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The epidemiological situation of tuberculosis in Poland: Part I. According to notification rates, the incidence of tuberculosis varies in different regions of Poland: is this true?

Sytuacja epidemiologiczna gruźlicy w Polsce: Część I. Rejestrowana zapadalność na gruźlicę jest różna w poszczególnych regionach Polski — czy to prawda?

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Abstract

Introduction: In 2012 the incidence rate of tuberculosis in Poland was 19.6/100,000 but these was great variability between regions concerning notification rates (from 10.9/100,000 to 30.2/100,000).

The aim of the study was to assess whether there are elements that might confirm that these differences are true. To answer this question, we compared the population of TB patients from regions with higher notification rates to the population of patients from regions with lower notification rates. The data collected during three consecutive years were analysed. We selected for comparison the regions with the lowest and highest notification rates and those in which the notification rates for 3 years (2010–2012) were relatively stable.

Material and methods: Eight regions were chosen: three regions (Group I) with high notification rates (from 23.7 to 32.3/100,000 — mean rates in the analysed period of time) and five (Group II) with low notification rates (mean rates from 12.2 to 18.6/100,000).

Results: It was found that the proportion of sputum culture-positive patients was significantly higher in Group II. Thus, the difference in the notification rate of cases with culture-confirmed tuberculosis was smaller than the difference in the whole notification rate. Nevertheless, it was still significant. Tubercle bacilli in patients from Group I were significantly more often resistant to one drug. The incidence of chronic fibro-cavernous disease and of tuberculous pneumonia was significantly higher in Group I. The proportion of patients with symptoms was higher in Group I than in Group II. In addition, patients in Group I had the so-called primary tuberculosis (tuberculous pleuritis and tuberculous lymphadenopathy in the chest) significantly more often. It was also found that among patients from Group I there were significantly more children, more (though not significantly) youngsters and significantly fewer elderly patients.

Conclusions: Based on these observations, it was concluded that there is a real difference in the epidemiological situation of tuberculosis in the selected regions of Poland with high and low rates of notification. Possible causes of this situation will be presented in a following publication.

Key words: tuberculosis (TB), epidemiological situation, regional differences, age of TB patients, fibro-cavernous TB, acute forms, tuberculous pneumonia, extrapulmonary TB, real difference

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Streszczenie

Wstęp: W 2012 roku zapadalność na gruźlicę w Polsce wynosiła 19,6/100 000, ale utrzymywały się, stwierdzone od wielu lat, znaczne różnice zapadalności między województwami (od 10,9/100 000 do 30,2/100 000).

Celem pracy była ocena, czy występują zjawiska, których obecność mogłaby potwierdzić, że te różnice są faktyczne i prawdziwe. Aby odpowiedzieć na to pytanie, postanowiono porównać populację chorych na gruźlicę z regionów kraju o wyższych wskaźnikach zgłoszonych zachorowań z populacją pacjentów z regionów o wskaźnikach niższych. Analizowano dane o przypadkach zebrane przez trzy kolejne lata. Wybrano województwa o najniższej i najwyższej zapadalności i jednocześnie z względnie stabilnymi współczynnikami zapadalności w okresie 3 lat (2010–2012).

Materiał i metody: Wybrano 8 województw: trzy województwa o wysokiej zapadalności (średnio od 23,7 do 32,3/100 000 średnio w analizowanych latach) (grupa I) i pięć o zapadalności niskiej (od 12,2 do 18,6/100 000) (grupa II).

Wyniki: Stwierdzono, że odsetek pacjentów z dodatnimi wynikami posiewów płwociny był istotnie wyższy w II grupie województw. Różnice w zapadalności na gruźlicę potwierdzoną bakteriologicznie były zatem mniejsze, choć nadal istotne, niż różnice całkowitej zapadalności. Odsetek chorych z opornością prątków na jeden lek był istotnie wyższy w I grupie województw niż w II. Udział gruźlicy włóknisto-jamistej i gruźliczego zapalenia płuc był istotnie wyższy w grupie I. Większy też był w tej grupie odsetek chorych z objawami gruźlicy. Ponadto, w grupie I występowały znamienne częściej cechy gruźlicy pierwotnej (gruźlicze zapalenie opłucnej i gruźlica węzłów chłonnych klatki piersiowej). Stwierdzono również, że wśród chorych z województw I grupy było istotnie więcej dzieci, więcej, choć nieistotnie, młodzieży i istotnie mniej chorych w wieku podeszłym.

Wnioski: Przedstawione dane pozwalają na wniosek, że między regionami Polski o małej i dużej rejestrowanej zapadalności istnieją rzeczywiste różnice sytuacji epidemiologicznej gruźlicy. Możliwe przyczyny tego zjawiska zostaną przedstawione w kolejnej publikacji.

Słowa kluczowe: gruźlica, sytuacja epidemiologiczna, różnice regionalne, wiek chorych, gruźlica włóknisto-jamista, ostre postacie, serowate zapalenie płuc, gruźlica pozapłucna, potwierdzenie różnic

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Introduction

Epidemiological aspects of tuberculosis posed a vast problem in the second half of the 20th century in Poland. In the years 1957–1960 the incidence rate amounted to 290.4–289.3/100,000 [1]. In April 1959 this situation provided the impetus for passing the law on tuberculosis control. The staff of the National Institute of Tuberculosis drew up the National Tuberculosis Control Programme, which determined the objectives, methods and measures to improve the situation. The Programme was approved by the Ministry of Health. The main unit to control tuberculosis became the National Institute of Tuberculosis and Lung Diseases, and in other regions of the country, Regional and Local Outpatient Clinics of Lung Diseases [2].

The Programme implemented free of charge prevention, diagnosis, therapy and rehabilitation for TB patients. The law also provided long-term, payable sick leave for the period of treatment to all insured patients. It also confirmed obligation of BCG vaccination of neonates [2].

During consecutive years a distinct decrease in TB incidence was noted. In 2008 the problem of TB was included into the law on infections and infectious diseases. The law was amended in July 2012, which resulted in an efficient system of TB notification and directing patients to appropriate centres for treatment [3, 4].

Between the years 2010 and 2012 the incidence rate of tuberculosis was only 19.7–22.2/100,000. Nevertheless, the prevalence of tuberculosis in Poland, apart from the Baltic countries, Bulgaria, Romania and Portugal, is one of the highest in the European Union [5, 6]. In addition, the incidence of tuberculosis in Poland is different in various regions [1, 5]. Between 2010 and 2012, in some regions, the incidence rate was as low as 10.9/100,000 and in others as high as 30.2/100,000 [1, 7, 8].

Similar differences also occur in other countries, but they are usually caused by different ethnic or geographical origins of patients, or by HIV epidemic [9–11]. In Poland foreigners constitute barely 0.6% of all tuberculous patients, and according to official data, HIV infections affect a small proportion of tuberculous patients [1, 12, 13].

The objective of the study

The objective of the study was to compare the groups of patients reported in particular regions and to assess whether the differences in the degree of disease severity, its type, location and the age of patients confirm a real difference between particular regions in respect of TB epidemiology.

Material and methods

The material of the study consisted of data from the National TB Register (reports of Regional

Administration Units for Control of Epidemics and Hygiene Promotion, and Regional Outpatient Clinics of Lung Diseases), published mainly in Bulletins of the Department of Epidemiology and Tuberculosis, and data from the Central Statistical Office of Poland (GUS, Główny Urząd Statystyczny), also available in Bulletins [1, 7, 8].

The regions with the highest incidence of TB were compared to those with the lowest incidence. Only those regions with a relatively small variability of TB incidence rates during the study period (2010–2012) were selected. Finally, the material included three regions of incidence from 25.6 to 30.2/100,000 population (the Silesian, Łódź, Lublin regions) — Group I; and five regions with incidence rate from 10.9 to 19.0/100,000 population (the Wielkopolska, Podlasie, Opole, Małopolska and Kuyavia and Pomerania regions) — Group II.

The groups of patients registered in particular regions between 2010 and 2012 were analysed. The comparison of Group I and II included:

1. The proportion of patients with bacteriologically confirmed TB.
2. The prevalence of drug resistance of tubercle bacilli.
3. The proportion of relapses.
4. The occurrence of severe or chronic forms of TB.
5. The proportion of extrapulmonary TB and its location.
6. The distribution of the patients' ages.

Data are presented separately for each region, taking into account all patients registered during

three years, and jointly for all regions from the group.

To determine the statistical significance of the relations between the variables, the chi-squared test was used. $P < 0.05$ was assumed as a significant value.

Results

The mean TB incidence rate in the regions from Group I during the study period was 29.5/100,000 and it was significantly higher than the rate for Group II, which amounted to 14.8/100,000. However, in regions with registered higher incidence, significantly fewer cases were bacteriologically confirmed. This may indicate inadequacies in diagnosis in Group I. Nevertheless, the incidence rates of bacteriologically confirmed TB in this group were still significantly higher than relevant rates for Group II; thus, both selected groups met the criteria for the comparison of regions with higher and lower incidence of TB (Table 1).

The proportion of sputum-positive patients with tubercle bacilli resistant to one drug was found markedly more often in the group of regions with higher TB incidence; however, the distribution of multidrug resistant TB was comparable in both groups (Table 2).

The proportion of relapses of TB (or recurrences) was comparable in both groups (Table 3).

The proportion of patients diagnosed due to the occurrence of symptoms was significantly higher in regions from Group I, compared to Group II ($p < 0.0001$).

Table 1. The comparison of notification rates (NR) for tuberculosis and for bacteriologically confirmed tuberculosis (BCTB) in selected Voivodeships in 2010–2012

Voivodeships	Total number of TB patients	Notification rates (mean)	Total number of patients with BCTB	Proportion of patients with BCTB	Notification rates (mean) for BCTB
Lubelskie	2099	32.4	1351	64.3	20.5
Łódzkie	2267	29.8	1190	52.5	15.6
Śląskie	3666	26.4	2263	61.7	16.3
Altogether Voivodeships with higher NR	8032	29.5	4804	59.8	17.5
Wielkopolskie	1255	12.2	978	77.9	9.5
Opolskie	445	13.8	353	79.3	11.4
Podlaskie	491	13.7	367	74.7	10.2
Kujawsko-Pomorskie	1162	18.6	1012	87.1	16.2
Małopolskie	1558	15.6	1229	78.9	12.3
Altogether Voivodeships with lower NR	4911	14.8	3939	80.2	11.9
		$p < 0.05$			$p < 0.05$

Table 2. The frequency of resistance of tubercle bacilli in patients registered in selected Voivodeships in 2010–2012

Voivodeships	Total number of patients with BCTB*	Tubercle bacilli resistant to ≥ 1 drug		Multidrug resistant tubercle bacilli	
		Number	Proportion	Number	Proportion
Lubelskie	1351	34	2.5	19	1.4
Łódzkie	1190	32	2.7	8	0.7
Śląskie	2263	68	3.0	14	0.6
Altogether Voivodeships with higher NR**	4804	134	2.7	41	0.9
Wielkopolskie	978	13	1.3	3	0.3
Opolskie	353	3	0.8	1	0.3
Podlaskie	367	5	1.4	3	0.8
Kujawsko-Pomorskie	1012	29	2.9	8	0.8
Małopolskie	1229	46	3.7	8	0.6
Altogether Voivodeships with lower NR**	2939	96	2.0	23	0.6

p < 0.05

NS***

BCTB*bacteriologically confirmed tuberculosis; NR**notification rates; NS***difference not significant

Table 3. Number and proportion of relapses (or recurrent cases) among patients registered in selected Voivodeships in 2010–2012

Voivodeships	Total number of TB patients	Number of relapses	Proportion of relapses
Lubelskie	2099	265	12.6
Łódzkie	2267	294	13.0
Śląskie	3666	393	10.7
Altogether Voivodeships with higher NR*	8032	952	11.8
Wielkopolskie	1255	143	11.4
Opolskie	445	60	13.5
Podlaskie	491	55	11.2
Kujawsko-Pomorskie	1162	146	12.6
Małopolskie	1558	205	13.1
Altogether Voivodeships with lower NR*	4911	609	12.4

NR*notification rates; difference not significant

Fibro-cavernous TB was diagnosed markedly more frequently in patients registered in regions from Group I than from Group II (Table 4).

The occurrence of acute forms of TB was sparse and it was comparable in both groups. The exception was caseous pneumonia, which occurred significantly more frequently in Group I, but it concerned almost exclusively the Łódź region (Table 5).

Extrapulmonary TB was equally frequent in both groups. However, it should be emphasised that the changes typical for primary tuberculosis (exudative pleuritis and lymphonodular tuberculosis in the chest) were found

significantly more often in Group I than in Group II (Table 6).

In contrast, in Group II, significantly more often tuberculosis of the peripheral lymph nodes was found, which is mainly a disease of adult patients [14].

Because tuberculous pleuritis and lymphonodular tuberculosis in the chest are usually related to early age, the age brackets in the two analysed groups were compared (Table 7). It was found that Group I, compared to Group II, included markedly more children with TB, whereas Group II included significantly more elderly patients, above 65 years of age.

Table 4. Number and proportion of fibrocavernous tuberculosis (FCTB) in patients with pulmonary tuberculosis (PTB) and in patients with bacteriologically confirmed pulmonary tuberculosis (BCPTB) registered in selected Voivodeships in 2010–2012

Voivodeships	Total number of patients with PTB	Number of patients with BCPTB	Number of patients with FCTB	Proportion of patients with FCTB among patients with PTB	Proportion of patients with FCTB among patients with BCPTB
Lubelskie	1917	1268	22	1.1	1.7
Łódzkie	2153	1153	48	2.2	4.1
Śląskie	3407	2206	15	0.4	0.6
Altogether Voivodeships with higher NR*	7477	4627	85	1.1	1.8
Wielkopolskie	1166	937	7	0.6	0.7
Opolskie	417	346	0	0.0	0.0
Podlaskie	460	355	6	1.3	1.7
Małopolskie	1483	1185	8	0.5	0.7
Kujawsko-Pomorskie	1074	967	1	0.1	0.1
Altogether Voivodeships with lower NR*	4600	3790	22	0.4	0.6
				p < 0.0001	p < 0.001

NR*notification rates

Table 5. Acute forms of TB among patients registered in selected Voivodeships in 2010–2012

Voivodeships	Total number of TB patients (100%)	Number and proportion of acute forms of TB including:		
		Tuberculous pneumonia	Miliary TB	Tuberculous meningitis
Lubelskie	2099	0	8 (0.4%)	3 (0.1%)
Łódzkie	2267	67 (2.9%)	1 (0.04%)	6 (0.3%)
Śląskie	3666	7 (0.2%)	5 (0.1%)	4 (0.1%)
Altogether Voivodeships with higher NR*	8032	74 (0.9%)	14 (0.17%)	13 (0.16%)
Wielkopolskie	1255	3 (0.2%)	1 (0.07%)	3 (0.2%)
Opolskie	445	0	0	1 (0.2%)
Podlaskie	491	5 (1.0%)	5 (1.0%)	2 (0.4%)
Kujawsko-Pomorskie	1162	0	1 (0.08%)	2 (0.17%)
Małopolskie	1558	0	0	0
Altogether Voivodeships with lower NR	4911	8 (0.16%)	7 (0.14%)	8 (0.16%)
		p < 0.0001	NS**	NS**

NR*notification rates; NS**differences not significant

Discussion

The presented data show that the differences in the epidemiology of tuberculosis in various regions of Poland are real. In the regions with higher incidence rates (Group I), severe forms of TB occur more often, particularly fibro-cavernous TB and caseous pneumonia.

The proportion of patients with TB diagnosed due to the occurrence of symptoms in Group I was higher, and the resistance of tubercle bacilli to at least one drug was found more frequently than in Group II. Pleural effusion and enlargement of the lymph nodes in the chest, typical of primary TB, were also found more often in Group I. The occurrence of lymphonodular

Table 6. The frequency and localisation of extrapulmonary tuberculosis (EPTB) among patients registered in selected Voivodeships in 2010–2012

Voivodeships	Total number of TB patients	Number and proportion of EPTB	Number and proportion of specified forms of EPTB among all EPTB cases					
			Pleura	Lymph nodes In the chest	Peripheral lymph nodes	Bones	Układ moczowo-płciowy Urogenital	Inna lokalizacja Others
Lubelskie	2099	182 (8.6%)	70 (38.5%)	19 (10.4%)	14 (7.6%)	16 (8.8%)	47 (25.8%)	16 (8.8%)
Łódzkie	2267	114 (5.0%)	53 (46.5%)	5 (4.3%)	19 (16.7%)	12 (10.5%)	10 (8.7%)	15 (13.1%)
Śląskie	3666	259 (7.1%)	116 (44.8%)	31 (12.0%)	29 (11.2%)	46 (17.8%)	8 (3.1%)	29 (11.2%)
Altogether Voivodeships with higher NR*	8032	555 (6.9%)	239 (43.1%)	55 (10.0%)	62 (11.2%)	74 (13.3%)	65 (11.7%)	60 (10.8%)
Wielkopolskie	1255	89 (7.1%)	31 (34.8%)	9 (10.1%)	15 (16.8%)	9 (10.1%)	7 (7.8%)	18 (20.2%)
Opolskie	445	28 (6.3%)	7 (25.0%)	–	11 (39.3%)	7 (25.0%)	1 (3.5%)	2 (7.0%)
Podlaskie	491	31 (6.3%)	8 (25.8%)	1 (3.2%)	7 (22.6%)	6 (19.3%)	4 (12.9%)	5 (16.1%)
Kujawsko-Pomorskie	1162	88 (7.6%)	27 (30.7%)	4 (4.5%)	16 (18.1%)	8 (9.0%)	15 (17.0%)	18 (20.4%)
Małopolskie	1558	75 (4.8%)	35 (46.7%)	3 (4.0%)	9 (12.0%)	10 (13.3%)	5 (6.7%)	13 (17.3%)
Altogether Voivodeships with lower NR*	4911	311 (6.3%)	108 (34.7%)	17 (5.5%)	58 (18.6%)	40 (12.9%)	32 (10.2%)	56 (18.0%)
		NS**	p < 0.05	p < 0.05	p < 0.05	NS**	NS **	NS **

NR*notification rates; NS**differences not significant

Table 7. The age Groups of TB patients registered in selected Voivodeships in 2010–2012

Voivodeships		Age Groups					Total
		0–14	15–19	20–44	45–64	> 65	
Lubelskie	N	31	51	533	874	610	2099
	%	1.5	2.5	25.4	41.6	29.1	100.0
Łódzkie	N	17	40	572	1004	579	2267
	%	0.7	1.8	25.2	44.2	25.5	100.0
Śląskie	N	51	52	1031	1796	736	3666
	%	1.4	1.4	28.1	49.0	20.1	100.0
Altogether Voivodeships with higher NR*	N	99	143	2136	3674	1925	8032
	%	1.2	1.8	26.6	45.7	24.0	100.0
Wielkopolskie	N	9	13	327	596	310	1255
	%	0.7	1.0	26.0	47.5	24.7	100.0
Opolskie	N	1	6	124	202	132	445
	%	0.3	1.3	27.9	45.4	29.7	100.0
Podlaskie	N	4	7	143	204	133	491
	%	0.8	1.4	29.1	41.5	27.1	100.0
Małopolskie	N	8	24	387	630	510	1558
	%	0.5	1.5	24.9	40.4	32.7	100.0
Kujawsko-Pomorskie	N	14	18	362	541	227	1162
	%	1.2	1.5	31.1	46.5	19.5	100.0
Altogether Voivodeships with lower NR	N	36	68	1343	2173	1312	4911
	%	0.7	1.4	27.3	44.2	26.7	100.0
		p < 0.01	NS**	NS**	NS**	p < 0.0005	

NR*notification rates; NS** differences not significant; N — number

tuberculosis in the chest and exudative pleuritis in youngsters was found in another paper by Polish authors [15]. The relation between these forms of TB and early age was also observed by researchers from Germany and Estonia [16, 17]. Tuberculosis of the peripheral lymph nodes, typical for adults [14], was found more often in patients from Group II.

According to those facts, we found in Group I a higher proportion of young patients, compared to Group II. At the same time, in Group II, TB was found significantly more frequently in patients above 65 years of age. Such age distribution is typical of other environments with worse epidemiological situation [18].

Conclusions

Based on the presented data, it was found that the epidemiological situation is very different in various regions of Poland. The fundamental problem, however, is to find reasons for this phenomenon. A possible cause of this situation will be presented in a following publication.

Conflict of interest

The authors declare no conflict of interest.

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