

Evaluation of Approaches and Knowledge Levels of Pediatric Infectious Diseases Physicians about the Diagnosis and Treatment of Tuberculosis

Çocuk Enfeksiyon Hastalıkları Hekimlerinin Tüberküloz Tanı ve Tedavisinde Yaklaşımlarının ve Bilgi Düzeylerinin Değerlendirilmesi

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ABSTRACT

Objective: In this study, we aimed to evaluate the approaches and knowledge levels of pediatric infectious diseases research workers and pediatricians in the diagnosis and treatment of tuberculosis under the guidelines updated by the Ministry of Health in 2019.

Method: This survey is a descriptive study applied to pediatric infectious diseases research workers and pediatricians. In the study, a questionnaire form prepared by researchers consisting of questions about sociodemographic features (n:5), knowledge level about tuberculosis (n:20), experience and approaches (n:13) was used.

Results: Fifty physicians participated in the study. The average age of participants was 36 years, and 90% of them were women. It was observed that physicians participating in the study had sufficient knowledge of tuberculosis. In terms of their experiences about tuberculosis, it was learned that m. tuberculosis culture (86%), acid-fast-bacilli test (82%), chest radiography (78%) and tuberculosis polymerase chain reaction (66%) were used most frequently for the diagnosis of pulmonary tuberculosis. Most common form of non-pulmonary tuberculosis was lymphadenitis (84%), and the most challenging condition in the treatment of tuberculosis was drug side effect (78%). When drug resistance was questioned, it was seen that 60% of the physicians encountered drug resistance, and the most common drug resistance was against isoniazid (54%). The isolation measures applied to tuberculosis patients were single room admission, and use of a N95 mask in 80%, an ultraviolet protected lamp use in 22%, and negative pressure room monitoring in 32% of the cases.

Conclusion: In our country, tuberculosis still retains its importance. For this reason, the information should be updated with in-service training on issues such as diagnosis, treatment, drug resistance and prevention methods.

Keywords: Tuberculosis, pediatric infectious diseases, approach, level of knowledge

Öz

Amaç: Bu araştırma ile çocuk enfeksiyon hastalıkları yan dal araştırma görevlisi ve uzman hekimlerinin tüberküloz tanı ve tedavisinde yaklaşımlarının ve bilgi düzeylerinin 2019 yılında Sağlık Bakanlığı tarafından güncellenen rehber eşliğinde değerlendirilmesi amaçlanmıştır.

Yöntem: Bu çalışma çocuk enfeksiyon hastalıkları araştırma görevlisi ve uzman hekimlerine uygulanan tanımlayıcı tipte bir araştırmadır. Çalışmada, araştırmacılar tarafından hazırlanan sosyodemografik özellikler ile ilgili 5 soru, tüberküloz bilgi düzeyi ile ilgili 20 soru, deneyim ve yaklaşımlar ile ilgili de 13 sorudan oluşan anket formu kullanılmıştır.

Bulgular: Araştırmaya 50 hekim katılmıştır. Katılımcıların yaş ortalaması 36 yıl olup, %90'ı kadındır. Çalışmaya katılan hekimlerin çoğunlukla tüberküloz bilgi düzeylerinin yeterli olduğu gözlenmiştir. Tüberküloz deneyimleri açısından, pulmoner tüberküloz tanısında en sık tüberküloz kültür (%86), asidorezistan basil bakısı (%82), akciğer grafisi (%78) ve tüberküloz polimeraz zincir reaksiyonu (%66) kullanıldığı öğrenildi. En sık karşılaşılan non-pulmoner tüberküloz formu lenfadenit (%84), tüberküloz tedavisinde en çok zorlanılan durum ise ilaç yan etkisi (%78) olarak bulundu. İlaç direnci sorgulandığında, hekimlerin %60'ının ilaç direnci ile karşılaştıkları görüldü, en sık karşılaşılan ilaç direncinin ise isoniazid (%54) olduğu belirtildi. Tüberküloz hastalarına uygulanan izolasyon önlemleri, %80 tek kişilik odaya alma ve N95 maske, %22 ultraviyole korumalı lamba kullanımı, %32 negatif basınçlı odada izlem idi.

Sonuç: Ülkemizde tüberküloz halen önemini korumaktadır. Bu nedenle tanı, tedavi, ilaç direnci ve korunma yöntemleri gibi konularda meslek içi eğitimlerle bilgilerin güncellenmesine devam edilmelidir.

Anahtar kelimeler: Tüberküloz, çocuk enfeksiyon hastalıkları, yaklaşım, bilgi düzeyi

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INTRODUCTION

Tuberculosis continues to be an important public health problem worldwide. According to the 2019 tuberculosis global report of the World Health Organization (WHO), the estimated number of cases with tuberculosis in 2018 was 10 million, including 1.1 million children. and 230,000 children and 1.5 million people died due to tuberculosis in 2018 ⁽¹⁾. In our country, the incidence of tuberculosis per 100,000 population was 14.6 in 2017 and 14.1 in 2018 ⁽²⁾.

Tuberculosis control has been called the “tuberculosis war” for a hundred years in our country. Continuing the follow-up and treatment of smear-positive patients and their contacts is of great importance in tuberculosis control. Since children usually contract tuberculosis bacilli from adult patients with tuberculosis, the problem of tuberculosis in childhood is one of the most important indicators of the effectiveness of tuberculosis control programs in adults. For this reason, the knowledge level of pediatric infectious diseases physicians who will diagnose tuberculosis in children, regulates their treatment. Besides, follow up period of the patients should be of sufficient length.

In our country, guidelines are prepared to provide a standard approach for tuberculosis control practices, diagnosis and treatment standards, and the recording and reporting system to be used. The first guidelines for tuberculosis in Turkey were published in 1932 ⁽³⁾. Guidelines containing standards for the diagnosis and treatment of tuberculosis were published by the Ministry of Health in 1998, 2003 and 2011 ⁽⁴⁾. Finally, this guideline was updated in 2019 ⁽⁵⁾. In this study, we planned to evaluate the approaches and level of knowledge about tuberculosis of 50 pediatric infectious diseases research workers and pediatricians who are members of the Pediatric Infectious Diseases and Immunization Association, in line with the recently published guidelines.

MATERIAL and METHOD

This survey is a descriptive study applied to

pediatric infectious diseases research workers and specialists. The research population was composed of the members of the pediatric infectious diseases association. The sample was not selected for the research. A website or face-to-face questionnaire forms were used in the study. Participation in the survey was on a voluntary basis.

A questionnaire form prepared by the researchers was used as a data collection tool. Questionnaire form contained questions about sociodemographic characteristics (n:5), knowledge level about tuberculosis (n:20), and experiences and approaches (n:13). The questions regarding the level of knowledge on tuberculosis were prepared based on the Tuberculosis Diagnosis and Treatment Guideline updated by the Ministry of Health in 2019 ⁽⁵⁾.

Regarding the level of knowledge of tuberculosis, the participants were asked the questions related to the criteria used for the definitive diagnosis of tuberculosis, the other tests and features used for the diagnosis, the indications of the interferon-gamma release assay (IGRA), contagious forms of tuberculosis, the duration of the contagiousness, contact approach, diagnosis of latent tuberculosis, treatment and follow-up, side effects of antituberculostatic drugs and follow-up of these side effects, indications of corticosteroid use, alternative approaches in patients who did not comply with antituberculostatic drug treatment, drug sensitivity tests and drug-resistant tuberculosis, follow-up of the baby born to a mother with tuberculosis, tuberculosis screening in patients using anti-tumour necrosis factor drugs (anti-TNF) and required isolation methods in patients with tuberculosis.

Regarding the experiences and approaches of the participants in cases of tuberculosis, they were asked questions related to the hospital isolation methods, the tests they used in diagnosis, the conditions they had difficulty in treatment, the drug resistance type they mostly encountered, the tuberculosis treatment they applied for HIV-positive patients, the applications they performed for the contact healthcare workers, and tuberculosis screening before immuno-suppressive therapy.

Statistical evaluation was performed using SPSS,

version 19.0 (IBM company, USA) program, mean, standard deviation, number and percentage were used in defining the data. The approval for the conduction of the study was obtained from the local ethics committee.

RESULTS

Fifty physicians participated in the study. The average age of participants was 36 years (range: 24-48 years), and 90% (n:45) of them were women. Twenty-seven (54%) pediatric infection subspecialists and 23 (46%) pediatric infection research workers were included in the study. The physicians were working in the field of pediatric infection for one (n:11; 22%), 1-3 (n:15; 30%), 3-5 (n:9; 18%) , 5-10 (n:7; 14%), and ≥ 10 (n:8; 16%) years. The physicians were working in a university hospital (n:27; 56%), in a training and research hospital (n:21; 42%), and in a state hospital (n:1; 2%) (Table 1).

Table 1. Sociodemographic characteristics of physicians.

Female / Male	n (%)
	45/5 (90/10)
Age (years), median (range)	36 (28-48)
Branch	n (%)
Pediatric infectious diseases research worker	27 (54)
Pediatric infectious diseases specialist	23 (46)
Years of working	n (%)
0-1	11 (22)
1-3	15 (30)
3-5	9 (18)
5-10	7 (14)
≥ 10	8 (16)
Health institution	n (%)
University Hospital	28 (56)
Training and Research Hospital	21 (42)
Public Hospital	1 (2)

When asked, 58 (96%) participants knew that the definitive diagnostic test of tuberculosis is a bacterial susceptibility test performed on Lowenstein-Jensen selective culture medium, and 98% (n:49) of them knew that larynx is the site of infection Besides, 56% (n:28) of them gave correct answers to the question related to the indication of IGRA in a patient with a negative tuberculin skin test (TST) result.

Twenty-eight (56%) participants correctly

responded to the question about the time when the infectiousness ends in patients receiving tuberculosis treatment by marking the options of undergoing the effective treatment for at least 3 weeks, by indicating decrease in symptoms, and by observing smear test positivities at least 8 hours apart and negative sputum smear test results obtained at least 3 consecutive in the morning or 3 consecutive days.

In the question about the use of nucleic acid amplification test (NAAT) in the diagnosis of tuberculosis, 84% (n:42) of the physicians knew that negative NAAT did not exclude the diagnosis of tuberculosis. However, the question of which laboratory test is not necessary before treatment of a patient diagnosed with tuberculosis, was responded correctly by 22 (44%) participants who selected bleeding diathesis among the options of liver function tests, erythrocyte sedimentation rate, anti-HIV, hepatitis B and C screening, fasting blood glucose, HbA_{1c}, and bleeding diathesis.

When the study participants contacted with contagious tuberculosis patient (s) were asked about the indications for preventive treatment, 92% of the physicians (n: 46) correctly answered that preventive treatment should be initiated in the babies born to a mother with tuberculosis, individuals under the age of 35 with negative TST results and normal chest radiography or IGRA positivity and normal chest radiography. Thirty physicians (60%) knew correctly the preventive treatment to be selected and its duration that consisted of isoniazid for 6 or 9 months, rifampicin for 4 months and moxifloxacin for 9 months. Eleven (22%) physicians did not know that moxifloxacin treatment was among the preventive drug options in cases of contact with resistant tuberculosis patients, which is the new information in the latest guideline. Thirty-three (66%) physicians were informed about this most currently updated information that preventive treatment should be initiated again in people who previously received preventive treatment for any reason but had a history of contact in a new close environment.

Forty-three (66%) physicians knew that pyrazinamide causes hyperuricemia as a response to the question concerning antituberculosis drugs and

their side effects. To the question inquiring if antituberculostatic drug treatment has a minor side effect that does not require discontinuation of the treatment, 29 (58%) physicians correctly chose the option of hypersensitivity reactions.

Thirty-two (64%) participants knew correctly what to do in the presence of hepatotoxicity in a patient receiving antituberculosis treatment. Accordingly, they stated that the drug should be discontinued if the transaminase values exceeded 5 times the upper limit value of normal regardless of the presence of any symptom and if the bilirubin value exceeded 1.5 mg/dL or the patient's clinic required emergency treatment. They indicated that in these patients non-hepatotoxic treatment should be initiated and viral hepatitis should be considered in the differential diagnosis in cases where transaminases are at a very high level. Forty-seven (94%) patients knew the indications of corticosteroid use in the treatment of tuberculosis.

Thirty-six (72%) patients were informed about the alternative approaches to the patients who did not comply with the antituberculosis treatment. The conditions that should be considered as multi-drug resistance were known correctly by 47 (94%) physicians, but only 30 (60%) study participants answered correctly to the question concerning the definition of multi-drug resistant tuberculosis, and the development of resistance to isoniazid and rifampicin. Twenty-eight (56%) participants knew correctly that the drug sensitivity test should be performed at the beginning of treatment and if bacterial reproduction continues on the 3rd month.

Thirty-seven (74%) physicians correctly knew that whether the babies born to a mother with tuberculosis had or had not tuberculosis, the isoniazid treatment should be completed to 6 months, regardless of the TST results.

Thirty-four (68%) patients correctly knew how to perform tuberculosis screening tests in patients using anti-TNF drugs, and stated that clinical screening tests should be performed every 3, radiological screening studies every 6, TST/IGRA every 12 months.

Twenty-two (44%) physicians were not informed

about isolation measures of the patient with tuberculosis, and did not know that the patient who came out of the ward did not need to wear an N95 mask.

When physicians' approaches to diagnosis and treatment were evaluated, the indicated proportions of study participants had correct knowledge about the use of tuberculosis culture (86%), acid-fast bacilli (AFB) smear tests (82%), chest radiography (78%) and tuberculosis polymerase chain reaction (PCR) (66%). Ten percent of the physicians, all of whom were first-year research workers in the department of pediatric infectious diseases, stated that they had not diagnosed anyone with tuberculosis before. It was observed that TST, chest radiography and IGRA were used in the diagnosis of latent tuberculosis in immunosuppressed individuals (74%). The most common type of non-pulmonary tuberculosis was lymphadenitis (84%), followed by bone, joint (56%) and central nervous system tuberculosis (34%). Treatment of tuberculosis was extremely difficult in cases of drug side effects (78%), patient noncompliance (56%) and drug resistance (26%). Sixty percent of the study participants encountered drug resistance, and the most common drug resistance was against isoniazid (54%). As screening tests of the healthcare workers in contact with tuberculosis patients, most frequently (64%) annual TST + chest radiography and in suspected cases sputum AFB controls were performed. When the isolation measures applied to tuberculosis patients were questioned, 80% of the physicians stated that they used a single-bed isolation rooms and N95 mask, and 22% of them used ultraviolet (UV) protected lamps. It was learned that 32 % of the patients were monitored in the negative pressure rooms, and 88 % of them for 24 hours. To the question "Do you feel safe in terms of preventive measures while monitoring tuberculosis patients?," 20 (40%) physicians responded as "yes most of the time", 36% (n:18) of them as "never" and 24% (n:12) of them as "sometimes".

DISCUSSION

Although tuberculosis is a preventable and treatable disease, it continues to be an important cause of morbidity and mortality in children and adolescents. Each child diagnosed with tuberculosis in society is an indicator of a new outbreak and that tuberculosis disease is not well controlled in that society. For this reason, pediatric infectious diseases physicians dealing with childhood tuberculosis must have good knowledge and experience concerning tuberculosis. It was observed that the physicians involved in this study were mostly experienced and sufficiently knowledgeable about tuberculosis.

The definitive diagnosis of pulmonary tuberculosis in children is made by showing tuberculosis bacilli in sputum⁽⁵⁾. Diagnostic methods such as ARB and PCR might shorten the time to diagnosis. In our study, 96% of the physicians correctly answered the question of how the definitive diagnosis of tuberculosis was made. In another study, 83.6% of pediatric research workers gave correct responses to that question⁽⁶⁾. When the experiences of the physicians participating in the study were questioned, it was found that they mostly used culture, AFB, PCR, TST and radiological imaging for the diagnosis of tuberculosis.

In our country, TST is used extensively in tuberculosis screening. However, TST can be affected by many factors such as BCG vaccine, immunity of the individual, application and interpretation technique of the screening tests⁽⁷⁾. IGRA has been used frequently in recent years, and its use is recommended in immunosuppressed patients with negative TST results or those using immunosuppressive drugs, and in TST-positive patients with poor prognosis but without any risk factor for tuberculosis disease to rule out false positivity⁽⁵⁾. In our study, 56% of the patients had an accurate knowledge about the indication of IGRA in patients with TST-negativity. This lower rate shows that IGRAs are still not performed routinely in most hospitals in our country, so there is a lack of knowledge and experience in this respect.

Preventive treatment is given to patients who

have contact with infectious patients without active disease, children with latent infection, and babies born to mothers with tuberculosis. In preventive treatment, isoniazid (10 mg/kg, maximum 300 mg) is used daily for 6 months. This period is 9 months in immunocompromised children. In case of resistance to isoniazid, rifampicin is given for 4 months (10 mg/kg daily, maximum 600 mg)⁽⁵⁾. There is no randomized controlled study on an effective preventive treatment regimen in children in contact with patients with multi-drug resistant tuberculosis. In quinolone-sensitive cases, use of either moxifloxacin or levofloxacin is recommended for 9 months. Alternatively, quinolone + ethambutol treatment is recommended⁽⁸⁾. In our study, although most (92%) of the participants correctly knew the indications for preventive treatment, among the options of preventive treatment, scarce number of these physicians heard about moxifloxacin which was attributed to the fact that most of the physicians did not encounter cases with resistant tuberculosis and therefore did not have up-to-date knowledge of resistant tuberculosis treatment. Because adults with resistant tuberculosis have an important place in our country, we think that in-service training on current issues should be done.

Extrapulmonary tuberculosis is more common in children than adults, especially with younger age, due to the high risk of lymphohematogenous spread. Tuberculous lymphadenitis is the most common form of extrapulmonary tuberculosis⁽⁹⁾. In the study of Coşar et al.⁽¹⁰⁾ evaluating childhood tuberculosis, the rate of extrapulmonary tuberculosis was 38.6% and the frequency of tuberculous lymphadenitis was 11.7%. In another study, the most common forms of extrapulmonary tuberculosis in children were found in decreasing order of frequency as lymphadenopathy, bone, meninges, and miliary tuberculosis, respectively⁽¹¹⁾. When physicians' experiences about extrapulmonary tuberculosis were questioned in our study, they indicated that they mostly (84%) encountered lymphadenitis followed by bone joint (56%) and central nervous system tuberculosis (34%).

It is important to identify tuberculosis patients in

the community, to treat these patients regularly and to complete their treatment within the appropriate time. Drug side effects are among the most important issues that make compliance difficult. Children tolerate tuberculostatic drugs better than adults, and side effects such as hypersensitivity, visual impairment, hepatotoxicity or hearing loss that require interruption of treatment are less common in children⁽⁵⁾. Despite this, drug side effect (78%) was found to be the most difficult situation in the treatment of tuberculosis by the physicians participating in our study followed by patient compliance (56%) and drug resistance (26%). The lack of special drug formulations for children and the fact that the flavours of the drugs are not palatable for children are factors that reduce patient compliance to treatment⁽⁵⁾. Drug resistance is another factor that makes tuberculosis control difficult. In patients who use the drug irregularly or discontinue it, and in cases of tuberculosis accompanied by a human immunodeficiency virus infection, single or multi-drug resistance can occur. This form of tuberculosis, which is also passed on to children as a result of the contact of children with these patients, complicates the diagnostic process and selection of appropriate treatment. In our study, 60% of the physicians encountered drug resistance, and they most commonly reported drug resistance against isoniazid (54%).

Many studies have demonstrated that tuberculosis is seen more often in healthcare workers in our country than the general population. It is known that nurses and medical staff in hospitals most often contract tuberculosis bacilli⁽¹²⁾. A series of precautions should be taken by the health institutions to prevent transmission of tuberculosis which include measures taken by management, engineering measures and personal protective measures⁽⁵⁾. One of the preventive measures implemented by the management is to screen the health personnel for tuberculosis periodically. In this study, it was found that as the screening tests of health workers contracting tuberculosis bacilli, most frequently (64%) annual TST + chest radiography + and sputum control for ARB in suspected cases were performed.

Engineering measures are related to the effective installation and use of isolation rooms and ventilation systems. It is recommended that rooms with contagious tuberculosis patients be under negative pressure⁽⁵⁾. Another practice is to install UV lamps in rooms, corridors and sections where tuberculosis patients are present⁽⁵⁾. Using a mask is among the personal protective measures. A 95% effective filtering N system (N-95) mask is recommended as a protective measure against tuberculosis bacilli⁽⁵⁾. It was determined that more than half of the physicians participating in the study did not have a negative pressure room in the institution where they worked, UV lamps were less frequently applied, and usually N95 masks were used.

The approach and level of knowledge of pediatric infectious diseases physicians about tuberculosis have not been evaluated in the literature before. Since a suitable sampling selection technique is not used, it cannot be said that the number of participants represents all physicians working in this field. On the other hand, in studies evaluating the knowledge level of healthcare professionals about tuberculosis, it was observed that the knowledge level of pediatric residents, infectious diseases and clinical microbiology specialists was sufficient^(6,13).

In conclusion, pediatric infectious diseases physicians continue to encounter tuberculosis patients frequently. Although they don't receive any special training on tuberculosis during their education, they mostly have sufficient knowledge and experience on tuberculosis. Since tuberculosis still maintains its importance in our society, we think that it will be beneficial to continue updating the information with in-service training on diagnosis, treatment, drug resistance and prevention methods.

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