

# Peculiarities of Pulmonary Tuberculosis Demonstrated by HIV-infected Women and Treatment Efficiency

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**Abstract:** Despite of the clear trend to decrease of tuberculosis incidence in Russia, the tuberculosis issue still poses a serious problem, a contribution thereto being made by HIV-infected women suffering from tuberculosis. This research aims at studying peculiarities of clinical features of tuberculosis among HIV-infected female patients and analyzing the treatment results. The research covered 80 HIV-infected women with tuberculosis and 128 women suffering from tuberculosis without HIV infection (the comparison group) receiving treatment in Saratov Region Tuberculosis Research and Teaching Hospital during years 2017 through 2019. The research has found out that in most cases the HIV-infected women developed tuberculosis at a young age while having a late stage of HIV infection thus turning tuberculosis into a significant threat to their life and health. The prevailing forms were the infiltrative and disseminated ones, in one out of four cases the disease was complicated and in every fifth case it was generalized. Most bacteria discharging patients had drug-resistant tuberculosis forms. The treatment efficiency was low, the rate of default from treatment amounting to 36.4%, death rate achieving 25.0% and 53.8% among the patients suffering from the generalized disease forms. It is imperative to concentrate efforts on early detection of HIV infection and ensuring proper tuberculosis-preventive therapy for this category of patients.

**Keywords:** tuberculosis, HIV infection, women, clinical manifestations, tuberculosis forms, generalized tuberculosis, drug resistance, treatment efficiency.

## Introduction

The recent years witnessed a steady tendency towards tuberculosis incidence decrease in Russia, but the spread of HIV impedes its further reduction. The growing number of HIV-infected entails increasing incidence of HIV and tuberculosis coinfection [1,2].

The World Health Organization (WHO) reports published in 2018 attribute the overwhelming majority of newly registered tuberculosis cases to the 30 countries with the high tuberculosis incidence rate including the Russian Federation. The WHO experts also point out the growing number of the HIV-infected accounting for increase of HIV and tuberculosis coinfection [3-6]. According to the Center for Tuberculosis Control Monitoring the HIV and TB coinfection incidence grew by 73.7% during years 2009 through 2016 [7]. Treatment of such

patients is hindered by the disease's being severe, fulminant and prone to generalization [8–13]. Under such conditions detection of tuberculosis is obstructed by the need for a larger number of differential diagnostic procedures required to exclude other HIV-associated diseases [11, 14, 15]. The higher risk of developing tuberculosis faced by HIV-infected patients is attributed to the immunological status changes taking place when no antiretroviral therapy is applied: for example, the CD4-count decline below 200 cells per microliter increases the risk of tuberculosis [16, 17]. It must also be borne in mind that according to individual regional-level studies the multidrug-resistant tuberculosis rate among the HIV-positive patients who are newly diagnosed with tuberculosis is quite significant and ranges between 53.8% and 60.2% [18–20]. Providing such coinfecting patients with due treatment is to a considerable extent impeded by not only the generalization and severity of the disease and immunity decline, but also by low compliance to treatment, which poses significant obstacles to tuberculosis interventions. This problem is contributed to by female patients coinfecting with HIV and tuberculosis.

**Objective:** to study the peculiarities of tuberculosis clinical manifestations demonstrated by HIV-infected female patients as compared to those without HIV and analyze the treatment methods.

## Materials and Methods

The study covered 80 HIV-infected women suffering from tuberculosis and 128 TB-infected female patients without HIV (the comparison group) receiving treatment in Saratov Region Tuberculosis Research and Teaching Hospital during years 2017 through 2019.

## Results

The group of the HIV-infected females who developed tuberculosis was dominated by young patients with 76.9% of the group members not older than 40, this proportion for the control group not exceeding 52.2% ( $p \leq 0,001$ ). Tuberculosis in these cases was affected by HIV in its advanced stages, 73.5% of the patients having Stage 4B and 26.4% being diagnosed with Stage 4C (AIDS). Almost all the patients (93.8%) were newly diagnosed, only 1.3% had a relapse and 5.0% were chronically ill.

The pulmonary manifestations analysis revealed infiltrative tuberculosis prevalence among the

HIV-infected subjects (47.5%). Another salient peculiarity discovered was the high rate of dissemination (38.8%), tuberculomas being detected only in 7.5% of cases, 6.3% of cases involving focal-pattern wet pleurisy, cavernous and fibro-cavernous tuberculosis found in 2.5% of cases, both focal tuberculosis and caseous pneumonia having equal incidence rates of 1.3% of the studied cases. The control group was also dominated by infiltrative disease (53.1%), but the disseminated tuberculosis incidence within it was lower by a factor of five (7.0%). 10.9% of the patients had tuberculomas and 19.5% of them had cavernous and fibro-cavernous tuberculosis. 5.5% of patients were diagnosed with focal tuberculosis, 1.6% with caseous pneumonia and 2.3% with wet pleurisy ( $p \leq 0,001$ ).

Destructive forms were found relatively rare among the female patients with HIV, namely in 44.0% of cases which is by 20% less than in the comparison group (64.8%), ( $p \leq 0.01$ ). Almost half (47.5%) of the patients were capable of spreading bacteria, which was almost identical to the control group proportion of 49.2%.

However, every fourth (23.9%) of the HIV-infected female patients had complications: in 18.8% of cases wet pleurisy and empyema were found, while 1.3% had fibroatelectasis, haemoptysis, bronchopleural fistula and laryngophthisis. In the control group complications (wet pleurisy, haemoptysis, spontaneous pneumothorax) were diagnosed for 4.7% patients only ( $p \leq 0,001$ ).

The comparatively high generalized tuberculosis incidence within the main group of HIV-infected patients achieved 18.8%, thus affecting almost one out of every five patients. The disease generalization was most frequent among the patients with disseminated disease, namely in 37.0% of cases, thus being diagnosed for every third patient with disseminated tuberculosis. The most common generalized disease type was tuberculous meningitis which accounted for 56.3% of all the generalized diseases and was followed by tuberculosis colitis (18.8%), while both peripheral lymph node tuberculosis and tuberculous pericarditis featured equal incidence of 12.5% each. The proportion of the female patients without HIV affected by disease generalization did not exceed 2.3% wherein two patients suffered from tuberculosis colitis, one had peripheral lymph node tuberculosis and another

one developed salpingo-oophoritis ( $p \leq 0,001$ ), no tuberculous meningitis being registered within this group.

The situation was aggravated with high occurrence of drug resistance. Among the bacteria-spreading patients with confirmed drug resistance of the infectious agent only 12.0% were found susceptible, the rest demonstrating various types of drug resistance: 36.0% were drug resistant and 52.0% were MDR/XDR including 4.0% of those XDR. With reference to the total number of the patients (including those without confirmed infection spreading capability) the respective figures would be 3.8%, 11.3%, 16.3% and 5.0%. Drug resistance was frequently detected within the control group as well: the drug resistance proportion was 4.8% with the MDR/XDR accounting for 61.9% of cases including 33.3% of the XDR (due to the higher incidence of chronic condition within this group). With reference to the total number of the patients that accounted for 1.6%, 20.3% and 10.9% respectively.

The severe and generalized character of tuberculosis among the HIV-infected alongside with the high drug resistance level predetermined the treatment outcome. The latter proved efficient only in 22.9% of cases and was inefficient with 31.3% of the patients, 25.0% of the patients died and 20.8% were receiving treatment for less than 2 months. The treatment outcomes for the patients with generalized disease

were as follows: therapy has proved efficient with 15.4% of patients and inefficient with 15.4%, 53.6% of the patients died and the hospital stay duration of 15.4% of the patients did not exceed 2 months. The rate of default from treatment in this group amounted to 36.4%.

The treatment outcomes for the patients without HIV were the following: 42.0% cases of efficient therapy and 27.3% of that inefficient with 3.4% death rate, the patients treated in inpatient wards for less than 2 months accounting for 27.3% ( $p \leq 0,01$ ). The rate of default from treatment in this group amounted to 14.1% ( $p \leq 0,01$ ).

## Conclusions

Most HIV-infected women developed tuberculosis at a young age while having, however, advanced stages of HIV making tuberculosis a significant threat to life and health. The infiltrative and disseminated forms of tuberculosis were prevalent, the disease being complicated in one out of four cases and generalized in every fifth case. Most infection spreading patients had drug-resistant tuberculosis forms. The treatment efficiency was low, default from treatment constituting 36.4% and death rate amounting to 25.0% and achieving 53.8% with the patients suffering from generalized disease. Given the above mentioned it is imperative to focus efforts on early detection of HIV and prevention of tuberculosis among this category of patients.

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