



Original article

GINGIVAL STATUS AND ORAL HYGIENE HABITS IN CHILDREN BETWEEN 10-12 YEARS

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SUMMARY

Introduction: Children's adolescence is characterized by dynamically changing indicators of periodontal and oral health, related mainly to the eruption of the permanent dentition and stabilization of the periodontal space. This age period is also characterized by an increased incidence of gingival diseases, with the dental biofilm being the main risk factor for the inflammatory process.

Aim: The aim of this study is to assess the relationship between gingival status, oral hygiene habits and knowledge on topics related to oral health in children aged 11-13.

Material and methods: The subject of the study was 106 children aged 11-13 years. All children underwent a clinical periodontal examination and periodontal risk assessment at 4 levels. An electronic periodontal probe PA ON (Orangedental) with specially designed software was used to assess periodontal and oral hygiene status. The study included a survey method for assessing children's knowledge on topics related to oral health with periodontal focus. The survey consists of 38 questions divided into eight topics.

Results: All the children aged 11-13 years had an initial form of gingival inflammation, against the background of plaque accumulation affecting more than 69% of tooth surfaces, unstable and irregular oral hygiene habits, as well as insufficient knowledge of oral/periodontal health.

Through appropriate preventive programs, this age is best suited to create consciously motivated behavior for proper oral hygiene and oral health.

Keywords: gingivitis, children, preventive programs, electronic periodontal probe,

INTRODUCTION

Children's adolescence is characterized by dynamically changing indicators of periodontal and oral health, related mainly to the eruption of the permanent dentition and stabilization of the periodontal space. Children are gaining greater autonomy to maintain their own oral health, while parental control over the frequency, duration and effectiveness of oral hygiene procedures decreases during this period of development [1].

This age period is also characterized by an increased incidence of gingival diseases, with dental biofilm being the main risk factor for the inflammatory process [2]. The gingival status of adolescents is directly dependent on plaque accumulation and is often the cause of the initial reversible forms of gingival inflammation, which are the subject of oral preventive programs with periodontal orientation [3].

Clinical methods for assessing the gingival status of adolescents are based on a visual evaluation of changes involving marginal gingiva and probing to assess the depth of the gingival sulcus and bleeding on probing (BoP) [3]. The parameters mentioned are usually part of various gingival indexes and/or systems for assessing oral hygiene status and gingival inflammation, most of which use certain representative teeth and surfaces to characterize gingival status [4].

Periodontal probing as an element of the gingival status diagnostic protocol is a sensitive and delicate method that could mislead clinicians with incorrect application [5]. A major disadvantage of mechanical periodontal probes is the lack of controlled force during the probing process. At the same time, modern studies of the latest generation of electronic periodontal probes show an easy protocol of application, accuracy in measurements and digitalization of the diagnostic process [6].

Given the key importance of dental biofilm as a risk factor in periodontal pathology, establishing proper oral hygiene habits in adolescents is an integral part of primary oral prophylaxis. For establishing these habits, the level

of knowledge on topics related to oral/periodontal health is important, and the absence of which is usually the reason for underestimating the main causes of gingival pathology and misbehavior in this direction [7, 8].

Building up conscious, rational, and sustainable behavior that preserves the oral/periodontal health of children is an emphasis of periodontal prophylaxis in adolescence [7, 8].

AIM

The aim of this study is to assess the relationship between gingival status, oral hygiene habits and knowledge on topics related to oral health in children aged 11-13.

MATERIAL AND METHODS

The subject of the study was 106 children aged 11-13 years from 5th, 6th and 7th grade of 11 Primary School "Hr. Botev" town of Blagoevgrad.

Criteria for including children in the study were:

- Absence of risk for periodontal health systemic diseases;
- No antibiotics intake in the last three months;
- Lack of non-removable orthodontic appliances;
- The presence of initial gingival inflammation with a BoP of more than 10 %.

Methodology

All children overwent a clinical periodontal examination and periodontal risk assessment at 4 levels. The examinations were carried out by one examiner in the school's dental office according to a specially developed schedule. For the present study, an electronic periodontal probe **PAON** (Orange dental) with specially designed software was used to assess periodontal and oral hygiene status. The software of the probe provides an automatic calculation of the values of the examined parameters in each child.

Anamnestic data according to personal information, general health status and oral hygiene habits was collected according to children.

The clinical study included:

- Assessment of the dental status of children;
- Assessment of oral hygiene status by index embedded in the software of the electronic periodontal probe – full mouth plaque score (FMPS). The index is calculated for each patient as a relative proportion of surfaces covered with dental plaque. The study included an assessment of the presence/absence of dental biofilm using a disclosing tablet. All permanent teeth were assessed in four fields – distal (distovestibular), vestibular, mesial (mesiovestibular) and oral;

- Gingival status assessment by gingival index embedded in the software of the electronic periodontal probe – full mouth bleeding score (FMBS). The index value indicates a relative proportion of gingival points with bleeding in each patient. The presence/absence of bleeding on probing of all fully erupted permanent teeth at four points of the gingival sulcus was examined.

The current study included a survey method for assessing children's knowledge on topics related to oral health with **periodontal focus**. The survey consists of 38 questions divided into eight topics (Oral Environment (8 Questions), Teeth (5 Questions), Oral Microorganisms (3 Questions), Dental Plaque (5 Questions), Oral Hygiene (9 Questions), Dental Caries (2 Questions), Inflammation (6 Questions). The questions on each of the topics were divided into "easy" and "difficult" for a detailed assessment of knowledge. Each question had four possible answers – "completely true", "partially true", "false" and "don't know", and for the purposes of the present study and statistical processing, only answers "completely true" were accepted, and all other options were considered wrong.

SPSS Windows, version 19.0, was used for statistical data processing.

RESULTS

1. Distribution of examined children by sex and age

The following table presents the distribution of examined children by sex and age (table. 1)

Table 1. Distribution of examined children by sex and age.

Age \ Sex	Boys		Girls		Total	
	N	%	N	%	N	%
11 years old	26	50,0	26	50,0	52	100
12 years old	14	50,0	14	50,0	28	100
13 years old	14	53,8	12	46,2	26	100
Total	54	50,9	52	49,1	106	100

Pearson Chi square = 0,709 P > 0,05

The table shows that the total number of children examined was 106, with an even distribution by gender ($P > 0,05$).

2. Cariosity of the examined children

The following table presents an average number of decayed, extracted (permanent teeth extracted due to complicated caries) and filled teeth in the examined children, distributed by sex (table. 2)

Table 2. Average value of decayed, extracted, filled teeth distributed by sex.

Sex \ Cariosity	Boys ¹	Girls ²	Total	ANOVA
	Mean ± SD	Mean ± SD	Mean ± SD	
D (D+d)	0,85± 1,16	1,60± 2,25	1,23± 1,82	T _{1,2} =3,500 p> 0,05
M (M+m)	0,00± 0,00	0,05± 0,22	0,03± 0,15	T _{1,2} = 2,053 p>0,05
F (F+f)	0,75± 1,31	1,95± 2,01	0,75± 1,31	T _{1,2} =9,966 p<0,05*
DMF (T+t)	1,60± 1,61	3,60± 3,51	2,60± 2,89	T _{1,2} =10,700 p<0,05*

The examined children have a mixed dentition with single primary teeth. The table shows that the average DMF (T+t) index for all examined children was 2,60± 2,89 teeth per child, with a higher index in girls, which was supported by statistical reliability (p<0,05). An average of 1,23± 1,82 teeth per child were affected by carious lesion, with no statistically reliable difference between boys and girls. Obturated teeth average 0,75± 1,31, and again in girls, the value of obturated teeth is statistically higher (p<0,05).

3. Oral hygiene habits in the studied children

The following table presents the oral hygiene habits of the studied children (table. 3).

The table shows that only one third of the children brush their teeth twice a day, while over 60 % of them brush sometimes (either just in the morning or just in the evening). In terms of cleaning time, 68 % of all children do not detect it at all, and only 22 % of them follow the 2-minute rule. The table also shows that nearly 90 % of the examined children use a mechanical toothbrush.

Table 3. Oral hygiene habits of the studied children.

Oral Hygien Habit		N	%	Pearson Chi Square
Frequency	Twice a day	41	38,7	$\chi^2= 0,711$ p>0,05
	Sometimes	65	61,3	
	Total	106	100	
Duration	Does not detect	72	67,9	$\chi^2=4,362$ p<0,05
	1 min	10	9,4	
	2 min	24	22,6	
	Total	106	100	
Brush type	Mechanical	96	90,6	$\chi^2=4,230$ p<0,05
	Electric	10	9,4	
	Total	106	100	

4. Oral – hygiene and gingival status of the examined children distributed by sex

The following table presents the oral hygiene index (FMPS) and the gingival index (FMBS) of the examined children by gender (table. 4)

Table 4. Oral hygiene status and gingival status in examined children

Oral hygiene/ gingival indexes	N children	Boys ¹ Mean ±SD	N children	Girls ² Mean ±SD	N children	Total	ANOVA
FMPS	54	68,3± 13,680	52	71,4± 12,001	106	69,8± 12,915	T _{1,2} =1,502 p> 0,05
FMBS	54	23,2± 13,292	52	30,1± 19,372	106	26,6± 16,828	T _{1,2} = 4,492 p< 0,05

The table shows that the proportion of surfaces covered with plaque on average in all examined children is 69,8 %, indicating that more than 2/3 of the tooth surfaces have plaque accumulation. The average induced gingival bleeding in all children was 26,6 %, which corresponds to initial localized gingival inflammation. For FMPS, no statistically significant gender differences were found (p> 0.05).

5. Knowledge of oral health topics with periodontal focus in the studied children

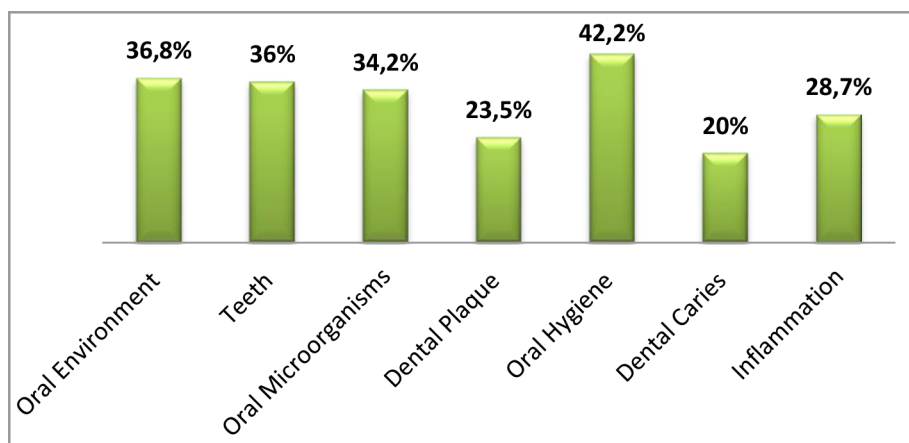
The following diagram presents a relative proportion of correct answers on various topics related to oral health in all children examined (diag. 1)

On the diagram presented, children’s knowledge of different topics shows success rates around and below 42 %. Less than one third of children are familiar with the topics related to periodontal health (oral MO, dental plaque, inflammation). The highest proportion of correct answers were given on the topic of Oral Hygiene (42.2 %).

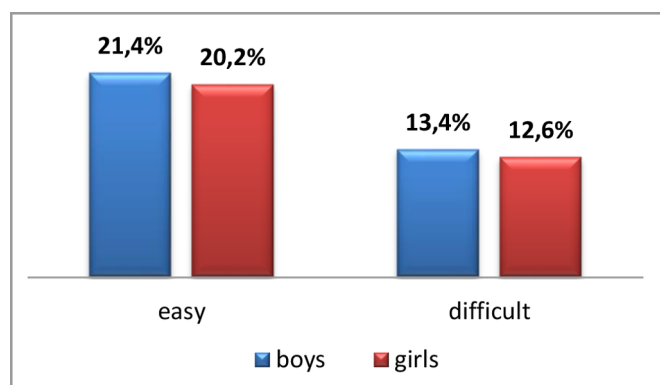
- Distribution by difficulty of the questions of the correct answer survey

The following diagram presents relative shares of the correct answers in difficulty between boys and girls (diag. 2)

Diag. 1. Assessment of knowledge on topics related to oral health



Diag. 2. Distribution of correct answers on the difficulty of the questions, between sex



The diagram shows that for all children examined, the relative proportion of correct answers in easy questions is around 40 %, with no statistically reliable difference between genders. With the correct answers to difficult questions, it is noticeable that less than 1/3 of all children answer correctly. It is noteworthy that almost twice as many correct answers are given to easy questions.

DISCUSSION

The aim of this study was to assess the relationship between gingival and oral hygiene status of children between the ages of 11 and 13, as well as the impact of children's knowledge of oral/periodontal health on periodontal status.

Dental biofilm is the main etiological factor in the pathogenesis of the two most common oral diseases – caries and gingival pathology [9, 10]. In turn, the presence of carious lesions or incorrectly adapted approximal obturations is considered a risk factor in periodontal pathology, which is why the assessment of cariosity of children is part of the assessment of the risk associated with periodontal health [11]. In this study, we found that in children from 10-12 years, the DMF index averaged $2,60 \pm 2,89$, with an average of one carious lesion and one obturation per child. This indicates that at this age, caries activity is not so high, and this factor is not considered risk for the periodontal status of children.

In this age period, dental biofilm is a major risk factor for pathological changes affecting the periodontal space [9, 12]. The age of late mixed dentition, when there are still single primary teeth in the oral cavity of adolescents, the frequency of gingival pathology increases on the one hand due to the start of hormonal changes, on the other, due to neglect of oral hygiene habits by children. In this regard, the current study found that the oral hygiene habits of the examined children were poor. Only one third of children brush their teeth in the morning and evening, and 70 % of them do not detect the duration of the cleaning procedure. The rules of oral hygiene behavior aimed at controlling dental biofilm are fundamental to achieving both oral and periodontal health [13, 14].

Lang found that the amount of dental biofilm needed to initiate gingival inflammation, as well as its association with the rate of progression, varied significantly between individuals [15]. The objective assessment of the oral hygiene status of the children examined showed that the plaque accumulation at this age was relatively high (FMPS – 69,8 %), and we found that more than 2/3 of the tooth surfaces examined had a dental biofilm. These data are comparable to the incorrect oral hygiene habits of children established by anamnesis at the beginning of the study and are the leading cause of the results obtained in terms of the studied oral status.

The assessment of gingival status in the children we studied showed an average of 26,6% of the gingival index FMBS. According to the classification of periodontal diseases, the spread of gingival inflammation is assessed objectively and accurately by the values of provoked gingival bleeding [3, 16]. The results we have obtained show initial localized gingival inflammation, the cause of which is most likely to be high values of plaque accumulation.

Gingival status in preschool children indicates relatively low plaque accumulation and single cases of gingival inflammation [18]. This, on the one hand, is due to the characteristic of periodontium of primary teeth and their anatomical features, which do not imply the accumulation of dental biofilm near the marginal gingiva. A group of scientists found like ours results associated with oral hygiene and gingival status in children 12 years of age [19].

In contrast to our results, scientists observing periodontal status in children in the late adolescent period (15-17 years) found more severe gingival inflammation at relatively less plaque accumulation [17]. This is probably because gingival pathology is a chronic process that requires time for development and progression. It is noticeable that the period of mixed dentition is characterized by increased plaque accumulation due to the presence of teeth in eruption, which do not actively participate in the chewing act. This, in combination with incorrect oral hygiene habits, as well as colonization of gingival sulcus with periodontopathogens, leads to the development of initial forms of gingival inflammation.

One of the main psychological principles in establishing long-lasting healthy habits is to gain a stable motivation and desire to maintain oral/periodontal health [20, 21]. In this regard, each oral health prevention program includes education based on knowledge related to the basic structures of the oral environment and its functioning [22, 23]. These facts were a reason to evaluate the knowledge on topics with an emphasis on periodontal health of the children studied by us to seek a relationship between behavior and awareness. Our results showed that children at this age correctly answered the questions asked in about

42 % of cases, and only 1/3 of them showed knowledge of periodontal health. Less than half of the children answered the easier questions correctly and about 20% to the more difficult ones. This leads us to conclude that poor oral hygiene habits and high plaque accumulation are probably due to the lack of basic knowledge of maintaining oral/periodontal health.

CONCLUSION:

In the present study, it was found that almost all children aged 10-13 years had an initial form of gingival inflammation, against the background of plaque accumulation affecting more than 69% of tooth surfaces, unstable and irregular oral hygiene habits, as well as insufficient knowledge of oral/periodontal health.

Through appropriate preventive programs, this age is best suited to create consciously motivated behavior for proper oral hygiene and oral health.

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