

The prevalence of gingivitis among 4-16 year old schoolchildren in Kaunas

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SUMMARY

The objective of this study is to investigate the incidence of gingivitis and periodontitis among schoolchildren of 6 - 14 years old in Kaunas City.

The state of oral hygiene and incidence of periodontitis was evaluated among 89 schoolchildren between 6-8 years old, 86 schoolchildren between 9-11 years old and 75 schoolchildren between 12-14 years old.

After investigating and evaluating the degree of severity of gingivitis among the schoolchildren, it was stated that benign (light) gingivitis constitutes periodontal lesions among more than half (59,6%) of the schoolchildren, at the age of 6-8 years old, 34,9% at the age of 9-10 years old, and 46,7 % at the age of 12-14 years old. Medium degree of severity of gingivitis was diagnosed only to a very small number of all examined (9,2%).

Evaluating the connection between the incidence of gingivitis and the state of oral hygiene, benign gingivitis was diagnosed to almost half (47,1%) of the examined and gingivitis of medium severity was diagnosed to 44,1% of the examined. However, no periodontal lesion was diagnosed for the majority of schoolchildren with efficient oral hygiene (98,2%).

Trying to improve the health of the oral cavity among schoolchildren, it is necessary to form efficient habits of oral hygiene, combining the efforts of dentists, oral hygienists, teachers, parents and schoolchildren themselves.

Keywords: schoolchildren, prevalence, periodontitis, oral hygiene.

Many people in the world, and in Lithuania, have periodontal diseases. Usually elderly people suffer the most, however, some forms of the diseases appear at quite a young age (1,2).

Investigations show that marginal gingivitis starts in early childhood and its incidence and degree of severity increases in adolescence, whereas in the next decade, the incidence of gingivitis spreads insignificantly. However, gingivitis of adults appears in a more severe form. After evaluation of the general incidence among the adult population, it was stated that from 50,0 to 100,0% of people suffer from gingivitis.(3)

One of the main etiological factors of the appearance of periodontal diseases is the collection of the microbe pad on the periodontal edge, bed or recess. Resistance of periodontal webs to microbes depends on many local and general factors. Hyperergical reactions to bacteria belong to the immune mechanisms: anafilaxium and oversensitivity, reactions of immune complexes, and citotoxic reactions (3,4,5).

Systematical factors are related to the general health of an organism, they influence periodontitis (e.g. endocrine factors, disorders of nutrition or its insufficiency, effects of medicine, psychological or emotional factors, inheritance, metabolic factors and hematological diseases)(5,6,7).

One of the local initial factors is the soft pad, which is one the most frequent appearances of periodontitis. It im-

pels the spread of microorganisms, periodontal inflammation (because it emits toxins, antigens). Then the soft pad mineralizes, it becomes concrete. The soft pad impels the appearance of caries as well (1,3,4,5,6).

Other important local pre-dispositional factors includes: the consistency of food and it's remains, orthodontic means, pigment pad, teeth concretion, caries, smoking, inefficient help of a dentist or hygienist (6,7).

Many people in the world, and in Lithuania, suffer from periodontal diseases. Usually it is spread among elderly people, however, some forms of the disease appear at a young age (8,9,10).

Earlier performed investigations on the incidence of periodontal diseases in Lithuania has shown that the incidence of these diseases varies from 38,0% to 100,0 % depending on age. (11,12,13,15).

In the case of gingivitis, inflammation processes engages only the free gingiva and does not spread into other periodontal webs. At this stage periodontal disease can be treated successfully. If not treated, the epithelium link of the gingival bed with the tooth surface can be stroyed and then the inflammation would spread to the marginal periodontal tissues and later inevitably would move to the bone of alveolus. At this stage of disease when periodontitis develops, deep periodontal recesses are noticed and teeth become very mobile. Periodontitis is treated by stomatology specialists in periodontics. The time of treatment is very long and expensive, so stomatologists of general practice can help their young patients, warning them about the risk factors of periodontal diseases, eliminating them in time, and diagnosing periodontal diseases at early stages (11,12,13).

To develop and apply programs of prevention of periodontal diseases successfully, it is necessary to know the intensiveness and spread of the diseases and their risk factors. Recently there are many investigations carried out in the world, with the aim to investigate the incidence of gingi-

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vitis among schoolchildren and adolescence, and to evaluate the effectiveness of chosen preventative means (12,13,14,16). Since in our country periodontal diseases causes not only a few problems for children and adults as well, the objective of our work was to investigate the incidence of gingivitis and periodontitis among schoolchildren at the age 6-14 years old, and to suggest practical recommendations for the decrease of incidence of these diseases.

METHODOLOGY AND MATERIAL OF RESEARCH

A single research was performed at two randomly chosen secondary schools of Kaunas City. Schoolchildren of the 1st, 4th and 7th forms took part in the research.

While forming the investigation, one form was taken as a unit of the sample.

250 schoolchildren were interviewed and examined objectively. 140 boys (56%) and 110 (44%) girls. The state of oral hygiene, the incidence of gingivitis and periodontitis, and the knowledge and skills were evaluated among 89 (35,6%) 6-8 years old (1st form schoolchildren), 86 (34,4%) 9-10 years old (4th form schoolchildren), 75 (30,0%) 12-14 year old (7th form students). Distribution according to the age and sex are shown in the chart number 1.

In the process of the research, all the schoolchildren were interviewed according to a standard questionnaire. Objective investigation of the oral cavity, during which oral hygiene state and index, according to Silness and Loe, were evaluated and diagnosed as to whether there is gingivitis or periodontitis.

Objective research was performed evaluating the state of oral hygiene during the examination as follows:

- Good (hygienic index 0,1-1,0),
- Fair (hygienic index 1,1-2,0)
- Bad (hygienic index 2,1-3,0).

Using the oral hygiene index according to Silness and Loe (PLI) is estimated the quantity and the place of the pad. The investigation is performed using stilet and was evaluated visually. Evaluation uses the 4 point system:

- 0- no pad
- 1- pad at the marginal edge of gingiva, quantity is insignificant
- 2- pad is well seen at the marginal edge of gingiva, in the interdental areas,
- 3- thick pad well seen visually and scratching with a stilet and are on the surface of the teeth near the gingiva, in the interdental areas.

The evaluation was performed adding the score and dividing it from the number of teeth.

Gingivitis and periodontitis (index of periodontitis) is evaluated according to the degree of web lesions and the state of the gingiva, according to Ramford (PDI) index:

- 0 – no lesions,
- 1-benign (light) gingivitis,
- 2-medium gingivitis,
- 3-more complicated gingivitis, bleeding, redness and gingival tendency to ache,
- 4-widening of periodontal recess not bigger than 3 mm,
- 5-periodontal recess 3-6 mm large,
- 6-periodontal recess larger than 6 mm, damaged joint between enamel and cement; the tooth is mobile in any direction.

Statistical data basis performed using standard statistical program of data analysis. Reliability of statistical hypothesis about the link between the factors was evaluated referring to X2 criteria. Comparing the difference of statistical data between the investigated groups, reliability was checked on the basis of Student's criteria. Results are considered to be statistically reliable when p<0,05.

RESULTS AND CONSIDERATION

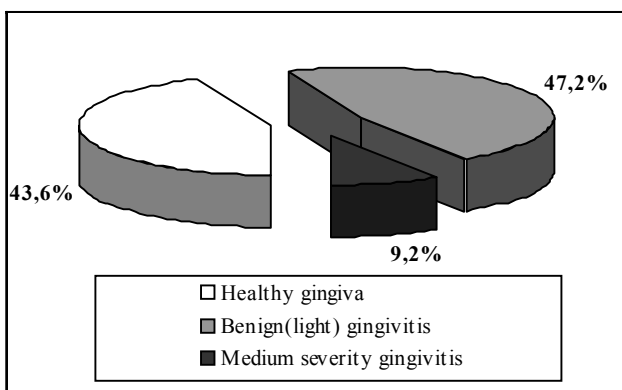
After the examination of 6-14 year old schoolchildren, it was estimated that only 43,6 % of the schoolchildren have healthy gingiva (40,0 % boys and 48,2 % girls). Benign (light) gingivitis was identified in 47,2 % of the schoolchildren (47,1 % boys and 47,3 % girls) and in 9,2 % of the examined schoolchildren there was diagnosed medium severity of gingivitis (12,9 % boys and 4,5% girls) (picture 1).

After evaluation of the incidence of gingivitis, depending on age, it was identified that one third of schoolchildren of 1st form (36,0%), more than a half (57,0%) 9-11 years old schoolchildren and 37,3 % schoolchildren of 7th form had healthy gingiva. The schoolchildren of the 4th form had the healthiest gingiva (p<0,05) and the schoolchildren of the senior classes take less care of their oral hygiene. In our opinion 1st form schoolchildren do not have sufficient skills to take care of the health of their oral cavity, thus the lesions in their gingiva are more frequent.

Evaluating a degree of severity of gingivitis according to PDI index, it is estimated, that benign (light) gingivitis made up more than half - 59,6% among schoolchildren of 6-8 years old, 34,9% of 4th form schoolchildren and 46,7% 12-14 year old schoolchildren. Gingivitis of medium severity was diagnosed only to a small portion (9,2%) of the examined.

Analysis of the data showed, that gingivitis of medium severity was more common among schoolchildren of 12-14 years old (p<0,05), 16,0 % of medium severity gingivitis was diagnosed to them. Younger schoolchildren had this diagnosis less seldom (chart no 2). The findings of the study performed by Bossnjak A. et al (11) are similar to with our results. They found that prevalence of gingivitis in 6-11 year old Croatian children was 57%.

Comparing these results with a study performed earlier, the results among 12 year olds in Kaunas show, that the state of periodontal disease has not improved. Since a de-



Picture 1. The incidence of gingivitis, depending on the degree of severity, among 6-14 year old schoolchildren was as follows

Chart 1. Distribution of schoolchildren according to sex and age group.

Sex	Age groups					
	6 - 8		9 - 11		12 - 14	
	n	%	n	%	n	%
Boys	45	50,6	50	58,1	45	60,0
Girls	44	49,4	36	41,9	30	40,0
Altogether	89	100,0	86	100,0	75	100,0

Chart 2. Incidence of gingivitis among the schoolchildren according to age.

Gingivitis	Age (years)					
	6 – 8		9 – 11		12 – 14	
	n	%	n	%	n	%
Healthy gingiva	32	35,9*	49	57,0**	28	37,3**
Benign gingivitis	53	59,6	30	34,9	35	46,7
Medium severity gingivitis	4	4,5	7	8,1	12	16,0
Severe gingivitis	0	0	0	0	0	0
Altogether:	89	100,0	86	100,0	75	100,0

$X^2=17,05$ $df=4$ $p<0,002$

Chart 3. Incidence of gingivitis among 6-14 years old schoolchildren, depending on a state of oral hygiene.

Gingivitis	State of oral hygiene							
	Bad		Fair		Goog		Altogether	
	n	%	n	%	n	%	n	%
Healthy gingiva	3	8,8**	52	32,3*	54	98,2**	109	43,6
Light gingivitis	16	47,1	101	62,7	1	1,8	118	47,2
Medium severity gingivitis	15	44,1	8	5,0			23	9,2
Altogether:	34	100,0	161	100,0	55	100,0	250	100,0

$X^2=137,21$ $df=4$ $p<0,0001$

Table 4. Incidence of gingivitis among 6-14 years old schoolchildren due to the index of oral hygiene.

Gingivitis	Index of oral hygiene in scores							
	0		0,1 – 1,0		1,1 – 2,0		2,1 – 3,0	
	n	%	n	%	n	%	n	%
Healthy gingiva	44	100*	46	65,7*	19	16,2		
Benign (light) gingivitis			23	32,9**	88	75,2**	7	36,8
Medium severity gingivitis			1	1,4	10	8,5	12	63,2
Altogether:	44	100,0	70	100,0	117	100,0	19	100,0

$X^2=180,85$ $df=6$ $p<0,0001$

gree of gingivitis has not been evaluated earlier, we can not compare the dynamics of the severity of the disease during some years. Thus we can state, that schoolchildren do not pay sufficient attention to oral hygiene, especially the quality of teeth cleaning. Relations between gingivitis and oral hygiene was found by Taani D.S. et al, Astrom A.N., Samdal O., Rajab L.D. et al (16,17,18).

Periodontitis has not been diagnosed in the examined schoolchildren. Results of the investigation coincide with the data of studies performed earlier (5,12,15). It is a positive result, that among young schoolchildren deeper periodontal webs are not damaged, only gingiva. Efficient oral care can prevent disease.

While analyzing data of the investigation it was estimated, that there is a link between the incidence of gingivitis and oral hygiene state, and the index of oral hygiene. It has been stated by a number of researchers, Swiss and Japanese scientists among them (4,9).

Summing up the results, it is acknowledged, that almost half of the examined with a poor oral hygiene state (47,1%) had benign (light) gingivitis and 44,1 % had medium severity of gingivitis. Only 8,8% of the examined had healthy gingiva, though their oral hygiene state was poor.

More than half (62,7%) of schoolchildren had benign(light) gingivitis with fair oral hygiene state, and 1,8% had a light degree of damage to the gingiva . Thus, there are some exceptions, i.e. healthy gingiva with poor oral hygiene. After the interview it was clear that when a patient usually cleans teeth regularly, but has not cleaned them on the day of the examination (chart no 16).

According to the acquired data, it was seen that most schoolchildren (98,2%) with good oral hygiene state did not have gingivitis $p<0,05$ (chart 3).

Evaluating the results, it was estimated , that the index of oral hygiene, the state of oral hygiene and the incidence of gingivitis are closely linked. The bigger the index according to the score, the more damaged the gingiva, i.e. light or medium severity gingivitis was diagnosed.

Evaluating the index of oral hygiene in scores and analyzing degree of severity benign (light) gingivitis was diagnosed for the three fourths (75,2%) of 6-14 years old schoolchildren, after finding pads at the edge of gingiva and interdental (hygienic index 1,1-2,0) and 36,8% with pads at the edge of gums, interdental and covering the corona of a tooth (hygienic index 2,1-3,0). Medium severity gingivitis was diagnosed to more than a half (63,2%) schoolchildren of 6-14 years old, whose hygienic index is 2,1-3,0 and 8,5%, when hygienic index is 1,1-2,0 (table no 4).

Summing up, a conclusion could be drawn, that the incidence of gingivitis depends on the state of the oral hygiene and the hygienic index of the oral cavity, correspondingly, due to schoolchildren's knowledge of individual oral hygiene and skills. Prevalence and severity of gingivitis was reduced by improving oral hygiene. The similar results were performed by Rajab L.D. et al and Williams K. et al (18,19).

We have noticed, that schoolchildren's answers about frequency of cleaning and the objective evaluation of oral hygiene state for the most part, do not coincide. Even if it is stated, that teeth are cleaned regularly, 2 times a day, index of oral hygiene is between 1,1-2,0 score, i.e. fair state of oral hygiene. That proves that schoolchildren do not pay due attention to the quality of cleaning of teeth. Cleaning of teeth takes only 20-30seconds, all the surfaces are not cleaned, dental floss is not used for interdental cleaning. Thus, after evaluation of the results of our research it is recommended to pay greater attention to the "quality" of

teeth cleaning. It is necessary to explain to schoolchildren how important it is to entirely eliminate the pad from the dental surface. Another important point is the usage of interdental floss. As many as 93,6% of the interviewed schoolchildren do not use floss for interdental cleaning. Only 24,8 % of schoolchildren gargle the mouth after a meal. Only 2 (0,08%) from the examined schoolchildren have visited an oral hygienist for professional oral hygiene. The schoolchildren do not know much about periodontal diseases, their affects, though they know more about caries, its complications and possibilities of prevention. So it is necessary to stress the prevention of periodontal diseases, to explain the importance of oral hygiene, and the elimination of soft and hard pad. A significant role in this field should be played by oral hygienists, whose contribution in the decrease of periodontal disease and the spread and intensity of caries can be crucial. It is necessary to find some funds to employ oral hygiene specialists in vacant rooms of schools' dentists. Teachers and parents should be gathered to promote healthy life style, healthy teeth politics. Only joint efforts of doctors, dentists of general practice, children's dentists, oral hygiene specialists, parents and schoolchildren themselves

can help children and adolescence to preserve good oral health.

CONCLUSIONS

1. After examining 6-14 year old schoolchildren's gingiva and state of the periodontal tissues, it was estimated, that lesions of different severity i.e. gingivitis is diagnosed to every second (56,4%) 6-14 year old schoolchild. No periodontitis cases have been registered.

2. Hygiene of the oral cavity of the examined with gingivitis was worse than schoolchildren, whose gingiva were healthy. Almost all (98,2%) whose oral hygiene was good did not have gingivitis.

3. Seeking to improve the health of the oral cavity of schoolchildren, it is necessary to educate them to form skills of individual oral cavity hygiene, joining efforts of teachers, parents and schoolchildren themselves.

4. Significant role to the decrease of incidence of periodontal diseases would have employment of oral hygiene specialists at schools in remaining rooms of school dentists.

REFERENCES

1. Axellson P. Caries and periodontal disease // in: An introduction to risk prediction and preventive dentistry. 2000. p.39-77.
2. Žekonis G, Balčiūnaitė S. Features of clinical investigation data of patients with gingivitis and periodontitis. *Stomatologija* 1999; 4: 9-12
3. Sheiham A. In the chemical prevention of gingivitis necessary to prevent severe periodontitis. *Periodontol* 2000. 1997; 15:15-24.
4. D'Almeida HB, Kagami N, Maki Y, Takaesu Y. Self-reported oral hygiene habits, health knowledge, and sources of oral health information in a group of Japanese junior high school students. *Bull-Tokyo-Dent-Coll* 1997; 38(2): 123-31.
5. Ashley FP, Usinskin LA, Wilson RF. The relationship between irregularity of the teeth, plaque, and gingivitis. *Eur J Orthod* 1998; 20(1): 65-72.
6. Tae Ju-Oh, Robert Eber, Hom Lay-Wang. Periodontal diseases in the child and adolescent // *J Clin Periodontol* 2002; 29 (5): 400-10.
7. Milčiuvienė S, Jasulaitytė L. Prevention of stomatological diseases; Kaunas 1999. p. 31-71.
8. Yonemitru M., Watanabe H., Ono Y. Epidemiological study on distribution of plaque, calculus and gingivitis among Nigeria people // *Arf-Y-med-Sci* 1996, Dec. 25 (4).
9. Lietha-Elmer E., Vock P., Spielman T. The incidence of plaque and gingivitis in schoolchildren of the davos region // *Schweiz. Monatschr.Zahnmed* 1989, 99(3).
10. McDonald R.E., Avery D.R., Weddel J.A. Gingivitis and Periodontitis Disease // in: *Dentistry for the Child and Adolescent*. Mosby 2000, 7th edition: 440-84.
11. Bossnjak A. Curilovic C., Vuccicevic-Boras V., Plancak D., Jorgic-Srdjak K., Relja Bozic D., Varnica H. Prevalence of gingivitis in 6-11 year old Croatian children. *Eur J Med Res* 2003, 31: 6(7): 313-7.
12. Silveira J.L., Oliveira V., Padilha W. Evaluation of the reduction of the visible plaque index of the gum bleeding index in a program of oral health promotion for children. *Pesqui Odontol Brasil* 2002, 16(2): 169-74.
13. Mazzocchi AR, Moretti R, Effectiveness of a dental preventive program on plaque index in 8-year old children of Mergamo, Italy. *Community Dent Oral Epidemiol* 1997; 25(4): 332-3
14. Kaivusilta L., Honkala S., Honkala E., Rimpela A. Tooth brushing as a part of the adolescents lifestyle predicts educational level. *J Dent Res* 2003. 82(5): 361-6.
15. Bendoraitiene E., Milciuviene S. Periodontal status and oral hygiene among Lithuanian 12 year old schoolchildren. *Stomatologija* 2001; 3(2): 10-13.
16. Taani D.S., a;-Wahadni A.M., al Omari M. The effect of frequency of toothbrushing on oral health of 14-16 year old. *J Intern Dent Assoc* 2003; 49(1): 15-20.
17. Astrom A.N., Samdal O. Time trends of oral health behaviours among Norwegian adolescents: 1985-1997. *Acta Odontol Scand* 2001; 59(4): 193-200.
18. Rajab L.D., Petersen P.E., Bakaeen G., Hamdan M.I. Oral health behaviour of schoolchildren and parents in Jordan. *Intern J Paediatr Dent* 2002, 12(3): 168-176.
19. Sayegh A., Dini E.L., Holt R.D., Bedi R. Oral cleanliness, gingivitis, dental caries and oral health behaviours in Jordanian children. *J Int Acad Periodontol* 2002, 4(1): 12-8.

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