IMPLICATIONS OF THE OVERJET VALUE AND OF THE MALOCCLUSION CLASS IN PREDICTING THE DYNAMICS OF DENTO-PERIODONTAL TRAUMATISMS IN PRE-SCHOOL CHILDREN

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Abstract

The scope of the study is to evaluate the influence exercised by the overjet values, associated to a class of malocclusions, in the characterization and prediction of dento-periodontal traumatic events in pre-school children.

Materials and method. The study was developed on a group of 672 children with chronological ages ranging between 3-7 years, coming from urban and rural areas of the Iaşi district. The presence of dento-periodontal traumatisms, the overjet and the canine class were followed. Data processing was made with the STATISTICA program.

Results and discussion. The prevalence of dento-periodontal traumatisms in the experimental group was of 19.64%. The urban environment to which the children belonged was moderately associated with the presence of traumatisms, the prevalence of which was significantly higher (40.19%) in children with overjet values exceeding 6 mm. Canine class II was significantly associated with the presence of traumatisms (54.55%), the children without traumatisms showing mainly canine class I (62.96%).

Conclusions. The overjet value may represent an important factor for predicting the occurrence of dento-periodontal traumatisms in temporary dentition.

Keywords: dento-periodontal treatment, temporary teeth, overjet.

INTRODUCTION

The dento-periodontal traumatisms of childhood involve a multitude of aspects, from the perspective of both immediate and long-term consequences, impacting both the morpho-functional recovery possibilities and psycho-emotional stability, with future individual and parental potential.

In recent years, a considerably higher number of traumatisms of the temporary teeth has been recorded, the studies developed for establishing some epidemiological coordinates of this pathology evidencing that, up to the age of about 5 years, approximately one third of the children suffers traumatic dento-periodontal lesions [1,2].

Among the factors favouring the manifestation of the traumatic oro-dental pathology, excessive overjet and labial incompetence are most frequently cited in literature [3,4]. As a matter of fact, only few investigations have been devoted to the profile of pre-school child with dento-periodontal traumatisms from the perspective of its introduction into a malocclusion class, the authors considering the phenomenon closely correlated to the post-traumatic lesional and evolutionary post-traumatic pattern [5-9].

The present study attempts at characterizing the traumatic dento-periodontal pathology in temporary dentition, from the viewpoint of some important factors favorizing its installation, namely the overjet value and the malocclusion class.

MATERIALS AND METHOD

The investigations were performed on a group of 672 children with chronological ages ranging between 3-7 years, coming from urban and rural areas of the Iaşi district, consulted in several pre-school communities from the city and district of Iaşi, between May 2011 – May 2012.

Prior to the screening activities as such, the approval had been obtained from the part of the Commission of Ethics of the “Gr.T. Popa” University of Medicine and Pharmacy Iaşi, and of the School Inspectorate of the Iaşi District; also, the legal representatives of the children had been informed on the investigation during
the meetings with the parents organized, in kindergartens, by the team of physicians involved in the project; the parents were asked to fill in an application form containing their informed, written consent.

The inclusion criteria were: age between 3-7 years, informed consent from the part of parents or tutors, children without severe carious lesions at the level of the frontal group. Exclusion criteria: absence of informed consent, lack of cooperation from the part of the child, eruption of permanent incisors and complete eruption of the first permanent molar.

The children were consulted by specialized physicians who had previously participated to a calibration process, for minimizing the potential errors of diagnosis and traumas' classification into certain lesional categories, according to the structure proposed by Andreasen et al. and accepted by World Health Organization. Enamel fissures and radicular fractures were not registered, as no suitable conditions for their evaluation could be met.

All children included in the study were consulted under natural light, for the evaluation of their oro-dental health condition, presence of traumas, of the malocclusion class (the main parameters being the postlacteal plane and the canine mark) and the overjet.

The obtained data were statistically processed with the STATISTICA program, dedicated to medical researches, and specific tests (ANOVA, Scheffé, Sjotmol/Stoline, Pearson, CHI – square (c2), Mantel-Haenszel, Fisher, Spearman, Kendall tau, Gamma) were applied, which permitted the selection of the main parameters of interest. Thus, $p$, the reference parameter of the tests, takes significant values for a $p_{calculated} < 0.05$

RESULTS AND DISCUSSION

After the application of the inclusion and exclusion criteria, 672 children have been selected for the study, out of the total number of 729.

The demographic data of the children under investigation show a balanced distribution of theirs according to the medium from which they come (53.57% rural, 46.43% urban) and to sex (52.55% boys, 47.47% girls). The distribution of children on groups of age is plotted in figure 1.

The prevalence of dento-periodontal traumas in the experimental group was of 19.64% (132 children, out of the total number of consulted ones – 672 – showing at least one traumatically affected tooth), which is an average value, comparatively with the general interval of 5-40%, given in various studies for the same age [1,7,10-13].

Study of the medium from which the children with traumas came evidenced a moderate association ($\chi^2 = 14.73, r = -0.359 \ p = 0.00012, 95\%\ CI$) between the presence of traumas and the urban area (61.36% urban vs. 38.64% rural).

The result of the test of non-parametric correlation indicated a moderate association between the male sex ($\chi^2 = 6.06, r = -0.438 \ p = 0.0137, 95\%\ CI$). The unequal distribution of the traumatic events between the two sexes was also evidenced in other studies [6,7,14], being considered a consequence of boys’ tendency of participating to more dynamic activities, with a higher risk of traumas.

A significant association of the presence of dento-periodontal traumas of the temporary teeth in younger children ($\chi^2 = 17.59, r = -0.289, p = 0.00009, 95\%\ CI$), from 28.41% for the 36-48 month stage, to 6.49% for the 73-84 month one, was evidenced (fig. 2). Similar results were reported in other studies [2,15,16].

As also shown by the non-parametric analysis of the age-presence of traumas association, the mean age of the children with traumas was of 53.4 months ±11.13DS, and of 59.1 months ±12.04DS, respectively, for those without traumas (fig. 3).
Investigation of the overjet values in the experimental group showed that, at values < 3 mm, 14.11% of the cases evidenced dento-periodontal traumatisms, while, for overjet values between 3 and 6 mm, the frequency of traumatisms was of 17.03%. The prevalence of cases with dento-periodontal traumatisms of temporary teeth is significantly higher (40.19%) in children with overjet values over 6 mm. The non-parametric analysis of the association extent between the overjet values and the presence of traumatisms demonstrates the existence of a significant correlation, if considering the high value of the correlation coefficient ($\chi^2 = 34.78$, r = 0.641 p << 0.01, 95% CI) – as shown in table 1.

A quantitative analysis of the mean age showed an association of its low values with the presence of the traumatism and also with increased overjet values ($F = 6.073$, p = 0.000016, 95% CI) (fig. 4).

The experimental group shows a reverse, significant correlation, between children’s age and the overjet (r = -0.411, p = 0.002), an aspect evidenced both by the correlation coefficient and by the slope of the regression straight line (fig. 5).

A comparative analysis between the results of the present study and the available literature data shows the same tendencies, supporting the importance of an increased overjet as a factor contributing to the production of traumatic events. Thus, Burden [3] evidences the fact that

![Figure 2. Association of dento-periodontal traumatisms of temporary teeth with the group of age](image)

![Figure 3. Mean values of age according to the presence of dento-periodontal traumatisms of temporary teeth](image)

![Figure 4. Mean values of age as a function of the presence of dento-periodontal traumatisms of temporary teeth and overjet values](image)

![Table 1. Prevalence of dento-periodontal traumatisms of temporary teeth vs. the overjet value](image)
the risk of suffering traumatisms of the maxillary incisors was significantly higher in subjects with an overjet exceeding the normal values (0-3.5mm). Dearing [17] and Hunter et al. [18] also observed a significant difference, namely a higher frequency of fractures in incisors with patients showing a higher overjet. The results of the present investigation also confirm those reported by Robson et al. [10] and Zadik et al. [19].

Figure 5. Regression straight line in the age vs. overjet correlation

Table 2. Result of the age vs. overjet Pearson correlation test

<table>
<thead>
<tr>
<th>Pearson</th>
<th>r (correlation coefficient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age vs. overjet</td>
<td>-0.41166 (95% confidence interval)</td>
</tr>
<tr>
<td></td>
<td>0.002</td>
</tr>
</tbody>
</table>

Multivariate analysis of the aspects investigated on the presence of dento-periodontal traumatisms of temporary teeth was based on logistic regression, modelling the relation between a multitude of independent (categorial, continuous) variables and a dependent (nominal, binary) one, such as – in the situation here considered – the presence/absence of traumatisms. Analysis permitted the realization of a profile of the patient with a dento-periodontal traumatism of the temporary teeth, referring to a series of clinical aspects (table 3).

Table 3. The multiple correlation between the presence of the traumatism (tr.) and the clinical data

<table>
<thead>
<tr>
<th>Multiple correlation</th>
<th>Estimated value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of multiple correlation</td>
<td>0.30731</td>
</tr>
<tr>
<td>Multiple R²</td>
<td>0.09444</td>
</tr>
<tr>
<td>F</td>
<td>13.89127</td>
</tr>
<tr>
<td>p (95%CI)</td>
<td>0.00000</td>
</tr>
<tr>
<td>Std.Err. of Estimate</td>
<td>0.37977</td>
</tr>
</tbody>
</table>
The above-presented results (synthesized in table 3) permit the conclusion that the environment from which they come (r = -0.403, p = 0.0005) and the age of the children (r = -0.504, p = 0.000077) represent risk factors for the production of dento-periodontal traumatisms, while the overjet value (r = -0.592, p = 0.000015) remains the most important factor in the prediction of possible traumatisms.

CONCLUSIONS

The dento-periodontal traumatisms observed, in the experimental group for the 3-7 year age category cumulated a prevalence of 19.64%, with an uneven distribution, the children from the urban areas, respectively, the boys, being the most traumatically-affected ones.

The overjet values and canine class II malocclusion have influenced the occurrence of traumatisms in the experimental group, a significant correlation being established among the analyzed variabiles.

The overjet value represents the most important factor for predicting the occurrence of dento-periodontal traumatisms in temporary dentition.

References

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