

## **Dental Caries in Children with Chronic Tonsillitis**

*George Kipiani, Ketevan Davladze*

Department of Paedodontic and Stomatologic Disease Prevention, Tbilisi State Medical University, Georgia

### **Abstract**

Has been detected that in 9 years old children with chronic tonsillitis the clinical course of dental caries and clinical course of active form of dental caries has a strong resemblance, which is confirmed by the relatively increased indices of primary and permanent teeth caries spread and intensity (DMF, df). In children with chronic tonsillitis (29) significant changes in dental plaque microbial ecosystem were detected compared to children with intact tonsils (28). Aforesaid changes first of all were expressed by increased indices of cariogenic microorganisms' inoculation that was statistically reliable. In both clinical groups statistically reliable correlation between immunoglobulins' containment in fluid of oral cavity and dental caries intensity has not been detected.

**Keywords:** *caries, chronic tonsillitis, microorganisms, immunoglobulins*

### **Introduction**

Etiopathogenesis of dental caries has been investigated for a long time, however nowadays existing scientific point of view about mentioned problem is quite vague. According to recent studies [1,3,7,8] immune system status of oral cavity and regulation of oral micro-flora via the above-mentioned system is considered as very important in the dental caries pathogenesis. At the same time it is known, that formation of immune status of oral cavity to a great extent depends on regional lymphoid organs and main role belongs to laryngeal and pharyngeal tonsils [4].

Tonsils are considered as lymphoid organs, providing oral cavity by immunoglobulins in cooperation with salivary glands. On the other hand, it is about four decade that the leading role of infectious antigens in the pathogenesis of dental caries has been detected [8]. Consequently, it is supposed that tonsils play an essential role in suppression of cariogenic micro-flora, thereby providing caries prophylaxis or vice versa.

With the exception of several scientific investigations, suggesting information about tonsilopathies possible role in the dental caries pathogenesis, the serious and large-scale investigations of mentioned problem is not performed yet. Along with that, the problem is interesting also, because there is not direct indications for tonsillectomy and this organ in most cases becomes as an object of unfair "surgical aggression". On the other hand it is known that tonsillectomy supports development of diseases such as malignant lymphomas etc.

Coming from the aforesaid, the aim of our investigations was detection of role of chronic tonsilopathies in the development of dental caries.

The major tasks were:

- Detection of clinical peculiarities of dental caries in children with chronic tonsillitis;
- Quantitative and qualitative investigation of dental plaque microbial structure;

- Detection of immunoglobulin containment in oral cavity.

### **Material and Methods**

Investigations have been carried out on the basis of Tbilisi State Medical University (TSMU) N1 Dental clinic, TSMU Clinic of Pediatrics- Department of Otto-Rhino-Laryngology and Tbilisi Secondary schools.

Two clinical groups were formed: children with chronic decompensated tonsillitis (100) and children with intact tonsils (101). The primary and permanent teeth were examined on the daylight using the dental mirror and dental explorer. In some cases, for diagnosis confirmation, X-ray examination was used.

There were detected indices of caries intensity: DFM, df, and DFM+df, where D is the carious tooth; F- filling; M - extracted tooth;

The rate of caries intensity was determined as well.

Total of 57 children underwent microbiological and immunological investigations. Of 57, the 28 children were with intact tonsils and 29 - with chronic tonsillitis.

For microbiological investigations dental plaque material was taken from the first permanent molars' vestibular and frontal surfaces of lower jaw, using the standard parodontologic round-headed explorer.

Obtained material was placed in transport medium "Amies transport medium without charcoal" and was sent in microbiologic laboratory immediately. For investigation, aerobic and anaerobic microorganisms were subjected to special regimes.

For microbiological investigations the quantitative and qualitative methods were used. Preliminary count of results was performed after 24 and 48 hours (in case of fungi).

The culture was kept in thermostat with anaerobic packets - "Anaerocalt", t-370C, during 5 to 7 days for detection of anaerobic flora.

With the use of immunodiffusion, quantity of immunoglobulins was detected.

Received data were analyzed using the Software (primer biostatics 4.02 version).

### **Results**

Results of stomatological investigations have shown that of 100 children with decompensated chronic

tonsillitis 94 had the dental caries (94%), while of 101 children with intact tonsils 89 children were with dental caries (88,12%).

Investigations of dental caries intensity revealed that in children with intact tonsils the mean indicator of caries intensity according to DFM index was 1, according to DFM cavities - 1,366. The mean intensity according to primary teeth disorders was 3,653, according to cavities - 4,03. Indicator of intensity according to DFM+df index was 4,574, according to cavities+df cavities - 5,406.

In children with chronic tonsillitis the mean indicator of caries intensity was increased according to DFM index and DFM cavities as well 1,71 (P=0,000) and 2,35 (P=0,000) compared to children with intact tonsils.

In children with chronic tonsillitis indicator of caries intensity appeared increased in primary teeth also. For instance, the mean indicator of intensity according to df index was 4,52 (P=0,030), according to df cavities - 5,32 (P=0,008).

In children with chronic tonsillitis statistically reliable increase in indicator of intensity was detected according to DFM+df and DFM cavities+df cavity indexes as well. For instance, indicator of intensity according to DFM+df cavities was 7,63 (P=0,000).

Investigations have shown that frequency of distribution of dental caries clinical forms between children with chronic tonsillitis and children with intact tonsils ranges. The compensated form of caries in children with intact tonsils was detected in 50,5% of cases, subcompensated form - in 29,7% of cases, decompensated form - in 7,92% of cases, while in children with chronic tonsillitis, compensated form of caries was manifested in 32,0% of cases, subcompensated form - in 37,0% of cases and decompensated form - in 25,0% of cases.

Apparently, the clinical course of dental caries in children with chronic tonsillitis is characterized by markedly increased frequency of decompensated forms on the background of significantly decreased frequency of compensated forms.

Owing to microbiological investigations of dental plaque in 29 children with chronic tonsillitis 170 strains of microorganisms were detected and identified. The mentioned strains were belonged to 17 species of aerobic, facultative and obligatory anaerobic microorganisms.

Aerobic, facultative-anaerobic and microaerophilic microorganisms predominated in dental plaque microbial structure (55,8%). They mainly were presented by the gram-positive cocci and bacilli.

44,2% of identified strains was obligatory anaerobes, mainly gram-negative bacilli and cocci and gram-positive cocci.

The dental plaque microorganisms in children with chronic tonsillitis in most cases were associated with various microorganisms. Strains of *St.salivarium*, *B.subtilis*, *St.phyogenes*, *St.mutans* and among them *B.subtilis* and *S.phyogenes* characterized by hemolytic ability were manifested as monocultures.

Comparison of quantitative and special constituents of dental plaques in children with chronic tonsillitis to the same parameters in children with intact tonsils has shown difference in mentioned parameters (table N1).

In children with chronic tonsillitis, unlike children with intact tonsils, strains of *St.mutans*, *St.mitis* and *Candida albicans* were fixed in dental plaque microbial structure.

The indicator of dental plaque microorganisms' inoculation in children with chronic tonsillitis appeared different compared to children with intact tonsils. There were detected increased indicator of dental plaque microorganisms' inoculation and decreased indicator of the same parameter as well.

Increased indicator of dental plaque inoculation with *St.phyogenes* ( $P=0,03$ ) and *St.pneumoniae* ( $P=0,011$ ) appeared statistically reliable.

Also statistically reliable was decrease in dental plaque inoculation with *Lacobacilus* spp. ( $P=0,028$ ), *Neisseria* spp ( $P=0,033$ ) and *Bacteroides* spp ( $P=0,025$ ) strains. In clinical groups other changes of dental plaque inoculation with microorganisms were not statistically reliable.

Results of carried out immunological investigations have revealed that in children with intact tonsils Ig-A containment in fluid of oral cavity ranged from 0,26 g/l to 0,68 g/l. The mean value was 0,3506 g/l. The range of Ig-G was <1,5 g/l to 4,99 g/l, the mean value - 2,102 g/l.

In children with chronic tonsillitis containment of Ig-G in fluid of oral cavity ranged from 1,5 g/l to 6,0 g/l. The mean value was 2,172 g/l. The range of Ig-A was 0,26 g/l to 0,68 g/l, mean value - 0,3946 g/l.

Although, Ig-A and Ig-G containments in fluid of oral cavity were slightly increased in children with chronic tonsillitis compared to children with intact tonsils, detected changes and increase were not statistically reliable.

In both groups of children statistically reliable correlation between immunoglobulin containment in fluid of oral cavity and indicators of intensity in dental caries was not detected.

## Discussion

Recently, an important role of dental plaque micro-flora in etio-pathogenesis of dental caries has been proved, [1,8,9] that's why it is not the subject of dispute. *S.mutans* by various investigations has been identified as the main etiological agent of dental caries.

Present microbiological study of children with chronic tonsillitis has revealed changes in dental plaque microbial ecosystem compared to children with intact tonsils. Investigations have shown that dental plaque microbial structure in children with chronic tonsillitis was presented by aerobic, facultative-anaerobic and microaerophilic microorganisms, mainly by Streptococci, Staphylococci and lactobacilli among them microbial associations of *S.phyogenes* and *S.pneumoniae* (for chronic tonsillitis) and *S.mutans* and *S.mitis* (for dental caries) were distinguished with high inoculation indices.

Presence of *S.mutans* strains in dental plaque microbial associations of children with chronic tonsillitis indicates participation of mentioned microorganism in pathological processes

Along with that, presence of other cariogenic Streptococci and *Candida albicans*' strains in dental plaque microbial structure points on pathogenetical interrelations between chronic tonsillitis and dental caries.

Nowadays, the role of immunoglobulins in immune mechanisms of dental caries is still disputable and position of investigators is quite obscure. Some authors [8,12,13] suggest information about protective role of Ig-A, however exists an opposite point of view as well. [11]

Results of our immunological investigations coincide with results of other investigators [10,14] suggesting that there is not a difference in immunoglobulin containments in fluids of oral cavity of children without and with caries (among them children with active caries).

There is information about significant ranges of immunological indices in case of dental caries active form and in norm as well, Tenovue. [13] That's why, for evaluation of immune state, information and considerations of its separate elements is not sufficient, the more so that functioning of the above-mentioned system is provided by the balanced action of various sub-populations.

Coming from the above-mentioned, we should agree with concept, that none of the separate anti-microbial agent of oral cavity is the valuable and important diagnostic criterion in the formation of dental caries sensitivity *in Vivo*.

STRAINS AND SPECIES OF MICROORGANISMS STANDARD DEVIATION	CHILDREN WITH CHRONIC TONSILLITIS			CHILDREN WITH INTACT TONSILS			P
	Selective mean	Standard error	Standard error	Selective mean	Standard error	Standard error	
St. epidermitis	9,543×10 <sup>6</sup>	2,742×10 <sup>7</sup>	7,604×10 <sup>6</sup>	3,25×10 <sup>6</sup>	4,555×10 <sup>6</sup>	2,278×10 <sup>6</sup>	0,661
St. aureus				2,348×10 <sup>7</sup>	5,931×10 <sup>7</sup>	2,097×10 <sup>7</sup>	
S. mutans	4,667×10 <sup>7</sup>	4,04×10 <sup>7</sup>	2,333×10 <sup>7</sup>				
S. salivarium	1,171×10 <sup>8</sup>	1,579×10 <sup>8</sup>	7,06×10 <sup>7</sup>	1,045×10 <sup>6</sup>	6,435×10 <sup>5</sup>	4,55×10 <sup>5</sup>	0,371
S. mitis	1,67×10 <sup>7</sup>	1,438×10 <sup>7</sup>	8,3×10 <sup>6</sup>				
S. sanguis	1,005×10 <sup>6</sup>	8,244×10 <sup>5</sup>	2,203×10 <sup>5</sup>	3,84×10 <sup>5</sup>	6,558×10 <sup>5</sup>	2,319×10 <sup>5</sup>	0,084
S. phyogenes	2,612×10 <sup>7</sup>	4,925×10 <sup>7</sup>	2,463×10 <sup>7</sup>	6,059×10 <sup>5</sup>	4,534×10 <sup>5</sup>	1,1×10 <sup>5</sup>	0,030
S. pneumoniae	2,167×10 <sup>6</sup>	1,756×10 <sup>6</sup>	1,014×10 <sup>6</sup>	3,375×10 <sup>5</sup>	2,264×10 <sup>5</sup>	8,003×10 <sup>4</sup>	0,011
Lactobacillus spp.	2,378×10 <sup>4</sup>	5,292×10 <sup>4</sup>	9356	7,171×10 <sup>4</sup>	1,532×10 <sup>5</sup>	3,514×10 <sup>4</sup>	0,028
Candida albicans	3,236×10 <sup>7</sup>	4,682×10 <sup>7</sup>	1,481×10 <sup>7</sup>				
B. subtilis							
H. influenza							
Neisseria spp.	2,142×10 <sup>6</sup>	2,883×10 <sup>6</sup>	1,289×10 <sup>6</sup>	5,733×10 <sup>6</sup>	1,836×10 <sup>6</sup>	7,495×10 <sup>5</sup>	0,033
E. coli							
Pr. melaninogenica							
Peptostreptococcus spp.	3,236×10 <sup>7</sup>	4,682×10 <sup>7</sup>	1,481×10 <sup>7</sup>	1,102×10 <sup>6</sup>	2,526×10 <sup>6</sup>	6,522×10 <sup>5</sup>	0,992
Actinomyces spp.	5,091×10 <sup>4</sup>	4,742×10 <sup>4</sup>	1,43×10 <sup>4</sup>	2,369×10 <sup>6</sup>	4,351×10 <sup>6</sup>	1,207×10 <sup>6</sup>	0,092
Veillonella spp.	1,312×10 <sup>7</sup>	4,275×10 <sup>7</sup>	9,558×10 <sup>6</sup>	3,676×10 <sup>7</sup>	6,579×10 <sup>7</sup>	1,645×10 <sup>7</sup>	0,202
Fuzobacterium spp.	5,083×10 <sup>4</sup>	1,262×10 <sup>5</sup>	3,154×10 <sup>4</sup>	1900	1440	434,2	0,213
Bacteroidis spp.	6,143×10 <sup>4</sup>	4,811×10 <sup>4</sup>	1,818×10 <sup>4</sup>	2,09×10 <sup>6</sup>	4,169×10 <sup>6</sup>	1,318×10 <sup>6</sup>	0,025

**Tab.1** Dental plaque microorganisms' correlative contamination in clinical groups

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## **Карлес зубов у детей с хроническим тонзиллитом**

*Георгий Кипиани, Кетеван Давладзе*

Кафедра стоматологии детского возраста и профилактики стоматологических заболеваний  
Тбилисского государственного медицинского университета, Грузия

### **РЕЗЮМЕ**

Клиническая картина кариеса зубов у девятилетних детей с хроническим тонзиллитом характеризуется активным течением заболевания, что подтверждается показателями распространенности и интенсивности заболевания. В микробной экосистеме зубного налета у детей с хроническим тонзиллитом (29 пациентов) в сравнении с детьми со здоровыми миндалинами (28), отмечаются изменения – статистически достоверное увеличение показателей обсеменения зубного налета кариесогенными микроорганизмами. В обеих клинических группах содержание иммуноглобулинов в среде полости рта и интенсивность кариеса статистически достоверной связи не имеют.

**Ключевые слова:** *хронический тонзиллит, микрофлора, иммуноглобулины*