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ORIGINAL RESEARCH

CLINICAL EPIDEMIOLOGICAL PROFILE OF TUBERCULOSIS IN CHILDHOOD AND ADOLESCENCE

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Abstract

The presence of tuberculosis in childhood is a good indicator of the extent of the disease bacilífera and inefficiency of control of the tort in the adult population. In order to describe the clinical and epidemiological profile of cases of children and adolescents which evolved clinically with tuberculosis. Was held a retrospective study of survey data from patient records involving all patients with the diagnosis of tuberculosis assisted on inpatient and outpatient de pneumologia of a children's Hospital public in the city of São Paulo from 2005 to 2010. 45 cases of tuberculosis were diagnosed, most aged under 4 years of age and adolescents, all vaccinated with BCG ID. The most common clinical form was followed by pulmonary and pleural meningeal. Of cases handled, 98% spontaneously to diagnostic research hospital. Cough and fever symptoms were reported. Of the cases raised, 18 (40%) had contacts with intradomiciliares of adults with pulmonary tuberculosis. The radiological characteristics were found more opacity and the pleural effusion. Of the cases investigated 32.5 % presented positivity for identification of Mycobacteria. Most patients was strong proof reactors tuberculínica. Tuberculosis in childhood is a neglected aspect, for the most part, in the evaluation of adult communicating with pulmonary tuberculosis bacilífera. Often children are assisted when disease symptoms are already installed. Interconnecting control is a way early and efficiently diagnose and treat children with tuberculosis, reducing suffering and reducing the chance of an outbreak of severe forms of the disease.

Key words: tuberculosis; epidemiology; child; adolescent; clinical profile.

INTRODUCTION

Tuberculosis (TB) is a serious infectious disease that has accompanied humanity for millennia.

The apogee of this disease occurred in Europe in the eighteenth century. At this time, the rural exodus due to climate change with loss of crops, and the possibility of working in the factories, in the heyday of the Industrial Revolution led to a rise in urban population with consequent overcrowding in cities, which increased poverty, morbidity and mortality rate of several diseases, including tuberculosis.

In Brazil, the disease spread initially in the countryside. It was introduced by the Portuguese colonizers to the indigenous population, who were an opportune labor force at the time of discovery and later it spread to the slave population, the substitute labor force. The unsanitary living

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conditions, physical exhaustion at work and poor diet were factors that predisposed those populations to fall sick.[1].

The process of industrialization, which was late in Brazil, made tuberculosis become a real public health problem in urban centers only in the twentieth century when a large human contingent was formed in the cities looking for work opportunities and skill training in industries. That increased poverty on the periphery of urban centers.

Despite the isolation and identification of the causative agent, Mycobacterium tuberculosis, since 1882 and the use of specific chemotherapy from the early twentieth century, the disease remains a major public health problem, especially in developing countries. The deterioration of the socio-economic situation with increase in poverty, overcrowding, and marginalized populations; scarce access to health services harming the finding of new cases of the disease, migration, elder population, the growing of AIDS cases and the emergence of multi-resistant germs are factors that make this aggravation far from being eliminated.

Pulmonary disease is the most common clinical presentation of the disease regardless of age, and the smear-positive one is responsible for the transmissibility of the disease.

The fact that the Mycobacterium has a great affinity for oxygen, and that it needs it to develop, makes the lungs the favorite target for the location of this infectious agent.

The propagation of tubercle bacilli occurs through droplets containing the bacilli expelled by a patient with pulmonary tuberculosis bacillus when coughing, sneezing or talking.

The spread of disease is associated with the living conditions of the population. A large human concentration, poor urban infrastructure, hunger, poverty and the lack of access to health care providers are facilitating factors for the dissemination of the disease. Some conditions which weaken the immune system, such as HIV infection, diabetes, use of immunosuppressive drugs, malnutrition, chronic kidney disease, can contribute to the disease installation.

Prevention, early diagnosis and the correct treatment of patients are some measures to control tuberculosis.

Children exhibit some peculiarities related to the disease. This is often more severe than in adults and, comparatively, there is a higher proportion of extrapulmonary involvement and disseminated forms[2].

The agent identification by Gram stain and culture of sputum are hampered by technical difficulties in obtaining material from children through sputum and also by lesions, which are mostly noncavitary and little bacillary.

This study is justified by the difficulty of isolating the causative agent of tuberculosis in pediatric patients. Knowledge of clinical and epidemiological profile of this disease in this specific group can be a facilitator in establishing the diagnosis.

The objective in this study is to describe the clinical and epidemiological profile of children and adolescents who progressed clinically with tuberculosis.

METHODS

This is a retrospective, descriptive, quantitative approach to data collection of chart records involving all patients with the diagnosis of tuberculosis, assisted in the inpatient unit and the pneumatology ambulatory clinic of a Children´s Hospital of the State Health Department of São Paulo in the period 31/07/2005 to 31/07/2010.

The data obtained from the medical records were transcribed into an instrument for collecting the data of interest for this research for further analysis. They included the following information: hospital number, date of birth, gender, clinical symptoms at diagnosis, type of exposure (intra or extra household), radiological abnormalities, abnormal cerebrospinal fluid in cases of meningoencephalitis caused by tuberculosis, pleural fluid changes in cases of pleural tuberculosis, immunization status (BCG), result of smear and / or culture for BK, therapy, outcome in this case, and seropositivity for HIV. The protocol 446397/2011 was approved by the Ethical Comitee and Research of the Universidade Nove de Julho, São Paulo, Brazil.

RESULTS

During the study period, 45 cases of tuberculosis were diagnosed in this hospital. From those 44 were new cases and one was recurrence.

Most patients were male and belonged to the age group of under 4 years and adolescents (table 1).

Table 1: Distribution of children / adolescents according to variables related to conditions of gender and age.

Variable	Distribution	
	Nº	%
Gender		
Female	21	47
Male	24	53
Age		
0.1 Year	12	27
2-4 Years	05	11
5-9 Years	07	15
10-14 Years	13	29
15-19 Years	08	18

The most common clinical presentation of tuberculosis was the pulmonary in 33 (72%) of cases. As for the extrapulmonary forms, five cases (11%)

were diagnosed as pleural tuberculosis, followed by the meningeal form with three cases (7%) and miliary and pericardial each with 2 cases (4%).

Of forty-five cases treated, forty-four spontaneously sought the hospital for diagnostic investigation and one was referred from the Health Unit Basis for contact investigation because it was about a communicant of intra-household tuberculosis.

The most commonly reported forms of clinical symptoms for pulmonary tuberculosis were cough (38%), fever (31%), dyspnea (8%), malaise, asthenia (6%), sweating (5%), emaciation (4%), chest pain, and hemoptysis (1%).

In non-pulmonary tuberculosis the most common symptoms were fever (30%), cough (20%), and emaciation (20%). Other reported symptoms (5%) were strabismus, asthenia, dyspnea, seizures, chest pain and enlarged lymph nodes.

All patients in this study were vaccinated with one dose of BCG.

Among the 45 cases analyzed, 20 (45%) reported household contact with adults with pulmonary tuberculosis, 2 (4.5%) reported contacts outside the home. In other cases there was no history of previous contact with tuberculosis.

Forty cases (89%) underwent collection of material (gastric lavage or sputum) for the isolation of the infectious agent. These include 33 cases of pulmonary tuberculosis, 5 cases of pleural tuberculosis and 2 cases of miliary tuberculosis. Of these, 16 (32.5%) cases showed positive identification of Mycobacterium (Table 2). All the isolates of M. tuberculosis were made for the pulmonary form of the disease. Collection of gastric lavage was performed in 15 patients. Of these 3 (20%) resulted in the identification of positive acid fast bacilli (AFB) smear.

Table 2: Identification of the causative agent in cases of pulmonary tuberculosis (2005-2010)

Culture	1 case
Bacilloscopy	12 cases
Bacilloscopy + Culture	3 cases

The most frequent radiological features found in cases of diagnosed tuberculosis were: opacity (36%), pleural effusion (20%), cavitation (18%), bilateral infiltrates (12%), perihilar adenopathy (8%) and miliary pattern (6 %).

The tuberculin test in the diagnosis of tuberculosis was made in 10 out of 33 cases of pulmonary tuberculosis. Of these, 9 cases showed a measure equals or greater than 15mm and one case between 10 and 15mm. In extrapulmonary cases, in all 5 cases where the test was conducted, the results were superior to 15mm (Table 3).

Table 3: Distribution of TB cases according to the results of tuberculin test

Tuberculin test	**Pulmonary**		**Extrapulmonary**	
	N°	**%**	**N°**	**%**
>= 10mm	01	10	0	0
>= 15mm	09	90	05	100

Four of them were HIV / TB co-infected, all with the pulmonary form of the disease.

The cure rate in the cases studied was 91%. Death occurred in three cases. Of these, two patients were infected with HIV and one presented sudden and deadly hepatitis during treatment.

DISCUSSION

Tuberculosis is the most common infectious disease in humans occurring in different proportions worldwide. About one third of the world population is infected with Koch bacillus[2].

In 2009 it was estimated that there were 9.4 million new cases of tuberculosis worldwide. The majority of the cases (55%) occurred in Asia followed by Africa (30%) and in minor proportions in Europe (4%) and the Americas (3%). TB is responsible for 1.7 million deaths every year[3].

About 50% of TB cases reported in the Americas are located in Brazil and Peru.

Brazil ranks 19th place among the 22 countries responsible for 80% of all the TB cases in the world. It is estimated that there are 57 million people infected with the TB bacillus in the country and every year there are 72,000 new cases of this disease, representing an incidence rate of 37.5 / 100,000 habitants. Mortality is 4.5 thousand deaths / year[4, 5].

17.698 TB cases (new and retreatment cases) were notified in the state of São Paulo in 2009. The incidence rate was 37.9 / 100.000hab. Out of 15,768 new cases reported that year, 82% corresponded to pulmonary form. The majority of patients (97%) were 15 years or older. The cure rate was 70%, below the rate announced by the World Health organization (WHO) which recommends that the minimum cure rate should be 85%. The dropout rate is 10%[6].

In São Paulo city 5853 new cases of tuberculosis were notified in 2009. The incidence rate was 53.2 / 100.000hab. Pulmonary disease accounted for 81% of total cases and the majority

of these patients (96%) were older than 15 years. The cure rate in children under 15 years of age was 87.9% and in those over 15 years of age it was 73%. The dropout rate in the county is 8.6%.

The risk of individuals becoming ill after the first contact (primary infection) with the mycobacterium is about 10% in the general population. In pediatric patients the risk is 43% in children under 1 year of age, 24% among those between 1 and 5 years and 15% in adolescents[2, 7].

Prevention is made by BCG vaccination, which is a priority in children under 4 years of age. It aims to prevent the individual, if infected, to develop the severe forms of the disease, particularly the meningoencephalitis by tuberculosis. Another measure for prevention is chemoprophylaxis with the use of isoniazid. This prevents the establishment of infection (latent infection prevention or primary chemoprophylaxis) or the latent infection to progress to clinically active disease (treatment of latent infection or secondary chemoprophylaxis) [4].

There is an estimate of one million recorded cases of tuberculosis among children aged 0 to 14 years in the early 2000 in the world. Every minute two children die of TB in the world. In developing countries, tuberculosis is the disease that most kills children[8].

In 2005, 9.7% of the total reported tuberculosis cases occurred in the pediatric age range[2].

The great difficulty in establishing the tuberculosis diagnosis is well known. That is due to the impossibility of the bacteriological confirmation of the disease in most cases, whether because of the noncavitary lesion characteristics in this age group, with a small number of bacilli, whether because of the technical difficulty in obtaining sputum once the children up to school age are not able to expectorate.

We often make use indirect data for the diagnosis of this disease. The clinical history, the epidemiology of contact with adult patients, radiological findings and the interpretation of the tuberculin test are useful in the diagnosis[9, 10].

In this study most of the patients were male and belonged to the age groups of either under 4 years of age or adolescents. In both age groups the pulmonary form was the most frequent presentation of the disease.

According to Sant'anna et al.[9,] children under the age of 2 have double the disease rates in relation to older children due to their immune system immaturity

Incidence of tuberculosis is also high among adolescents. Such fact must be related to the very common behavior changes occurring in this age range. The sleeping times, the irregular meals, the extreme physical activities and the emotional instability may somehow compromise immunological resistance. In addition to that, the amplified universe of contacts and the leisure activities in conglomerations increases the likelihood of exposure to the tuberculosis bacillus.

The disease in childhood presents non-specific signs and symptoms that make a precise diagnosis difficult and delay treatment. The clinical manifestations present a wide clinical spectrum, from oligosymptomatic forms such as irritability, discreet weight loss and little cough to more serious forms with a significant decline in the general health condition, such as cachexy, which often leads to death.[10, 11].

The majority of the patients involved in this study sought the medical service because they were symptomatic. The most reported symptoms in the pulmonary forms of disease were cough and fever. They are common to several diseases that affect the respiratory tract.

Maciel et al.[10], in a study conducted in two children's hospitals in the state of Espírito Santo, revealed that persistent cough, out of all the found symptoms, was referred by 75% of patients.

Fever is another symptom that stands out in most cases. Usually, it manifests in moderate intensity, in the afternoon, persisting for over 15 days. Still, according to this author, the presence of nocturnal profuse perspiration is a frequent symptom and hemoptysis is rare[11.]

Pulmonary manifestations in children differ from adults because the bacteriological smear examination usually presents a low number of bacilli. Due to this feature, children acquire tuberculosis through contact with active TB patients, usually adults and / or teens. Therefore, childhood tuberculosis is considered a sentinel event, because it reflects the frequency of the disease in adults in a certain community[7].

Eighteen patients affected by tuberculosis (40%) had a history of contact with adults with pulmonary tuberculosis. However, only one of them was referred for contact evaluation, the remainder sought the service presenting the symptoms of the disease.

When there is intra-household contact with a proven bacillary tuberculosis individual, the possibility of an individual under 15 years of age becoming infected is around 73%, and the likelihood of his/her falling ill is ten times higher. The fact is that about 30% develop the disease from the contact in their environment[12].

Due to the high risk of a child living with an adult with the tuberculosis bacillus getting infected, the important role of tracing and controlling contacts for diagnosing tuberculosis in children becomes evident

The bacteriological research for the isolation of Mycobacterium tuberculosis should always be performed by examining sputum in children over 6 years old, who has already developed the ability to expectorate, or by collecting gastric lavage in younger children.

The gastric lavage is a valuable procedure for the bacteriological diagnosis of childhood TB, due to the difficulty in obtaining secretions in children. The isolation rate in culture for M.

tuberculosis in gastric lavage in the literature ranges from 20 to 52%[13, 10].

The major drawback in performing gastric lavage is that this procedure needs to be performed in a hospital setting. Maciel et al.[10], analyzing the positivity in the bacteriological identification of gastric aspirates collected in ambulatory and hospital unit, concluded that there is no significant difference between the samples collected in relation to the positivity for *Micobacterium tuberculosis*.

In this study, the positivity of gastric lavage and secretion culture by conventional bacteriological means(baciloscopy and culture) was 32.5%

Radiological findings of tuberculosis are varied. The most common are: hilar lymphadenopathy and / or paratracheal; pneumonia, sometimes associated with enlarged mediastinal lymph nodes and diffuse nodular infiltrate and cavitations (miliary) [14, 11].

The variety of the radiological presentation of tuberculosis makes it difficult to make an early diagnosis when we face pneumonia in childhood. However, the differential diagnosis of tuberculosis should be considered every time before a slow evolution pneumonia case, when it is treated with antibiotics to common germs without any improvement after two weeks.

The radiological images of tuberculosis cases involved in this study were very diverse. The higher frequency of opacity and pleural effusion images does not facilitate the diagnosis of the disease since they are more common from other pathogens. We need to highlight that in the description of histories and physical examinations of patients with pleural effusion caused by tubercle, all of them showed preserved general good condition, i.e., they were not prostrated. This clinical-radiological dissociation should raise the suspicion of tuberculosis.

The tuberculin skin test (TST) is an aid in the diagnosis of tuberculosis when combined with some other data suggestive of the disease (clinical symptoms and epidemiology) .[13] In children aged 10 years or under, a result of tuberculin test greater than or equal to 5mm in non-vaccinated or vaccinated with BCG for over two years, as well as a result greater than 10mm in vaccinated with BCG in less than two years are indicative of infection by M. tuberculosis. In this situation, according to the Ministry of Health of Brazil, chemoprophylaxy with isoniazid is recommended to reduce the risk of developing the active disease. In adolescents and adults the risk-benefit of chemoprophylaxis with isoniazid should be evaluated due to the possibility of hepatotoxicity[4].

There is a consensus that intradermic BCG is effective against severe forms of primary tuberculosis. The efficacy of BCG vaccine in studies conducted in under developed countries, in relation to the protection against serious forms of the disease, miliary and meningoencephalitis, ranged between 82.4% and 99.6% and against the other forms from 16% to 88%[11, 15].

All the patients in this study were vaccinated with one dose of BCG. Those who underwent tuberculin skin test showed readings suggestive of being infected.

The high vaccine coverage of patients in this study may explain the low frequency of cases of meningoencephalitis, and military found.

The extrapulmonary disease form is more common in childhood. Some locations are more frequent, such as the lymph nodes, preferably unilateral cervical lymph nodes may develop fistulas; pleural; bones, especially of the spine (Pott's Disease), occurring with pain in the segment reached, paraplegia and spinal deformities and meninges, occurring with prolonged fever accompanied by irritability, paralysis of cranial nerves, signs of meningeal irritation and intracranial hypertension. In cases of meningoencephalitis the CSF is clear with low CSF glucose, high level proteins and mononuclear predominance[11,14].

In cases of pleural tuberculosis, the following changes were found in pleural fluid: increased protein suggestive of exudate, pleocytosis on the expense of monocytosis and increased adenosine diaminase enzyme (ADA) in one of the cases where the enzyme was dosed

Low levels of CSF glucose, increased protein and pleocytosis on the expense of monocytes were the laboratory findings of cerebrospinal fluid in the cases diagnosed as meningoencephalitis by tuberculosis

The description of the alterations both of the pleural liquid and CFS in pleural tuberculosis and meningoencephalitis by tuberculosis cases is common practice [14].

The epidemic of infection by the human immunodeficiency virus HIV / AIDS is a global phenomenon, in which the form of occurrence in different regions of the world depends on the individual and collective human behavior among other determining factors [16].

In HIV infection, due to progressive cellular immunodeficiency, there is a high risk of developing active TB.

Regarding the investigation of co-infection TB / HIV, there is the need to perform background research on previous blood transfusion history record and risk factors for HIV in parents in all cases of TB in children. . Serology for HIV is recommended to all the diagnosed cases of tuberculosis.

In this study, co-infection was present in 4 patients with ages 11 to 16, all of them with HIV vertical transmission history.

Tuberculosis is still a major public health issue especially in developing countries. It is an example of the interdependence between socioeconomic inequalities and health status and the quality of life of a population.

Despite of causing significant morbidity and mortality, tuberculosis in children is neglected, most often on the aspect when it comes to

evaluating the contacts of an adult with bacillary pulmonary tuberculosis. The children are frequently assisted only when they are already presenting symptoms of the disease, i.e., when the disease is active.

The existence of tuberculosis among children is a good indicator of the extent of bacillary disease and of the inefficiency of the control of the aggravation in adult population, once children get infected from the adults with the pulmonary form of the disease in their surroundings.

The contact control is an early and efficient way to diagnose and treat children with latent infection by reducing the risk of active tuberculosis and for the ones with tuberculosis it decreases the suffering and the likelihood of the appearance of severe forms of disease.

The adoption of measures capable of ending social injustices and promoting universal access of the population to health actions is urgent in order to change the picture of this disease in the world, that is, to eliminate it.

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