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Challenging issues of tuberculosis control in the Russian Federation

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Abstract

Background: The comparative assessment of the epidemiological indices and challenging issues of the tuberculosis control in the Russian Federation. **Material and methods:** In the study were used the analytical annual reports of the statistical indices registered and the electronic resources of the Federal Research Institute for Health Organization and Informatics of the Russian Ministry of Health.

Results: The tuberculosis epidemiological situation in the Russian Federation is continuously improving. The achieved indices in disease control were 71.3% of the population annually screened and the rate of 51.5% patients with microbiological sputum conversion from positive to negative. During the period from 2000 till 2017, the incidence decreased from 90.4 to 48.3 per 100 000 population, the incidence in children aged between 0 and 14 years old decreased from 19.1 in 2001 to 9.7 in 2017 and in children aged between 15 and 17 reduced from 40.5 (the highest level) in 2005 to 21.6 in 2017 (the lowest level 16.6 in 1992). One of the contributing factors with an important impact on the epidemiological state represents the HIV-infection, the incidence of which went up from 6.5% in 2009 to 20.9% in 2017. In 2017, the effectiveness of treatment based on bacterial conversion was reported in 70.7% of new cases, and closure of cavitory lesions was reported in 62.9% of cases.

Conclusions: Russia made certain progress in tuberculosis control, however, the vast territory, its heterogeneity, including climatic and social economic differences, affect the epidemiological situation. Big efforts were performed for solving the problems associated with the infection control. The epidemiological data determined an increasing rate of the MDR-TB and TB/HIV co-infected patients, which required the development of the new approaches in tuberculosis control.

Key words: tuberculosis, federal programme, incidence, prevalence, mortality, HIV infection, MDR-TB.

Introduction

Tuberculosis (TB) control in the Russian Federation (RF) has a national importance. Since 1993, the Russian Federation is consistently implementing the federal TB control programmes, established by the regulations of the Ministry of Health, according to the requirements of the World Health Organization. Starting from 2015 a common electronic platform for case surveillance was developed and implemented in the RF. It allowed the monitoring of diagnosis and treatment, including MDR-TB and TB/HIV co-infected patients. Actually the electronic platform is used in some regions of the RF and its national implementation depends on the project outcomes. The RF joined the resolution of the 67th session of World Health Assembly, which set up the goal to end tuberculosis globally by 2050. In this way the Russian TB control strategy outlined the following targets: 1. Early detection of TB patients by active screening with a coverage of at least 70% of the population; 2. Chemopreventive treatment of 100% TB/HIV coinfecting individuals with a CD4 lymphocytes count below 350 cells/ml; 3. Total supply with the anti-tuberculosis drugs for MDR-TB including XDR-TB in 100% of patients; 4. Ensuring a treatment success rate at least 75% in drug susceptible cases and 55% in MDR-TB cases; 5. Research, including innovative development for improving the patient's care; 6. Extension of the collaboration with the Commonwealth of the Independent

States, countries of the Eurasian Economic Community and BRICS countries.

Actually the TB control activities in the RF are considered a part of the state programme "Healthcare Development". The national TB control is reflected in the President's decrees. According to the Decree of 07.05.2012 regarding "The improvement of the state policy in health care" and the state program "Healthcare Development for 2013-2020" the TB mortality should target 11.8 cases per 100 000 population. The value was achieved in advance and in 2017 the disease mortality decreased to 6.4 per 100 000 population. The "Healthcare Development" program provided the reduction of the TB incidence to 35 per 100 000 population. In order to reduce the disease mortality and incidence, the national program provided the assessment of such indicators: the rate of the population covered with the annual active screening (target value was established 70.1%) and the rate of patients with the sputum conversion among microscopic positive patients (target value 45%). The achieved indicators were registered in terms of 71.3% of the population actively screened and 51.5% of the microscopic positive patients converted their microscopic positive state [5].

Material and methods

In the study were used the analytical annual reports of the statistical indices registered in the Russian Federation

and the electronic resources of the Federal Research Institute for Health Organization and Informatics of the Russian Ministry of Health.

Results and discussion

Assessing the epidemiological indicators registered between 2000 and 2017 the incidence of TB went down by 46.6% (from 90.4 to 48.3 per 100 000 population) and by 7.3% in the period 2016-2017 (from 53.3 to 48.3 per 100 000 population). The mortality due to tuberculosis decreased 3.5 times, from 22.1 per 100 000 population in 2005 to 6.4 per 100 000 population in 2017[1, 2, 3]. The indices were reflected in the figure 1.

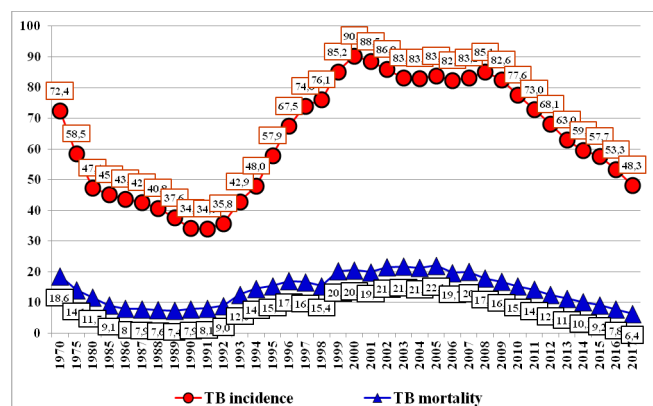


Fig. 1. Tuberculosis incidence and mortality during the period 1970 and 2017.

Tuberculosis affected more men than women in the RF. So, in the young age groups, in the economic and reproductive period (18-44 years old) men were 61.2% of patients. The rate of the women aged between 25 and 34 years during the period 2009-2017 was in the range of 30.5-32.1% from the total number of patients. A decreasing tendency of the TB incidence in both men and women' groups was established. So, the TB incidence in men in the period 2009-2017 decreased from 124.1 per 100 000 in 2009 to 70.7 per 100 000 and in women from 46.9 per 100 000 to 28.9 per 100 000 population.

The TB incidence registered in children aged between 0 and 14 years old decreased by 49.2% in the period 2001-2017 from 19.1 per 100 000 population to 9.7 per 100 000 population. The lowest value was reported in 1992 in terms of 9.4 per 100 000. The TB incidence in children aged between 15 and 17 years old decreased by 46.7% during the period 2005-2017. So, the incidence registered in 2005 declined from 40.5 per 100 000 to 21.6 per 100 000 in 2017. However, the lowest value reported in 1992 of 16.6 per 100 000 was not achieved [1, 2, 3, 5]. Data are shown in the figure 2.

A positive evolution of the TB incidence was registered in both, urban and rural population of the RF. The TB incidence in the rural population was higher than in the urban population and decreased during the period 2008-2017 from 96.4 to 53.5 per 100 000 population in rural residents of the RF and from 80.9 per 100 000 population to 46.5 per

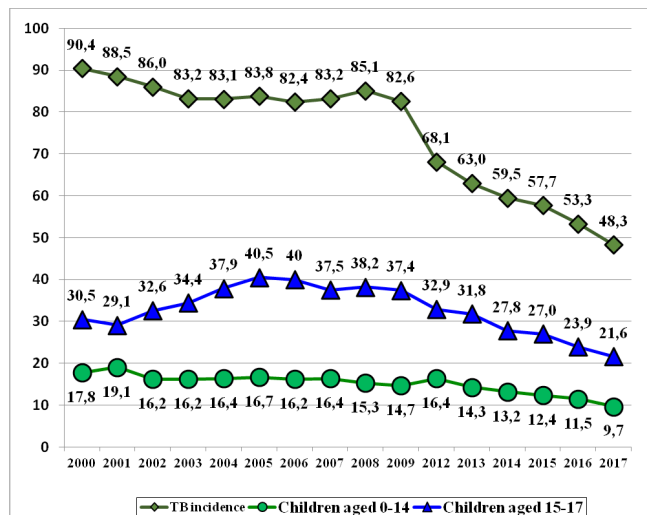


Fig. 2. Distribution of disease incidence in adults, children 0-14 years and 15-17 years old.

100 000 population in urban residents. The proportion of newly diagnosed TB patients in the rural areas is almost one-third from all registered cases (28.4%). Data are shown in the figure 3.

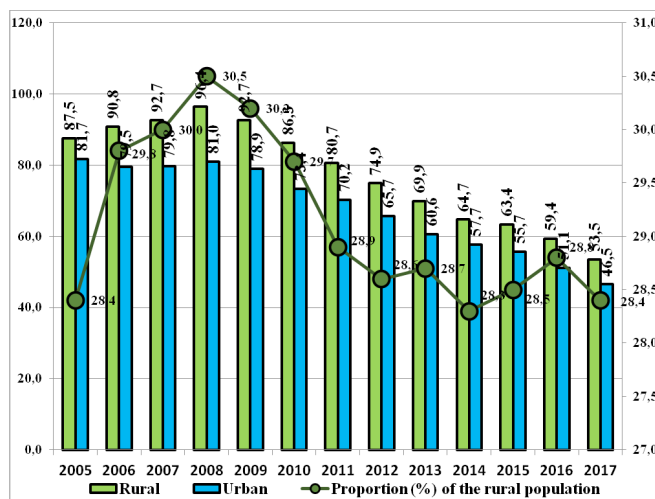


Fig. 3. Distribution of the epidemiological indices according to the demographic area of registered patients.

While distributing patients according to the regions it was established that the severest epidemic state of tuberculosis was reported in the Far East, Siberian and Ural federal districts. The lowest incidence and mortality indices were registered in the Central, North-Western and North-Caucasian federal districts which were approached to the Central European ones[4]. Data are shown in the figure 4.

One of the emergent epidemiological problems with a negative impact on the TB indices in the Russian Federation is the rate TB/HIV co-infection in newly detected patients. According to the executive order of October 2016 the Russian Federation government approved the National Strategy to Combat the Spread of HIV-infection. Over the period from 2009 to 2017 the proportion of newly diagnosed TB patients among HIV-infection increased 3.2 times from

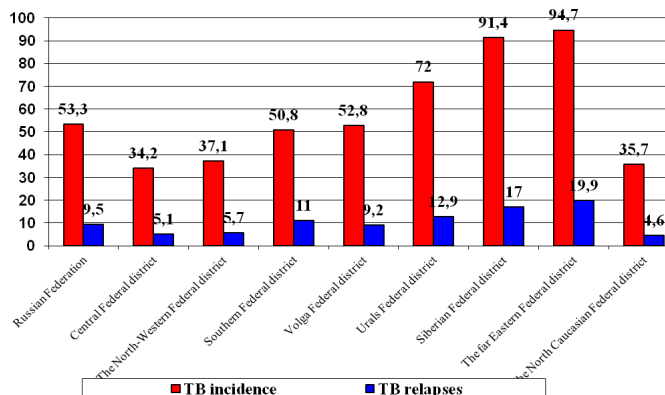


Fig. 4. The distribution of the epidemiological indices: incidence and relapse according to the Districts of the Russian Federation.

6.5% in 2009 to 20.9% in 2017. Among previously treated patients the associated TB/HIV co-infection increased 3.4 times from 5.5% in 2009 to 18.5% in 2017 [6]. Indices were shown in the figure 5.

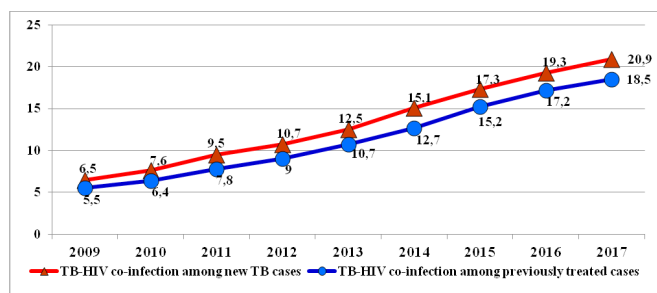


Fig. 5. The rate of TB/HIV coinfection among new and previously treated cases.

Another problem that negatively affects the dynamics of the epidemiological indices in the Russian Federation is the increasing rate of the multidrug-resistant tuberculosis (MDR-TB) among new and previously treated patients. The MDR-TB registration started in the Russian Federation in 1999. So, the rate of the MDR-TB among new microbiological positive cases increased 4 times from 6.7% in 1999 to 27.4% in 2017 and 5 times from 10.5% to 54.0% in previ-

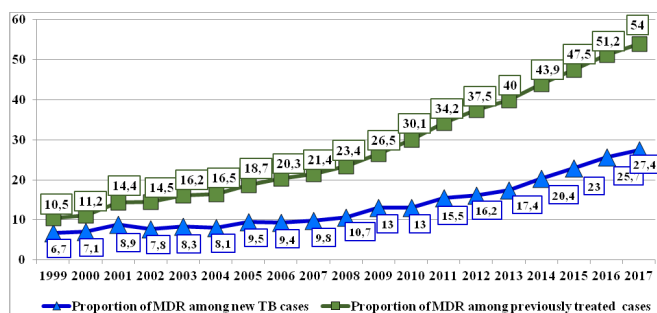


Fig. 6. The proportion/rate of MDR-TB among new and previously treated cases.

ously treated cases. Multiple causes contributed to the rising of the MDR-TB rate in the previously treated cases. The most important were: inadequate treatment without taking into consideration the drug susceptibility, low treatment adherence reflecting the poor patients' supervision, lack of an appropriate variety and quantity of the anti-tuberculosis drugs[5].

During the period from 2002 till 2017 the disease prevalence decreased by 59.8% from 272.8 per 100 000 population to 109.8 per 100 000 population. The rate of the severest form with the highest epidemiological danger fibro-cavernous tuberculosis decreased 2 times from 25.0 to 10.2 per 100 000 population during the period 2002 till 2017. The rate of the microscopic positive patients decreased during the period 2002 till 2017 two times from 88.5 per 100 000 population to 46.0 per 100 000 population. It can deduct an earlier screening of limited forms and increasing the use of the molecular genetic methods in the diagnosis of tuberculosis.

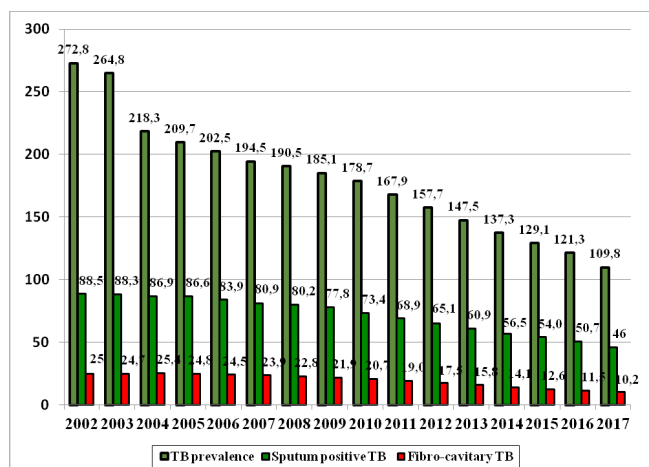


Fig. 7. The distribution of the epidemiological indices: prevalence, the rate of the sputum positive cases and the rate of the fibro-cavitary tuberculosis.

The anti-tuberculosis treatment effectiveness reflects an important impact on the disease prevalence. Using a 12 months regimen the closure of the lung cavities was achieved in 62.9% of new pulmonary cases, compared with 62.8% in 2016 and the microbiological positive state converted into negative in 70.7% of cases in 2017, compared with 70.2% in 2016. The closure of the lung cavities in relapsed cases using a 12 month regimen achieved 40.3% of cases in 2016, compared with 41% in 2015 and 41.9% in 2014. Microbiological conversion of the positive state into negative was reported in 46.6% in 2016 compared with 43.5% of cases in 2009. The rate of the clinical cured patients increased from 28.5% in 2005 to 35.7% of cases in 2015, 35.6% in 2016 and 38.2% in 2017. The rate of the patients with sputum conversion in culture positive patients increased from 30.8% in 2005 to 51.5% of cases in 2017. The increased rate of the microbiologic conversion in the MDR-TB cases from 5.7% in 2005 to 28.7% in 2017 was due to the allocation of funds from the federal budget for the procurement of the expensive anti-tuberculosis drugs[4].

Conclusions

The Russian Federation made certain progress in tuberculosis control, however, the vast territory, its heterogeneity, including climatic and socio-economic differences, affect the epidemiological situation. Big efforts were performed for solving the problems associated with the infection control.

The epidemiological indices went down. More expressed was the reducing of the the mortality rate. The rate of the affected men is maintaining at the same level, demonstrating the persistence of the social and behavioral risk factors in the male groups.

The epidemiological indices in the pediatric population went down, however the lowest level registered in 1992 was not achieved. The rate of tuberculosis in urban and rural population remains in average at the same level.

Big differences of the epidemiological indices were registered in different districts, demonstrating regional disparity in the social economic development and accessibility to the health care services.

The increasing rate of the TB/HIV infection demonstrated the limited resources available in the control of both infections.

The epidemiological data determined several times increase of the MDR-TB rate in primary and previously treated cases, due to multiple causes.

The decreasing rate of the fibro-cavitary tuberculosis and the rate of microscopic positive cases demonstrated the early diagnosis using the annual radiological screening and the molecular genetic method with substantially improved diagnosis sensibility.

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