INCIDENCE OF TUBERCULOSIS IN CHILDREN IN MODERN CONDITIONS

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The incidence of tuberculosis in children is considered an important prognostic epidemiological indicator reflecting the general epidemiological situation of tuberculosis in the region. This is due to the fact that tuberculosis in children most often occurs immediately after contact with a source of infection. In international health care practice not related to the problem of tuberculosis, it is customary to include in the group of "children" individuals from newborns to 17 years 11 months 29 days. Other approaches are adopted with regard to the epidemiology of tuberculosis. For children of different ages, both clinical manifestations of the disease and the possibilities of diagnosing tuberculosis differ significantly. Given the natural biological processes of growth and hormonal changes in the body, as well as a sharp expansion of the sphere of communication and social activity, in the epidemiology of tuberculosis it is advisable to distinguish a group of adolescents - children aged 15-17 years. When the disease occurs at this age, a fundamentally different localization of the process is observed. If among sick children aged 0-14 years, pulmonary tuberculosis occurs only in 18-20%, then in children aged 15-17 years (adolescents) - already in almost 85% of cases. Therefore, in addition to the summary data on children aged 0 to 17, separate information is provided on tuberculosis among children aged 0 to 14 and aged 15 to 17 (for adolescents). In the Russian Federation as a whole, the indicator of registered tuberculosis incidence among children aged 0–14 increased more than

twofold between 1992 and 2001 (from 9.4 to 19.1 per 100,000 children, Fig. 1). In 1999–2001, a sharp increase in the incidence of children was noted, followed by a decline in 2002. This is due to the introduction of computed tomography for examining children during these years, which led to overdiagnosis of tuberculosis. The incidence rate changed insignificantly over the next five years within the 95% confidence interval (16.2–16.4 per 100,000), and by 2009 had decreased to 14.6 per 100,000. The number of children (0–14 years) in the structure of the incidence rate of the entire population (form No. 8) decreased from 3.8% (1999) to 2.7% (2009). The decrease in incidence affected almost all age groups of children.

Over the past 5–6 years, the rate of tuberculosis incidence in children under one year and 5–6 years of age has remained virtually unchanged, with the latter having the highest rates. Figure 2 shows the results of registering tuberculosis incidence in children by Federal District. In the east of the country, in the Siberian and Far Eastern Federal Districts, the rate of this indicator is almost twice as high as in the Urals, in the central, southern and western constituent entities of the Russian Federation. This information once again confirms the fact that the epidemiological situation with tuberculosis in the east of Russia is significantly more alarming than in its other regions, which may also be determined by the “organizational and methodological features of the system of preventive and therapeutic and diagnostic measures” carried out among the child and adolescent population. The incidence of 15-17 year old adolescents is recorded more reliably than children in the 0-14 age group, since they have predominantly severe forms of tuberculosis, accompanied by significant radiographic changes and often bacterial excretion . The incidence rate of this population group can be used to control the completeness of detection of tuberculosis among the adult population of the territory, since adolescents regularly undergo preventive examinations in connection with their training in an organized group and the need to be examined for fitness for military service, tuberculosis is detected in them not only by appeal. In adolescents, in contrast to children aged 0–14, an increase in morbidity was observed until 2005. Between 2002 and 2005, the morbidity rate among

adolescents increased from 32.7 to 40.5 per 100,000. Since 2006, this rate has stabilized at 37–38 per 100,000 adolescents, changing insignificantly within the 95% confidence intervals in subsequent years. By the end of 2009, 678,908 children and adolescents (2.6% of the population of this age) were being observed in risk groups for tuberculosis in anti-tuberculosis institutions in the country. Of these, 1,125 children and adolescents fell ill with tuberculosis, or 163.7 per 100,000. The value of this indicator is 8.6 times higher than the morbidity rate among all children aged 0–17. The incidence rate is especially high among people in contact with bacteria excretors – over 600 per 100 thousand (691 and 731.4 in 2002 and 2006, respectively). In subsequent years, this indicator gradually decreased, reaching 605.7 in 2009, which is 4.6 times higher than the same indicator for children in contact with patients who do not excrete Mycobacterium tuberculosis (132.1 per 100 thousand of the average annual number of contacts, 2009). Primary infection of children with Mycobacterium tuberculosis is reflected in the number of VIA groups of dispensary registration. In general, slightly more than 1% of the population aged 0 to 17 years (1.1% in 2009) are diagnosed with such children annually. As a rule, these are children under 7 years of age, which indicates a high prevalence of tuberculosis infection in the country. A peculiarity of the child's organism is the possibility of spontaneous recovery from tuberculosis by isolating the inflammation focus with subsequent formation of petrifications or fibrosis of the surrounding tissue at the site of the lesion. Recovery from tuberculosis with the formation of calcifications and cicatricial changes in the lesion focus is often incomplete. Many of these children retain signs of tuberculosis intoxication, which indicates the preservation of the activity of the process. Possible reactivation of the process in the future (especially in adolescence and young age) requires surgical treatment by removing large residual post-tuberculous changes.

Over the past two years, another increase in the registered incidence of tuberculosis in children has been noted, from 14.6 (in 2009) to 16.3 per 100,000 children in 2011 (3,545 newly diagnosed children aged 0–14 years with

tuberculosis). The increase in the incidence rate in children following a three-year decline in the rate for the entire population requires special study. This phenomenon is apparently associated not only with epidemiological reasons, but also with the implementation of measures in the country for the early diagnosis of tuberculosis infection using the drug Diaskintest® , a recombinant tuberculosis allergen in a standard dilution.

In 2011, Reporting Form No. 33 began to reflect information on the proportion of sick children identified using Diaskintest ® recombinant tuberculosis allergen in standard dilution quite fully. According to this information, in 2011, 35.7% of children aged 0–14 years with newly diagnosed tuberculosis were among those examined using the Diaskin test (thus, in contrast to the intradermal Mantoux test with 2TE purified tuberculin, children's phti ziatrists decided to call the intradermal test with 0.2 mcg of the drug Diaskintest ®). Moreover, in 42 subjects

In the Russian Federation, there were more than 30% of such children with newly diagnosed tuberculosis, in 25 regions more than 50%, and in the Rostov, Bryansk, Novgorod, Yaroslavl and Tomsk regions, the Trans-Baikal Territory, the republics of Altai, Tatarstan, Bashkiria, Kalmykia and Udmurtia - over 80%. At the same time, in the regions where the proportion of children with tuberculosis, identified during the examination with Diaskintest , exceeds 30%, in 2010-2011 a statistically significant increase in the total number of newly diagnosed patients aged 0-14 years was noted , while in other territories - a decrease ($p<0.01$).

The structure and localization of tuberculosis in children varies significantly in different age groups, while the structure of newly diagnosed tuberculosis reflects the quality of work of the territories on prevention and early detection of the disease. Clinical forms of the disease are characterized by the predominance of tuberculosis of the respiratory organs in the form of damage to the intrathoracic lymph nodes without spread to the lung tissue. In children under 7 years of age, tuberculosis of the respiratory organs occurs with damage to the lung tissue only in 6-7%, in children aged 7-14 - in 28.8%, and in adolescents - already in 83.5% of cases. The proportion of bacteria excretors in children aged 0-

14 is only 6%. However, due to the predominant damage to the intrathoracic lymph nodes in children, bacteria excretion cannot be the main criterion for the prevalence of the process. Despite the fact that the number of children and adolescents with bacterial excretion is small (167 children and 426 adolescents were registered in regional dispensaries by the end of 2009), it should be noted that the level of multiple drug resistance of the Mycobacterium tuberculosis detected in them is high - 16.8 and 17.3%, respectively. In children under 14, tuberculosis of the intrathoracic lymph nodes predominates (from 64 to 90%). Extrapulmonary tuberculosis is less common - from 5 to 12% of cases depending on the age group, while its share has tended to decrease over the past fifteen years, and the pathology itself is detected mainly "by referral". Over the last four years, after a decrease by 2006, the number of cases of tuberculous meningitis, recognized as an indicator of the effectiveness of vaccination in the territories, has remained at approximately the same level (in 1997 - 38 cases, in 2005 - 27, then in 2006-2011 - 22-23 cases). Mortality from tuberculosis in children is low: for the age of 0-14 years, it has been about 0.08 per 100 thousand of the child population in recent years (17 cases in the Russian Federation in 2010). In the nineties of the last century, the Ministry of Health of the Russian Federation annually analyzed all cases of child deaths from tuberculosis (it is desirable to resume this practice). As a rule, children under one year of age die, unvaccinated or poorly vaccinated in the maternity hospital, who ended up in a tuberculosis "hotbed" (up to 80% of cases). This fact indicates the importance of vaccination in maternity hospitals and examination of the environment of newborns. The coverage of BCG vaccination among newborns was 88.0% of the total number of live births. In most regions of Russia, the coverage of BCG vaccination exceeds 90%, but there are regions with insufficient coverage of BCG vaccination. The lowest coverage of BCG vaccination was in the Kabardino-Balkarian Republic (58.3%), which was due to the insufficient amount of BCG vaccine available in the Republic. In addition, low vaccination coverage was noted in the Nenets Autonomous Okrug (69.0%). The most significant reason for the decrease in BCG vaccination coverage on a national scale is the presence of certain

medical contraindications to vaccination, the list of which is contained in the Order of the Ministry of Health of the Russian Federation No. 109 dated March 21, 2003.

One of the problems with immunization with the BCG vaccine is the risk of complications after vaccination. The BCG and BCG-M vaccines, like any live vaccine, can cause both local and generalized forms. Children with developed post-vaccination complications receive anti-tuberculosis treatment drugs , and therefore should be observed by a phthisiatrician. Since 2005, such children have been included in the 5th group of dispensary observation. Over the past 5 years, an average of 631 ± 63.2 children aged 0–17 years with complicated course of vaccination against tuberculosis have been registered. The prevalence of complications following the introduction of the BCG vaccine in children aged 0–14 years was 2.7–3.4 per 100,000 children of this age. The frequency of complications following revaccination is several times lower than following vaccination. At the same time, only isolated cases of complications are noted following revaccination at the age of 14. Severe complications of BCG vaccination (generalized and disseminated BCG infection requiring inpatient treatment) over the past 5 years have been registered in an average of 168.2 ± 72.9 children aged 0–14 years. The remaining children had limited and local lesions (cold abscesses and BCG lymphadenitis).

Complications after the BCG vaccine administration have occurred since the very beginning of its use. Until 1962, the oral BCG vaccine was used, with cervical lymphadenitis described as complications. These complications were widespread and occurred in a significant number of children in various cities of the USSR in the pre-war years. Later, granulation otitis was described as a complication of the oral BCG vaccine. The transition to the cutaneous and then intradermal administration of the vaccine changed the structure of complications after BCG vaccination.

According to the classification proposed by the International Union Against Tuberculosis (WHO) in 1984, complications arising from BCG vaccination are divided into four categories: Category 1 – local lesions (subcutaneous filtrates, cold

abscesses, ulcers) and regional lymphadenitis; Category 2 – persistent and disseminated BCG infection without a fatal outcome (lupus, osteitis); Category 3 – disseminated BCG infection, generalized lesion with a fatal outcome, which is observed in congenital immunodeficiency.

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