç direnç oranları gibi konularda bilgi eksikliği olduğunu bulduk. Halk sağlığında önemli bir yere sahip olan eczacılar, lisans eğitimleri sırasında TB hastalığı hakkında bilgilendirilmeli ve bilgilerini güncel tutmaları tavsiye edilmelidir. Ayrıca her yıl binlerce ölüme neden olan tüberküloz hastalığı konusunda toplumu bilinçlendirmek için sorumluluk almaları sağlanmalıdır.*

Anahtar Kelimeler: *Anket, eczacılık öğrencileri, farkındalık, tüberküloz*

INTRODUCTION

Tuberculosis (TB) is transmitted from person to person by inhalation of infected aerosols (particles called droplet nuclei) generated by coughing, sneezing, or speaking of the active TB patients [1,2]. The people who are in close contact with patients with active TB (e.g., family members or friends living in the same household with infected people, health-care professionals directly involved in their treatment) are at higher risk [3].

Antituberculosis drugs are essentially divided into two groups as first-line drugs (e.g., rifampin, isoniazid, ethambutol, and pyrazinamide) and second-line drugs consisting of four subgroups; aminoglycosides (e.g., kanamycin, amikacin, and capreomycin), fluroquinolones (e.g., ofloxacin, levofloxacin, moxifloxacin, and ciprofloxacin), oral bacteriostatic second-line anti- TB drugs (e.g., ethionamide, prothionamide, cycloserine, and P- aminosalicylic acid) and anti-TB drugs with limited data on efficacy (e.g., bedaquiline, delamanid, and linezolid) [3,4]. However, drug-resistant *Mycobacterium tuberculosis* strains have emerged, especially in TB endemic areas. The emergence and spread of drug resistant strains are one of the primary problems in combating TB. Multi-drug-resistant (MDR) TB is defined as TB resistant to first-line drugs such as isoniazid and rifampin, and extensive drug-resistant (XDR) TB is defined as resistance to MDR-TB plus any fluoroquinolone and at least one injectable second-line drug [5,6].

In 2019, the estimate of the new cases was 10 million (range, 8.9–11.0 million) and there were almost 1.2 million deaths among HIV-negative people [7]. The people with HIV have a much higher risk of developing TB disease due to weak immune systems. Additionally, 208.000 deaths among HIV-positive people reported. The incidence rate of TB was 130 cases per 100,000 population in 2019. The incidence of TB varies among countries due to their healthcare services, economic conditions, and

policies of governments about TB disease [7]. According to Tuberculosis Report of Turkish Ministry of Health (2019), estimated incidence rate of TB was 17 cases per 100,000 population for 2017 year. While MDR-TB strains constitute 3,2% of TB cases in Turkey, only two TB strains are XDR-TB [8].

As the most accessible health counselors, pharmacists play a vital role in the delivery of the primary health care, including the management of the chronic diseases. They have a face-to-face contact with people who may have many infectious diseases such as tuberculosis [9-11]. Although the studies were conducted to investigate the knowledge and attitudes of medical doctors and the other Healthcare professionals or nursing and medical students about TB, no studies were found with pharmacists or pharmacy students in Turkey [12-17]. The aim of this study is to evaluate the awareness and knowledge levels of the Pharmacy Faculty students about the basic information such as the transmission of TB disease, its symptoms, risk factors and protection from the disease.

MATERIAL AND METHOD

Place of Study

We implemented this cross-sectional study at a Pharmacy Faculty in İstanbul in 2019-2020 education year.

Study Population

Education in pharmacy faculties is five years and the first four years are spent with taking theoretical courses and internship. In the last year, the again internship and the graduation thesis must be completed. The survey was conducted in the period of December 2019-March 2020. The students in the first four grades were included in the study. However, fifth-year students could not be included as they are often out of school in this term due to their graduation projects or internships (e.g., hospital pharmacy, community pharmacy, and industry internships).

Data Collection

The data were collected using the "Assessment of Awareness and Knowledge Level of TB" Questionnaire. It consists of a total of 26 questions, 15 of which contain information about TB and 11 to obtain information about the personal characteristics of the participants. Previously, Enginyurt et al. [12] carried out a study for TB awareness assessment with healthy workers in 2016 in Turkey. After permission to use and modify, this questionnaire was obtained from authors and modified by reviewing current reports and literature about transmission, symptoms, risk factors, diagnosis, prevention, and treatment of TB disease. As the incidence of TB changes from year to year in the TB Dispensary report, only choices of one of TB related questions was changed. The other 11 questions were also revised

according to students. Identity information of participants were not requested, and no question related to personal privacy or daily life was present in the survey form. The privacy principle was adhered while preparing the survey questions.

The questionnaire forms were given to the participants who gave informed verbal consent after explanation of the aims, objectives, and methodology of this study. The questionnaire was administered by face-to-face interview method. The data in the forms in which all questions were answered, were evaluated.

Statistical Analysis

The data collected were analyzed by using descriptive statistical methods and Pearson Chi-Square test. P values < 0.05 were considered statistically significant.

Table 1. Answers of pharmacy students to survey questions about tuberculosis (n 238)

Characteristics		% of Respondents				
		First grade students	Second grade students	Third grade students	Fourth grade students	Total
Have you ever had an education about tuberculosis in school?		19,6%	31,3%	19,2%	22,2%	23,5%
Have you ever had a role in monitoring or treatment of a tuberculosis patient in your internships?		16,1%	14,9%	19,2%	12,7%	15,5%
Have you ever encountered with a tuberculosis patient in your clinical or pharmacy internships?		12,5%	7,5%	11,5%	7,9%	9,7%
Do you know a family member who had tuberculosis?		8,9%	10,4%	3,8%	3,2%	6,7%
Do you see tuberculosis as a professional disease of Healthcare professionals? Why?	Healthcare professionals encounter more likely with tuberculosis patients.	96,4%	88,1%	82,7%	81,0%	87,0%
	It is highly contagious in contacts (close contact during examination and treatment) since it is transmitted by respiratory tract.	100,0%	100,0%	98,1%	95,2%	98,3%
What would your thoughts be if you had tuberculosis in the following years?	I used to take my medications regularly according to my doctor's recommendations.	16,1%	13,4%	9,6%	12,7%	13,0%
	I would go to a health institution for vaccination.	78,6%	82,1%	86,5%	85,7%	83,2%
	I would be sad that the treatment of the disease took a long time.	5,4%	4,5%	3,8%	1,6%	3,8%
How many years have you been studying in Pharmacy Faculty?		23.5%	28.2%	21.8%	26.5%	-
Your sex?	Female	69,6%	65,7%	69,2%	69,8%	68,5%
	Male	30,4%	34,3%	30,7%	30,2%	31,5%
Your age?	17-19	39,3%	7,5%	0,0%	3,2%	12,2%
	20-22	58,9%	77,6%	75,0%	66,7%	69,7%
	23-25	0,0%	10,4%	19,2%	30,2%	15,1%
	26 or more	0,4%	1,3%	0,8%	0,0%	2,5%
Do you smoke?	Yes	19,6%	22,4%	25,0%	17,5%	21,0%
If yes, how many years have you been smoking?	0-2 years	8,9%	11,9%	1,9%	4,8%	7,1%
	3-5 years	5,4%	7,5%	15,4%	6,3%	8,4%
	6-8 years	1,8%	6,0%	5,8%	4,8%	4,6%
	9-11 years	0,0%	0,0%	1,9%	1,6%	0,8%
	12 years or more	3,6%	0,0%	0,0%	0,0%	0,8%

Table 2. Assessment of pharmacy students' tuberculosis related knowledge (n 238)

Questions		% of Respondents Who Answered Correctly					
		First grade students	Second grade students	Third grade students	Fourth grade students	χ^2 (df)	p value
How is tuberculosis transmitted?		16,1%	49,3%	67,3%	39,7%	70.30 (15)	<0.001
Which type of tuberculosis is contagious?		3,6%	34,3%	63,5%	38,1%	69.10 (15)	<0.001
Which organs may affect by tuberculosis?		32,1%	59,7%	69,2%	57,1%	49,69 (15)	<0.001
How to make a definitive diagnosis of tuberculosis Infection?		16,1%	16,4%	11,5%	23,8%	22.47 (12)	0.033
Is tuberculosis a disease must be reported?		76,8%	94,0%	90,4%	81,0%	13,59 (6)	0.034
How often tuberculosis is seen in one year in Turkey?		8,9%	1,5%	13,5%	15,9%	25,98 (12)	0,011
What is DOT (Directly Observed Treatment=DOT) in Tuberculosis?		12,5%	22,4%	13,5%	19,0%	29,10 (12)	0,004
Which is the most important for the treatment of tuberculosis?		30,4%	52,2%	48,1%	44,4%	22,67 (12)	0,031
Which of the followings are features of Tuberculosis Dispensary? (you may mark more than 1 answer)	Keeps records of tuberculosis patients and notifies the ministry of health	82,1%	68,7%	36,5%	60,3%	25,41(3)	<0.001
	Provides follow-up and treatment of tuberculosis patients with or without health insurance	60,7%	47,8%	46,2%	52,4%	2,89 (3)	0,409
	Obtains tuberculosis drugs to the certain participation fee	78,6%	82,1%	78,8%	74,6%	1,08 (3)	0,781
	It is main component of the tuberculosis control program in our country	76,8%	76,1%	80,8%	66,7%	5,69 (6)	0,458
What do you think is the most common risk factor for Tuberculosis?		5,4%	11,9%	21,2%	34,9%	41,67 (12)	<0.001
When do you think tuberculosis should be vaccinated first?		14,3%	16,4%	21,2%	15,9%	20,64 (12)	0,056
What are the symptoms of pulmonary tuberculosis?		14,3%	34,3%	48,1%	55,6%	65,84 (13)	<0.001
How to diagnose pulmonary tuberculosis?		12,7%	6,0%	9,6%	27,0%	44,40 (15)	<0.001
Which of the following is a way of preventing Healthcare professionals from tuberculosis?		21,4%	32,8%	40,4%	22,2%	61,18 (15)	<0.001
What would be the precautions to be taken when providing health care in a hospital environment to a patient with pulmonary tuberculosis found to be infectious?		10,7%	13,6%	30,8%	34,9%	43,60 (18)	<0.001

RESULT AND DISCUSSION

During the period of the study, a total of 389 students were in either their first, second, third, or fourth years. Majority of these students (238 of 389) participated voluntarily the survey. Of the 238 participants, 163 (68.5%) were female students, while male students were 75 (31,5%). The characteristics of them were summarized in Table 1. All participants expressed having heard about TB

earlier. Although 15,5% of them received information on monitoring or treatment of a TB patients in their internships, only 9,7% had encountered with a TB patient. Majority of participants had acknowledged TB disease as a professional disease of healthcare professionals because Healthcare professionals encounter more likely with TB patients, and it is highly contagious in contacts (close contact during examination and treatment) since it is transmitted by respiratory tract (Table 1).

Participants' TB-related knowledge and attitudes are shown in Table 2. According to results of survey, 42.9% of the students knew that TB is transmitted airborne and 34.5% of them said that pulmonary TB is contagious. More than half of participants, (54.6%) explained that both lungs and many organs may be affected by TB. There was a significant difference in the answers given to first three questions in students having different study years (grades) (Tablo 2). The minority of participants (16,1%, 16,4%, 11,5% and 23,8%, from 1st to 4th grade respectively and mean 17,2%) knew that TB was diagnosed by examination of sputum whereas 38.7% of them knew the tuberculin s*kin* test (TST) as a diagnostic tool. Also, 85.7 % of students accurately answered that when a person was diagnosed with TB, it was compulsory to report to the Health Ministry of Turkey whereas 13.9 % of students had no idea if it must be reported or not. More than half of students (55%) estimated high incidence of TB in Turkey (25 or 50 people per 100,000). Less than half of the students (44.1%) expressed that they must use antituberculosis drugs for at least six months in the treatment of TB patients, students did not know that directly supervised treatment means administration of TB drugs by a trusted person. Most of the participants knew the duties -except for one option- of the TB Dispensary, no difference was observed between the study years in terms of their answers. The question "what is the most important risk factor for TB disease" was correctly answered as Acquired Immune Deficiency Syndrome (AIDS) by the students at the rate of 18.5%. Many students (41.2% and 51.7% respectively) reported that they had no idea about two questions "When do you think people should be vaccinated first for TB?" and "What is the most important risk factor for TB disease?". More than one of third of students (38.2%) correctly explained pulmonary symptoms as blood in the mouth/sputum, fever, night sweats, and prolonged cough. The correct answers were increased from the first to the fourth grades and statistical differences were observed between the grades. Although 29.0% of the students said that Healthcare professionals should take measures to prevent transmission as a way of protection from TB such as wearing a mask, 23.9% of them stated that the BCG vaccine can provide lifelong protection. Some students also considered getting a chest x-ray or vaccination after they got in touch with a pulmonary TB patient.

Healthcare professionals are more likely to encounter TB patients. Especially, community pharmacists frequently encounter individuals with respiratory diseases such as TB. So, it is important to determine and increase the knowledge level of the pharmacists about TB disease for protecting themselves and inform the patients. Pharmacy faculty students basically get information about TB from

the lectures during their undergraduate education. After the students complete their 2nd year theoretical and practical courses, their internship programs start in community or hospital pharmacies. So, they also increase their level of knowledge about many diseases during internships. The results of this study indicated that almost all pharmacy students have heard about TB disease. But they had inaccuracies in their knowledge related to: How does TB transmit, which type of TB is contagious and which organs are affected by tuberculosis (Table 2). In the answers given to these questions, there were differences between grades. The definitive diagnosis of TB is made by bacteriological examination of sputum. In different studies conducted with doctors, this question was answered correctly by 83.6% [13], 68.4% [15] and 31.9% [16] of them. While 17.2% of our students stated that the definitive diagnosis of TB is made by bacteriological sputum examination, 38.7% of them had the wrong information that this can be done with the TST. Similar studies were found in which participants stated that the definitive diagnosis of TB was made with the TST [17,18]. The 75.6% of our students correctly knew the symptoms of TB disease. The awareness rate about TB symptoms was higher in upper-class students (Table 2) and was statistically significant. Although 41.2% of the students stated that they had no idea about the risk factors of TB, 18.5% of them stated that AIDS patients had a high risk of developing TB disease. It was observed that the understanding of the relationship among AIDS and TB in upper-class students increases and this difference was statistically significant. In our country, it is obligatory to report a person diagnosed with TB disease and directly observed treatment (DOT) is applied for TB treatment. TB drugs are given to patients free of charge by TB dispensaries. TB patient records are kept and Turkey' Tuberculosis Report is annually published [8]. It is known by 44.1% (105/238) of students that it is important to use medications for at least six months in the treatment of TB disease for effectiveness. On the other hand, they (85.7 %) stated that it is mandatory to report a person diagnosed with TB. At the same time, 187 of 238 students (78.6%) students said TB drugs were given free of charge by dispensaries. When these above summarized results were evaluated statistically, no significant difference was found between the grades. Interestingly, the students estimated that the number of incidences of TB is high in Turkey. Essentially, minority of students (9.7%) have encountered TB patients during their internships yet. Only15.5% students stated that they took an active role in the monitoring and treatment of TB patients during their internships. Since many students did not encounter TB patients during their internship, this emphasizes the importance of covering TB during their undergraduate education and sharing information about TB on television or on social media in order to increase their awareness of TB. Students consider TB as an occupational disease of Healthcare professionals because of close contact during the examination and treatment of patients and because the disease is transmitted through the respiratory tract. In other respects, it is interesting that 83,2% of the students said that they would get vaccinated if they had TB. The fact that some students think that the BCG vaccine can provide lifelong protection or that some get vaccinated after encountering a patient

with TB shows that they do not have enough information about the prevention measures against TB and the effectiveness of the vaccine. In a previous study in Japan, physicians of 80 medical school hospitals answered TB-related questionnaire consisting of two sets. Authors emphasized that additional training is required for physicians and medical students [19]. Nakanishi et al. [20] conducted a study in 2002 and showed that less than 50% of physicians gave correct answers to questions about TB. Kara et al. [12] evaluated the knowledge, attitudes, and behaviors of 110 pediatric residents from three different centers and determined that physicians lacked knowledge about TB diagnosis, treatment, and follow-up. The results of our study also showed that there is a lack of knowledge about TB disease among pharmacy students. Healthcare professionals are more likely to encounter patients with respiratory infection such as TB. So, it is important to determine and increase of the knowledge level of all of healthcare professionals about TB disease to protect themselves and to inform the patients. Therefore, TB disease should be emphasized in detail in the courses given during the undergraduate education of health-related occupational groups. The level of knowledge and awareness of TB should be increased with educational programs conducted by specialists working on TB control of healthcare professionals working with TB patients after graduation.

Our research has several limitations. First, the survey was carried out only with students of the first four grades. Since we included all volunteering students in our survey, there were 238 participants from the first four grades. Therefore, our results may not represent awareness and knowledge about TB of all students including 5th grade. Second, students were almost never encountered with TB patients during their internships. Consequently, the majority of the students did not have experience in monitoring or care for TB patients. Since there were no TB patients (except 6.7%) in their families, they could not have knowledge and experience about TB from their social circles. Finally, the students participating in the survey had not yet completed their fifth year's internship.

Pharmacists are frontline Healthcare professionals, and in most countries, they are the first to come into contact with people with TB. In order to combat TB effectively, it is necessary to improve the TB knowledge level and awareness of all healthcare teams, including pharmacists.

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AUTHOR CONTRIBUTIONS

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS COMMITTEE APPROVAL

The ethics committee approval has been received from Altınbaş University Clinical Research Ethics Committee (Decision No:03, Date: 29 Nisan 2020).

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