



A COMPARATIVE STUDY OF FULL MOUTH BLEEDING SCORE (FMBS) AND GINGIVAL INDEX LOE AND SILNESS (GILS) IN ASSESSING GINGIVAL STATUS OF CHILDREN AGED 10-14 YEARS

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SUMMARY

Aim: Comparative analysis of two gingival indices with different diagnostic thresholds and methods of application in recording the gingival status of the whole dentition in children aged 10-14 years.

Materials and methods: The subjects of the current study were 457 children. The clinical periodontal examination is performed in 4 levels. Gingival status is objectified by inspection and probing using (1) provoked gingival bleeding by the full mouth bleeding score (FMBS) with a diagnostic threshold above 10% bleeding gingival units and (2) gingival index according to Loe and Silness (GILS), with a diagnostic threshold above 0.

Results: Gingival inflammation could be detected in 64.3% of the children studied, with a mild form of plaque-induced gingivitis in 40% of them, concentrated mainly on the vestibular surfaces in the frontal regions of both jaws. In 87% of the same children studied, we recorded an initial degree of gingival inflammation with a gingival GILS index value above 0, also concentrated in the frontal areas of both dental arches.

Keywords: gingival index, Loe and Silness, full mouth bleeding score, gingival inflammation in children,

INTRODUCTION

Gingivitis are reversible inflammatory diseases of the gingival tissues. In the initial stages of inflammation, this pathology usually has a relatively asymptomatic course, which is the reason that these conditions often remain neglected by patients and carries a risk of developing a subsequent inflammatory-destructive process in the periodontium [1]. Very often, adolescence initiates this process [2, 3, 4]. According to literature sources, the prevalence of gingival diseases in children and adolescents varies between 19% and over 90% [5, 6]. The reasons for the heterogeneous results obtained by the authors are related to the different age groups of the children studied, the use of different indices and diagnostic thresholds for objectifying the gingival status, as well as different modifications in implementation methodologies. The classical indices used for epidemiological purposes (CPITN, GI, PBI) mainly record the condition of the gingival tissues around representative teeth and surfaces, which is another factor reflecting the obtained data on the prevalence of gingival pathology.

MATERIALS AND METHODS

The subjects of the current study were 457 children aged 10-14 years. The clinical periodontal examination is performed in 4 levels: 1st level - examination of general health status and oral hygiene habits; 2nd level - assessment of oral hygiene status; 3rd level - assessment of teeth and gingiva; 4th level - assessment of gingival sulcus. Gingival bleeding was assessed by mechanical periodontal probe using: the gingival index according to Loe & Silness (GILS) and full mouth bleeding score index (FMBS).

Loe and Silness Gingival Index (GILS)

An initial examination is performed to assess the color and contour of the gingival tissues. The periodontal probe is inserted into the entrance of the gingival sulcus, then withdraw the probe from the sulcus, monitoring for

bleeding within 10 seconds.

We registered the provoked gingival bleeding of all permanent teeth at four points of the gingival sulcus – distal (distovestibular), vestibular, medial (mediovestibular) and oral.

Rating scale: Score 0 = Normal gingiva; Score 1 = Mild inflammation – a slight change in color, slight edema. No bleeding on probing; Score 2 = Moderate inflammation - redness, edema, glazing. Bleeding on probing; Score 3 = Severe inflammation - marked redness and edema, ulceration. A tendency toward spontaneous bleeding.

An average value of the index for a patient is calculated from the sum of all registered values divided by the total number of examined gingival points.

In the present study, a diagnostic threshold GILS above 0 was adopted, at which we assumed that the children had gingival inflammation

Full mouth bleeding score index (FMBS)

Insertion of the probe at the distal point of the tooth without the need to reach the bottom of the gingival sulcus and withdraw the probe from the gingival space. Monitor for bleeding within 10 seconds. Registers with (+) availability of provoked bleeding and with (-) its absence. We examined all permanent teeth in four points – distal (distovestibular), vestibular, medial (mediovestibular) and oral.

The index is calculated as a percentage and represents a relative share of places with provoked gingival bleeding from all examined gingival points for each child.

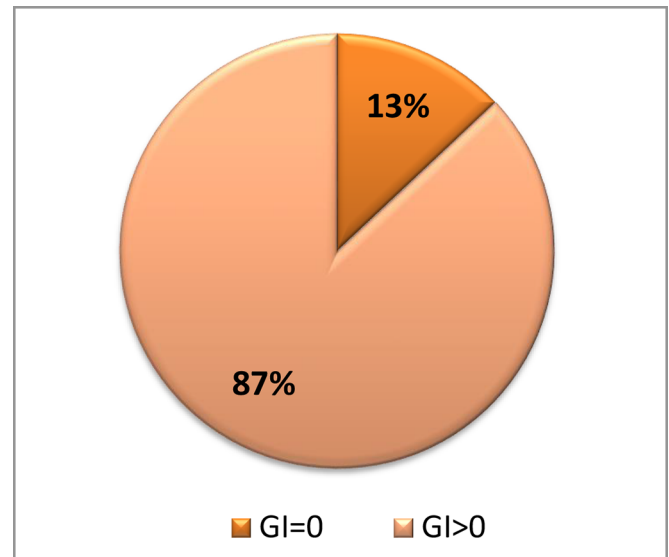
According to the new classification of periodontal diseases, gingivitis is considered when provoked gingival bleeding involves more than 10% of the gingival units of the child.

RESULTS

The results of the study show that the children are systemically healthy, with unsatisfactory oral hygiene status and plaque accumulation concentrated in the frontal areas of both dental arches.

The following chart shows the relative proportion of children studied according to GI Loe & Silness (diag. 1).

Diag. 1. Proportion of children according to GI severity Loe & Silness



The diagram clearly shows that 87% of the examined children have gingival inflammation GI Loe & Silness value above 0, while the relative share of healthy children is 13% (t=33,01 P<0,05).

The following table shows the average value of GI Loe & Silness in the different sextants (tbl. 1)

Table 1. Loe and Silness gingival index by sextants

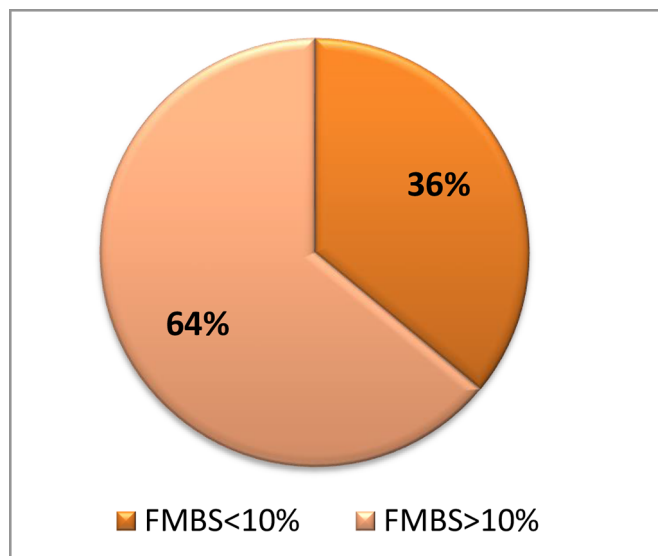
Sextant	n children	Mean ± SD	Paired samples T-test			
I sextant ¹	457	0,18 ± 0,44	t _{1,2} =-22,414	P _{1,2} <0,05	t _{2,6} =24,163	P _{2,6} <0,05
II sextant ²	457	0,98 ± 0,74	t _{1,3} =-1,387	P _{1,3} >0,05	t _{3,4} =4,797	P _{3,4} <0,05
III sextant ³	457	0,20 ± 0,50	t _{1,4} =4,241	P _{1,4} <0,05	t _{3,5} =-22,956	P _{3,5} <0,05
IV sextant ⁴	457	0,11 ± 0,37	t _{1,5} =-23,910	P _{1,5} <0,05	t _{3,6} = 3,308	P _{3,6} <0,05
V sextant ⁵	457	1,04 ± 0,77	t _{1,6} =2,637	P _{1,6} <0,05	t _{4,5} =-26,336	P _{4,5} <0,05
VI sextant ⁶	457	0,13± 0,39	t _{2,3} =21,403	t _{2,5} =-1,761	P _{2,5} >0,05	t _{2,4} =24,952
			P _{2,4} <0,05	t _{5,6} =24,869	P _{5,6} <0,05	P _{2,3} <0,05
			t _{4,6} =-1,979	P _{4,6} <0,05		

The data from the table show that the highest value of the Loe & Silness gingival index is found in the front region, with no statistically significant difference between the upper and lower jaw (P<0.05). The obtained results give reason to believe that gingival inflammation between the

ages of 10 and 14 is concentrated in the frontal areas of both dental arches.

The following chart shows the relative proportion of children according to FMBS severity of provoked gingival bleeding index (diag. 2)

Diag. 2. Relative share of children according to the severity of FMBS – index



The data from the diagram show that 64% of the examined children had gingival bleeding covering more than 10% of the gingival units of a child, which is considered clinically established gingivitis. About 1/3 of all examined children are healthy, with an index value of up to 10% ($t=9.05$ $P<0.05$).

The following table presents an average value of the FMBS index by sextants (tbl. 2)

Table 2. Gingival index FMBS by sextants

Sextant	FMBS %		Paired samples T-test			
	n children	Mean ± SD				
I sextant ¹	457	7,55 ± 17,43	$t_{1,2}=-16,833$	$P_{1,2}<0.05$	$t_{2,6}=17,153$	$P_{2,6}<0.05$
II sextant ²	457	30,97± 29,18	$t_{1,3}=-1,164$	$P_{1,3}>0.05$	$t_{3,4}=1,688$	$P_{3,4}>0.05$
III sextant ³	457	8,25 ± 19,52	$t_{1,4}=0,752$	$P_{1,4}>0.05$	$t_{3,5}=-17,495$	$P_{3,5}<0.05$
IV sextant ⁴	457	6,96 ± 16,44	$t_{1,5}=-17,907$	$P_{1,5}<0.05$	$t_{3,6}=0,729$	$P_{3,6}>0.05$
V sextant ⁵	457	32,11± 29,94	$t_{1,6}=-0,145$	$P_{1,6}>0.05$	$t_{4,5}=-17,752$	$P_{4,5}<0.05$
VI sextant ⁶	457	7,67 ± 16,50	$t_{2,3}=16,504$	$P_{2,3}<0.05$	$t_{4,6}=-1,613$	$P_{4,6}>0.05$
			$t_{2,4}=17,442$	$P_{2,4}<0.05$	$t_{5,6}=16,949$	$P_{5,6}<0.05$
			$t_{2,5}=-0,851$	$P_{2,5}>0.05$		

The table shows that the highest values of the index are recorded in the II and V sextant - 30.97 and 32.11%, which corresponds to inflammation present in the frontal areas of the upper and lower jaw and corresponds to the results obtained by the gingival index of Loe & Silness. In the remaining sextants, the values for provoked bleeding are approximately the same but three times lower than those in the front ($P<0.05$).

DISCUSSION

Most gingival indices used in periodontal diagnostics rely on the visual assessment of one or more of the following clinical parameters: change in gingival color, change in gingival contour, presence of provoked gingival bleeding [7, 8]. According to Poulsen, the only way to compare the reproducibility of different gingival indices is to apply several indices in the same study [9]. For the purposes of the present study, two index systems were selected to assess plaque build-up and gingival bleeding/inflammation with a uniform registration scale between gingival and plaque score. Index system of Silness&Loe - Loe&Silness and index system full mouth plaque/full mouth bleeding score. The first index system provides information on the severity of inflammation and

the degree of plaque accumulation, and the second – on the spread of inflammation and plaque accumulation in the corresponding dentition. Both index systems were applied to all erupted permanent teeth in four probing fields/ points of the gingival sulcus, with the goal being the evaluation of the entire dentition according to the modern concept of the diagnosis of gingivitis as a nosological unit [4].

A large percentage of epidemiological studies related to the prevalence of periodontal diseases use Loe & Silness's gingival index (GI) to objectify gingival status [10, 11, 12]. Using the same index in the present study, an 86.7% prevalence of gingival disease was found at the diagnostic threshold $GILS>0$, which we chose in our study. This was necessary due to the more common initial forms of gingival inflammation in the children we studied, which would have been lost as numbers at a higher diagnostic threshold. The choice of diagnostic threshold usually results in significant differences in the reported prevalence and is a choice of each author's collective. Multiple scientific studies using the Loe & Silness gingival index and the same diagnostic threshold found a similar high prevalence (around and above 90%) of plaque-induced gingivitis in children [6, 13, 14].

Contrary to our results, another scientific study in which the authors used the Loe & Silness gingival index but with a diagnostic threshold of GI>2, i.e. only registering cases where gingival bleeding was detected, showed significantly lower prevalence rates, around 20 % [15].

The present study found that the prevalence of gingival diseases in the children studied, according to the second index of objectification of gingival status (FMBS) we used, affected 64.3% of children aged 10 to 14 years. Gingival inflammation was found to affect most often the upper and lower front, and the most pronounced inflammation was recorded in the area of the interdental papillae.

Results similar to ours were obtained by a group of American scientists conducting a national study of oral health in adolescents, and to objectify the gingival status, the authors used the index of bleeding on probing (BOP=60%) applied to all available permanent teeth [16].

Bonetta et al. reported over 80% incidence of gingival disease in children aged 12 years [17]. The high

relative share of prevalence obtained by them is probably due to the different methodology used to register the periodontal status. The scientists examined all the teeth (temporary and permanent) but only in two quadrants - one in the upper and one in the lower jaw, and considered gingivitis in any case in which there was bleeding in at least one gingival unit of the subjects, which was not in accordance with the modern concept of periodontal health [17]. Contrary to them, Fan et al. found only a 29.6% prevalence of gingivitis among children aged 12 - 15 years. The researchers examined all available permanent teeth by induced gingival bleeding, reporting the index per tooth rather than at multiple points [18].

CONCLUSIONS

The cited results give reason to conclude that depending on the diagnostic criteria chosen by the authors, the prevalence values of periodontal diseases can vary significantly even if they are registered with the same gingival index.

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