We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

4,800
Open access books available

122,000
International authors and editors

135M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

CLARIVATE ANALYTICS BOOK CITATION INDEX INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Chapter 2

Prevalence of Malocclusion in Brazil and Associated Factors Among Adolescents 15-19 Years Old

Rafael da Silveira Moreira,
Mônica Regina Barros de Moura and
Edyellem Virginia Cavalcante Mangueira

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/59507

1. Introduction

Malocclusion, defined as an abnormality in the growth and development of the teeth, is considered a public health problem because of its high prevalence. It may adversely affect the quality of life of affected individuals, impairing their social interaction and psychological well–being [1,2,3], due to impaired facial esthetics, as well as weakened functions related to speech, chewing and swallowing [4].

Occlusion problems occur worldwide, regardless of gender, ethnic group and social class and can affect the teeth, bones, muscles and nerves simultaneously [5-8]. The World Health Organization (OMS) recommended the Dental Aesthetic Index (DAI, Dental Aesthetic Index) in the 4th edition of Oral Health Surveys Basic manual, so there would be one able to gather information from epidemiologic [9].

Epidemiological knowledge enables evaluation of the distribution and severity of morbid conditions that occur in a population. It also allows verification of the interference of etiological factors on the occurrence of diseases, providing data for planning preventive and curative actions. According to the World Health Organization (OMS) [10], malocclusion currently holds the third place in the scale of priorities among dental problems of public health worldwide, surpassed only by tooth decay and periodontal disease [11,12,13], directly related to these two most prevalent problems of dentistry [14].

The registered prevalence of occlusal disorders may have an impact on public health, such as increased demand for services for a population in need of more expensive and specialized orthodontic treatments. However, neither the prevention, interception and correction of

malocclusion, nor the care of people with occlusion problems at the Center for Dental Specialties (CEO) are found in the core network of municipality programs directly targeted by the study [13].

In this context, affected by the scarcity of financial resources and the predominantly aesthetic connotation given to malocclusions, the Single Health System has not taken action related to the prevention and/or treatment of malocclusions; instead, priority is given to preventive and therapeutic action against the manifestations of decay as this is the most common oral disease. Thus, taking into account that a significant portion of the population has access to health services exclusively through the Single Health System, it is assumed that there is a large contingent of people, with malocclusion and functional changes, who are devoid of preventive care and treatment [15].

The evaluation of occlusion considering the aspects of public health has two main objectives: first, to assess the need for priority treatment; second, to inform and enable planning of necessary resources for the provision of orthodontic treatment to the population [3]. From this perspective, the development of public policies that include orthodontic treatment among health procedures accessible to the population becomes essential. Difficulties in resources cannot serve as justification for the omission and the lack of information for professionals involved in health-promotion programs and policymakers to represent the needs of the population [16].

Because financial resources in the public health are scarce and orthodontics is a specialty that requires greater investment, both in material appearance as a professional, public access to orthodontic services becomes difficult [6]. Thus, even in the 21st century, orthodontics is seen as an elitist art [17].

Information about the distribution of malocclusion in a population and the identification of factors and associated conditions could help researchers build models to understand its occurrence and help policymakers, and improve public health interventions [18]. The planning of public health policies should be founded on knowledge of the needs of the population, correlating causes, effects and possible solutions to problems and sizing available resources [19]. Thus, the objective of this study was to estimate the prevalence of malocclusion in adolescents (15-19 years old) in Brazil.

2. Method

The prevalence of malocclusion in adolescents (15-19 years old) in Brazil, whose data (based on codes and criteria from WHO's oral health survey recommendations) were collected from the National Survey of Oral Health (SB Brasil 2010) [20], was analyzed. Secondary data analysis was based on subjective and normative criteria related to the contextual level, individual, clinical, self-perception and access variables.

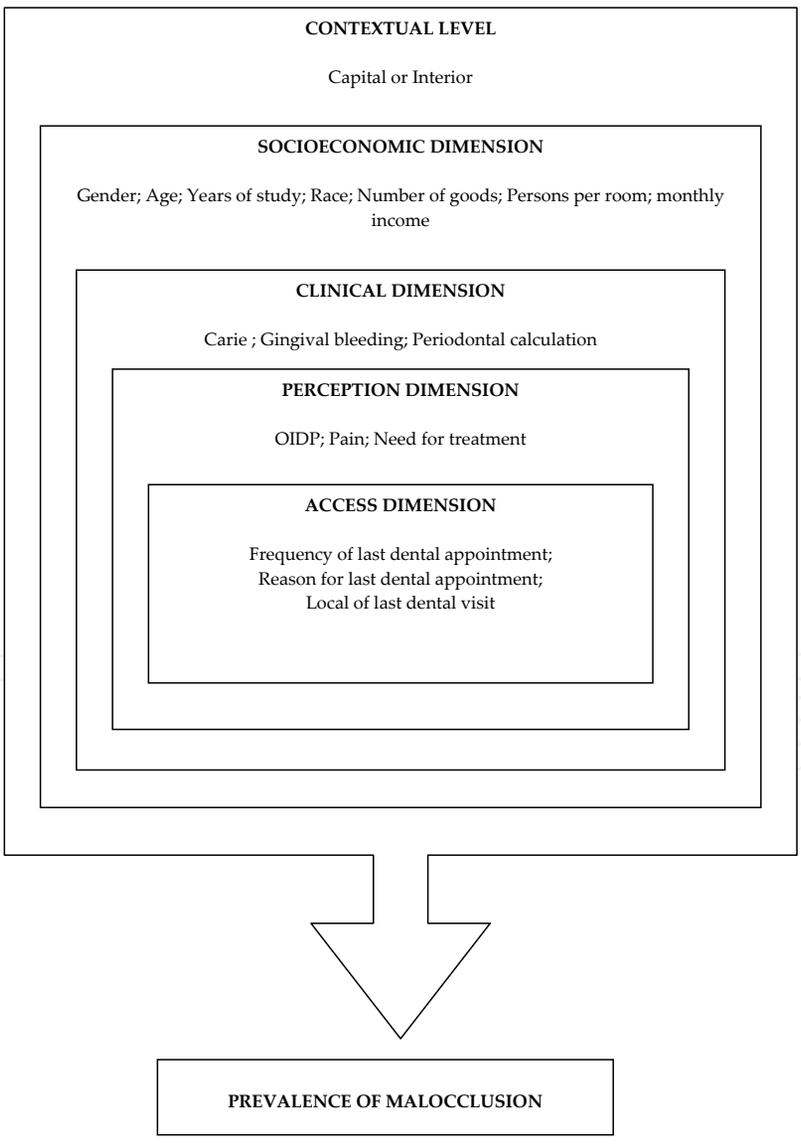
Data collection was based on subjective and normative criteria related to the contextual level variables (locations) and individual level variables, which were divided into socio-economic (gender, race/color, age, number of assets, persons per room, years of education and family

http://dx.doi.org/10.5772/59507

income); clinical (presence of bleeding, presence of calculus, caries experience); self-perception (OIDP - Oral Impact on Daily Performances, oral pain and need for treatment) and last dental visit (frequency, location, and reason).

For the definition of malocclusion, the Dental Aesthetic Index (DAI) with scores less than or equal to 25 was used [6,10].

Descriptive statistics was initially performed for the outcome variable. Then all independent variables were described according to the prevalence of malocclusion. Rao-Scott test, an equivalent to Chi-square test for complex samples, was used to test the dependence between variables. This analysis was performed using the SPSS 13© software considering the complex sample design. The simple model and hierarchical (Figure 1) multiple logistic regression (confidence intervals of 95%) were used to measure the association of independent variables with the prevalence of malocclusion (dependent variable) with odds ratio as an effect measure.



3. Results

With regard to the socio-economic characteristics or individual level variables of the study population, there were no statistically significant differences in terms of gender, ethnic group, number of people per room and years of study. There were also no statistical differences for the areas studied (contextual level variables) (Table 1).

Contextual level variables		Sample%	Malocclusion %	IC95%*	p-Value†
Contextual level	Capital	30,0	34,8	31,0-38,7	
	Interior	70,0	34,9	29,3-40,9	0,970
Individual level variables (socioeconomic)		**Sample%**	**Malocclusion %**	**IC95%***	**p-Value†**
Gender	Male	48,4	35,8	30,6-41,4	
	Female	51,6	34,0	29,1-39,3	0,593
Race / Color	White	46,2	30,7	25,1-36,9	
	Not White	53,8	38,4	32,8-44,4	0,073
Age	Below the median (≤ 17)	61,8	37,8	33,0-42,8	
	Above the median ("/> 17)	38,2	30,3	25,1-36,0	0,025
Number of goods	Below the median (≤ 6)	54,5	39,9	34,5-45,4	
	Above the median ("/> 6)	45,5	28,9	23,9-34,5	0,004
Persons per room	Below the median (≤ 1.5)	53,2	32,9	26,9-39,6	
	Above the median ("/> 1.5)	46,8	37,0	32,9-41,4	0,265
Years of study	Below the median (≤ 9)	53,1	36,4	31,7-41,3	
	Above the median ("/> 9)	46,9	33,1	27,7-39,1	0,342
Monthly income	Up to R$ 500	16,4	38,8	32,0-46,1	
	R$ 501 to R$ 1,500	50,7	38,9	33,6-44,5	
	More than R$ 1,500	32,9	27,0	20,5-34,6	0,008
Individual level variables (clinical)		**Sample%**	**Malocclusion %**	**IC95%***	**p-Value†**
Presence of bleeding	Yes	33,8	45,2	38,8-51,7	
	No	66,2	30,0	25,7-34,7	<0,001
Presence of calculation	Yes	36,2	40,7	35,3-46,2	
	No	63,8	31,4	26,8-36,4	0,005
Caries	Yes (CPO-D "/>1)	76,1	37,1	32,7-41,8	

http://dx.doi.org/10.5772/59507

	No (CPO-D =0)	23,9	27,8	21,5-35,3	0,023
Individual level variables (perception)		**Sample%**	**Malocclusion %**	**IC95%***	**p-Value†**
OIDP	No change (OIDP = 0)	60,5	30,5	25,2-36,3	
	With amendment (OIDP ≥ 1)	39,5	42,0	36,1-48,1	0,008
Mouth pain	No	75,3	33,8	28,6-39,3	
	Yes	24,7	38,4	31,9-45,4	0,328
Need for treatment	No	32,7	25,0	19,1-32,0	
	Yes	67,3	39,7	35,5-44,1	<0,001
Variables at the individual level (Access the last dental visit)		**Sample%**	**Malocclusion %**	**IC95%***	**p-Value†**
Frequency	Less than 1 year	54,6	34,2	29,8-39,0	
	1 to 2 years	29,1	41,0	34,1-48,4	
	3 or more years	16,4	31,6	22,7-42,0	0,163
Local	Public	46,5	37,3	31,6-43,3	
	Particular	43,6	32,8	26,8-39,5	
	Health Plan	8,7	40,2	27,5-54,3	
	Other	1,3	25,9	10,0-52,3	0,516
Reason	Review	34,6	28,3	23,9-33,1	
	Pain	14,6	32,9	25,3-41,6	
	Tooth extraction	8,6	42,3	33,4-51,7	
	Other treatments	40,4	41,6	34,2-49,4	0,005
Total		**100,0**	**34,9**	**30,9-39,1**	

Table 1. Prevalence (confidence intervals 95%) of malocclusion according to the independent variables in schoolchildren 15-19 years. Brazil, 2013.

The access of the individuals during their last visit to the dentist was not significant in the same location; however, as the frequency of consultations, individuals who had access between one and two years, they had 93% more chances of having malocclusion as to who had his last visit in three years or more, according to the odds ratio after multiple hierarchical logistic regression model. Individuals, whose consultation was due to pain, tooth extraction and other treatments, respectively, had 25%, 86% and 81% chances of having malocclusion. This showed that there was statistical significance for this variable according to the odds ratio following the simple logistic regression model (Table 2).

Contextual level variables		OR*	IC95%†	p-value	OR‡	IC95%†	p-value
Contextual level	Capital	1,00	---		---	---	
	Interior	1,01	0,74-1,37	0,970	---	---	
Individual level variables (socioeconomic)		**OR***	**IC95%†**	**p-value**	**OR‡**	**IC95%†**	**p-value**
Gender	Male	1,08	0,81-1,44		---	---	
	Female	1,00	---	0,593	---	---	
Race / Color	White	1,00	---		---	---	
	Not White	1,41	0,97-2,05	0,074	---	---	
Age	Below the median (≤ 17)	1,40	1,04-1,87		1,36	1,02-1,83	
	Above the median ("/> 17)	1,00	---	0,025	1,00	---	0,041
Number of goods	Below the median (≤ 6)	1,63	1,17-2,26		---	---	
	Above the median ("/> 6)	1,00	---	0,004	---	---	
Persons per room	Below the median (≤ 1.5)	1,00	---		---	---	
	Above the median ("/> 1.5)	1,20	0,87-1,65	0,265	---	---	
Years of study	Below the median (≤ 9)	1,15	0,86-1,55		---	---	
	Above the median ("/> 9)	1,00	---	0,342	---	---	
Monthly income	Up to R$ 500	1,72	1,07-2,75		1,67	1,05-2,66	
	R$ 501 to R$ 1,500	1,73	1,17-2,54		1,70	1,16-2,50	
	More than R$ 1,500	1,00	---	0,017	1,00	---	0,020
Individual level variables (clinical)		**OR***	**IC95%†**	**p-value**	**OR‡**	**IC95%†**	**p-value**
Presence of	Yes	1,92	1,39-2,66		1,83	1,29-2,60	
bleeding	No	1,00	---	<0,001	1,00	---	0,001
Presence of	Yes	1,50	1,13-1,98		---	---	
calculation	No	1,00	---	0,005	---	---	
Caries	Yes (CPO-D "/>1)	1,53	1,06-2,21		---	---	
	No (CPO-D =0)	1,00	---	0,023	---	---	
Individual level variables (perception)		**OR***	**IC95%†**	**p-value**	**OR‡**	**IC95%†**	**p-value**
OIDP	No change (OIDP = 0)	1,00	---		---	---	
	With amendment (OIDP ≥ 1)	1,65	1,14-2,39	0,008	---	---	
Mouth pain	No	1,00	---		---	---	
	Yes	1,22	0,82-1,83	0,329	---	---	
Need for treatment	No	1,00	---		1,00	---	
	Yes	1,98	1,39-2,81	<0,001	1,80	1,27-2,54	0,002
Variables at the individual level		**OR***	**IC95%†**	**p-value**	**OR‡**	**IC95%†**	**p-value**

	(Access the last dental visit)						
Frequency	Less than 1 year	1,13	0,73-1,73		1,52	0,98-2,36	
	1 to 2 years	1,51	0,93-2,45		1,93	1,19-3,14	
	3 or more years	1,00	---	0,179	1,00	---	0,029
Local	Public	1,00	---		---	---	
	Particular	1,21	0,85-1,74		---	---	
	Health Plan	1,37	0,71-2,64		---	---	
	Other	0,71	0,22-2,29	0,545	---	---	
Reason	Review	1,00	---		---	---	
	Pain	1,25	0,87-1,78		---	---	
	Tooth extraction	1,86	1,23-2,81		---	---	
	Other treatments	1,81	1,26-2,59	0,001	---	---	

* Odds Ratio according to the simple logistic regression model

† Confidence intervals of 95%

‡ Odds Ratio according to the hierarchical multiple logistic regression model

Table 2. Prevalence (confidence intervals 95%) of malocclusion and Odds Ratio (OR) according to the independent variables from the simple and multiple logistic regression models in schoolchildren 15-19 years. Brazil, 2013.

In the current study, the associations were also found for age, according to the odds ratio of hierarchical multiple logistic regression model. Individuals below the median of 17 years old were 40% likely to have malocclusions that individuals over the age. According to the odds ratio of the simple logistic regression model, the families who owned less than 6 goods in their homes were 63% more likely to have adolescents between 15 and 19 with some type of malocclusion. In addition, families with monthly income of up to R $ 500.00 and R $ 501.00 to R $ 1,500.00, respectively, had 67% and 70% likely to have adolescents with occlusal problems compared to families with monthly income or more than R $ 1,500.00 (odds ratio according to hierarchical logistic regression model).

Regarding clinical variables, there was enough statistical significance of the presence of bleeding, presence of calculus and caries experience. Individuals who had gingival bleeding showed 83% more chance of having dental crowding compared with those without bleeding during clinical examination (odds ratio according to multiple hierarchical logistic regression model); those with dental calculus were 50% more likely to have malocclusions than those without calculation and those who have tooth decay were 53% more likely to have malocclusion than those who have healthy teeth (odds ratio according to the simple logistic regression model) (Table 2).

Considering the variables related to self-perception, oral pain was not statistically significant, however, individuals with OIDP change were 65% more likely to have occlusal disorders than those without changes (odds ratio according to the simple logistic regression model). In

addition, individuals who saw the need for treatment were 80% more likely to have malocclusions (odds ratio according to multiple hierarchical logistic regression model) than those who did not perceive such a need (Table 2).

4. Discussion

The growing interest in malocclusion is global and is evidenced by the quantity and diversity of studies that have been published on the topic over the last decade. Consequently, we have expanded our knowledge about the distribution and evolution of this disease in various populations, allowing comparisons and facilitating the growth of interest on the subject [13].

Several studies worldwide have reported the high prevalence of malocclusion in young adolescents [21] and revealed that the majority of Brazilian teenagers would like to receive orthodontic treatment, believing that orthodontic treatment can improve their quality of life [22].

In this study, as well as in others, the lack of statistically significant association between the severity of malocclusion and socio-demographic characteristics: gender [7,8,17,21-26], race [5, 8,18,21,27, 28], number of persons per room and schooling may highlight multifactorial malocclusion, explaining the fact that people belonging to the same cluster may have several kinds of intensity of severity of injury [5,27].

A study by Ferreira, Roncalli, and Lima [24] on public health dentistry showed that in homogeneous racial groups, the existence of occlusal problems is rarely observed. On the other hand, in societies with large racial miscegenation, like Brazil, the prevalence of these occurrences is greater, which may explain the fact that no statistically significant differences between the races in this study have been found.

A research by Rasheed and Ali [29] on the prevalence of malocclusion among Iranian students 13 years of age found a significant difference between residents in urban and rural areas. Similarly, a study by Thomaz and Valença [30] revealed the existence of a statistically significant association between malocclusion and the geographic location of preschool, so there was a 60% increase in the odds of occurrence of malocclusion among children in urban areas compared with children in rural areas. These studies differ from the results of current research, in which there was no statistical significance for the prevalence of occlusal disorders among the studied regions. This finding agrees with the results of a study by Meira, Oliveira, and Alves [13]. Perhaps the absence of statistically significant differences in our findings may have been due to the existence of the degree of isolation between rural and urban areas and access to dental services.

According to Freire et al. [31], who analyzed the oral health status among 12-year-old students of public and private schools in Goiânia, Brazil, 22.5% of students had some kind of injury. In their study, there was a statistically significant difference when comparing the types of school ($P < 0.001$), with a higher prevalence of malocclusion in students from public schools than those who attended private schools. Regarding severity, higher values for public schools ($P < 0.001$)

http://dx.doi.org/10.5772/59507

were also observed. These findings agree with our research on the following: the presence of some type of malocclusion was more likely in adolescents whose families had a monthly income of R$ 1,500.00 and had less than the median number of 6 for assets. Moreover, Marques et al. [32] reported that the variable socio-economic intermediate appeared as a risk factor for malocclusion.

Mtaya, Brudvik, and Astrom [33] evaluated the prevalence of malocclusion and its association with socio-demographic characteristics with caries experience and the level of oral hygiene in school children 12-14 years of age, living in two neighborhoods with socio-economic differences (in Tanzania). They concluded that the higher prevalence of malocclusion in the study subjects was associated with environmental factors in terms of caries experience and socio-economic underprivileged conditions. Likewise, in a study of preschoolers 5 years of age, Hebling et al. [12] reported that environmental factors, such as the presence of deleterious oral habits, as well as social class, play an important role in identifying children with open bite and/or cross bite. In the present study, there was also a relation between the prevalence of malocclusion and the socio-economic conditions, as households with lower monthly incomes were 70% more likely to have adolescents with occlusal problems when compared with households with higher monthly incomes.

Regarding the association of certain disorders and occlusal caries experience on the part of the individuals studied, our work agrees with the work of Mtaya, Brudvik, and Astrom [33], for the studied individuals who had caries, they were also more likely (53%) to have malocclusions. These findings are also in agreement with Marquezan et al. [34]: They studied the association of occlusal anomalies and dental caries in Brazilian children. They reported that the lack of space in the maxillary anterior segment represents a risk factor for dental caries in preschool children (or caries severity is significantly higher in children whose jaws do not have adequate space for the teeth in their anterior portion). In turn, Gábris, Márton, and Madléna [35] reported that adolescents with decayed teeth, missing teeth and with a considerable amount of dental plaque had significantly higher chances of having malocclusion.

Kukletova et al. [36] analyzed the relationship among caries experience, gingival condition and occlusal abnormalities in adolescents 13 to 15 years old in Brno, Czech Republic and concluded that there was a significant association among high caries experience, gingival index and malocclusions. In our study, the presence of gingival bleeding was highly significant, according to the odds ratio based on the hierarchical multiple logistic regression model, so that adolescents with gingival bleeding showed an 83% higher chance of having disorders of occlusion.

Regarding the perceived need for treatment, a study by Marques et al. [37] showed that most schoolchildren, 10-14 years old, wished to be treated orthodontically (n = 292, 87.7%). Marques et al. [22], whose survey covered a sample of 403 individuals from 14 to 18 years old, reported that there was significant association between the desire for treatment by individuals and most types of malocclusion. Likewise, the results obtained by this current research showed that 67.3% of the subjects have perceived need for treatment, while 32.7% have not realized that they have malocclusion (Table 1). Ansai et al. [38] used the DAI (Dental Aesthetic Index) and assessed malocclusion in Japanese high school students. They concluded that the number of

students with acceptable dental appearance among Japanese high school students was significantly lower than among US high school students, thus, confirming that there was a greater perceived need for treatment in Japan.

5. Conclusions

In Brazil, malocclusion is more common in adolescents aged below 17 years old, female and with low income. Furthermore, the self-perception of the need for aesthetic improvement and the need for treatment, as well as the need for treatment of dental caries and periodontal problems are more evident in patients with malocclusion.

Author details

Rafael da Silveira Moreira*, Mônica Regina Barros de Moura and
Edyellem Virginia Cavalcante Mangueira

*Address all correspondence to: moreirars@cpqam.fiocruz.br

Department of Public Health, Oswaldo Cruz Foundation, Aggeu Magalhães Research Center, Recife, Pernambuco, Brazil

References

[1] Peres KG, Traebert ESA, Marcenes W. Diferenças entre autopercepção e critérios normativos na identificação das oclusopatias. Rev Saúde Pública; 2002. 36:230-6.

[2] Marques LS. Repercussão estética da má-oclusão em adolescentes de Belo Horizonte [Dissertação de Mestrado]. Belo Horizonte: Faculdade de Odontologia, Universidade Federal de Minas Gerais; 2004.

[3] Oliveira CM, Sheiham A. Orthodontic treatment and its impact on oral health-related quality of life in Brazilian adolescents. J Orthod; 2004. 31:20-7.

[4] Proffit WR, Fields HW. Contemporary orthodontics. Saint Louis: C. V. Mosby; 1995.

[5] Alves T. Saúde bucal de escolares com doze anos de idade do município de Feira de Santana, Bahia, zona urbana [tese] São Paulo: Universidade de São Paulo; 2003.

[6] Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Coordenação Nacional de Saúde Bucal. Departamento de Atenção Básica. Projeto SB BRASIL 2003: Condições de saúde bucal da população brasileira 2002-2003: resultados principais. Brasília. 2004.

[7] Evensen JP, Ogaard, B. Are malocclusions more prevalent and severe now?: A comparative study of medieval skulls from Norway. AJO-DO; 2007. 131(6).

[8] Ngom I, Diagne F, Dieye F, Diop-ba K, Thiam F. Orthodontic treatment need and demand in Senegalese school children aged 12-13 years. Angle Orthod; 2007. 77(2): 323-330.

[9] Garbin AJI, Perin PCP, Garbin CAS, Lolli LF. Prevalência de oclusopatias e comparação entre a Classificação de Angle e o Índice de Estética dentária em escolares do interior do Estado de São Paulo – Brasil. Dental Press J. Orthod; 2010. 15(4) :94-102.

[10] Organização Mundial de Saúde. Levantamentos básicos em saúde bucal. 4ª ed. São Paulo: Ed. Santos; 1999.

[11] Dias PF, Gleiser R. O índice de necessidade de tratamento ortodôntico como um método de avaliação em saúde pública. Rev Dental Press Ortod Ortop Facial; 2008. 13(1):74-81.

[12] Hebling SRF, Cortellazzi KL, Tagliaferro EPS, Hebling E, Ambrosano GMB, Meneghim MC, Pereira AC. Relationship between malocclusion and behavioral, demographic and socioeconomic variables: a cross-sectional study of 5-year-olds. Journal of Clinical Pediatric Dentistry; 2008. 33(1):75-79.

[13] Meira ACLO, Oliveira MC, Alves, TDB. Severidade das oclusopatias e fatores associados em escolares de 12 Anos no município de Feira de Santana, Bahia, 2009. Rev. Baiana de Saúde Pública; 2011. 35:196-210.

[14] Borges CM, Cascaes AM, Fischer TK, Boing AF, Peres MA, Peres KG. Dor nos dentes e gengivas e fatores associados em adolescentes brasileiros: análise do inquérito nacional de saúde bucal SB-Brasil 2002-2003. Cad Saúde Pública; 2008. 24(8):1825-1834.

[15] Suliano, AA, Borba PC, Rodrigues MJ, Caldas Júnior AF, Santos FAV. Prevalência de más oclusões e alterações funcionais entre escolares assistidos pelo Programa Saúde da Família em Juazeiro do Norte, Ceará, Brasil. Rev Dent Press Ortodon Ortop Facial; 2005. 10(6):103-110.

[16] Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. Community Dent Oral Epidemiol; 2000. 28: 399-406.

[17] Emmerich A, Fonseca L, Elias AM, Medeiros U. Relação entre hábitos bucais, alterações oronasofaringianas e mal-oclusões em pré-escolares de Vitória, Espírito Santo, Brasil. Cad Saúde Públ; 2004. 20(3): 689-697.

[18] Frazão P, Narvai PC, Latorre, MRDO, Casstellanos, RA. Are severe occlusal problems more frequent in permanent than deciduous dentition? Rev. Saúde Pública; 2004. 38(e): 247-254.

[19] Moura C, Cavalcanti, AL. Maloclusões, cárie dentária e percepções de estética e função mastigatória: um estudo de associação. Rev Odonto Ciênc; 2007. 22(57):256-262.

[20] Brasil. Ministério da Saúde. SB Brasil 2010. Pesquisa Nacional de Saúde Bucal: Resultados Principais. Brasília, DF. 2013.

[21] Bebehani, F, Artun J, Al-Jame B, Kerouso H. Prevalence and severity of malocclusion in adolescent Kuwaitis. Med Princ Pract; 2005. 14(6): 390-395.

[22] Marques L, Pordeus IA, Ramos-Jorge ML, Filogônio CA, Filogônio CB, Pereira LJ, Paiva SM. Factors associated with the desire for orthodontic treatment among Brazilian adolescents and their parents. BMC Oral Health; 2009; 9(34).

[23] Tomita NE. Relação entre determinantes socioeconômicos e hábitos bucais: influência na oclusão de pré-escolares de Bauru [Tese]. São Paulo: Universidade de São Paulo; 1996.

[24] Ferreira MAF, Roncalli AG, Lima KC. Saúde bucal coletiva: conhecer para atuar. Natal: EDUFRN; 2002.

[25] Leles CR, Nunes MF, Silva ET, Santos NCM, Paula Junior DF. Psychosocial impact of dental esthetics on quality of life in adolescents. Angle Orthod; 2009. 79(6):1186-1192.

[26] Shiavakumar KM, Shaffiulia MD, Subba RV. Prevalence of malocclusion and orthodontic treatment needs among middle and high school children of Davange City, Índia by using Dental Aesthetic Index. J. Indian Soc Pedod Prevent Dent; 2009. 27(4): 211-218.

[27] Cangussu MC, Lopes L. Prevalência e severidade das alterações oclusais em escolares de 12 a 15 anos de Salvador-BA, 2004. Rev Ci Méd Biol; 2005. 4(2):105-112.

[28] Bernabé E, Flores-Mir C. Orthodontic treatment need in Peruvian young adults: evaluated through dental aesthetic index. J Angle Orthod; 2006. 76(3):417-421.

[29] Rasheed T, Ali Aia F. Assessment of orthodontic treatment needs of Dental Aesthetic Index. East Mediterr Health J; 2009. 15(6):1535-1541.

[30] Thomaz EBAF, Valença AMG. Prevalência de má-oclusão e fatores relacionados à sua ocorrência em pré-escolares da cidade de São Luís – MA – Brasil. RPG Rev Pós Grad; 2005. 12(2):212-221.

[31] Freire CM, Reis, SCGB, Gonçalves MM, Balbo PL, Leles CR. Condição de saúde bucal em escolares de 12 anos de escolas públicas e privadas de Goiânia, Brasil. Rev Panam Salud Publica; 2010. 28(2): 86-91.

[32] Marques LS, Ramos-Jorge ML, Paiva SM, Pordeus IA. Malocclusion: Esthetic impact and quality of life among Brazilian schoolchildren.. Am J orthod dentofacial orthop; 2006. 129(3):424-427.

[33] Mtaya M, Brudvik P, Astrom AN. Prevalence of malocclusion and its relationship with sociodemographic factors, dental caries, and oral hygiene in 12- to 14-year-old Tanzanian schoolchildren. Eur J Orthod; 2009. 31: 467-476.

[34] Marquezan M, Marquezan M, Faraco-Junior IMF, Feldens CA, Kramer PF, Ferreira SH. Association between occlusal anomalies and dental caries in 3- to 5-year-old Brazilian children. J Orthod; 2011 (March). 38(1): 8-14.

[35] Gábris K, Márton S, Madléna M. Prevalence of malocclusions in Hungarian adolescents. Eur J Orthod; 2006. 28: 467-470.

[36] Kukletova M, Izakovocova HL, Muzilova K, Broukal Z, Kukla L. Relationship between gingivitis severity, caries experience and orthodontic anomalies in 13-15 year-old adolescents in Brno, Czech Republic. Commun Dent Health; 2012. 29(2): 179-83.

[37] Marques LS, Barbosa CC, Ramos-Jorge ML, Pordeus IA, Paiva SM. Prevalência da maloclusão e necessidade de tratamento ortodôntico em escolares de 10 a 14 anos de idade em Belo Horizonte, Minas Gerais, Brasil: enfoque psicossocial. Cad. Saúde Pública;2005. 21(4):1099-1106.

[38] Ansai T, Miyasaki H, Katoh Y, Yamashita Y, Takehara T, Jenny, J. Prevalence of malocclusion in high school students in Japan according to the Dental Aesthetic Index. Commun Dent Oral Epidemiol; 2006. 21(5):303-305.

IntechOpen