ORIGINAL ARTICLE

Tuberculosis in the Czech Republic in 2003

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ABSTRACT

Background. In 2003 1,162 new cases of tuberculosis were diagnosed in the Czech Republic; pulmonary tuberculosis represented 942 cases, and in 660 cases the diagnosis of tuberculosis was bacteriologically confirmed.
Methods and Results. 355 cases were smear-positive tuberculosis. The increase in certain TB cases (70%) in 2003 compared to 2002 is not statistically significant (p=0.031). In 2003, the notification rates (incidence) were 1.4/100,000 of all cases of tuberculosis, 9.2/100,000 of pulmonary tuberculosis and 6.5/100,000 of certain cases of tuberculosis.
Conclusions. Compared to 2002, a decline of all forms of tuberculosis was observed; however, this decline was not statistically significant. The increase in bacteriologically confirmed tuberculosis and smear-positive tuberculosis was also not statistically significant.
Key words: tuberculosis, epidemiology, notification, annual risk of infection.

Čas. Lék. čes., 2004, 143, pp. 594–597.

Tuberculosis (TB) is a disease given major attention both by the professional and lay public. This is so because on the one hand, TB is an infection which was a most dangerous disease in the past, and on the other hand, because it most often afflicts members of communities living outside society (homeless people, prisoners, drug addicts, foreigners, and so on).

In the Czech Republic combating TB has a longstanding tradition, and previous generations have been largely successful in their efforts. The system of TB surveillance in the Czech Republic has met with considerable approval from the World Health Organization (WHO). The Czech Republic ranks among nations with a favorable situation as regards TB occurrence and its effective control (1). The current WHO guidelines (2) are targeted primarily at nations with a high incidence of TB where financial resources for effective control are lamentably scarce. These are particularly countries of Sub-Saharan Africa and some nations of South-East Asia (3).

In the Czech Republic, in addition to screening, diagnosis, treatment and notification of TB, we have to employ control mechanisms confirming that the process of TB surveillance is not biased and that notification reflects the actual situation in TB occurrence.

In 2003 at the TB Section of the Czech Society of Pneumology and Phthiseology of the Czech Medical Association of Jan Evangelista Purkyně we performed an analysis of the incidence of TB using notification reports in that year. The data collected were compared with the ARI estimate using the WHO-recommended method (4, 5). Data are reported as defined by the WHO (lung TB, extrapulmonary TB) (6, 7).

DATA BASE AND METHODS USED

To analyze TB data in 2003, data were sued from the TB Patient registry, which is run by the Institute for Health Information and Statistics (Ústav zdravotnických informací a statistiky, ÚZIS). Newly diagnosed TB cases are reported to the registry by specialists involved in the field of TB and respiratory disease through mandatory notification of TB and other mycobacterioses. Data are reviewed and augmented with results of tests (including sensitivity data) for mycobacteria by bacteriological laboratories participating in the registry of bacteriological isolates of mycobacteria (Information System of Bacillary Tuberculosis; Informační systém bacilární tuberkulózy, ISBT) run by the State Health Institute. Results of tuberculin testing in 11-year-olds constitute a part of Reports on the Activity of Outpatient TB and Respiratory Disease Centers, as collected by ÚZIS. The annual risk for infection and estimate of TB sources in the population at large is calculated using the method developed by Karel Stýblo (5), also recommended by the WHO (8). Statistical analysis was performed using the chi-square test; with Yates correction in the event of small numbers; the least square method was used to evaluate long-term trends. A CI level of 99% and higher was considered statistically significant (p≤0.01).

RESULTS

Evaluation of the status in TB and developmental trends

In 2003 a total of 1,162 new cases of TB (Tab. 1) were diagnosed in the Czech Republic; of this number, 942 were cases of lung TB with the etiologic agent identified in 660 (definitive lung TB); of these, 355 were the most serious sources of infection, i.e., microscopically positive cases. The proportion of definitive lung TB (70% of all lung TB cases) is higher than in previous years and falls at the limit of statistical significance in terms of five-year trends (p=0.031). In numbers related to 100,000 pop., the figures are 11.4 of all cases of TB, 9.2 cases of lung TB and 6.5 cases of definitive cases of lung TB.

Compared with 2002 there was a decrease in the incidence of all forms of TB and localizations and total number of cases of lung TB; however, the decrease is not significant. As regards the numbers of bacteriologically verified and microscopically positive cases of TB, there was a non-significant increase in TB incidence. Thus there was stagnation in the number of TB notifications for the first time in five years (Graph 1).

As usual in the Czech Republic, the number of males with all forms and localizations of TB was almost twice that of females, 742 males (63.9 %) versus 420 females (36.1%).

Of the total number of 1,162 of reported cases of TB, 139 individuals were treated for TB according to their medical history (recurrence as defined by WHO); out of this number 52 (4.5% of all cases of TB) over the past 3 years (recurrence as defined by a decree still in effect).

Tab. 1. Number of reported cases in 1998–2003

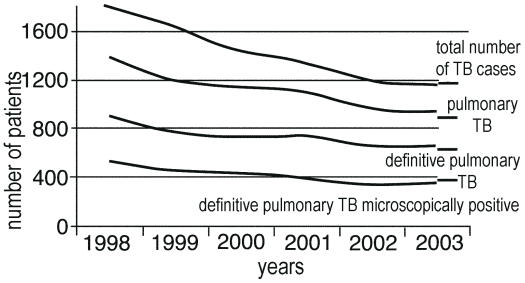
			a) absolute numbers			
Year TB	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
all forms and localizations	1805	1631	1442	1350	1200	1162
out of them pulmonary TB	1389	1197	1144	1102	972	942
out of them definitive TB diagnosis	903	778	732	740	658	660
out of them microscopically positive	535	461	436	395	338	355
TB of other organs	416	434	298	248	228	220
			b) relative numbers			
Year TB	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
all forms and localizations	17.5	15.7	14.1	13.1	11.8	11.4
out of them pulmonary TB	13.5	11.6	11.1	10.7	9.6	9.2
out of them definitive TB diagnosis	8.8	7.6	7.1	7.2	6.4	6.5
out of them microscopically positive	5.2	4.5	4.2	3.9	3.2	3.5

In 2003 lung TB was diagnosed most often in the elderly (Graph 2). The implication is that these patients were infected by TB decades ago but tend to spread TB to only a limited extent. The rise in TB in middle-aged males (40-65 years) is due to the at-risk groups, which may also be largely involved in the spread of TB infection within the population. The incidence of TB in children was very low.

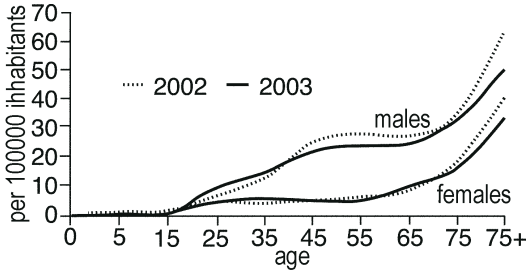
If considering the distribution of TB by regions (Tab. 2), a higher number of TB cases is reported from Prague, Karlovy Vary and Moravian-Silesian regions. In Prague, almost 10% of TB cases are among the homeless; an additional factor adversely affecting the TB status in Prague is the older mean age of Prague residents. In the Karlovy Vary region, a high proportion of TB patients are foreigners while, in the Moravian-Silesian region, the situation is adversely affected by the local socio-economic situation with high unemployment rates.

The number of TB patients born abroad was 126 (10.8%) in 2003, a decrease at the level of significance compared with 2002 (p=0.042). Most foreigners came from Ukraine and Vietnam (21 TB patients), while there were 19, 11, and 9 reports of Slovak, Russian, and Mongolian TB patients. A significant rise in TB incidence is not likely to occur with the accession of the Czech Republic to the European Union.

Among the 1,162 TB patients entered into the TB registry in 2003, a total of 262 individuals died (according to Mandatory Notification); of this number, 56 died of TB and 206 of other



Graph 1. Trends in TB notification rates (newly diagnosed cases and recurrence) in the Czech Republic over the 1998–2003 period



Graph 2. Newly reported cases of lung TB (newly diagnosed cases and recurrence) in the Czech Republic in 2002 and 2003 stratified by sex and age

Tab. 2. Reported cases of TB in the ČR according to the regions in years 2000, 2001 and 2002

Region	**2001**		**2002**		**2003**	
	absolute	**relative**	**absolute**	**relative**	**absolute**	**relative**
Prague	171	14.5	187	16.1	194	16.7
Central Bohemia	150	13.8	117	10.4	116	10.3
South Bohemia	48	7.7	49	7.9	41	6.6
Pilsen	80	14.3	80	13.9	68	12.4
Karlovy Vary	68	22.0	42	12.1	50	16.4
Ústí upon Elbe	133	16.4	122	14.9	100	12.2
Liberec	51	11.7	47	11.0	42	9.8
Hradec Králové	55	10.0	54	9.8	56	10.2
Pardubice	52	10.0	52	10.3	48	9.5
Vysočina	42	8.8	40	7.8	40	7.7
South Moravia	121	10.7	127	11.3	124	11.1
Olomouc	66	10.1	51	8.0	50	7.9
Zlín	51	10.5	41	6.9	65	11.0
Moravian Silesia	262	19.3	191	15.1	168	13.3
Czech Republic (total)	1350	13.1	1200	11.8	1162	11.4

*per 100,000 inhabitants

causes. TB mortality is 0.5 deaths per 100,000 pop. More than a half of individuals dying from TB (53%) were over 65 years of age and had serious associated diseases.

As regards detection of TB, 73% of patients presented to a physician with complaints (passive method of identification), while only 15.3% of cases of TB were identified actively (2/3 by screening at-risk populations and 1/3 by screening contacts). In 58 patients, TB was not detected until an autopsy was performed, but in most cases this was only an additional finding to another serious disease.

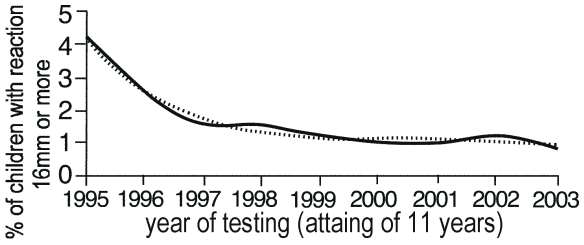
Estimate of efficacy of TB screening

In 2003, tuberculin (PPD) testing was performed in 123,224 eleven-year-olds in the Czech Republic. Of this number, 82,349 were tuberculin negative, (66.8%), with a reaction of 6–15 mm in 39,796 children (32.3%) and hyper-responders with a reaction of 16 mm and over accounting for 1,079 (0.9%). Children with PPD results of 16 mm and over were most likely infected by TB by inhalation on contact with TB, so their numbers roughly reflect the number of TB sources (known and unknown) in the population. A favorable finding is that the percentage of 11-year-olds with a reaction of 16 mm and over has decreased to almost a fifth during the past 9 years (Graph 3) and a significant decrease was achieved in the trend over the past 9 years.

Compared with the tuberculin reaction, a measure reflecting more accurately the risk of the population to contract TB is the annual risk of infection (ARI infection). This was 0.109 % in the 11-year-olds, with the implication being that among 1,000 children turning 11 in 2003, only one contracted TB per year. As a result, the real incidence of microscopically positive TB in 2003 can be estimated at 5.4 cases per 100,000 pop. The efficacy of identification of microscopically positive TB patients reached 65% in 2003. Using the same method, the estimate of real incidence of microscopically positive TB is 6/100,000 with the efficacy of active identification being 52% in 2002.

DISCUSSION

Our paper addressing the situation with TB incidence in 2003 gives the numbers of TB notifications, and trends of their development, but we also seek to make an estimate of unknown TB cases in an attempt to outline the real situation as regards TB. Although the WHO and International Union Against TB and Lung Disease (IUATLD) make every effort to make assessment of the incidence of TB in Europe using standard principles to provide comparable results in terms of TB control (9–11), measures allowing verification of reports are unavailable in most countries. This was why this report employed both WHO-recommended definitions and techniques of individual calculations.



Graph 3. Proportion of tuberculin reactions of 16 mm and over in 11-year-olds

Recently, a critical issue in TB control has been individuals living on the verge of society, making TB increasingly a public health challenge (12). As regards TB, there was not a dramatic change in 2003 compared with 2002. While there was a decrease in the total number of cases of TB and lung TB, there has been an increase in the number of bacteriologically documented (definitive) cases of lung TB and microscopically positive cases. However, the changes are not statistically significant. Considering the results of PPD testing in the 11-year-olds and estimate of sources of TB infection in the population, the increased rates of notifications of definitive lung TB and microscopically positive TB may be related either to more effective screening of TB patients or to improved bacteriological diagnosis of TB. However, the goals set by the WHO – i.e., to identify 70% of existing microscopically positive sources of TB – were not achieved in the Czech Republic in 2003 (13). It is therefore critical to improve passive identification, with the implication being that all physicians, not only pneumophthiseologists, should consider TB in differential diagnosis. Further improvement can be obtained by active TB screening programs in at-risk populations (14). It is imperative to continue screening individuals from populations at risk who are not receiving standard health care (the homeless, drug addicts, foreigners, and illegal migrants in particular).

In terms of regional distribution, TB infection rates were higher in the Prague and Karlovy Vary regions in 2003. It is therefore critical to develop tailor-made projects for these regions and to consider the development of surveillance of TB infection spread in these regions using the tuberculin test (Tab. 3). In Prague, the number of TB cases has been rising for two years in a row.

TB in middle-aged males will require increased attention in the future, focusing on identification, isolation and treatment of at-risk populations (homeless people, foreigners). In the foreseeable future, passive identification of cases with TB is to be improved in the Czech Republic (education for the lay people and the professional community) and to target projects of active screening specifically at at-risk populations.

Abbreviations

ARI	–	annual risk of infection
ISBT	–	Information System of Bacillary Tuberculosis
IUATLD	–	International Union Against TB and Lung Disease
PPD	–	

Tab. 3. Methods of detection of new, previously untreated cases of TB of respiratory system

Method of detection	2000		2001		2002		2003	
	number	%	number	%	number	%	number	%
passively	759	68.7	705	67.1	636	70.0	702	73.0
actively	185	16.7	200	19.0	135	14.9	147	15.3
by autopsy	80	7.2	62	5.9	59	6.5	58	6.0
other methods	82	7.4	84	8.0	78	8.6	54	5.6
total	1106	100	1051	100	908	100	961	100

TB – tuberculosis
TRN – tuberculosis and infectious disease
ÚZIS – Institute for Health Information and Statistics
WHO – World Health Organization

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Translation: René Prahl