

## EVALUATION OF ORAL STATUS IN CHILDREN INFECTED WITH MYCOBACTERIUM TUBERCULOSIS

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### ABSTRACT

Background : Pulmonary tuberculosis is one of the most common cause that leads to death in the world, about a third of world's population being infected with Mycobacterium tuberculosis. Oral manifestations of tuberculosis are rare and more common in young people and the connections that may occur between tuberculosis and the incidence of dental caries are determined mainly by socio-economic conditions and also long-term treatment with drugs that contain large amounts of sugar.

Material and methods: The study was performed examining two groups of children selected on inclusion criteria such as positive tuberculin skin test and a minimum 10-14 days of specific treatment for tuberculosis, both being compared with a control group. At the same time the odontal status was evaluated by determining the DMFT index and caries intensity index. The muco-periodontal status was evaluated by assessing the presence, types and extent of oral lesions.

Results : The data obtained showed that there is an increased degree of caries index among the children diagnosed with tuberculosis compared to the control group and oral lesions have a low incidence among the study groups, which means that oral manifestations are reduced in children and also, the oral mucosa is rarely a gateway for microorganisms, such as Koch bacillus.

Conclusions: There is an indirect correlation between the presence of dental caries and tuberculosis in children, an increased caries index being a direct consequence of poor oral hygiene and a low socio-economic status associated with a specific medication for tuberculosis rich in sugar administered orally to children as syrups.

**Key words:** tuberculosis, dental decay, caries index, socio-economic status.

### INTRODUCTION

*Pulmonary tuberculosis* in childhood and adolescence is a major global health problem and is responsible for a considerable burden of the overall disease. The World Health Organization (WHO) estimates that each year *Mycobacterium*

*tuberculosis* is responsible for nearly 2 million deaths and 9 million new diagnosed cases of tuberculosis worldwide. In 2016, 6.9 % of the reported 6.3 million new cases of tuberculosis were in children aged <15 years.<sup>1</sup>

Tuberculosis is an unending

granulomatous illness caused by *Mycobacterium tuberculosis*, which is transmitted principally through the respiratory tract through inhalation of airborne beads containing bacillus.<sup>2</sup> Symptomatic tuberculosis may occur a few months later after infection or may not set in for years or even decades. Although the immune response to tuberculosis occurs after infection, there may be substantial inborn resistance to the initial infection.<sup>3</sup>

To diagnosed the tuberculosis in children the combination of clinical history, tuberculin skin test and a chest X-ray serve as simple, low-cost approach that can be used for pediatric tuberculosis diagnosis.<sup>2</sup>

Bacteriologically confirmed tuberculosis was defined as the presence of acid-fast bacilli on sputum microscopy and/or *Mycobacterium tuberculosis* cultured from a respiratory specimen. Radiologically certain tuberculosis was defined as agreement between both independent experts that the chest radiograph indicated certain tuberculosis in the absence of bacteriologic confirmation.<sup>4</sup>

Saliva is considered to have a significant protective role which explains the paucity of oral lesions, despite the large numbers of bacilli present in sputum which are in contact with the oral mucosa in a typical case of pulmonary tuberculosis. Local factors that may facilitate the invasion of oral mucosa include poor oral hygiene, leukoplakia, local trauma and irritation by clove chewing, etc.<sup>5</sup>

The incidence of dental caries in children diagnosed with tuberculosis are determined mainly by socio-economic conditions and also long-term treatment

with drugs that contain large amounts of sugar.

Oral lesions associated with tuberculosis have a relatively rare occurrence. Studies vary, but the incidence has usually been reported as <1% of the population with tuberculosis.<sup>2</sup> Oral tuberculosis lesions may be either primary or secondary in occurrence. Primary lesions are uncommon, seen in younger patients and present as single painless ulcer with regional lymph node enlargement. Primary oral tuberculosis can be present as painless ulcers of long duration with enlargement of the regional lymph nodes. The secondary lesions are common, often associated with pulmonary disease, usually present as a single, indurated, irregular, painful ulcer covered by inflammatory exudates in patients of any age group but relatively more common in middle-aged and elderly patients.<sup>4</sup>

Primary gingival involvement is more common in children and adolescents than adults. It usually presents as a single painless indolent ulcer, which progressively extends from the gingival margin to the depths of the adjacent vestibule and is often associated with enlarged cervical lymph nodes. They may be single or multiple, painful or painless and usually appear as irregular, well-circumscribed ulcers with surrounding erythema without induration. Satellite lesions are commonly found.<sup>5</sup>

The management of infectious-contagious diseases has always a fundamental coordinate related to prophylaxis. That is way the dentist faces in practice with new challenges, such as tuberculosis, viral hepatitis and HIV infection, which have various oral manifestations and are often the alarm

signal for the presence of these diseases. Early detection and intervention are essential for the treatment of such fatal diseases. Furthermore, the identification serves as an important aid to reduce the potential source of infection among the community and the dental team itself.<sup>6</sup>

The aim of our study is to determine the correlations between the pulmonary tuberculosis diagnosed in children and the dental health status by clinical evaluation of caries indices and the presence of oral lesions.

## MATERIAL AND METHODS

The study was conducted between November 30, 2017 and May 31, 2019 on a group of 70 children aged between 4 and 12 years old.

The legal representatives of children were fully informed about the purpose and methodology of the investigation and were asked to sign a written consent regarding the inclusion of their children in the examination process and complete access to their medical records.

The study group consists of 40 subjects that are in evidence at the Pneumoftiziologie hospitals in Brasov and Tîrgu-Mures, previously diagnosed with tuberculosis and under specific treatment and medical supervision.

The control group (C) consists of 30 healthy children which were selected from patients who presented to the Center of Integrated Dental Medicine (CIMD) in the University of Medicine, Pharmacy, Science and Technology of Tîrgu-Mures for control and routine dental treatment.

The main study group was divided into two groups, depending on the area of origin of the patients diagnosed with tuberculosis, respectively a group S1

consisting of 25 subjects from rural area and a group S2 consisting of 15 subjects from urban area.

The selection criteria for children in the study group were :

- subject with positive Koch bacillus culture;
- subject with a positive tuberculin skin test (test Mantoux);
- subject under treatment for at least 10-14 days;

The selection criteria for the control group were :

- subject with no signs and symptoms of tuberculosis;
- subject with no history of suggestive tuberculosis symptoms;
- subject with protective factors such as : behavioral, environmental factors, drugs, vaccines;

The examination of the study group was performed in strict conditions of specific isolation, under natural light with the aid of a dental mirror and explorer, respecting the standard procedure (mask, gloves) in a room provided with special ventilation systems and ultrafiltrating masks. All the teeth were evaluated according to the criteria recommended by the World Health Organization (WHO). The presence of carious lesions was assessed by calculating DMFT caries indices which expresses the average number of decayed, missing and filling teeth for permanent and temporary teeth, prevalence index of dental caries, frequency of subjects free of caries lesions, indicators of the severity of the dental caries and also the state of dental hygiene of each subject studied.

The dental caries intensity index relates the number of DMF teeth to the number of subjects with dental caries, thus reflecting

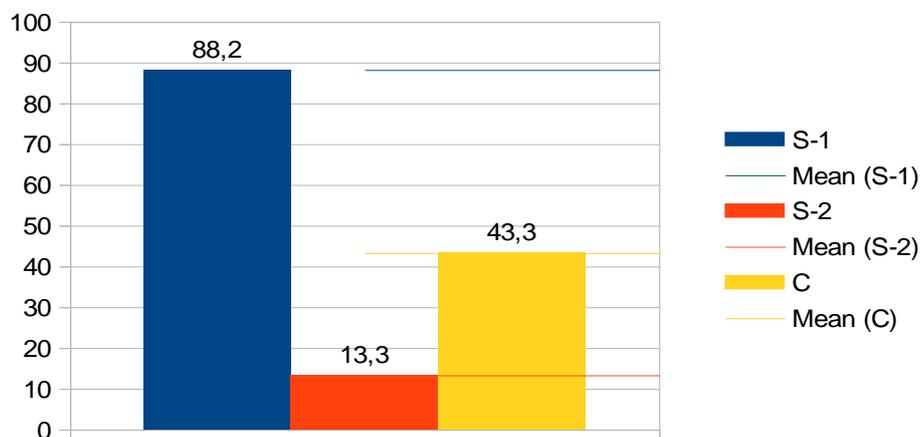
the average degree number of impairment of the investigated subjects.

**RESULTS**

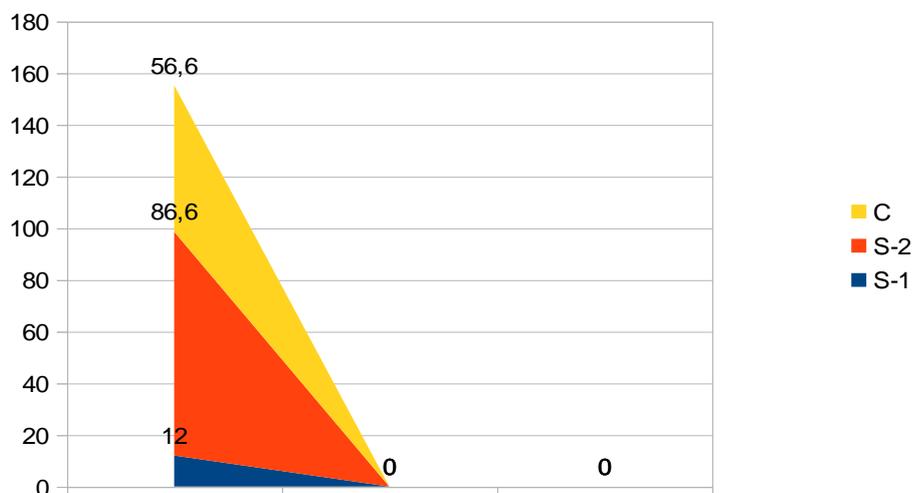
A total number of 70 subjects were examined of which 31 girls and 39 boys, with a mean age of 8.1 years in the study groups and 7.8 years in the control group (C). Regarding the means values of the prevalence index of dental caries we found statistically significant difference between the measurements recorded in the study groups, respectively S1 and S2 with a

higher percent among subjects from rural area (88.2%) compared with subjects from urban area (13.3 %). Figure 1

The frequency of subjects without caries lesions is a complementary indicator to the prevalence index which highlights the percentage of healthy subjects of the total number of the investigated subjects. The results showed that the subjects from the C group records the highest values, followed by the subjects from the study group S2. (Figure 2)



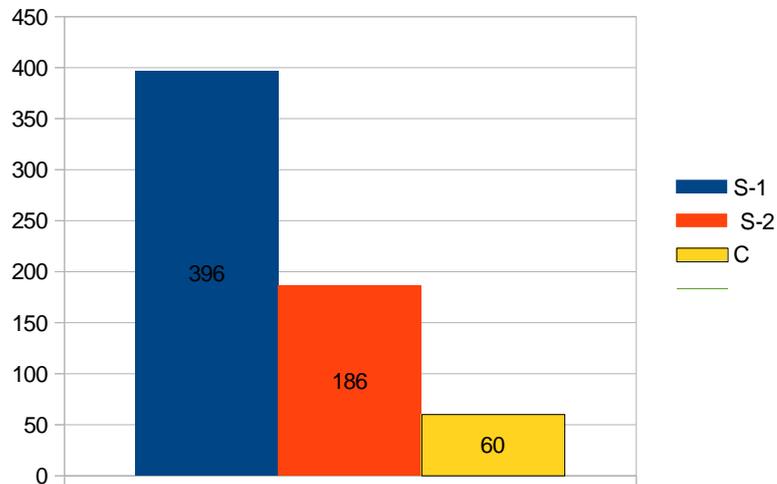
**FIGURE 1.** The prevalence index of dental caries



**FIGURE 2.** The frequency of tooth decay-free of investigated subjects

Analyzing the DMF-T index within groups, subjects in group S1 record higher values of caries index, both for temporary

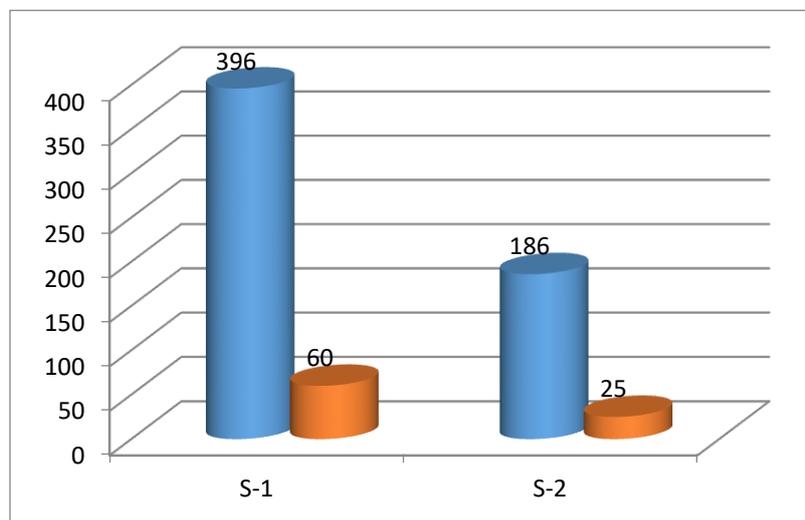
and permanent teeth, compared to the other two groups. (Figure 3)



**FIGURE 3.** Comparative values of DMFT index

Within group S2 the subjects had an increased value of the component F (filling) while in group S1 component D (decay) registered a higher value. (Figure

4). It can be said that there is a significant correlation between the presence of caries lesions, treatment and socio-economic conditions.



**FIGURE 4.** DMF-T index in the study groups S1 and S2

The low values of the caries index in group C are correlated with the presence of sealed permanent molars and subjects with a low risk for dental decay.

The detection of the oral lesions

showed a low incidence of subjects with a certain type of oral lesions found in groups S1, S2 and C. Thus, the common oral lesions were oral candidiasis (15.9%) followed by aphtous stomatitis (9.09%)

and herpetic stomatitis (6.81 %), which show that there is no statistically correlation between tuberculosis and the presence of oral lesions.

## DISCUSSION

The present study showed that there are a few direct connections between the infections with *Mycobacterium tuberculosis* and dental caries in children and also the literature provides little data on this topic. The epidemiology of opportunistic infections and chronic diseases, including oral mucosa and dental lesions has changed in frequency and nature.<sup>7</sup>

One of the connections is given by the patients' medication received either as tablets or in some cases syrups or tablets dissolved in water, but an important factor is the socio-economic conditions.<sup>8</sup> A study conducted in Chennai among randomly selected patients suffering from tuberculosis using a questionnaire showed that only 30 % of them visited the dentist when they had dental pain and this is due probably to a lack of awareness of dental caries or low economic status or both.<sup>9</sup>

In the present study in most cases the increased frequency of carious lesions are located in the area of the posterior teeth, especially in group S1 compared with the S2 and C group. We can say that the socio-economic aspect plays a major role not only in the occurrence of an increase rate of carious lesions but also in infection with *Mycobacterium tuberculosis*.

In a study published in India in 2002, the authors compared two groups of children, 51 subjects who received long-term liquid medication and 54 subjects who did not receive liquid medication. A high and significant difference was found

between the DMFT/dmft index in the age group 2-6 in which most of the posterior teeth were affected and also in the age group 6-13 years old. While the burden of childhood tuberculosis is known, regional data from the World Health Organization (WHO) indicate that children with active tuberculosis under 14 years old accounts for 0.6%-3.6% of all cases.<sup>10</sup>

Another study conducted in India showed that the rate of malnutrition were not different between children with pulmonary tuberculosis compared with children without tuberculosis, possible due to the overall rates of malnutrition that the entire population is struggling with.<sup>11</sup>

Another important problem is related with the possibility of transmitting this disease in the dental office from patients, especially children with active tuberculosis, through inhalation of mycobacteria, which then travel to the alveoli of the lungs. Although the risk of transmission of tuberculosis in dental settings is low, the Center for Disease Control and Prevention (CDC) recommends dental health care personnel include protocols for tuberculosis infection control in their offices' written infection control program.<sup>12</sup>

A respiratory tuberculosis should be suspected in any patient with symptoms including coughing for more than 3 weeks, loss of appetite, unexplained weight loss, night sweats, bloody sputum or hemoptysis, hoarseness, fever, fatigue or chest pains.<sup>13</sup>

Because a person with latent tuberculosis is not infectious, he or she can be treated in the dental office under standard infection control precautions.<sup>14,15</sup>

In a study conducted in Romania Assoc. Cuculescu M. admits that the

management of infectious-contagious diseases always has a fundamental coordinate related to prophylaxis.<sup>16</sup> In a few cases the oral mucosa may be the gateway to the microorganism, given that, naturally, the oral mucosa has a good resistance to the colonization with the Koch bacillus. The classic mucosal lesion is a deep, irregular ulcer, located on the dorsal side of the tongue, sometimes at the cutaneous-mucous junction of the mouth (lips, commissures) in patients with active lungs lesions.<sup>17</sup>

## CONCLUSIONS

In conclusion, the correlations that can be deduced between the liquid oral medication for tuberculosis and the prevalence of dental caries in children infected with *Mycobacterium tuberculosis* are the most relevant given the increased risk of carious processes, but an important role associated with active tuberculosis caries play poor oral hygiene and low socio-economic status.

## CONFLICT OF INTEREST

**Nothing to declare.**

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