

Simultaneous Occurrence Of Other Diseases Among Prison Inmates With Tuberculosis

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ABSTRACT Prison populations are considered to be at high risk for tuberculosis infections, and many of the cases encountered have initiated while the individuals were in prison. There are also studies that have estimated the occupational risk of exposure and infection for hospital-based and correctional healthcare workers. To our knowledge, data on the incidence and risk factors associated with tuberculosis are very scanty in Romania, and therefore the aim of this study was to determine the prevalence and associated risk factors for this infections among a sample of prison inmates stationed at Colibasi Hospital Prison.

KEY WORDS tuberculosis prison, co-morbidity

Introduction

Tuberculosis (TB) is a bacterial infection that is endemic, specific, transferable, with fatal chronic and widespread in the population, affecting virtually all ages and body parts.. Untreated or not treated properly, it has a significant fatality. Etiological agents of human tuberculosis are grouped into 'Mycobacterium tuberculosis complex, consisting of the species M. tuberculosis, M. bovis and M. africanum.

A third of the world is believed to be infected with Mycobacterium tuberculosis (1). Approximately 10% of patients with latent TB infection develop active TB infection. Imprisonment itself was described as a risk factor for infection with the etiologic agent, M. tuberculosis. Many inmates are in crowded prisons, increasing the risk of contracting the infection (2). Inmates have also a higher risk of TB due to several factors present before their incarceration, including decreased access to health care, low socioeconomic status, and substance abuse. The temporary nature of this high-risk populations can have a negative impact on public health of the general population when prisoners are released (3). If an infection is not detected or treated properly during incarceration, the prisoner may develop active TB and there is an increased risk of transmitting mycobacteria to his fellow inmates, staff or other community members outside prison.

The moral and legal premises underlying health education in prisons, that must be kept in mind when dealing with such cases, are: the right to health care of persons deprived of liberty is

guaranteed, inmates enjoy free healthcare and medicine, healthcare by understanding the implementation of all preventive measures, curative and rehabilitation for health insurance and any person deprived of liberty has the right to be respected as a human being without discrimination and be treated just as carefully as a aperson in liberty.

In order to improve and maintain a high standard of medical care for prisoners and for communities in which they will eventually live in, it is vital that correctional institutions include and support policies to manage TB.

Material and method

Our study was conducted using data from Colibași Prison Hospital, a medical facility component of the National Prison Administration, located in Pitesti, Arges. Prison Hospital Colibași functions as an integrated part of the Maximum Security Prison Colibași. The Prison Hospital is organized into three sections, TB profile, chronic diseases and dermato-venereology. The TB department, in which our study has been conducted, has a total of 125 beds. In this institution are treated only male patients.

Our study was conducted during 2006-2009. Data were obtained by investigating patients' medical records. Information on previous medical history was obtained both through consultation and transfer records by making anamnestic examination.

The final study group included 260 subjects. We made a database in which we included

epidemiological data (initial, sex age, place of origin, the unit - the institution of origin), the results of HIV serological tests, presence of comorbidities and risk factors, methods of identification TB infection and therapeutic method.

Results and discussions

Our aim in this study was to evaluate the presence of comorbidities associated with the presence of tuberculosis infection in a correctional institution.

Identification of significant risk factors for TB in prison would not only help staff to identify those subjects who are most vulnerable, but would also give prison staff the opportunity to educate inmates on behaviors that increase the risk of infection.

The study group included 260 subjects that were hospitalized in the Hospital Colibași Prison, Department of TB diagnosed with pulmonary tuberculosis and / or extrapulmonary during the period 2006-2009.

Because the prison population to / from other correctional institutions is in line with the national TB control groups vulnerable to TB 2007-2011, identification of cases is achieved through intensive screening: identification of suspects by repeated clinical control, followed by their evaluation of the bacteriological sputum for BK and radiological examination. Colibași Prison Hospital is a medium security correctional institution, which cares only for male subjects.

Cases ranged from 18 to 75 years, with an average of 35.992 years. Of these, most cases were in the 25-34 age group (85 cases), followed by the 35-44 years category deaproape (79 cases). These two age categories totaled 60% of patients in the study. ≥ 65 years age group was less affected in the study group (two cases). Distribution in age groups is shown in Table 1.

Table 1 – Age distributions of the patients included in our study

AGE	No. patients	Percentage
15-24	41	15.77
25-34	85	32.69
35-44	79	30.38
45-54	38	14.62
55-64	15	5.77
≥ 65	2	0.77
TOTAL	260	100.00

In investigating the epidemiological data, besides age, we recorded the origin of the patient environment. Following the centralization of data we identified a 0,94:1 ratio between urban and rural areas. Distribution by years showed a greater

number of cases from urban areas in 2005 and 2009, in the remaining years the number of cases from rural areas being higher. (Table 2).

Table 2 - Rural/urban distribution of population included in the study

YEAR	RURAL	URBAN	Total
2005	24	27	51
2006	35	30	65
2007	32	22	54
2008	37	25	62
2009	6	22	28
TOTAL	134	126	260
PERCENTAGE	48.46%	51.54%	100.00%

Results of the questioning history, medical records and consultation were registered in the database, thus identifying in 98 cases the presence of coexisting conditions.

Anemia was identified in seven of the patients in the study. In two patients the hemoglobin concentration was less than 10g/dl. Most common subtype was anemia normochromic, normocytic, in 5 cases, the other two cases of anemia were hypochromic, microcytic. Among the respiratory comorbidities, we identified 5 cases of asthma, 21 cases of Chronic obstructive pulmonary disease (COPD), 6 cases of pulmonary fibrosis and 5 cases of respiratory failure. We also identified 8 cases of associated mental illness, 11 cases of diabetes mellitus, 7 cases of hypertension, 13 cases of hepatitis, 1 case of renal failure, 2 cases of myocardial infarction and 10 cases of duodenal ulcer.

Table 3 - Distribution of comorbidities extracted from medical history of the patients in the study.

COMORBIDITY	TOTAL	PERCENTAGE
Anemia	7	7,14%
Asthma	5	5,10%
COPD	21	21,42%
Mental illness	8	8,16%
Diabetes mellitus	11	11,22%
Hypertension	7	7,14%
Pulmonary Fibrosis	6	6,12%
Hepatitis	13	13,26%
Respiratory failure	5	5,10%
Renal failure	1	1,02%
Myocardial infarction	2	2,04%
Laryngeal Cancer	3	3,06%
Lung Cancer	7	7,14%
Duodenal ulcer	10	10,20%

Neoplasia was also encountered in 10 cases, all located in the respiratory airways: 7 cases lung cancer and 3 cases laryngeal cancer.

The types of problems encountered in the patients included in our study are illustrated in the table 3. Please note that 10 cases have been identified in several types of underlying conditions overlapping TB infection.

In investigating comorbidities, HIV testing was recorded separately in the database of the study because of HIV infection is a risk enhancer factor for TB and the association between the two diseases represent a serious threat to public health. HIV test results were documented for 63 subjects and the presence of co-infection was identified in 3 cases (table 4).

Table 4 - Results of HIV tests in the patients in the study.

Hiv tested			
	Tested	Untested	Total
Total	63	197	260
Percentage	24.23%	75.77%	100.00%

Additional risk factors for TB that were not consistently documented include: detailed history of the place / places of work before the imprisonment of the prisoner, identified in our study is only the presence / absence of a toxic environment, frequency of use of a shelter for homeless, personal history as a TB contact in subjects with a history of current infections. Information on these variables were not available in medical records and could be collected only by a prospective study directly interviewing the prisoners.

We identified significant information and of marginal importance in medical history. Studies in the literature argue that any changes in the level of normal homozygosity either decrease or increase, indicating the possibility of changes at the genetic and physiological homeostasis of the organism and its amended response leads to disease. (4). Thus there are described in the literature increases of the homozygosity in associated TB-asthma and decreases in the association TB lung-cancer and TB-diabetes mellitus (5).

All chronic infections, TB inclusv may be causes of anemia (6). The presence of anemia was reported in 16-94% of patients with TB (7) though perhaps this wide variation described in the literature are due to different criteria to define anemia. In our cases anemia was identified in 7.14% of cases. While there are various datas in the literature on the pathogenesis of anemia in TB, most cases argue that the main etiological factor is the suppression of erythropoiesis by inflammatory mediators (8). Also in identifying etiopathogenesis anemia associated TB, especially in institutionalized subjects, one should consider the

socioeconomic environment of origin and possible presence of nutritional deficiencies.

Of the 98 cases with associated comorbidity, a total of five people imprisoned with TB infection, included in our study (5.10%) presented and asthma. A previous study on the relationship between TB infection and asthma has found that there was an inverse association present in children (9). The authors suggested that infection with *M. tuberculosis* during childhood might alter immunogenic responses that may act to reduce the incidence of atopic diseases. This reasoning of an inverse association may not be valid under our investigation since our study included only adults aged over 18 and exact age at which they were infected is unknown. The retrospective nature of our study further complicates the issues of temporality. It is unknown whether the prisoners included in the study were infected with *M. tuberculosis*, before or after the onset of asthma.

COPD and tuberculosis share some similarities in terms of carrying a considerable burden to the health of populations. The datas in the literature about the impact of COPD - TB comorbidity is scarce. A study performed by Didilescu et al (10) identified COPD in 10.6% of cases. The same study identified peptic ulcer in 10% cases, a percentage similar to the one in our study and 9,6% chronic hepatitis.

Rates of hepatitis C in people infected with TB associated comorbidities in our study was 13.26%. This finding is consistent with a study of U.S. Veterans Hospital, which found a significantly higher prevalence of tuberculosis among patients infected with hepatitis C (11).

It has been reported for some time that those with prior tuberculosis were at risk for the development of lung cancer. However, these studies may be confounded by the fact that the destruction of the lung and the subsequent scarring that develops from a severe tuberculosis infection may predispose to lung cancer (12). Other authors show that increasing incidence of lung diseases is associated with increased incidence of lung cancer and therefore there should be oncological watchfulness in follow-up of patients with lung diseases or tuberculosis (13). The biggest risk factor for lung cancer remains tobacco exposure. We identified the presence of associated lung neoplasia in 7.14% cases.

Recent molecular investigations have revealed that a genetic component to TB involves at least one major locus with a dominant susceptibility allele (14). Although many efforts are made to identify a scientific single dominant factor in both the TB and lung cancer is more likely where the

main role in the development of these diseases is played by a single gene, but pleiotropic effect of an increased number genes.

Association of tuberculosis and mental illness is reported, especially as a complication of the patients institutionalised in psychiatric facilities. In spite of the high prevalence of tuberculosis worldwide, there are few studies on its psychiatric complications. In our study we identified this association in 8.16% cases. Chronic renal failure impairs immune function and is associated with an increased incidence of TB.

According to an analysis published in PLoS Medicine, patients with diabetes mellitus are at increased risk of developing active TB (15).

Documented HIV test results obtained by serology have been identified for 63 of the cases included in the study. This information is vital for successful TB treatment program as co-infected persons have a much higher probability of conversion from latent infection to active infection during their life (16). In our study there were three inmates who were identified with HIV and TB.

Lack of records of examinations and HIV test results could be cause for concern, because as I mentioned earlier, co-infection with HIV increases the risk associated with activation of latent infection. Without documented results, it would be difficult to determine which inmates have an increased risk of activation, which could be particularly troublesome if they live in a prison area with high population density.

Conclusion

Among the difficulties identified in achieving our study regarding data collection and future research on TB infection in the prison environment we mention the impossibility of studying several potential predictors of TB infection. This is a concern not only because of high prevalence rates of this infectious disease among prison inmates, but also because numerous challenges to the implementation of standard infection control practices in the correctional setting have been identified.

By evaluating the implementation of monitoring protocols in prisons of TB, we can evaluate how the policies are successful in dealing with infections and to determine whether there are areas for improvement.

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