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Immigrants treated for tuberculosis in Mazovian Centre of Lung Diseases and Tuberculosis in Otwock

Abstract

Introduction: Migration of population contributes to the transmission of tuberculosis (TB), particularly multidrug-resistant tuberculosis. In the countries of Western Europe, the immigrants' inflow contributes to the deterioration of the epidemiological situation. Majority of newly detected TB cases in some countries were affirmed among immigrant and foreign born population. In Poland, this problem has not been investigated up to 2005. The aim of the study was the assessment of the occurrence of tuberculosis in immigrants treated in the Mazovian Centre for Treatment of Lung Diseases and Tuberculosis in Otwock.

Material and methods: This work had a retrospective character. The number of cases of tuberculosis in immigrants admitted between 2002 and 2007 was calculated from the data base of the Mazovian Centre for Treatment of Lung Diseases and Tuberculosis; 125 patients, whose basic demographic data, bacteriological status and the radiological changes suggested TB, were included in the study.

Results: The foreigners made up to 0.5–1.7% all tuberculosis cases treated in Mazovian Centre for Treatment of Lung Diseases and Tuberculosis. Among confirmed cases, twenty four nationalities were seen. Nationals of the Russian Federation (coming from the Republic of Chechnya) formed the biggest group (24%), followed by the Vietnamese (21%) and the Ukrainians (12%). Most of all cases were young men (77%; average age — 34 years). Children made up to 12% of all cases. Tuberculosis of the lungs was predominating, and there were culture confirmed extrapulmonary locations in 13.6% of cases. Bacteriological confirmation was achieved in 53% of cases, but up to 22.7% cases were resistant to one of the antituberculosis medicines and 13.6% was multidrug-resistant.

Conclusions: Despite the fact, that immigrants made up a small proportion among all the patient treated for tuberculosis in Mazovia, their number systematically increases. High proportion of multidrug-resistant tuberculosis reported in foreign-born cases is a concern.

Key words: tuberculosis, epidemiology, immigrants

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Introduction

Human migration between countries and continents is one of the factors contributing to the spread of infectious diseases [1, 2]. The difficult economic situation in many Asian and African countries results in mass emigration to developed countries where labour is being sought. The prevalence rates of tuberculosis (TB) in the Asian and

African regions exceed those in most European countries by a factor of 20 to 50 times [3]. The significant human migration from regions with a high prevalence of TB may result in a worsening of epidemiological parameters in developed countries which are targets for economic migration. In some European countries, such as the Netherlands, Sweden, and Denmark, the number of new cases in immigrants, who account for a small part of the gene-

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ral population, already exceeds 60% (or 68% in the Netherlands) of all the registered cases of TB [4, 5]. The prevalence rate of TB in the native French population is 6 per 100,000, which is about ten times less than the prevalence rate in the immigrant populations, mainly among the immigrants from North Africa (57 per 100,000), raising the prevalence rate for the overall population to 10 per 100,000 [6]. In the United Kingdom, the differences in prevalence rates between the autochthonous population (4.4 per 100,000) and certain populations of foreign-born settlers are even greater (120–210 per 100,000) [5]. Migration also promotes the spread of infections caused by drug-resistant mycobacteria [1]. The overwhelming majority of cases of multidrug-resistant tuberculosis (MDR-TB) in developed countries, such as the United States and Canada, are detected in immigrants [7, 8].

Immigrants are a very heterogeneous group of people who differ in terms of country of origin, reason for emigration, and economic status. Many sputum-positive immigrants work or live illegally in developed countries. Fearing deportation, they refuse to see a doctor and be treated, posing a risk to people with whom they come into contact. In addition, the insularity of many groups of immigrants and the language and cultural barriers further impede the provision of medical and social assistance to foreigners. The lack of a permanent address and frequent changes of place of abode among immigrants are additional issues that make the treatment and epidemiological surveillance of patients with diagnosed TB even more difficult. In their communities, TB has become such an important problem that in developed countries it is currently being carefully monitored, as are drug-resistance and HIV co-infection [9].

In Poland, data on the proportion of immigrants among TB patients are very scarce. It was not until 2005 that new cases of TB in immigrants started to be recorded in the central TB registry [10]. They had not been included in the registry before, which is why it was difficult to determine their proportion in the general population of patients with TB. No analysis of foreigners treated for TB in terms of countries of origin has been conducted in Poland so far. Their bacteriological status, particularly resistance to antituberculous drugs, has not been investigated either. The aim of our study was to assess the prevalence of TB in foreigners treated at the Mazovian Centre for the Treatment of Lung Diseases and Tuberculosis in Otwock, Poland, between 2002 and 2007 and to identify their countries of origin, location of lesions, and bacteriology results.

Material and methods

This was a retrospective study. In the database of our Centre we identified foreigners treated for TB between 1 January 2002 and 31 December 2007. The personal data were retrieved from the registration system developed by Computerland and Optimed. For the purpose of the study we defined immigrants as individuals born outside Poland and possessing no PESEL number (the Polish national identification number). We included patients registered with a diagnosis of TB coded according to the 10th edition of the International Classification of Diseases (ICD-10 classification) as A15 (bacteriologically confirmed pulmonary tuberculosis), A16 (bacteriologically negative pulmonary tuberculosis), A18 (extrapulmonary tuberculosis), and A19 (miliary tuberculosis). The Mazovian Centre for the Treatment of Lung Diseases and Tuberculosis in Otwock is the only centre in Mazovia to have signed a contract with the Mazovian Branch of the National Health Fund for the treatment of TB. We included 125 patients in the study and assessed the basic demographic data, bacteriological status, and radiological presentation.

Results

A total of 125 immigrants were hospitalised for TB at the Mazovian Centre for the Treatment of Lung Diseases and Tuberculosis in Otwock, Poland, between 2002 and 2007. The study group comprised of 110 adults and 15 children and adolescents below 18 years of age. While in 2004 only 11 foreigners were treated for TB at our Centre, in 2007 this number tripled (34 patients). The proportion of foreigners among all the patients treated for TB at our Centre was 0.5% in 2004 and 1.7% in 2007 (Fig. 1). Females accounted for 23% of the

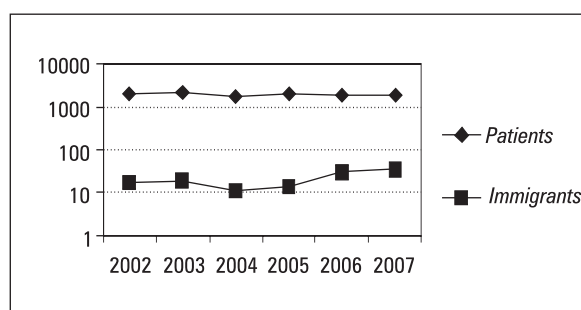


Figure 1. The number of immigrants in a proportion of all treated TB cases in MCLChPiG in Otwock 2002–2007 (logarithmic diagram)

Table 1. Origin countries of foreigners and bacteriological confirmation of TB

Country	Number of people	(%)	AFB (+) and culture	Only culture	Bacteriological confirmation	Children and young people
Albania	1	0.8	0	0	0	
Algeria	1	0.8	0	0	0	
Belarus	1	0.8	1	0	1	
Kongo	1	0.8	1	0	1	
Lybia	1	0.8	0	0	0	
Angola	1	0.8	0	0	0	
Republic of Moldova	1	0.8	1	0	1	
Togo	1	0.8	0	0	0	
Turkey	1	0.8	0	1	1	
Nepal	2	1.6	1	0	1	
Sri Lanka	2	1.6	1	0	1	
Tibet	2	1.6	0	1	1	1
Romania	3	2.4	1	0	1	
Somalia	3	2.4	2	1	3	
Bulgaria	4	3.2	3	0	3	
India	4	3.2	2	0	2	
Georgia	5	4	0	2	2	4
Mongolia	5	4	3	1	4	1
Russia	7	5.6	0	3	3	
Armenia	8	6.4	2	1	3	
/Ukraine	15	12	7	3	10	
Vietnam	26	20.8	5	7	12	
Chechnya	30	24	11	5	16	9
Total	125	100	41	25	66	15

adult foreigners treated at our Centre. Young adults predominated (mean age: 34 ± 9 years), especially among women (mean age: 30 ± 8 years). Twelve children aged below 14 years and 3 aged 14 to 18 years were treated, with girls accounting for 40% of the patients in the group of children and adolescents.

The most numerous groups among adults were Chechens (24%) and Vietnamese (21%) (Table 1). The second important population were citizens of Poland's neighbouring countries, particularly Ukrainians (12%) and Russians (6%). Armenians were a considerably numerous group as well (6%). A small group, only 7%, comprised patients from Southeastern Europe (Bulgarians, Romanians, Moldovans, etc.). There were a few patients from various countries in Africa (8 patients) and Asia (16 patients) (Table 1). In this group of patients, most originated from Mongolia (5 patients), India (4 patients), and Somalia (3 patients). Most paediatric patients were from Chechnya (9 patients) and

Georgia (4 patients) and there was one child each from Mongolia and Tibet.

TB was confirmed bacteriologically (culture) in 53% of adult patients and positive smears were identified in 33% (Tables 1 and 2). In the group of adult Chechens, the percentage of patients with culture-positive TB was 67%. In children and adolescents, culture-positivity was identified in 4 patients only (27%). The diagnosis of TB was based on a histopathological examination of peripheral lymph nodes in two adults and on genetic testing of cerebrospinal fluid (real-time polymerase chain reaction [real-time PCR]) in one patient. In one child with miliary tuberculosis the diagnosis was confirmed using a genetic probe (Gen-Probe, bio-Mérieux) for cerebrospinal fluid examination, although the diagnosis in this case was also confirmed by rapid culture on liquid media (BACTEC).

Mono-resistant or multiple-drug resistant mycobacteria were identified in 22.7% of sputum-

Table 2. Division of patients on the base of International Classification of Diseases (ICD-10)

<i>ICD-10 classification</i>	<i>Description</i>	<i>Adults</i>	<i>Children and young people</i>
A 15.0	Pulmonary tuberculosis — smear (and culture) positive	41	0
A 15.1	Pulmonary tuberculosis — only culture positive	19	3
A 15.3	Tuberculosis of lung, confirmed by unspecified means	2	
A 15.4	Tuberculosis of intrathoracic lymph nodes	2	
A 16.0	Pulmonary tuberculosis — bacteriologically negative	38	5
A 16.3	Tuberculosis of intrathoracic lymph nodes	1	3
A 16.4	Tuberculosis of larynx, trachea and bronchus		3
A 16.5	Tuberculous pleurisy	1	
A 18	Tuberculosis of other organs	5	
A 19	Miliary tuberculosis	1	1

Table 3. TB drug resistance

<i>Type of resistance</i>	<i>Pattern of resistance</i>	<i>Number of cases</i>	<i>Countries</i>
pre-XDR	RMP + INH + SM + OFLO	1	India
MDR	RMP + INH + SM + EMB	6	Chechnya (4) Russia (1) Mongolia (1)
MDR	RMP + INH + SM	1	Chechnya
MDR	RMP + INH	1	Chechnya
	SM + INH + EMB	1	Georgia
	SM + INH	3	Chechnya (2) Vietnam (1)
	SM	2	Armenia

positive patients (Table 3). They accounted for 12% of the foreign population (13.6% of the adult foreign population). As many as 9 cases of MDR-TB were identified, with the greatest number of cases among the Chechen immigrants (33% of patients). An extended drug-resistant strain (pre-XDR) was identified in one patient from India. None of the 4 sputum-positive children was found to be drug resistant.

In the investigated group of foreigners we identified 17 cases of extrapulmonary tuberculosis (Table 4), with tuberculosis of the intrathoracic lymph nodes (40%) and tuberculous peripheral lymphadenopathy (30%) being the two most common forms. Isolated tuberculous pleurisy was identified in one patient only. There was also one adult patient with miliary tuberculosis accompanied by signs and symptoms of meningitis. TB in this case was confirmed microbiologically by cerebrospinal

fluid examination. Tuberculosis of the hilar and mediastinal lymph nodes accounted for as much as 47% of the cases in children. One child from Mongolia with disseminated miliary changes in the lungs and signs of meningitis was diagnosed with miliary tuberculosis based on a positive CSF examination by real-time PCR.

Discussion

Human immigration is one of the most important problems of the modern world. According to the World Health Organisation (WHO), there are an estimated 150–200 million immigrants worldwide and over 50 million in Europe [11]. A considerable proportion of them are illegal immigrants residing in developed countries. Members of this population are at an increased risk of contracting TB as they often live in crowded and poor condi-

Table 4. Extrapulmonary tuberculosis in immigrants and their origin countries

ICD 10	Extrapulmonary localization	Number of cases	Countries
A 15.4	Tuberculosis of intrathoracic lymph nodes	3	Vietnam (1) Nepal (1) Chechnya (1)
A 16.3	Tuberculosis of intrathoracic lymph nodes	4	India (1) Chechnya (3)
A 16.4	Tuberculosis of bronchus	2	Chechnya (1) Georgia (1)
A 16.5	Tuberculous pleurisy	1	Ukraine
A 18.2	Tuberculous peripheral lymphadenopathy	5	Albania (1) Lybia (1) Vietnam (3)
A 19	Miliary tuberculosis	2	Vietnam (1) Mongolia (1)

tions [12]. Following migratory movements may help to limit the spread of infectious diseases, including TB. Health registries in the European Union lack a unified system for collecting immigration status data [13]. Fearing potential deportation, immigrants avoid contact with healthcare facilities. A few countries, following the example of the Netherlands and Norway, issue temporary residence permits to immigrants with TB for the period necessary to undergo antituberculous treatment [12, 14]. Such measures may help to reduce the number of immigrants with TB who pose an epidemiological risk to the native population of a given country. Theoretically, in many developed countries, illegal immigrants with TB have full access to free diagnosis and treatment of TB, although in some countries, such as the United Kingdom, Switzerland, Denmark, and Sweden, such access is difficult [12]. At the same time, in the majority of these countries, patients may be deported during treatment, although this right is rarely executed [12]. Two notable exceptions are the United States and Canada [15]. In Poland, foreigners with a diagnosis of TB are treated free of charge at the expense of the Ministry of Health, although the people who take advantage of this opportunity are mainly legal immigrants, such as political refugees from Chechnya. The number of foreigners with TB staying in Poland illegally is unknown [12]. The number of illegal immigrants is estimated at over 11 million in the United States and about 6 million in Western Europe [12]. Illegal immigrants suffering from TB account for more than 5% of new cases in Belgium and over 10% of new cases in Austria [12]. While the percentage of foreigners among new cases of TB in Western Europe is

35–70% [1, 2, 5], this parameter in Poland may range from 0.5–1.7%. It is difficult to establish the extent to which this reflects the actual epidemiological situation as the reported data only concern patients treated for TB who were hospitalised. On the other hand, it is hard to imagine that many patients with TB could receive intensive treatment in the outpatient setting.

Due to historic and cultural factors, each country has a specific profile in terms of regions from which most of their immigrants originate. For instance, immigrants from Turkey predominate in Germany, those from Africa and India in the United Kingdom, and those from Maghreb (Northwestern Africa) in France [4, 6, 16]. Polish statistical data demonstrate a very diversified nature of immigration [17]. The majority of immigrants granted permanent residence status come from Europe (over 8 thousand per year), mostly from Germany (3.5 thousand) and the United Kingdom (1.6 thousand) but also from Ukraine (0.7 thousand). A considerable proportion of immigrants come from the United States (1.5 thousand). Among the foreigners settling in Poland for a limited period of time the most numerous are Ukrainians (over 9 thousand per year), followed by Belarusians, Armenians, Russians, and Vietnamese. More than 11 thousand foreign students, including students from countries in poor epidemiological situations, come to study in Poland each year, with Ukrainians and Belarusians being the most numerous. A large group of foreign students is made up of Scandinavians and US citizens [17]. About 7 people per year apply for refugee status, as many as 90% of whom are Russians (mainly Chechens). We have little information on Vietnamese citizens staying in Poland. This

population seems large but also quite diversified, ranging from ex-students who have been granted Polish citizenship and settled down with their families tens of years ago to immigrants who have arrived in Poland in the past two decades mainly to look for employment.

The structure of immigration in Poland should be viewed in the context of the epidemiological situation of TB. While in Germany, the United Kingdom, Scandinavia, and the United States fewer than 10 new cases of TB per 100,000 inhabitants are reported annually [18, 19], the epidemiological situation in all the remaining countries from which immigrants come to Poland in large numbers is difficult. This is especially the case with former Soviet Union countries, where the prevalence rates are very high and are on the rise. The reported prevalence of TB is over 120 per 100,000 in Russia and over 80 per 100,000 in Belarus and Ukraine [18, 20]. In 1989 the epidemiological situation in these regions was similar to that in Poland. While in the past 20 years the prevalence of TB in Poland has decreased from 40 per 100,000 to 24 per 100,000, the number of new cases of TB in the former Soviet republics has risen from 42 per 100,000 to 80–150 per 100,000 [3, 10, 18]. It was not until 2008 that Ukraine finally implemented the Directly Observed Treatment Short course (DOTS) strategy. Moreover, in the former republics of the Soviet Union, drug resistance is increasing at an alarming rate, which is mainly due to non-compliance with the commonly recognised regimes of long-term use of antituberculous agents [20, 21]. The number of MDR-TB cases in these countries may be as high as 500 thousand [22]. The difficult epidemiological situation in prisons across the eastern border of Poland is commonly known [23]. Immigration from former Soviet Union republics has resulted in a significant increase in the number of cases of primary and secondary drug-resistant TB in Israel. As many as 17% of new cases of TB in immigrants arriving in Israel from the former Soviet Union have been cases of MDR-TB [24]. Vietnam is another country in a poor epidemiological situation, where the prevalence of TB is estimated at 155 per 100,000 [3].

Such evident differences in the epidemiological situation between Poland and its eastern neighbours, from which many citizens immigrate, requires careful monitoring of transmission of TB, especially MDR-TB. Appropriate programmes of early detection of TB have been implemented in Israel, where many immigrants from Ethiopia and the former Soviet Union republics arrive [25], and in the United States, where people from various

countries of the world are constantly migrating [26]. Treatment of latent TB, detected on the basis of a positive tuberculin test or in patients with radiological changes in the lungs typical of TB, has proved most cost-effective [5]. Obtaining periodic chest X-rays in individuals coming from epidemic foci has proved unsuccessful. This was caused by the poor response on the part of the interested individuals and by the low cost-effectiveness of such programmes, which required too many chest X-rays to detect one case. Due to the insularity of immigrant communities, the risk of TB transmission outside these groups is not high and transmission within a given population predominates [27].

The issue of TB in immigrants has not been previously analysed in Poland. The first report dates back to 2005, when the Institute of Tuberculosis and Lung Diseases Bulletin published data on the number of immigrants with TB diagnosed in Poland. In contrast to many countries, immigrants coming to Poland are not required to undergo prophylactic evaluation and they use health services on general terms. Only refugees residing at the Ministry of Internal Affairs and Administration centres, in whom TB is suspected, are referred for check-ups. Our study has shown that over half of the immigrants with TB treated at our Centre originated from the former Soviet Union republics (67/125). The overwhelming majority of drug-resistant TB cases (12/15) also originated from these countries. Immigrants from the former Soviet Union have a high risk of developing TB, particularly drug-resistant TB. Various early TB detection programmes in immigrants have been implemented in half of the European Union member states and in other countries, such as Canada, Japan, Australia, and the United States [13]. They have allowed the detection of active TB in an average of 0.35% of patients examined in European countries and in 0.5% outside Europe [13]. The best relative outcomes have been observed in the case of early TB detection programmes implemented in Asian countries before arrival in the United States (1.2%) [16]. In the largest study conducted in Norway a total of over 200 thousand immigrants were examined and TB was detected in 0.1% of them [13]. In a large Dutch study of 70 thousand recent immigrants a particularly high detectability of TB was observed upon arrival in the Netherlands [28]. Attempts to detect TB in immigrants one year after arrival are only justified in high-risk groups [28]. In the case of immigrants, the TB detectability rate largely depends on the prevalence of TB in their country of origin and was 71 per 100,000 for countries with a prevalence rate below 100 per 100,000 and

280 per 100,000 for countries with a prevalence rate above 200 per 100,000 [28].

It seems that the problem is slowly growing. While only 17 cases of TB in immigrants were recorded in Poland in 2005 (including 11 cases recorded at our Centre), this number reached 55 in 2007 (including 34 cases at our Centre) [29]. Among these patients, in 2007 the most numerous groups were Chechens (20 patients) and Vietnamese (10 patients). According to the annual bulletin on the epidemiology of TB in Poland published by the Institute of Tuberculosis and Lung Diseases, foreigners account for a mere 0.5% of all TB patients in Poland [30]. At our Centre this percentage was over three times higher (1.7%).

Mazovia is one of the provinces characterised by a high prevalence of TB of 28 per 100,000, the mean national prevalence being 24.3 per 100,000 [30]. Among the 1479 new cases of TB in Mazovia in 2006 the diagnosis was confirmed bacteriologically in a mere 46%, while 28% of these patients had smear-positive disease [30]. In the group of foreigners included in our study, the percentages of culture-positive and smear-positive cases were higher: 53% and 33%, respectively. Immigrants therefore pose a higher risk to others, as they shed mycobacteria more intensely. The mean age of patients with TB in Mazovia is 46 years old, while the mean age in our study population was lower (34 years old). This is due to the fact that mainly young adults emigrate for economic reasons. Chechens and Georgians made up the largest proportion of immigrant children. The percentage of extrapulmonary TB cases was higher among the immigrants than in the general population (13.6% vs. 8.2%) [30]. TB of the lymph nodes predominated in this group, while nearly half of the cases of extrapulmonary TB in the general population are cases of tuberculous pleurisy [29]. In Denmark, for instance, half of extrapulmonary TB cases are diagnosed among immigrants [31].

Drug-resistant *Mycobacterium tuberculosis* strains are uncommon in Poland. About 6% of mycobacteria identified in TB patients in Poland exhibit primary resistance to at least one antituberculous agent and 1.2% are cases of MDR-TB [32]. The increased rate of MDR-TB among immigrants directly generates high treatment costs and may trigger the spread of MDR-TB that will be difficult to predict. The case of pre-XDR tuberculosis in an Indian immigrant is of great concern. Few such cases have so far been reported in Poland [33], but difficulties in the treatment of extended drug-resistant TB demand careful monitoring of these patients and evaluation of the treatment efficacy.

Conclusions

1. Immigrants treated for tuberculosis at the Mazovian Centre for the Treatment of Lung Diseases and Tuberculosis in Otwock, Poland, account for a mere 0.5–1.7% of all the tuberculosis patients.
2. Young males predominate among the immigrants suffering from tuberculosis.
3. More than half of the immigrants treated for tuberculosis at the Mazovian Centre for the Treatment of Lung Diseases and Tuberculosis in Otwock, Poland, originate from the former Soviet Union: mainly from Ukraine, Armenia, Russia, Georgia, and Chechnya.
4. Most patients with tuberculosis have arrived in Mazovia from Chechnya, Vietnam, and Ukraine.
5. Of note is the high percentage of drug-resistant tuberculosis among the immigrants treated for tuberculosis in Mazovia.

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