ON THE PECULIARITIES OF THE CLINICAL-BIOLOGICAL INDICES IN PERIODONTAL DIAGNOSIS IN CHILDREN AND TEENAGERS

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Abstract

The aim of the study is to evaluate and compare the periodontal health condition in children and teenagers by means of some periodontal clinical indices. Material and method: The study, developed over 3 years (2007-2009), was performed on 134 children and teenagers, divided into 3 groups, according to age. Periodontal scanning in the children and teenagers under investigation appeared as a simple and rapid method for the identification of the periodontal problems, easily tolerated by the patients, providing indications on the possible treatment or subsequent evaluation. Results and discussion: Out of the total number of cases, only 22.09% had periodontal symptoms, the highest value being represented by generalized bacterial gingivitis (63 cases-57.78%), followed by chronic surface marginal periodontitis, caused by some local inflammation factors (21.39%), and by aggressive forms of periodontal disease (such as aggressive periodontitis), in a ratio of 7.83% (7 cases), comparatively with a ratio of 1%, mentioned in the literature of the field. No cases of deep periodontal disease (chronic average/deep marginal periodontitis) were recorded, as they need a long time for their installation and evolution.

Conclusions: children show a more important accumulation of bacterial plaque than adults, and numerous slight gingival inflammations. In children with ages between 12-17 years and in young adults, the gingival reaction is more important in the presence of a higher accumulation of bacterial plaque.

Keywords: periodontal scanning, clinico-biological indices, chronic gingivitis

INTRODUCTION

Various forms of periodontal diseases may be noticed in children and teenagers, from a reversible condition, restricted to the gingival tissue, up to those characterized by destruction of the attachment of periodontal conjunctive tissue and alveolar bone, which may alter the longevity of decidual or permanent dentition (1,2).

The prevalence, extension, severity and prognosis of the periodontal disease in the young group of age vary according to the type of disease. The diagnosis options are determined by a most recent classification of the periodontal disease, a topic continuously marked by debates and revisions (3-5). In such patients, the identification and management of any periodontal problem requires the application of some fundamental principles, together with a correct understanding of its causes, of the favourizing risk factors, and an exact selection of the various strategies inherent to any activity developed on a young group of patients, comparatively with the adult ones. (6-8).

Scope of the study: A minute periodontal evaluation, by means of indices, required after the diagnosis was established, should be included in the treatment scheme, in view of a correct assessment of the disease, thus permitting monitoring of the periodontal condition. Typically, monitoring is required for plaque and gingivitis. In the case in which initial evaluation identified pockets or other periodontally-relevant elements, monitoring will be directed towards them (96), as already discussed in the section devoted to initial therapy.

The present study evaluates and compares the condition of periodontal health in children and teenagers by means of some periodontal and orthodontic clinical indices.

MATERIALS AND METHOD

Algorithm for selecting the subjects included in the experimental group. The study was performed, over 3 years (2007-2009), on 134 children and teenagers selected from the patients of the Clinics of Periodontology, divided into 3
groups, according to age, as follows: Group A – children aged 6-11 years, with mixed dentition; Group B - children aged 12-17 years, with permanent dentition; Group C - adolescents aged 18-25 years. For all age groups, the following clinical indices were considered: the index of bacterial plaque (PI), the index of papillary bleeding (PBI), probing depth (AS), gingival retractions (R) and width of the attached gingiva. The reference sample was selected according to the probabilistic method, by layering, which permits subsequent inferential statistical analyses.

Periodontal scanning of the children and teenagers under investigation constitutes a simple and rapid method for the identification of the periodontal problems, also highly tolerable and providing indications on the treatment to be recommended or on subsequent evaluation. The method was based on the clinical observation sheet of periodontal type, filled in on the basis of clinical extra- and intra-oral examinations. Prior to any evaluation, the motivated consent of both parents/tutors and of the specialists in charge with the medical cases, who monitorized the patients, was obtained.

RESULTS AND DISCUSSION

Out of the total number of cases, 22.09% showed a symptomatology related to periodontal problems, most frequently being generalized bacterial gingivitis (63 cases – 57.78%), followed by superficial chronic marginal periodontitis, induced by some local inflammation factors (21.39%) and by some aggressive forms of periodontal diseases (such as aggressive periodontitis), in a ratio of 7.83% (7 cases) – versus a percentage value of 1%, given in the literature. No deep forms of periodontal alteration (such as chronic, average/deep marginal periodontitis) were observed, once known that they need a longer time for their installation and evolution.(table 1)

As to the distribution according to sex, it was approximately equal (54.03% girls and 45.97% boys) (fig.1).

Table 1. Total number of cases – distribution according to diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Nr. cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of examined cases -134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective periodontal symptomatology</td>
<td>1</td>
<td>22.09%</td>
</tr>
<tr>
<td>Generalized bacterial gingivitis</td>
<td>63</td>
<td>57.78%</td>
</tr>
<tr>
<td>Chronic surface marginal periodontitis</td>
<td>29</td>
<td>21.39%</td>
</tr>
<tr>
<td>Aggressive (juvenile) periodontitis</td>
<td>7</td>
<td>7.83%</td>
</tr>
<tr>
<td>No signs of disease</td>
<td>35</td>
<td>20.01%</td>
</tr>
</tbody>
</table>

Fig.1. Incidence of cases according to sex

Fig.2. Incidence of cases according to residence

Statistical processing of data on the experimental group evidences the following aspects:

The prevalence of gingival bleeding showed a decreasing tendency during the study, in all groups of age (fig.3), together with a lower prevalence of bleeding with the increase of age.

Consequently, in the year 2007, 58.8% of the children aged 6 and 7 years had gingival bleeding while, at the age of 10, the percentage ratio is reduced to 50.0% and, at 12, the prevalence of
gingival bleeding reaches a value around 45% (figs.3,4).

A comparison between the percent values corresponding to the first and last year of study evidences statistically significant differences for all groups of age under analysis (p<0.05), with the exception of the age of 6 years.

Nevertheless, the prevalence of gingival bleeding showed different values, as a function of the dental group under investigation. The highest values were recorded at the level of molars – 56.2% in 6 year-old children, 46.6% in the 12 year-old ones, in the year 2007 – while, at the level of incisors, the corresponding values were of 31% and, 30 and 28%, respectively, the same decreasing tendency being registered with the advance of knowledge on the category of age (fig.5).

At the same time, there also existed a group of subjects suffering from gingival bleeding at both incisor and molar level, as well as subjects suffering from gingival bleeding at either incisor or molar level (figs.6,7).

Evaluation of the oral health condition led to considering the Silness-Loe index of bacterial plaque. The data obtained indicate higher val-
ues in 7 and 8 year-old children, followed by a decreasing tendency up to the age of 12, so that, in 2007, the index of bacterial plaque was of 1.74 in 6 year-old children, of 1.84 in the 8 year-old ones and of 1.62, respectively, at ages of 12 years. The evolution tendency in the span of time the study was conducted is a decreasing one, for all groups of age. The most significant reduction was registered in 12 year-old children, in whom the Silness-Loe index started from 1.75 in 2003, reaching 1.62 in 2007 while, in the other groups of age, the reduction was of about 0.10 (table 2).

Table 2 Percentual distribution of PBI for various PI scores

<table>
<thead>
<tr>
<th>PI</th>
<th></th>
<th>0-1</th>
<th>1-2</th>
<th>0-1</th>
<th>1-2</th>
<th>0-1</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBI</td>
<td>0.1</td>
<td>0.2</td>
<td>0.5</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>GROUP A</td>
<td>11.6%</td>
<td>15.8%</td>
<td>10.3%</td>
<td>15.9%</td>
<td>11.4%</td>
<td>15.1%</td>
<td>10.5%</td>
</tr>
<tr>
<td>GROUP B</td>
<td>15.3%</td>
<td>18.7%</td>
<td>10.0%</td>
<td>13.9%</td>
<td>14.6%</td>
<td>18.2%</td>
<td>10.9%</td>
</tr>
<tr>
<td>GROUP C</td>
<td>19.7%</td>
<td>23.4%</td>
<td>9.0%</td>
<td>10.6%</td>
<td>9.4%</td>
<td>10.1%</td>
<td>9.7%</td>
</tr>
</tbody>
</table>

According to table 2, PB-induced gingivitis is the most frequent disease in all groups of age: 63.64% in group A, 37.27% in group B and 42.8%, respectively, in group C.

Determination of the Index of Necessity of Orthodontic Treatment (IOTN) showed that, both in 2003 and in 2007, most of the children have degree 1 (no treatment necessary) and 2 (reduced necessity for treatment), for all groups of age (fig. 8).

Fig. 8 IOTN index on groups of age in the year 2007

It is by now unanimously accepted that the most frequent disease of the marginal periodontium in children and teenagers is gingivitis, even if epidemiological studies concluded that children are also vulnerable to the periodontal disease, even if such a prevalence is lower than in adults.

Clinical examination evidenced that the frequency of gingivitis is directly proportional with an insufficient oral hygiene.

A large variability, quite different in various populations, was put into evidence as to the forms in which parodontites may be manifested in children and adolescents. Possibly, the different results obtained may be also caused by the variability of the epidemiological techniques, by the criteria and clinical methods applied for obtaining a correct diagnosis (9,10).

As to the distribution of patients according to sex, the subjective periodontal symptomatology was higher in girls (24.88%) than in boys (19.23%), which may be probably explained by the earlier puberty of the former ones.

Following the establishment of the experimental groups, analysis of the parameters related to distribution as a function of diagnosis, age, type of systemic disease evidences the following aspects:

The highest part is represented by plaque-induced microbial inflammatory diseases (87.50%), followed by superficial alteration of the supporting periodontium (chronic superficial marginal periodontitis) (8.33%) and by aggressive periodontites (4.17%).

The patients suffering from dento-maxillary anomalies evidenced hyperplasic gingivites in ratios of 34% in group A and of 22.23%, respectively, in group B. In the adult youths analyzed,
gingival retractions were noticed in 23.8% of cases (tables 3,4).

![Fig.10 Incidence of diseases in the total group](image)

**Table 3. Periodontal status on groups of age**

<table>
<thead>
<tr>
<th>Periodontal status</th>
<th>Group a (%)</th>
<th>Group b (%)</th>
<th>Group c (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy periodontium</td>
<td>19.09%</td>
<td>25.45%</td>
<td>28.5%</td>
</tr>
<tr>
<td>PB-induced gingivites</td>
<td>63.64%</td>
<td>37.27%</td>
<td>42.8%</td>
</tr>
<tr>
<td>Gingival hyperplasies şi acumulare de PB</td>
<td>17.27%</td>
<td>37.28%</td>
<td>-</td>
</tr>
<tr>
<td>Gingival retractions</td>
<td>-</td>
<td>-</td>
<td>28.7%</td>
</tr>
</tbody>
</table>

![Fig.11. Periodontal status in patients with dento-maxillary age groups](image)

**Table 4. Periodontal status in patients with dento-maxillary anomalies, on groups of age**

<table>
<thead>
<tr>
<th>Malocclusions</th>
<th>Group a (%)</th>
<th>Group b (%)</th>
<th>Group c (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy periodontium</td>
<td>12%</td>
<td>44.43%</td>
<td>27.7%</td>
</tr>
<tr>
<td>PB induced gingivitis</td>
<td>54%</td>
<td>33.34%</td>
<td>48.5%</td>
</tr>
<tr>
<td>Gingival hiperplasies</td>
<td>34%</td>
<td>22.23%</td>
<td>-</td>
</tr>
<tr>
<td>Gingival recessions</td>
<td>-</td>
<td>-</td>
<td>23.8%</td>
</tr>
</tbody>
</table>

![Fig.12. Periodontal diagnosis](image)

The present study was performed on patients with physiognomic disorders caused by various dento-maxillary anomalies. Being concerned with their physiognomic aspect, the patients used to pay special attention to dental health and oral hygiene, which explain why values of PI=3 and of PBI between 2.1-3.0 (severe gingival inflammation) are not present in the results of the study. However, most of the patients did not make a correct gingivo-dental brushing (11,12).

In the patients making up the experimental group, gingivitis occurred as early as their puberty, manifested as a hyperplasic gingivitis with bulb-shaped papillae and swollen free gingival margin (3,6) – which explains why statistical data on hyperplasic gingivitis also included the cases of puberty gingivitis (13).

The results obtained demonstrate that, in the case of an identical accumulation of bacterial dental plaque (PI=2), the gingival reaction is more intense with the advance of age. At PI=0 and PI=1 scores for the index of bacterial plaque, a slight gingival inflammation is prevailing, in all groups of age while, at a PI=2 score, average gingival inflammation is predominantly observed after the age of 12 years.

The experimental studies performed by Hodge and Tugnait (8,10) evidence a completely different incidence of gingivitis in preschool children, comparatively with young adults. Following a PB accumulation period of 3 weeks, almost 50% of the gingival points probed in adults were bleeding, versus only 8% in the case of children. In 12-17 year-old children and young adults, the gingival reaction is more important, evidencing regarding a higher accumulation of bacterial plaque.
Assessment of the periodontal health condition according to the socio-economic status evidences a much higher prevalence of gingival bleeding in children coming from families with a low or average socio-economic level, comparatively with those from wealthy families (Fig. 13).

The data collected in 2007 for 12 year-old children indicate a 30.3% higher prevalence of gingival bleeding in subjects with a low living standard, comparatively with that of the subjects from the average class which, in its turn, is 72.6% higher than the values recorded for children coming from wealthy families (Fig.13).

Statistical q-square analysis shows that such differences are statistically significant for a threshold of 0.01, while the Spearman correlation coefficient indicates a strong inversely proportional relation, namely: the lower is the socio-economic level, the higher the prevalence of gingival bleeding is. A more minute analysis, developed on dental groups, will also put into evidence significant differences.

Fig.13. Prevalence of gingival bleeding (%) in 12 year-old children, on socio-economic levels (2007).

The prevalence of gingival bleeding at molar level records the same differences as those observed at incisor level, while assessment of gingival bleeding prevalence at incisor level shows even more evident differences: the children with medium and high socio-economic standard of living have no gingival bleeding in the frontal area, instead, the low-levelled ones evidence a 63.6% prevalence.

The same values are recorded for simultaneous gingival bleeding at molar and incisor level.

Statistically significant differences (p < 0.01) are to be recorded, too, when evaluating gingival bleeding on dental groups, while the Spearman correlation coefficient indicates an intense inversely proportional correlation between the socio-economic status and the prevalence of gingival bleeding, whichever the arch zone under consideration should be.

A comparative evaluation - on socio-economic levels - of the oral hygiene condition shows that the level of oral hygiene is lower in the children coming from poor families.

In the year 2007, at the age of 12 years, the subjects with a low socio-economic status have a Silness-Loe index of bacterial plaque of 2.09, versus values of 1.61 and 1.16 recorded in subjects with average and high living standards. The same differences are to be registered, too, when determining the bacterial plaque index on arch zones.

Table 5 Results of the q-square test comparing the prevalence of gingival bleeding as a function of socio-economic level (12 years, 2007)

<table>
<thead>
<tr>
<th></th>
<th>Ratio of chances</th>
<th>p pt. 95% CI</th>
<th>Degree s of Spearman correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.81</td>
<td>40.049</td>
<td>0.000</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>-0.593</td>
</tr>
</tbody>
</table>

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CONCLUSIONS

1. Children show a more important accumulation of bacterial plaque and more numerous slight gingival inflammations, comparatively with adult patients. The gingivitis induced by the bacterial plaque is the most frequently occurring condition of periodontal disease in all groups of age.

2. Dento-maxillary anomalies which make difficult oral hygiene and PB removal are predisposing factors for gingivitis installation. The anomaly as such does not induce gingivitis, instead it prevents, to some extent, self-cleaning and brushing. The more severe the anomaly is, the more difficult hygiene becomes, which favours the possible manifestation of the anomaly-gingivitis correlation.

3. In the experimental groups under investigation, out of the total number of cases, only 22.09% showed a symptomatology related to
periodontal problems, the 77.01% remaining ones evidencing odontal-type disfunctions.

References