SEVERITY OF OCCLUSAL PATHOLOGIES AND ASSOCIATED FACTORS IN 12-YEAR-OLD SCHOOLCHILDREN

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ABSTRACT

The aim of this study was to estimate the prevalence and severity of occlusal pathologies in 12-year-old schoolchildren in Campina Grande, Brazil.
The study population was composed by 553 12-year-old schoolchildren attending the municipal educational system. Information regarding occlusal alterations (Dental Aesthetic Index) and subjective perceptions on occlusal pathologies were collected by means of structured questionnaires submitted to the students. Bivariate analysis and odds ratio were used to determine the existence of association between the severity of the occlusal pathologies and the other associated factors.

The prevalence and severity of occlusal pathologies were 65.1% (n=360) and 35.1% (n=194), respectively. The bivariate analysis revealed a positive association between the variable "dissatisfaction on smiling related to occlusal problems" (OR=1.92 [1.13-3.28]) and the severity of occlusal pathologies. The high prevalence and severity of occlusal alterations observed in the present study suggests that it is necessary to reformulate the current public oral health policies with the inclusion of orthodontic treatment in the set of health services provided to the population.

Key words: child, malocclusion, risk factors, cross-sectional studies.

SEVERIDADE DE OCLUSOPATIAS E FATORES ASSOCIADOS EM ESCOLARES DE 12 ANOS DE IDADE

RESUMO

O objetivo deste trabalho foi estimar a prevalência e a severidade de oclusopatias em escolares de 12 anos de idade em Campina Grande, Paraíba, Brasil.
A população do estudo compreendeu 553 escolares de 12 anos de idade matriculadas na rede municipal de ensino. Informações referentes às alterações oclusais (Índice de Estética Dentária – DAI) e percepções subjetivas sobre as oclusopatias foram coletadas por meio de um questionário estruturado. Análise bivariada e odds ratio foram usados para determinar a existência de associação entre a severidade das oclusopatias e os fatores associados.

A prevalência e severidade de oclusopatias foram de 65.1% (n=360) e 35.1% (n=194), respectivamente. A análise bivariada revelou uma associação positiva entre a variável "insatisfação ao sorrir relacionada a problemas oclusais" (OR=1.92 [1.13-3.28]) e a severidade das oclusopatias.
A alta prevalência e severidade de alterações oclusais observadas no presente estudo sugere que é necessário reformular as atuais políticas de saúde bucal com a inclusão do atendimento ortodôntico nos serviços de saúde ofertados à população.

Palavras chave: criança, maclocusão, fatores de risco, estudos transversais.

INTRODUCTION

Malocclusion is one of the most common oral disorders and its prevalence is high in most countries[1,2]. Therefore, occlusal pathologies may be considered as a public health problem[3] and interfere negatively with life quality, compromising the social interaction and psychological welfare of affected individuals[4,5]. Recently, occlusal indices, like the Dental Aesthetic Index (DAI)[6] have been developed to categorize the treatment of malocclusion into groups according to urgency and need for treatment. In Brazil, a recent study showed that 58.14% of the population aged 12 years presented some kind of dentofacial anomaly[7].

The purposes of the present study were to estimate the prevalence and severity of occlusal pathologies in 12-year-old schoolchildren in a probabilistic sample from an urban area in Campina Grande, Brazil.

MATERIAL AND METHODS

The study design consisted of a transversal investigation with descriptive and analytical characteristics, which was conducted in compliance with the ethical guidelines issued by the Resolution 196/96 of the Brazilian National Health Council/Ministry of Health on research involving human subjects. The research project was independently reviewed and approved by

Table 1: Distribution of the types of occlusal pathologies and need of treatment in the 12-year-old schoolchildren population.

Occlusal Conditions	n	%
Missing teeth (maxillary arch)		
None	549	99.3
One or more	4	0.7
Missing teeth (mandibular arch)		
None	553	100.0
One or more	-	-
Tooth crowding in the incisal segment		
No tooth crowding	187	33.8
Tooth crowding in one segment	140	25.3
Tooth crowding in two segments	226	40.9
Tooth spacing in the incisal segment		
No tooth spacing	342	61.8
Tooth spacing in one segment	124	22.4
Tooth spacing in two segments	87	15.8
Incisal diastema (mm)		
<2 mm	36	26.3
≥2 mm	101	73.3
Maxillary anterior misalignment		
<2 mm	120	41.7
≥2 mm	168	58.3
Mandibular anterior misalignment		
< 2 mm	209	68.7
≥2 mm	95	31.3
Maxillary anterior overjet		
< 4mm	278	53.6
≥4mm	241	46.4
Mandibular anterior overjet		
Absent	501	90.6
Present	52	9.4
Anterior open bite		
Absent	524	94.8
Present	29	5.2
Need of orthodontic treatment		
No need (≤25)	193	34.9
Elective (26-30)	166	30.0
Highly recommendable (31-35)	119	21.5
Mandatory (≥36)	75	13.6

the Ethics in Research Committee of the State University of Paraíba, Brazil.

The study was performed with the sample universe population constituted by all children aged 12 years who were regularly attending the municipal educational system in the city of Campina Grande, state of Paraíba, in the northeast of Brazil. The city has an estimated population of 379,871 habitants and a municipal human development index (HDI) value of 0.72. According to the data provided by the municipal Bureau of Education, at the time of the study, there were 18,743 12-year-old children studying in 89 municipal urban schools. A probabilistic sample was constituted with 95% confidence interval and 5% error margin. Children with current or previous use of orthodontic appliances and those who refused to participate in the trial or missed the scheduled study appointments were excluded. After application of the inclusion/exclusion criteria, the study population comprised 553 children from 31 municipal schools.

The parents/caregivers were fully instructed by the examiner on the study purposes, relevance and possible benefits arising from its development. All parents/guardians were asked to sign a written informed consent form authorizing the enrollment of their children in the trial.

Data were collected from individual-based interviews (questionnaire) to outline each child's profile with regarding gender and self-perception regarding oral health. A single calibrated examiner (Kappa = 0.94) performed all intraoral clinical examinations by direct visual inspection under good natural lighting with the child sitting on a chair in front of the examiner. Sterile gloves, disposable caps, face masks and wooden spatulas, and dental mirrors and millimeter probes (Community Periodontal Index - CPI - probes) were used.

The DAI criteria[8] for evaluation of occlusal anomalies were used. The DAI evaluates dentofacial abnormalities based on information referring to three major aspects: dentition, space and occlusion. The dentition is evaluated by the number of lost permanent incisors, canines and premolars, which cause esthetic problems in the maxillary and mandibular arches. The space is evaluated based on the crowding in the incisal segment, spacing in the incisal segment, presence of incisal diastema and maxillary and mandibular anterior misalignment. The occlusion is evaluated based on measurements of the maxillary and mandibular anterior overjet, vertical anterior open bite and anteroposterior molar relationship.

The DAI index defines four possible categories: absence of abnormality or mild occlusal pathology, with no need of treatment (DAI ≤ 25); defined occlusal pathology, with elective treatment (DAI = 26-30); severe occlusal pathology, with highly recommendable treatment (DAI = 31-35); very severe or incapacitating occlusal pathology, with mandatory treatment (DAI ≥ 36). The variable "severity of the occlusal pathologies" was evaluated based on the dichotomization of DAI scores in: normal occlusion/

mild occlusal patho-
logies (DAI ≤ 30)
and severe/very severe
occlusal pathologies
(DAI > 30). The di-
chotomization of the
severity of the maloc-
clusions was based on
the DAI scores and the
corresponding neces-
sity of treatment. In
this way, a DAI value
of 30 was established
as a cutoff threshold;
DAI values of 31-35
indicate severe maloc-

Table 2: Association between gender and self-perception regarding oral health and the severity of the occlusal pathologies.

Variables	Severity of the occlusal pathologies				OR (IC95%)	p
	DAÍ index >30		DAÍ index≤30			
	n	%	n	%		
Gender					1	
Male	108	55.7	173	48.2	1.35 (0.95-1.91)	0.11
Female	86	44.3	186	51.8		
Dissatisfaction on smiling					1	
Yes	73	67.6	66	52.0	1.92 (1.13-3.28)	0.01
No	35	32.4	61	48.0		
Difficulty in mastication					1	
Yes	51	26.3	107	29.8	0.83 (0.56-1.24)	0.43
No	143	73.7	252	70.2		

clusions with highly desirable treatment and DAI
values ≥ 36 correspond to malocclusions with strong
need of treatment. To test reproducibility, 20 chil-
dren were re-examined for DAI data.

Statistical Analysis
All statistical analyses were performed using the
Epi Info 2007 software (Centers for Disease Con-
trol and Prevention, Atlanta, GA, USA). The
absolute and percent frequencies were obtained for
data analysis (descriptive statistical techniques).
The existence of significant association among the
variables was verified by means of bivariate analy-
sis (Yates' chi-square tests) considering a value of
α=0.05 for rejection of the null hypothesis. Odds
ratio (OR) was used for analysis of the strength and
direction of association.

RESULTS
The prevalence of occlusal pathologies among the
schoolchildren was 65.1% (n=360). Regarding the
severity of occlusal pathologies, 64.9% (n=359) of
the children presented normal occlusion/mild
occlusal pathologies (DAI ≤ 30) and 35.1% (n=194)
had severe/very severe or incapacitating occlusal
pathologies (DAI > 30) (Table 1).
There were no statistically significant differences
(p>0.05) in the severity of occlusal pathologies
between genders. Self-perception regarding oral
health, evaluated by the variables "satisfaction
on smiling" and "difficulty on mastication",
showed that 57.5% of the schoolchildren were
satisfied with their smile while 42.5% were
unsatisfied, of which 59.1% presented associated

occlusal problems. Among the occlusal alter-
ations mentioned by the students, tooth
crowding, diastema, open bite and maxillary
anterior overjet were the most frequent com-
plaints. These occlusal problems were grouped
and designated as the variable "dissatisfaction on
smiling related to occlusal problems", which
exhibited a strong, statistically significant asso-
ciation with the severity of occlusal pathologies
(Table 2).
Discomfort on mastication was reported by
28.6% of the children; in 91.1% of these cases,
pain caused by dental caries was referred to as
the main reason. Maxillary anterior overjet was
mentioned by 5.1% of the interviewees as the
cause of difficulty in chewing foods. However,
there was no statistically significant association
between the variable "difficulty on mastication"
and the "severity of the occlusal pathologies"
(Table 2).
Table 3 presents the magnitude of the occlusal
alterations based on their presence/absence in
relation to the severity of the occlusal patholo-
gies. In this model, maxillary anterior overjet
was excluded because an overjet up to 3 mm was
considered as normal and, therefore, it could not
be transformed into a dichotomic variable
(yes/no). Although it is not part of the DAI eval-
uation criteria, the variable "crossbite" was
included in the bivariate analytical model
because it was present in 21.7% (n=120) of the
sample and exhibited a highly statistically sig-
nificant association with the severity of the
occlusal pathologies (Table 3).

Table 3: Association between occlusal alterations and the severity of the occlusal pathologies.

Occlusal Alteration	Severity of the occlusal pathologies				OR (IC95%)	p
	DAÍ index >30		DAÍ index≤30			
	n	%	n	%		
Tooth crowding					1	
Yes	147	75.8	219	61.0	1.9 (1.3-2.9)	0.001
No	47	24.2	140	39.0		
Tooth spacing					1	
Yes	93	48.0	118	32.9	1.8 (1.3-2.6)	0.001
No	101	52.0	241	67.1		
Diastema					1	
Yes	84	43.3	53	14.8	4.4 (2.9-6.6)	0.0001
No	110	56.7	306	85.2		
Crossbite					1	
Yes	64	33.0	56	15.6	2.6 (1.7-4.0)	0.0001
No	130	67.0	303	84.4		
Mandibular overjet					1	
Yes	34	17.5	18	5.0	4.0 (2.2-7.3)	0.0001
No	160	82.5	341	95.0		
Anterior open bite					1	
Yes	22	11.3	07	2.0	6.4 (2.6-15.3)	0.0001
No	172	88.7	352	98.0		

DISCUSSION

The present study revealed that 65.1% of the schoolchildren had some kind of occlusal alteration, thereby confirming the fact that occlusal pathologies affect great part of the world population, with percent levels that are never below 50%, which represents a serious public health problem[7].

There was no association between "gender" and "severity of the occlusal pathologies", in agreement with the findings of previous studies[9,10]. Nevertheless, Van Wyk and Drummond[11] demonstrated a positive association between DAI scores and their distribution by gender.

In recent years, the perception of an individual with disability has been slowly evolving from the 'forgotten' person to one who is recognized as needing treatment. One area that typifies this reorganization is dentistry and specifically orthodontics[12]. Self-concept is defined as the perception of one's own ability to master or deal effectively with the environment, and is affected by the reactions of others towards an individual[13].

In the present study, 42.5% of the schoolchildren reported being unsatisfied with their smile due to different reasons. The categorization of their responses to the questionnaire showed that tooth crowding (34%), diastema between the maxillary central incisors (15.3%), maxillary anterior overjet (9.4%) and anterior open bite (0.4%) were the most frequently reported causes of an unpleasant smile. These findings demonstrate that occlusal alterations represented approximately 60% of all mentioned causes of dissatisfaction on smiling, indicating that adolescents have well developed perception for identification of oral problems[14,15].

In the present trial, there was a positive association between the variables "dissatisfaction on smiling related to occlusal problems" and "severity of the occlusal pathologies", suggesting that smile esthetics can be defined employing a subjective perception associated to normative clinical criteria in order to determine the need of orthodontic treatment. The present results are in contrast with those of a previous study, which found a discrepancy between the needs of orthodontic treatment and the perception of individuals in relation to occlusal problems[5].

Although 28.6% of the children reported some kind of difficulty in mastication, it is not possible to establish a positive association between this variable and the severity of the occlusal pathologies, which is consistent with the results of previous investigations[1,5]. These results demonstrated that, although the children recognized some occlusal alterations of major impact on smile esthetics, they were not able to identify occlusion problems that could theoretically have a negative impact on the stomatognathic system over time.

In this context, worthy of note is the high percentage (21.7%) of schoolchildren that presented some kind of crossbite, which is a transversal occlusal alteration of major relevance to determine the need of orthodontic treatment and that, in this study, was

strongly associated with the severity of the occlusal pathologies. Nevertheless, only 39 out of 120 children with crossbite reported some kind of difficulty ion mastication. This finding leaves unanswered questions regarding the real deleterious effects of occlusal alterations on the masticatory system and the need for corrective orthodontic therapy. This discussion also demonstrates that the DAI index has some limitations, namely its restricted use in the permanent dentition and inaccuracy to identify dentofacial anomalies, such as midline deviation, crossbite, posterior open bite and overbite, which are major occlusal problems that could strongly influence the need of treatment of the studied populations. These limitations have been previously described[16].

CONCLUSION

The high prevalence and severity of occlusal alterations observed in the present study suggests that it is necessary to reformulate the current public policies of oral health with the inclusion of orthodontic treatment in the set of health services provided to the population.

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