

PREVALENCE OF MALOCCLUSIONS IN SCHOOLCHILDREN WITH MIXED DENTITION IN THE CITY OF PIRACICABA, BRAZIL

PREVALÊNCIA DE MALOCLUSÕES EM ESCOLARES COM DENTIÇÃO MISTA NA CIDADE DE PIRACICABA, BRASIL

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ABSTRACT

Introduction: The aim of this study is to evaluate the prevalence of Class I, Class II and Class III Angle's malocclusions and the associated problems open bite, cross-bite, anterior and posterior crowding, in schoolchildren of the public schools of Piracicaba's city – São Paulo's state. **Methods:** Four hundred and sixteen children were examined, 7 to 12 years of age, boys and girls, independent of the ethnic group and the socioeconomic condition. The children were examined in their own school by a professional graduated in Dentistry, are properly gagged. In the clinical exam wood spatulas were used to move away the check to facilitate the view of patient's occlusal characteristics. **Results:** The examined scholars (86,6%) showed occlusal problems: 55,7% with Class I malocclusion, 19,7% with Class II-1st division, 5,2% with Class II-2nd division and 6,0% with Class III. In relation to the associated problems, 16,5% showed anterior open bite, 3,3% anterior cross-bite, 15,8% posterior cross-bite, 3,6% anterior and posterior cross-bite and 52,6% anterior and inferior crowding.

Descriptors: Epidemiology • Prevalence • Dentition, mixed • Malocclusion.

RESUMO

Introdução: O objetivo deste estudo é avaliar a prevalência de maloclusões de Classe I, Classe II e Classe III de Angle e os problemas associados como mordida aberta, mordida cruzada, apinhamento anterior e posterior, em escolares das escolas públicas da cidade de Piracicaba - Estado de São Paulo. **Métodos:** Quatrocentos e dezesseis crianças foram examinadas, de 7 a 12 anos de idade, meninos e meninas, independente da etnia e da condição socioeconômica. As crianças foram examinadas em sua própria escola por um profissional formado em Odontologia, devidamente calibrado. No exame clínico, espátulas de madeira foram utilizadas para afastar e facilitar a verificação das características oclusais dos pacientes. **Resultados:** Os escolares examinados (86,6%) apresentaram problemas oclusais: 55,7% com má oclusão de Classe I, 19,7% de Classe II-1^a divisão, 5,2% de Classe II-2^a divisão e 6,0% de Classe III. Em relação aos problemas associados, 16,5% apresentaram mordida aberta anterior, 3,3% mordida cruzada anterior, 15,8% mordida cruzada posterior, 3,6% mordida cruzada anterior e posterior e 52,6% apinhamento anterior inferior.

Descritores: Epidemiologia • Prevalência • Dentição mista • Má oclusão

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INTRODUCTION

A large part of population in Brazil as well as worldwide is affected by malocclusions, which are considered a public health problem and third leading cause of dental conditions. In this sense, studies, incidence, types, and consequences to patient should be evaluated and made known for society (Silva Filho *et al.*¹, 1989).

As prevalence of malocclusions varies depending on ethnicity, race, and socio-economical status, it is crucial and scientifically important to investigate the occlusal characteristics by region or city because of the great variability found in individuals. Several studies have been performed to quantify the prevalence of malocclusions in certain populations, reporting varied percentages and types (Almeida *et al.*², 1970, Araújo e Silva³, 1986, Biscaro *et al.*⁴, 1994, Freitas *et al.*⁵, 2002, Galvão *et al.*⁶, 1994, Gandini *et al.*⁷, 1994, Gardiner⁸, 1976).

The norms proposed by (Angle⁹, 1899) are the most used protocol to evaluate and to compare the prevalence of malocclusions. In addition to these proposed types of occlusal changes, patients may present with other oral-related problems such as open-bite, cross-bite, and dental crowding (Carvalho *et al.*¹⁰, 2000, Lenci¹¹, 2002, Ramos *et al.*¹², 2000). These dysplasias can occur alone and may result in orthodontic treatment. Particularly, the antero-posterior crowding is a very common occlusal condition (Pires *et al.*¹³, 2001) found in individuals of different ages, and depending on the age group, no intervention should be taken. On the other hand, open-bite and cross-bite are malocclusions that need to be orthodontically corrected as soon they are detected as they do not resolve alone.

By identifying the number of individuals affected by malocclusions and

related problems, social programs can be carried out to prevent them from occurring and to promote interventions, thus providing better oral health to population. In this sense, the objective of this study was to assess the prevalence of Angle's Class I, Class II, and Class III malocclusions and occlusal problems related to them, such as open-bite, cross-bite, and tooth crowding in schoolchildren from Piracicaba, State of São Paulo.

MATERIALS AND METHODS

This study was approved by the Research Ethics Committee of the Dentistry School of Piracicaba, University of Campinas (UNICAMP), under protocol 096/2003.

A total of 416 boys and girls aged between 7 and 12 years old, all attending public schools of Piracicaba, were examined regardless of ethnicity and social-economical status. These educational institutions were located in different regions of the city in order to avoid having children from the same area.

Oral examination was performed at the schools by a dental practitioner who had been specifically trained so that evaluation errors could be avoided. This clinical naked-eye examination was performed under natural light by using disposable wooden spatulas to separate cheeks and peri-oral muscles. The practitioner was adequately dressed for examination according to the biosecurity norms.

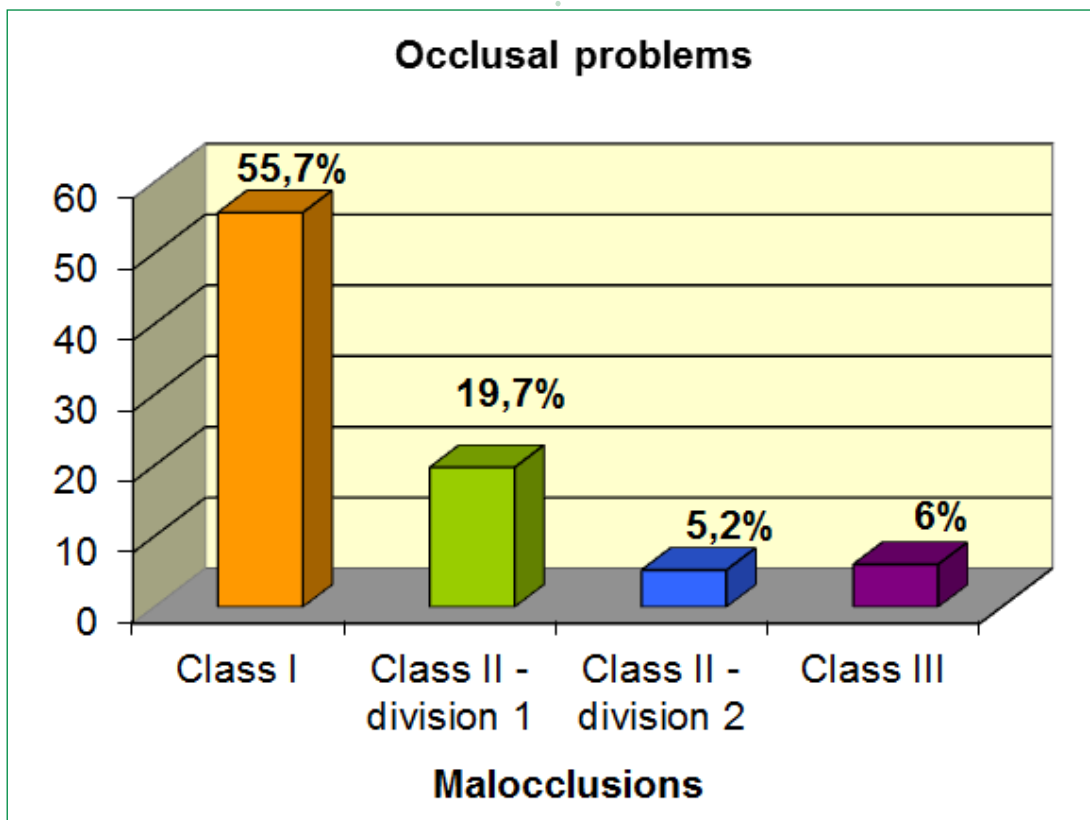
Each patient was evaluated for Class I, Class II, and Class III malocclusion according to the Angle's classification (Angle⁹, 1899), and presence of other conditions such as anterior open-bite, anterior and posterior cross-bite, and crowding were observed as well. Examination data were recorded on specifically designed forms containing identification, age, gender, address,

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Figure 1 – Types and percentage of malocclusions found in the schoolchildren studied.



and telephone number of the patient in addition to the occlusal features. Children exhibiting early bone loss or having one or more first permanent molars not erupted were excluded from the study.

RESULTS

The great majority of children exhibited occlusal problems (86.6%, $n = 361$). Only 55 children were classified as having normal occlusion. The percentages and types of malocclusion according to Angle's classification (2) can be seen in Figure 1, and Figure 2 shows the occlusal problems related to Class I malocclusion.

Class II division 1 malocclusion was found in 82 children (19.7%). Of these, 45 (54.8%) had bilateral and 37 (45.2%) had unilateral molar relationship, thus characterising subdivision. The occlusal problems related to this type of malocclusion can be observed in Figure 3. No children presented with single anterior cross-bite.

Class II division 2 malocclusion was found in 22 children (5.2%) (See Figure 1). Of these, nine (40.9%) had bilateral and 13 (59.1%) unilateral molar relationship, that is, subdivision. In those cases of bilateral Class II division 2 relationships, such as open-bite and anterior cross-bite, only one children had posterior cross-bite and eight had antero-inferior crowding. The problems related to Class II 2 division malocclusions are described in Figure 4.

Unilateral Class II malocclusion was found in 18 children (72%) and bilateral cases in seven (28%). The percentage of problems related to this type of malocclusion is shown in detail in Figure 5.

The percentage of problems related to malocclusions for all children examined, regardless of type of molar occlusion, can be observed in Figure 6.

DISCUSSION

The evaluation of the prevalence of malocclusions in several regions involv-



Figure 2 – Problems related to patients with Class I malocclusion.

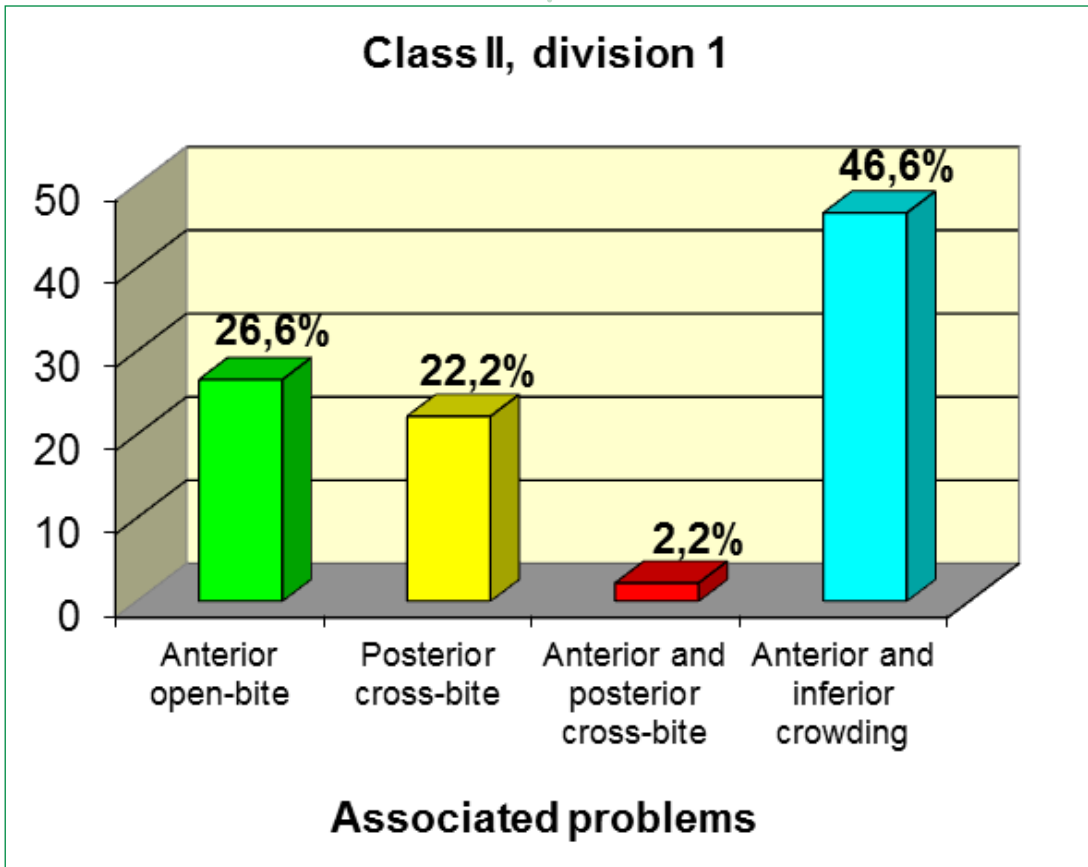


Figure 3 – Problems related to patients with Class II division 1 malocclusion.

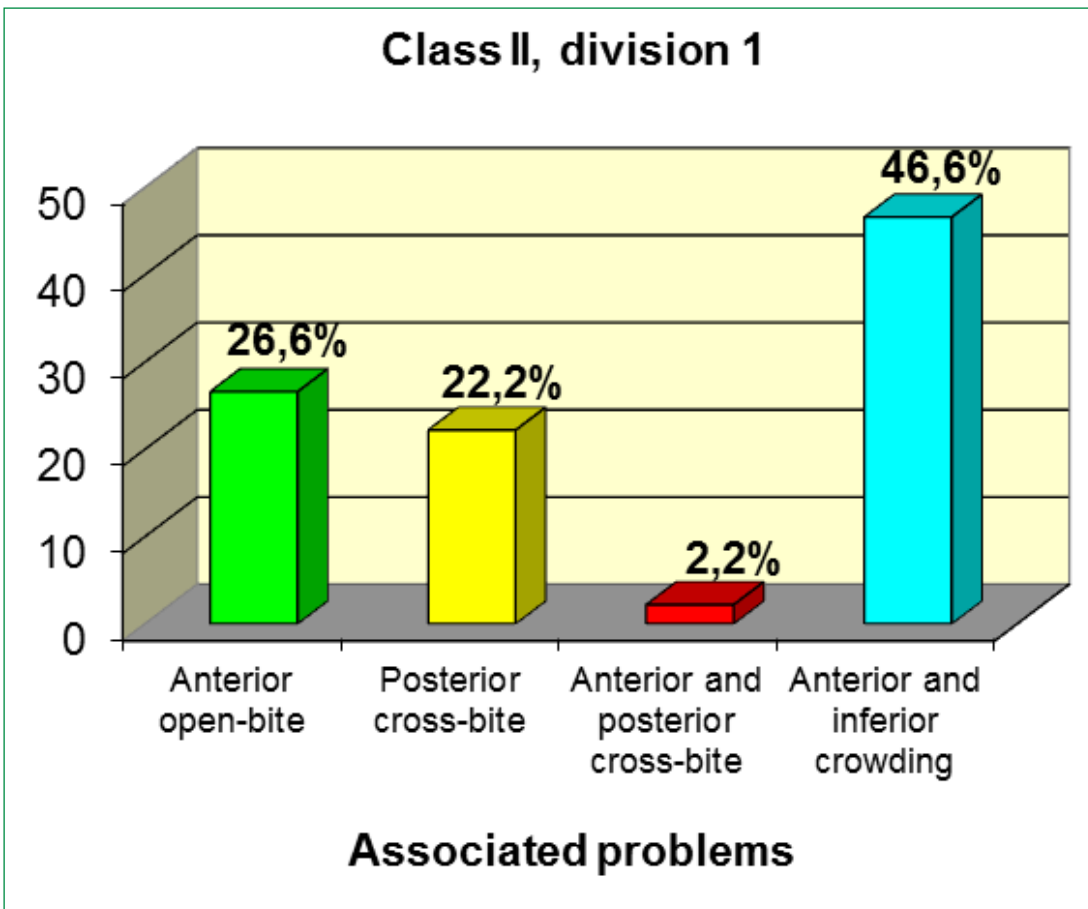
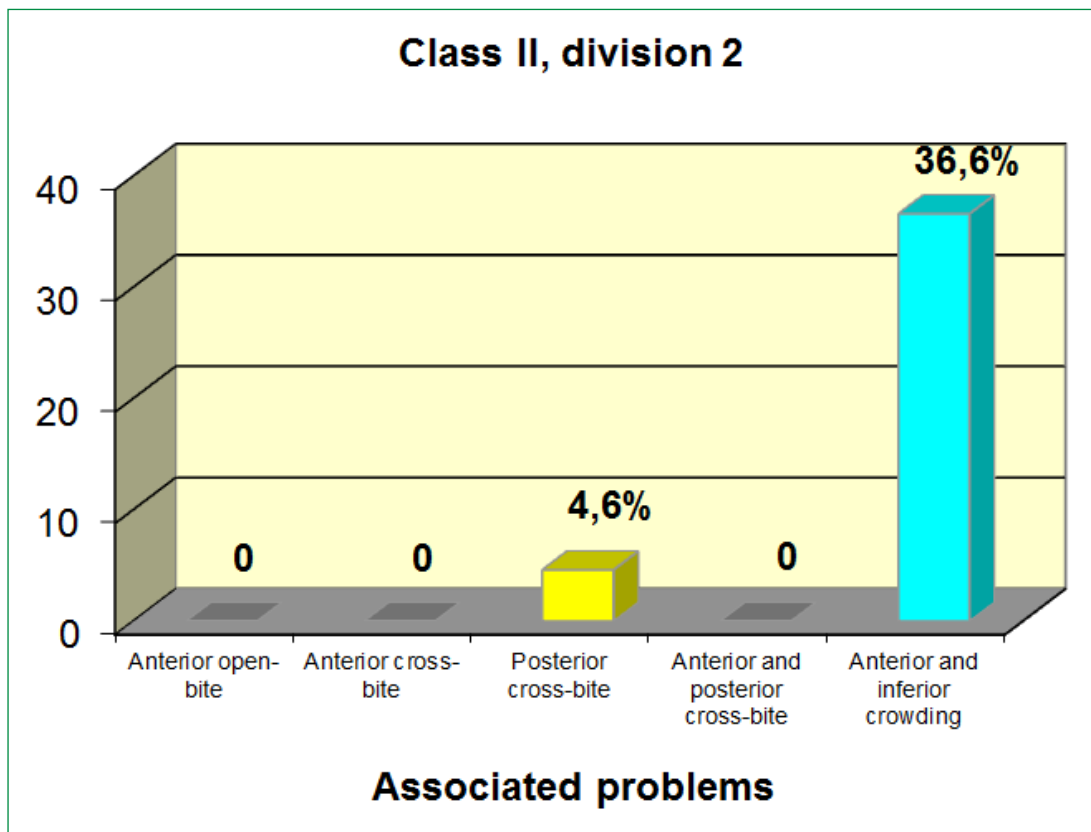


Figure 4 – Problems related to patients with Class II division 2 malocclusion.



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ing different populations has always been of interest among researchers worldwide (Silva Filho *et al.*¹, 1989, Araújo e Silva³, 1986, Biscaro *et al.*⁴, 1994, Freitas *et al.*⁵, 2002, Gardiner⁸, 1976, Angle⁹, 1899, Nouer¹⁴, 1966). Despite the numberless studies in the literature, it is always important to quantify the malocclusions in each region or city at regular time intervals to visualise whether the problems are increasing or decreasing. This evaluation is also useful to elaborate treatment programs for patients having dental occlusion disorders. Table 1 shows the values for three measurements of malocclusion prevalence performed in the city of Piracicaba over more than 40 years.

Of all children evaluated in the present study (n = 416), 86.6% had some types of occlusal problem. This figure is different from that found by Biscaro *et al.*⁴ (1994) who examined Piracicaba children and found that malocclusion was present in 97.7% of the cases, although Nouer¹⁴ (1966) had obtained very similar results for the same city compared to ours (Table 1). Our data are also close to the 89% and

88.53% found, respectively, by Ramos *et al.* (2000)¹², who examined 218 children aged 6-12 years from the city of Porto Rico, PR, and by Silva Filho *et al.*¹ (1989), who examined 2416 children aged 7-11 years old from Bauru, SP. However, Pires *et al.*¹³ (2001) examined 141 children from Salvador, BA, and they found a malocclusion prevalence of 71%, a figure lesser than those cited above. This lower percentage can be explained by the reduced sample size. The different results show that occlusal problems vary depending on both population and region.

With regard to the Angle's malocclusion classification², which was used in the present study, Class I malocclusion was the most frequent condition in which the mandible and its correspondent dental arch are in correct mesiodistal relationship with maxilla and skull. In this case, the mesio-buccal cusp of the upper permanent first molar occludes with the mesio-buccal sulcus of the lower permanent first molar, but another arch-related problem is needed to proper characterisation. This type of malocclusion was found in



Table 1 – Values found by three studies on prevalence of malocclusions carried out in the city of Piracicaba, SP.

Studies	Number of children	Malocclusions	Class I	Class II	Class III
Nouer (1966)	1623	87.0%	79.3%	8.5%	0.3%
Biscaro (1994)	891	97.7%	68.8%	23.8%	5.2%
Atual (2004)	416	86.6%	55.7%	24.9%	6.0%

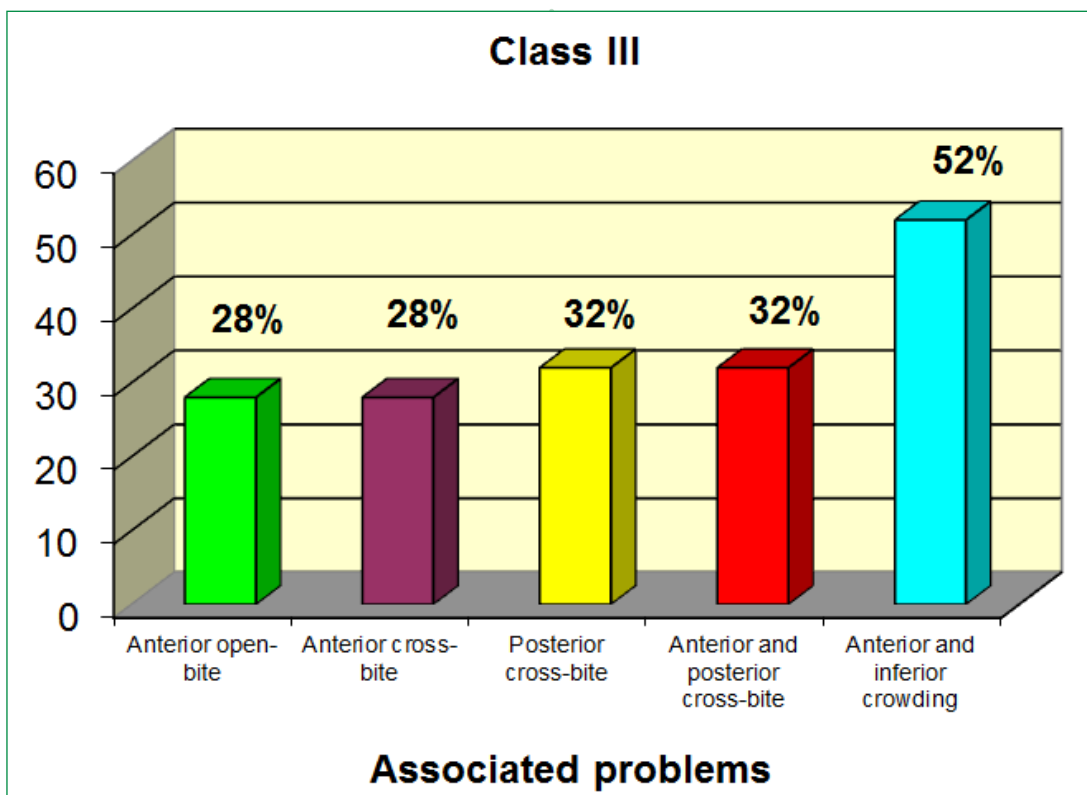
232 children (55.7%) in our study, a figure greater than those found by Ramos *et al.*¹⁴ (41%) and (Oda *et al.*¹⁵, 1995) (37.7%) but close to those found by Carvalho *et al.*¹⁰ (58.6%) and Silva Filho *et al.*¹ (55%). On the other hand, our result was lesser than those found by Biscaro *et al.*⁴ (1994) and Nouer¹⁴ (1966) % in the same city of Piracicaba, respectively, 68.8% and 79.3%. By comparing the percentage of Class I malocclusion found in the present study with that from Gardiner⁸ (1976), who examined 1000 English children, the result was found to be lesser (88.5%), thus confirming the difference among populations worldwide.

Class II malocclusion was observed in 24.8% of the schoolchildren examined. This result is lower than those of the ma-

majority of studies existing in the literature (Carvalho *et al.*¹⁰, 2000, Ramos *et al.*¹², 2000, Oda *et al.*¹⁵, 1995), greater than that by Silva Filho *et al.*¹ (1989), and close to that by Biscaro *et al.*⁴ (1994). Again, our result is greater than that found by Nouer¹⁴ (1966).

In our study, Class II division 1 malocclusion (19.7%) was more frequently observed compared to Class II division 2 malocclusion (5.2%), a finding also confirmed by elsewhere (Silva Filho *et al.*¹, 1989, Biscaro *et al.*⁴, 1994, Freitas *et al.*⁵, 2002, Oda *et al.*¹⁵, 1995, Arashiro *et al.*¹⁶, 2009).

In the majority of studies on prevalence of malocclusions, the least frequent type of Class III malocclusion (Silva Filho *et al.*¹, 1989, Gardiner⁸, 1976, Ramos *et al.*¹²,

Figure 5 – Problems related to patients with Class III malocclusion.

2000, Oda *et al.*¹⁵, 1995, Martins *et al.*¹⁷, 1998). In this investigation, this type of malocclusion was found in 6.0% (n= 25) of the schoolchildren (Figure 1), a finding that corroborates the studies cited above. This result is very close to that found by Biscaro *et al.*⁴ (1994) and greater than that by Nouer¹⁴ (1966). The differences between the present study and the Nouer¹⁴ (1966) are possibly due to number of children being examined.

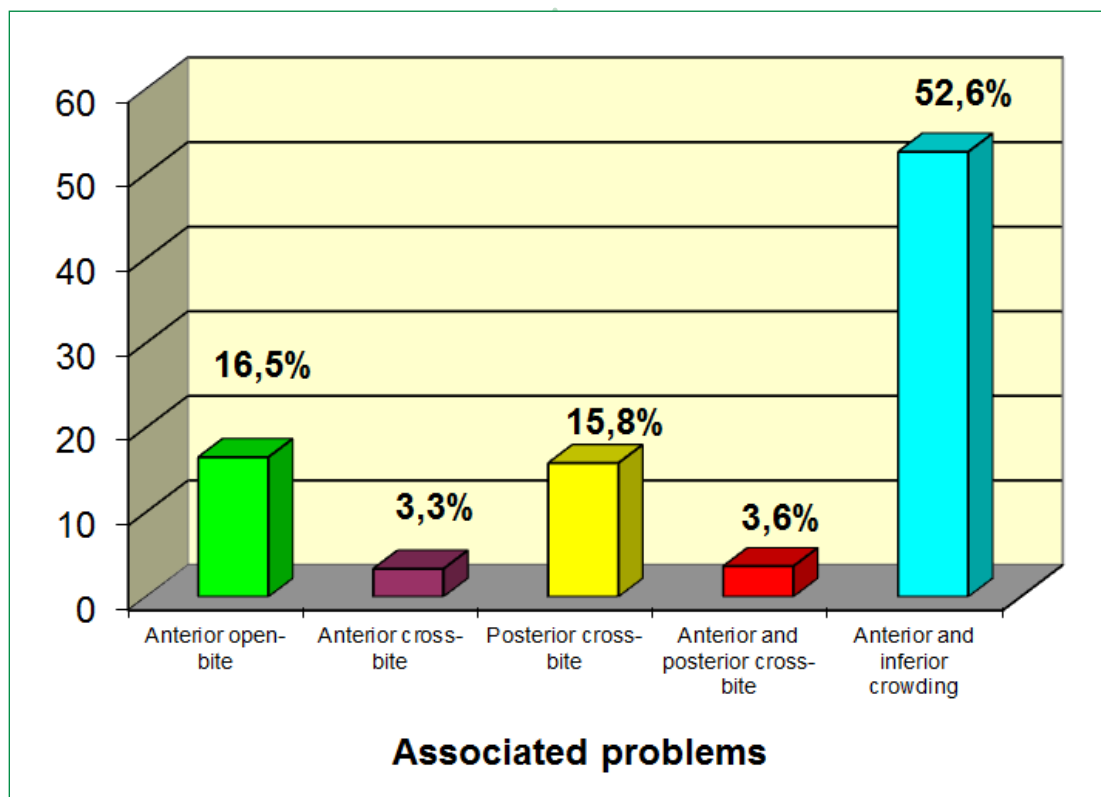
All types of malocclusions proposed by Angle⁹ and observed in the present study included problems related to open-bite, anterior and posterior cross-bite, and presence of antero-inferior crowding. This latter condition, in turn, was the most frequent problem found among the 219 schoolchildren (52.6%) regarding all types of malocclusion (Figure 6), except for bilateral Class III malocclusion. The value found in this work is similar to that by Silva Filho *et al.*¹ (1989) and greater than that by Ramos *et al.*¹² (2000), respectively, 52.73% and 34%. This large number of schoolchildren with tooth crowding is due to the fact that most of them are in the transitory phase of dentition, that is, there

are deciduous teeth in the dental arches and occlusion is incomplete.

Sixty-nine schoolchildren (16.5%) had anterior open-bite (Figure 6), but such an anomaly was not observed in the cases of bilateral Class II division 2 malocclusion, possibly due to the verticalisation of upper incisors usually seen in this type of occlusal change. Other authors assessing children with similar ages have found values close to that for this dental condition (Silva Filho *et al.*¹, 1989, Ramos *et al.*¹², 2000), but studies of younger children showed higher percentages for this situation (Martins *et al.*¹⁷, 1998, Silva e Araújo¹⁸, 1983, Tomita *et al.*¹⁹, 1998). This increased percentage of anterior open-bite in younger children can be explained by the greater incidence of deleterious oral habits in this age group.

The presence of cross-bite was also observed in 95 schoolchildren (22.8%) taking part of this study. Also, posterior cross-bite was more prevalent (15.9%, n= 66), a result very similar to other studies. Galvão *et al.*⁶, 1994, Oda *et al.*¹⁵, 1995, Martins *et al.*¹⁷, 1998, Silva e Araújo¹⁸, 1983, Silva Filho *et al.*²⁰, 1990. However, this fig-

Figure 6 – Percentage of problems related to all schoolchildren studied, regardless of Angle's classification.



ure was lower than that by Freitas *et al.*⁵ (2002), who found 27% in children aged 10-15 years old.

Anterior cross-bite was observed in 14 schoolchildren (3.3%), being more frequent in Class I and Class III malocclusions (7 cases each), whereas this problem was not observed in Class II malocclusion. The percentage found in the present work differs from that by other authors (Freitas *et al.*⁵, 2002, Carvalho *et al.*¹⁰, 2000, Ramos *et al.*¹², 2000, Pires *et al.*¹³, 2001, Nouer¹⁴, 1966, Silva Filho *et al.*²⁰, 1990) possibly due to different age groups and regional conditions regarding each sample (Dias e Gleiser²¹, 2009).

Some patients presented with anterior and posterior cross-bite (3.6%; n= 15), a condition mostly found in the cases of Class III subdivision malocclusion. This

predominance is due to the altered antero-posterior relationship in individuals having this malocclusion.

CONCLUSION

1 – The great majority of schoolchildren examined presented with occlusal problems;

2 – Class I malocclusion was the most common condition found in this study, followed by Class II and Class III malocclusions;

3 – Class III subdivision malocclusion was found to be more frequent than bilateral Class III malocclusion;

4 – The most frequent occlusal problem was the antero-inferior crowding, followed by anterior open-bite and cross-bite.

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