DEMOGRAPHIC DATA AS RISK FACTORS FOR ACTIVE TUBERCULOSIS

DANE DEMOGRAFICZNE JAKO CZYNNIKI RYZYKA AKTYWNEJ POSTACI GRUŹLICY PŁUC

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
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F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
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Summary
Background. The incidence of pulmonary tuberculosis is dependent on many factors, not just health but also demographics. The primary objective of the study was to identify and evaluate selected risk factors for active tuberculosis in patients treated in the former specialist clinic in the eastern part of Lublin Province and to compare them with the ones researched by other authors.
Material and methods. The work was retrospective as it concerns the analysis of the data drawn from the records of 100 patients with active tuberculosis. The information on the examined patients included the following parameters: sex, age, place of residence and marital status.
Results. The majority of the studied population were male (69.0%), among whom the highest proportion concerned the fourth age group, i.e. 51-60 years old (mean 36.3%). As for sex and place of residence of the patients, the proportion of the infected men living in the country was twice as high (68.7%) when compared to women (31.3%). However, there were no differences with regard to the subpopulation percentage of women (67.8%) and men (66.7%). In turn, considering the sex and marital status of the examined persons, we found that the highest proportion of men were bachelors – 39.1%, while the percentage of married persons was similar among men (56, 5%) and women (58.1%).
Conclusions. The analysis of the data shows that in the studied area pulmonary tuberculosis is most common among married men aged 51-60 years living in the country.

Keywords: pulmonary tuberculosis, epidemiology, risk factors, male, female

Streszczenie
Wprowadzenie. Zapadalność na gruźlicę płuc zależy od wielu czynników, nie tylko zdrowotnych, lecz również wskaźników demograficznych. Celem pracy była identyfikacja i ocena wybranych czynników ryzyka gruźlicy prątkującej w populacji chorych leczonych w specjalistycznym ośrodku lecznictwa zamkniętego we wschodniej części województwa lubelskiego oraz porównanie ich z wynikami badań innych autorów.
Materiał i metody. Praca miała charakter retrospektywny i była oparta na analizie danych pochodzących z historii chorób 100 pacjentów z aktywną postacią gruźlicy płuc. Zakres zbieranych danych obejmował następujące parametry: płeć, wiek, miejsce zamieszkania oraz stan cywilny badanych chorych.
Wyniki. W badanej populacji większość stanowili mężczyźni (69,0%), wśród których najwyższy odsetek odnotowano w czwartej grupie wieku, tj. 51- 60 lat (36,3%). Biorąc pod uwagę płeć i miejsca zamieszkania badanych osób, to aż dwukrotnie wyższy był odsetek mężczyzn zamieszkałych na wsi (68,7%) w porównaniu z kobietami (31,3%). Jednak nie ma różnic w udziałach badanych w subpopulacji kobiet (67,8%) i mężczyzn (66,7%). Z kolei uwzględniając płeć i stan cywilny badanych stwierdzono, że w badanej populacji dowiedziono, że największy udział mieli tu mężczyźni zaliczeni do kategorii stanu cywilnego (kawaler) 39,1%, natomiast zbliżone były udziały osób będących w związku małżeńskim, zarówno wśród mężczyzn (56,5%), jak i kobiet (58,1%).
Wnioski. Z analizy uzyskanych danych wynika, że gruźlica płuc na terenie objętym badaniami występuje najczęściej u mężczyzn w grupie wieku 51-60 lat, mieszkających na wsi i pozostających w związku małżeńskim.

Słowa kluczowe: gruźlica płuc, epidemiologia, czynniki ryzyka, mężczyźni, kobiety

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Introduction

The WHO report published in October 2014 announced that, in the year 2013, there were about 9.0 million people infected with tuberculosis (TB) in the world. Further, the number of patients was higher than in 2012 (8.6 million). The situation can be related, among other things, to fuller data provided by several countries, including Nigeria, a country with a high population and high incidence of the disease, which influenced the global epidemiological situation of tuberculosis. In most regions of the world, the numbers for tuberculosis are slowly decreasing, and its mortality rate has declined. In the 2014 WHO report, experts announced that, at the end of 2013, the death rate for tuberculosis globally was lower by 45% when compared to 1990, and the number of patients decreased by 41%. However, although the tuberculosis mortality indicator in industrialised European countries is lower, as it is 1 in 100,000, in Poland it still amounts to 1.6.

Most cases of tuberculosis were detected in Asia (56%) and Africa (29%). The countries with the highest number of diagnosed patients are India (2.0-2.3m), China (0.9-1.1m) and Nigeria (340-880th). Further, the highest incidence rates of TB have been found in southern Africa, where a high proportion of the population is infected with HIV. In Lesotho, Swaziland and South Africa, 1 in 100 persons dies of tuberculosis each year (the incidence being 1000/100000). The lowest rates are reported in the affluent countries of Europe as well as Canada, the United States of America, Australia and New Zealand (<10/100 000). In Poland, 7250 cases of tuberculosis were registered in 2013, 292 fewer than in the previous year and 2243 fewer than ten years earlier. The incidence of the disease in all forms in 2013 amounted to 18.8 / 100 thousand population. Poland has already recorded a low morbidity (<20/100 000) in the last few years, yet it is still higher than the EU average and that of the European Economic Area (EEA) – 12.7 / 100.000. 18 EU countries and the EEA report fewer than 10 new cases per 100 000 population.

The incidence of tuberculosis varies, but the highest rates occur among people in older age groups. The mean age of patients was 53.5 years (new cases), and the highest incidence estimate (33.7 / 100.000) was found in people aged 65 and older.

As in the previous years, the incidence of TB in men in 2013 was higher than in women (26.8 vs. 11.4 / 100,000); with the highest gender difference in the age group 55-59 – 55.5 vs. 13.3 / 100 000 respectively. The year 2013 was the fourth consecutive one in which the morbidity among urban dwellers was higher compared to the one in the population living in the country (20.0 vs. 17.1 / 100.000).

The available data indicate that there have been significant differences in the incidence of tuberculosis in Poland in all provinces over the last years. The highest registered in 2013 was visible in Lublin Province – 27,4; Holy Cross – 24,3 and Silesia –23,9; whereas the lowest in Greater Poland Province – 9,9; Podlaskie –12,5 and Subcarpathia – 13,1 / 100 000 [11,12].

Aim of the work

The study aimed at identifying and evaluating selected risk factors for tuberculosis in patients treated in the former specialist clinic in the eastern part of Lublin Province and to compare them with the research results by other authors.

Material and methods

The study is retrospective as it was based on the analysis of selected features from patients' records with active lung tuberculosis. The study involved a group of 100 patients living in Biała Podlaska county in Lublin Province who were hospitalised in the years 2011-2013 in the former specialised medical centre in the eastern part of the province. The majority of the respondents were men (69%), as the proportion of women amounted to 31%. The patients' age ranged between 23 and 84 years. The data collected comprised the following characteristics: sex, age, place of residence and the marital status. To standardise the received data, a research tool was developed in the form of a self-constructed survey (a research protocol), which served as an information database with the view to transferring data to calculate the final findings.

Results

Sex
Basing on the collected data, we found that among the 100 examined persons involved in the study who were hospitalised due to pulmonary tuberculosis 69% were male. Women accounted for 31% of the study population – Figure 1.
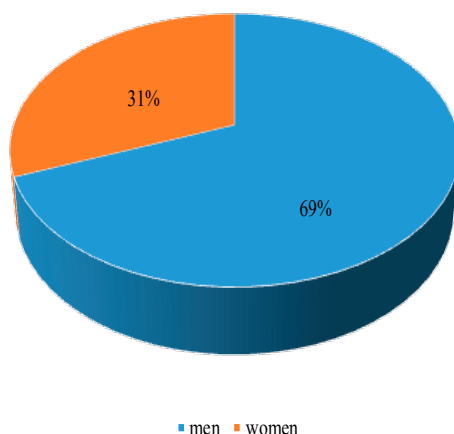
Figure 1. Surveyed persons by sex

Similar results were obtained in the research conducted by other authors. In the sample from Holy Cross Province, men were the dominant group as well – 62%, while women accounted for 38% of the total population [1]. Thus, it might confirm that being male was one of the identified risk factors for active tuberculosis.

Age

The age of the examined patient population was given in ten-year intervals, as shown in Table 1. It was found that the largest group who suffered from TB concerned 51-60 year-olds, accounting for 37.0% of the study population. Similar results were presented in studies carried out in the Holy Cross Province, where 26.19% of the respondents were aged 51-60 [1]. The proportion of the remaining age groups in the studied population was as follows: 23.0% were aged 41-50; 12% – 31-40; 11.0% – 61-70; 8% – 20-30; 7.0% – 71-80, and 2.0% – 81-90.

Table 1. Surveyed persons by sex and age group

Age range		Sex		Total
		women	men	
20-30	N	2	6	8
	% Line	25.0	75.0	100.0
	% Column	6.5	8.6	8.0
31-40	N	3	9	12
	% Line	25.0	75.0	100.0
	% Column	9.6	13.0	12.0
41-50	N	10	13	23
	% Line	43.5	56.5	100.0
	% Column	32.2	18.8	23.0
51-60	N	12	25	37
	% Line	32.4	67.6	100.0
	% Column	38.7	36.3	37.0
61-70	N	2	9	11
	% Line	18.2	81.8	100.0
	% Column	6.5	13.1	11.0
≥ 71	N	2	7	9
	% Line	22.2	77.8	100.0
	% Column	6.5	10.2	9.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

It is worth noting here that a gradual shift in the lung tuberculosis age towards older categories has been observed over the years, as in 1957 most patients were younger, below 40 years of age [2], whereas presently they are predominantly older. The studies conducted in Poland by other authors have also shown that 64% of the patients suffering from tuberculosis are over 45 years of age [3,4]. Our research, as well as the results from

the Holy Cross Province, confirm the observed phenomenon that a higher share of patients with pulmonary tuberculosis presently is visible in older age categories (Table 1).

As for the gender of the surveyed persons, the largest group were men aged 51-60 (25%). Also in the study conducted in the Holy Cross Province, men aged 51-60 years (23.81%) predominated. In the subpopulation of women in our studies, the most numerous categories were those in the age groups 51-60 (38.7%) and 41-50 (32.2%). In turn, in the survey conducted in the Holy Cross Province, the most numerous group of TB patients were aged 71-80 years [1].

Considering the above, we can state that the factor which may be considered as having a potential influence on the occurrence of active *M. tuberculosis* is being male, whereas among females it is age in the group of 51-60 years.

Place of residence

Another investigated factor was the place of residence. The collected data showed that the dominant group of patients were rural residents, who constituted 67% of the population. The patients in the cities accounted for one third of the respondents. The obtained results are presented in Table 2.

Table 2. Surveyed persons by gender and place of residence

Place of residence		Sex		Total
		women	men	
Countryside	N	21	46	67
	% Line	31.3	68.7	100.0
	% Column	67.8	66.7	67.0
City	N	10	23	33
	% Line	30.3	69.7	100.0
	% Column	32.2	33.3	33.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

Similar results were reported by authors researching the issue in other studies. The data gathered in the Holy Cross Province showed that 55% of the patients lived in the country and 33% of the residents in cities [1]. Thus, the place of residence can also be considered as a factor predisposing to tuberculosis.

The analysis of the structure by gender was further supplemented by the data on place of residence (Table 2).

Taking both factors into account, we show that both among male and female residents living in cities and the country were more than twice as likely to be men than women – 68.7% and 69.7% respectively. However, there were no such differences in the subpopulations of women and men. Women living in rural areas accounted for 67.8% of this group, whereas the inhabitants of the city constituted 32.2%. Very similar shares occurred among men – 66.7% and 33.3% respectively. A good point of reference for the findings is the work carried out in the Holy Cross Province whose authors gained similar results. Taking into account the structure of sex and place of residence, they found that, as in our study, it was men who are more likely to be infected in the Holy Cross Province, especially those who live in rural areas (33.3%), as well as those living in cities (26.2%), than women living in the country (21.43%) and city (16.67%) [1].

Marital status

Another factor that characterised the study group of the patients hospitalised for pulmonary tuberculosis was their marital status. More than half of those surveyed were married (57.0%). This may mean that marital status constituted the highest risk in acquiring active lung tuberculosis in the study population, whereas being single could be considered as a risk factor because they too accounted for 29.0% of the patients. The structure of the patients' civil status is presented in Table 3.

Table 3. Surveyed persons by gender and marital status

Marital status		Sex		Total
		women	men	
Married	N	18	39	57
	% Line	31.5	68.5	100.0
	% Column	58.1	56.5	57.0
Single	N	7	22	29
	% Line	24.1	75.9	100.0
	% Column	22.5	31.9	29.0
Widowed	N	5	6	11
	% Line	45.5	54.5	100.0
	% Column	16.1	8.7	11.0
Divorced	N	1	2	3
	% Line	33.3	66.7	100.0
	% Column	3.3	2.9	3.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

Slightly different results were obtained in the research conducted in the Holy Cross Province. Tuberculosis was predominantly diagnosed in the unmarried (both men and women), while those in marital relationships were the second most abundant group.

Sex and marital status data show that the largest group was married men who accounted for 56.5% of the studied population and bachelors – 22% of the male population. The opposite results were gained in the research conducted in the Holy Cross Province, where the largest group of respondents with tuberculosis were single men 33.3%, with the married ones accounting for 11.91% [1]. Taking into account the above, we can state that the highest risk of acquiring active lung tuberculosis in our research concerns married man, while in the study conducted in the Holy Cross Province – single men. The research conducted in Masovia Province showed that married men amounted to 40.0% of the studied male population; however, the majority of the patients were divorced, widowed or single. These studies suggest that single persons are somehow more likely to suffer from tuberculosis than married people [5]. In one Polish study from 2007, being single was found to be conducive to lung tuberculosis [4]. This is confirmed by the results of the study conducted in Estonia, where being single was one of the crucial factors contributing to tuberculosis infection and disease [6]. The studies conducted in Greater Poland Province show that half of the patients with tuberculosis were married [7]. Then comes the research conducted in Russia in which single men were a dominant group in those infected with tuberculosis [8]. On the other hand, Asian studies point to the opposite phenomenon, where tuberculosis is often encountered in multiple families [9].

As for the most numerous infected groups in our study, it was married women who follow men, i.e. 18.0% of respondents, and those who are single (7.0%).

Discussion

Tuberculosis (TB) morbidity and mortality rates have been reduced globally due to the efforts to improve access to medical services, early diagnosis and treatment of active tuberculosis. Despite the decrease of new cases to 9.6 million and deaths to 1.1 million in 2014 in relation to the previous years, these results are still considered high. One of the new priority directions promoted by the WHO is to detect latent infections in specific high-risk groups who may develop an active disease. Identifying the highest risk groups in the population, improving economic and social conditions as well as introducing effective preventive treatment can significantly reduce the incidence rates, especially in regions with low and middle-incomes. Accordingly, research in this direction is particularly recommended [13].

Further, numerous studies have shown a link between tuberculosis incidence and life expectancy, including homosexuality, criminality, age and sex, marital status and the connection between civilisation diseases such as diabetes [14] and HIV infection [15]. Also, increased morbidity among immigrants from the countries with high rates of incidence is commonly investigated [16]. Given the geographical location of Lublin Province, one may consider the site as an additional cause of the highest rates of morbidity. Next, the impact of socio-economic conditions on tuberculosis morbidity is widely scrutinised, especially in countries with high rates of morbidity, in combination with such factors as income, education and smoking [17].

Among the selected and hospitalised patients in the former specialist clinic in Lublin Province, men were the dominant sex, accounting for 69% of the study population. Numerous other surveys conducted in Poland show that men are more likely to have tuberculosis than women [10]. The results of our research confirm this phenomenon. The prevalence of men in the population of diagnosed and treated patients with tuberculosis is typical of modern societies in the countries with similar levels of development as Poland [1] and developing countries with high rates of morbidity. The data coming from 29 studies in 14 countries all over the world have also shown a higher incidence of tuberculosis in men than women, which sometimes doubles the average rate. Access to the health system, alcohol abuse, cigarette smoking, HIV incidence, homelessness, contact with other sick people at work are factors where differences are particularly evident in the age group 45-64 [18]. Gender susceptibility is also considered.

As for rural communities, the incidence of tuberculosis has always been lower ever since the data on TB were collected. For the first time, it changed in 2010, when the urban population cases started to prevail [1]. In our population, the trend towards higher tuberculosis morbidity in rural residents was higher (67%), which might suggest that this new epidemiological trend is not yet evident.

Different factors predisposing factors for tuberculosis have been identified in the literature. These include unemployment, loneliness, homelessness, prison record, age and weight [10]. The age that predisposes tuberculosis is the range 45-54 years, whereas in our research – 51-60 years (37% of the study population).

Accordingly, it might be said that there is a gradual shift in the age of patients infected with tuberculosis, where the ageing of the population with diagnosed pulmonary tuberculosis could be considered as a positive phenomenon indicating a decreasing transmission of the disease in society [8]. Global studies suggest that the age range of people with tuberculosis is partly due to the average lifespan of a particular country population. For example, in African countries, it ranges from 25 to 44 (75% of the population), while in the United States people in the sixties account for 35% of those infected.

Presently, tuberculosis studies are being conducted in the elderly, taking into account epidemiological data, risk factors, appropriate diagnostic programmes, as well as possible preventive and therapeutic strategies [21].

Further, numerous studies indicate that the higher the risk of tuberculosis, the more likely it is that the person turns out to be single. Tuberculosis and staying single have also been stressed in the studies conducted in Russia and Denmark. The disease was more common in men who were divorced and single. Among the men in the age range 55-64 years admitted to one of the Danish sanatoria, divorced people amounted to almost 40% of the group, whereas in the whole population of patients there were only 5% of such persons. In total, 60% of the male tuberculosis patients were single, while around 20% of the whole population were unmarried [8]. In our population, 20% of the persons were single, which might suggest that this particular factor is essential in the tuberculosis occurrence.

Research findings show that patients with active TB suffering from alcoholism, homelessness, unemployment, loneliness or AIDS should be provided with social care and support, and the best way to identify such patients is interviewing [19]. It may also be suggested that extended interviews concerning demographic data, being single, social conditions and economically determined living standards as well as data on the coexistence of certain diseases such as diabetes, hypertension, renal disease and cancer should be explored. They could help to create a model of appropriate measurement tools for those suffering from tuberculosis. These, in turn, could help to improve the condition of the infected and enable them to recover, ultimately preventing the disease [20].

Conclusions

From the collected data in the study, the following conclusions could be drawn:
1. 1. Among active tuberculosis patients, as in other populations, the majority are male, which should lead to further studies identifying men at the highest risk of being infected with tuberculosis.
2. 2. Active tuberculosis patients are most likely to be in the age groups of 51-60 and 41-50 years, with a similar proportion of men and women. It would be sensible to conduct screening in people in these age groups, especially in those with additional illnesses, or living in difficult social and economic conditions.
3. 3. There is a trend of higher morbidity among the rural population, with a similar proportion of the rural population among men and women.
4. 4. The highest risk of active lung tuberculosis in the study population turned out to be marital status, which may result from a family transmission, whereas being single can be considered as a factor that increases the risk of becoming infected, as indicated in the literature.

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