DOCTORAL DEGREE

The impact of social and occupational risk factors on the epidemiology of tuberculosis in Valcea county between 2003-2007

Scientific coordinator
Univ. Assoc. Prof. Cristian Didilescu, PhD

PhD Candidate
Dr. Viorica Mincu

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1. GENERAL DATA

1.1. The history of tuberculosis

Tuberculosis is perhaps the oldest documented disease in human history. Earliest evidences of tuberculosis in humans date back to the 6th millennium B.C. and were found on skeletal remains excavated in Italy. Ancient human remains showing evidence of Pott disease were found all over the world. Earliest proof of the disease in the New World date back to 800 B.C.

In the modern world, tuberculosis has taken the role of the neglected disease. Modern epidemiology has regarded tuberculosis as a disease of poverty and developed countries have made tremendous efforts to eradicate the disease. Because of these efforts tuberculosis epidemics were kept under control in most of the western countries, and the disease moved to the poorest regions of the world. Once the cold war ended and many political barriers were shattered, the developed countries were faced with the ever growing problem of immigration, which meant the “naïve” native population was exposed to immigrants who had previously been infected with Mycobacterium tuberculosis and were at risk of developing TB, thus becoming a source of infection.

During the period of TB decline in the Western world, pharmaceutical companies invested little in research on the treatment of tuberculosis. During this period the so-called 90/10 gap became apparent. It was theorised that 90% of the funding of medical research went into finding cures for the diseases that plagued the 10% richest population of the planet. This approach meant that treatment of diseases such as tuberculosis or malaria received no improvement over decades.

1.2. History of tuberculosis in Romania

Little or no data is available on the incidence and prevalence of tuberculosis in Romania before the 2nd World War. Based on its rather low population density, we could assume that, before the urbanisation of the country during the communist regime, the incidence of tuberculosis was lower than in countries with similar profiles of social, economic and demographic profiles that have statistical data on tuberculosis.
The communist regime strived to eradicate tuberculosis before the capitalist world did. As the epidemic proved hard to contain, hiding the real number of cases became the new “health policy” regarding TB. The real incidence and prevalence of tuberculosis during the communist regime are impossible to evaluate. After the 1989 Revolution, which meant the end of communism in Romania, the severity of the problem became apparent. Overnight, Romania had become one of the countries with the highest incidence of tuberculosis in Europe. The lack of an appropriate and consistent tuberculosis programme during the first decade after the revolution meant that the incidence and prevalence of the disease remained high.

After joining the European Union in 2007, Romania became the EU member with the highest incidence and prevalence of tuberculosis. 2007 is also the year when a new revision of The National Tuberculosis Control Programme was introduced, which resulted in a sustained and significant decrease in the number of TB cases.

Although a geographically diverse country, Romania has a fairly homogenous population. Immigration remains low and is highest in university towns, where most of the immigrants are students from the North African countries or from the Middle East.

1.3. **Tuberculosis in the Valcea county**

The Valcea county is situated in the South-West of Romania, in the historical province of Oltenia. The population of the county was 407,431 in 2007, with a density of 71.7/km², considerably lower than the national average of 93.78/km². Another difference between Valcea county and the national average figures is the rural/urban population ratio. While nationwide, 55% of the population resides in urban settings, in Valcea county, only 45% of the population lives in urban environments. The population is very homogenous, with only 2.5% of the population being of roma ethnicity. The county comprises of 2 municipalities, 9 cities and 78 comunes.

The incidence of tuberculosis in the Valcea county was lower than the average national figures throughout the last 10 years. The number of new cases of TB continued to decrease each year, following the national trends, but the decrease in Valcea county was slower than the national average.
2. SPECIFIC DATA

The geography and the demographics of Valcea county closely resemble those of Romania. The incidence of tuberculosis in Valcea county is constantly lower than the national average. This makes Valcea county suitable for the study of the impact of social and occupational risk factors on the tuberculous endemic.

The aim of this thesis is to define the relations between social and occupational risk factors and the risk of tuberculosis infection and progression to disease, within the geographical and administrative boundaries of Valcea county. Knowledge of these relationships could lead to the development of TB control strategies customized for the real needs of the studied population and, if possible, the extrapolation of data for the entire nation.

The objectives of the thesis are the identification of population groups at risk to develop tuberculosis, the analysis of the epidemiological traits of these groups, the characterisation of social and occupational risk factors on the epidemiology of tuberculosis, the assessment of the possibility to introduce customised control programs in the high risk populations and the evaluation of the interdependence between TB and its social and occupational risk factors in Valcea county.

2.1. Materials and methods

For the accomplishment of the aforementioned goals, a descriptive, retrospective study was conducted on 2103 patients, registered with tuberculosis between 2003 and 2007, in the 4 outpatient TB dispensaries in Valcea county. The data was collected from the patient’s Case file and Treatment file and from the Registry of new cases and relapses. Data confidentiality was respected according to current legislation.

2.2. Results and discussions

Most of the TB patients studied were male. A sex ratio of 2.4:1 in favor of the male sex was observed. This sex ratio was greater in the rural environments(2.9:1) and
smaller in urban settings (1.9:1). The male sex shows a substantial decrease in incidence over the studied period while the female sex shows only a modest reduction. Sex ratio is inversed during childhood (1.8:1 for females), equal in adolescence (1.02:1 for males) and considerably higher for males in old age groups (3.6:1 over 60 years).

The mean age of the studied group was 44.2 years, lower for the female population (40.5) and higher for males (45.7). A notable difference was observed in the 5-year trend. The age of the male population remained constant while a decrease in the female age was seen over this period. This could mean that prevention and control programmes are viable at all ages for the male population while for the female population they are only viable at older ages. Also, median age of rural patients (47) is 5 years higher than that of urban patients (42).

Women develop extrapulmonary tuberculosis more frequently than men, but relapses, treatment failure and non-compliance are significantly more frequent in men. Also, more male (63.6%) than female (53.1%) patients live in rural environments.

Patients living in rural areas are more oftenly older men, with a higher probability of alcohol abuse and occupational exposure to amorphous powders, with bilateral disease and higher bacteriological confirmation rates.

Almost a quarter of the studied patients were unemployed and had no declared income. Another 28% of the patients were retired with suboptimal revenues. Only 29% of the studied group were employed and had a steady income. The unemployed patients are more often male, living in rural areas and more prone to alcohol abuse. 5.5% of these patients were roma ethnics. Throughout the 5 year period the number of unemployed patients decreases while their median age increases.

Only 21% of the retired TB patients are females. This is probably due to the traditional "housewife" role played by the female in the rural, conservative area, which meant that less females are entitled to receive a pension. The median age of retired patients was 59.1 years.
40% of the elderly retired patients have associated pathologies. The most frequent comorbidity is alcohol abuse (11%) followed by cardiovascular disease, diabetes mellitus, cancers and liver disease. 91.9% of the alcoholics are male, living in rural settings (65.1%), with a median age of 50, married (49.7%), either unemployed or retired (81.2%). The bacteriological confirmation rate is higher in alcoholics, probably because of their tendency to develop more severe cases of TB.

Working in a medical institution can’t be regarded as an occupational risk factor for developing tuberculosis in the studied group. Employees of the chemical plant on the outskirts of Ramnicu Valcea were twice more frequent in the studied group than in the general population. Working in the chemical plant is a possible risk factor for TB but further studies are required to confirm it.

Only 44 patients declared themselves as roma ethnics. They comprised 2.1% of the studied population and had a distinct epidemiological profile than the romanian ethnics. The sex ratio of the roma patients was 1.1:1, probably due to equal exposure to Mycobacterium tuberculosis of both sexes. The median age was significantly lower than that of the entire group – 32.5 years, higher in rural environments (43.7) than in urban areas (29.6). Most of the roma patients were living in urban areas (n=35). A higher rate of non-compliance was also seen in roma patients. None of the 44 studied roma patients had a steady income.

**2.3. Conclusions**

Although its incidence has steadily decreased over the last decade, tuberculosis remains a major public health problem in Romania. Many risk factors and more importantly the relations between different known risk factors of TB remain unknown.

TB is not considered an occupational disease but, by exposing the worker to chemical irritants of the respiratory tract, proper conditions for the development of the disease can be created.

Even if it’s associated with poverty, tuberculosis is a social disease that crosses geopolitical, social and occupational boundaries, meaning that in a high incidence
setting, such as Romania, even social classes not affected by poverty are at risk for developing the disease.

2.4. Recomendations:

Seeing a high rate of treatment non-compliance in some population groups, legal actions could be taken to ensure a proper directly observed treatment administration in non-compliant patients. Also, a set of legal responsibilities should be defined for the medical personnel that deals with tuberculosis cases, in order to ensure a optimal diagnosis and treatment rate.

Offering incentives for the TB patients, ranging from covering transport and food expenses to providing basic personal hygiene kits could yield better results as far as compliance is concerned.

One of the major problems in the study of TB epidemiology is the improper data collection. Measures should be taken in order to improve both data collection and storage. A more modern, digital approach could mean a clearer picture of the local epidemic.

Once high-risk groups are found and characterized, finding a custom way to educate people from these groups is paramount. Education can greatly impact natural history of the disease by bringing the ill earlier to the doctor’s office and keeping them compliant to treatment. Also, measures to modify the fearful way physicians regard tuberculosis should be taken.

Since many TB patients don’t have a steady income, are homeless or lack the most basic hygiene utilities, the creation of integrated medical and social service facilities for patients coming from extreme poverty environments could lead to a much lighter economical burden of the disease. The direct costs of the disease for the 2103 patients we studied were over 3 milion euro for the 5 year period we studied.