Original Article

Condition-Specific Impacts on Quality of Life Attributed to Malocclusion by Adolescents with Normal Occlusion and Class I, II and III Malocclusion

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ABSTRACT

Objective: To compare the prevalence, intensity, and extent of condition-specific oral impacts on quality of life attributed to malocclusion by Brazilian adolescents with normal occlusion and those with Angle Class I, II, and III malocclusion.

Materials and Methods: Four groups of 55 adolescents were configured such that each group represented normal occlusion, as well as Angle Class I, II, and III malocclusion. No radiographs were taken. Adolescents aged 15 to 16 years were selected from those attending all secondary schools in Bauru (Sao Paulo, Brazil). The Oral Impacts on Daily Performances index was used to collect data on condition-specific impacts (CSIs) attributed to malocclusion. The prevalence, as well as the intensity and extent, of CSIs was compared among the four groups with the use of Chi-square and Kruskal-Wallis tests, respectively.

Results: Groups were comparable according to sex, age, and socioeconomic status. The prevalence of CSI was significantly different between groups ($P = .039$). Class II and III malocclusion groups reported a higher prevalence of CSI than those with normal occlusion and Class I malocclusion. However, the intensity and extent of CSI were not significantly different between groups.

Conclusions: The prevalence, but not the intensity and extent, of CSIs attributed to malocclusion differed among groups with different malocclusions. The present findings support the concept that malocclusion has physical, psychological, and social effects on quality of life.

KEY WORDS: Malocclusion; Quality of life; Adolescents

INTRODUCTION

Little research has been undertaken to explore the impacts of malocclusion and its treatment on quality of life. Even though it is generally accepted that individuals seek orthodontic care because of the negative effects of malocclusion,[1] a recent review concluded that evidence about the physical, psychological, and social consequences of malocclusion and orthodontic treatment as they relate to quality of life is conflicting.[2] In this regard, the use of standardized, valid, and reliable Oral Health Related Quality of Life (OHRQoL) measures has been recommended,[2–4] especially those OHRQoL measures that may be used to assess the condition-specific impacts attributed to malocclusion and/or conditions that the subject deems related to orthodontics. *Attributed* indicates that the subject has stated that the quality of life impact was linked to the malocclusion, rather than to any causal inference between variables.

To date, few studies have assessed the effects of malocclusion on adolescents' quality of life.[5–10] All have used epidemiologic indices of orthodontic treatment need[6,7] or specific occlusal traits[5,8–10] to define malocclusion. However, none has used the Angle classification of malocclusions, which is based on the anteroposterior relationship of the maxillary to the

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mandibular first molars.[11] Although the Angle classification was developed more than a century ago, it remains the most commonly used classification of malocclusions,[12–15] and its universal acceptance by the dental profession is evidence of its practicality.[15]

Because Angle classification is widely used and no studies have used it to evaluate quality of life, the present study was designed to fill this gap in the literature and to expand current knowledge about the impacts of malocclusion on quality of life. The objective of this study was to compare the prevalence, intensity, and extent of condition-specific oral impacts on quality of life attributed to malocclusion by Brazilian adolescents with normal occlusion and those with Angle Class I, II, and III malocclusion.

MATERIALS AND METHODS

A total of 1675 adolescents were randomly selected from the 2200 15- to 16-year-old students who attended all secondary schools in the City of Bauru, Sao Paulo, Brazil. This cross-sectional study permitted estimation of the prevalence of malocclusion with use of the Angle classification. In all, 101 (12.4%) adolescents had normal occlusion, 698 (65.8%) had Class I malocclusion, 172 (16.2%) had Class II division 1 malocclusion, 4 had (0.4%) Class II division 2 malocclusion, and 55 (5.2%) had Class III malocclusion. On the basis of these figures, the number of adolescents with Class III malocclusion was chosen to make up equal-sized groups that represented Angle classification.[11] Because very few participants in the sample had Class II division 2 malocclusion, this group was not included. All remaining groups were reduced to 55 participants by simple random sampling, yielding a final sample that consisted of 220 15- to 16-year-old schoolchildren. This sample size allowed the finding of a 20% difference between groups in the prevalence of condition-specific impacts attributed to malocclusion and produced a statistical power of 80% and a maximum tolerable error of 5%.

Ethical approval was obtained from the Ethics Review Board of the Dental School at the University of Sao Paulo. Parents signed a consent letter stating that their children could participate in the study. In addition, each student gave verbal consent. No student had received or undergone orthodontic treatment at the time of the survey.

Data were collected through face-to-face structured interviews and dental clinical examinations. During interviews, adolescents gave information about their sociodemographic characteristics and the impact of their oral condition on their quality of life over the previous 6 months. Socioeconomic status (SES) was assessed after information on the head of household's occupation, sector of activity, education, and ownership of the means of production had been recorded.[16] This classification system revealed six social classes, which were subsequently dichotomized for analysis as low or high SES.

The Oral Impacts on Daily Performances (OIDP) index was used to collect information on sociodental impacts. This tool had been used previously and was validated on Brazilian adolescents.[6,7] The OIDP index, which has good internal consistency (Cronbach's alpha, 0.84) and test-retest reliability (Spearman's correlation coefficient, 0.65),[6,7] is used to assess serious oral impacts on eight items of daily performance, namely, eating, speaking, cleaning the mouth, relaxing, smiling, studying, maintaining usual emotional state, and engaging in social contact. If an adolescent reported an impact on any of the eight items of performance, the frequency of the impact (scale from 1 to 3) and the severity of its effect on daily life (scale from 1 to 3) were scored. If no impact was reported, then a zero score was assigned. Thereafter, adolescents were asked to identify oral problems that, in their opinion, had caused the impact. Only those condition-specific impacts on items of daily performance related to ''bad position of teeth,'' ''space between teeth,'' and ''deformity of mouth or face,'' hereafter referred to as condition-specific impacts (CSIs), were considered in the analysis as sociodental impacts attributed to malocclusion or conditions related to orthodontics.

The performance score was calculated by multiplying the corresponding frequency and severity scores. The overall OIDP score was the sum of the eight performance scores (range, 0 to 72) multiplied by 100 and divided by 72.[17,18] The prevalence of CSIs on daily performances was calculated as the percentage of adolescents with an OIDP score higher than zero. Among those adolescents who reported a CSI, each performance score was reclassified into five levels to determine the intensity of the impacts per performance. Because only six numbers can be obtained by multiplying three-point frequency and severity scales (1, 2, 3, 4, 6, and 9), the intensity of the impacts was classified into very little (1), little (2), moderate (3 to 4), severe (6), and very severe (9).[19,20] The overall intensity of CSI then was calculated as the most severe impact on any of the eight items of performance. Finally, the extent of CSI was calculated as the number of daily performance items affected. This value ranged from one to eight performances.[19,20]

Adolescents then were clinically examined by one of the authors, who had been previously trained for that purpose. Examination was merely clinical, without using instruments. According to the weighted kappa, interexaminer and intraexaminer reliability values were 0.77 and 0.91, respectively.

Table 1. Comparison of Sociodemographic Characteristics of Adolescents With Normal Occlusion and Those With Angle Class I, II, and III Malocclusion[a]

	Normal Occlusion		Class I Malocclusion		Class II Malocclusion		Class III Malocclusion		
Covariable	n	%	n	%	n	%	n	%	*P* Value
Sex									.776
Female	30	54.5	35	63.6	33	60.0	31	56.4	
Male	25	45.5	20	36.4	22	40.0	24	43.6	
Age, y									.510
15	33	60.0	37	67.3	30	54.5	36	65.5	
16	22	40.0	18	32.7	25	45.5	19	34.5	
Socioeconomic status (SES)									.367
Low SES	28	50.9	30	54.5	36	65.4	28	50.9	
High SES	27	49.1	25	45.5	19	34.6	27	49.1	

[a] Chi-square test was used.

For statistical analysis, groups were compared by sociodemographic characteristics (sex, age, and SES) with the Chi-square test. Then, CSI-OIDP scores were compared among groups with use of the Kruskal-Wallis test, and the prevalence of CSIs attributed to malocclusion was compared among groups, again with the Chi-square test. Finally, the intensity and extent of CSIs attributed to malocclusion in those adolescents who reported impacts were compared among groups with the Kruskal-Wallis test.

RESULTS

No statistically significant differences were noted among the four malocclusion groups in terms of sex, age, or SES ($P = .776$, .510, and .367, respectively). Overall, each group comprised a slightly greater number of female subjects, 16-year-olds, and adolescents from low SES communities (Table 1).

A statistically significant difference was reported between groups in terms of the prevalence of CSIs attributed to malocclusion ($P = .039$). Subjects with Class II malocclusion reported the highest (54.6%) and those with normal occlusion reported the lowest prevalence of CSIs (32.7%). When the prevalence of CSI was analyzed according to the type of daily performance affected, eating and smiling were the most commonly affected everyday activities, whereas sleeping was not affected at all (Table 2). However, smiling was the most frequently affected daily performance in Class I and II malocclusion groups (18.2% and 38.2%, respectively), whereas eating was the most frequently affected performance in Class III malocclusion and normal occlusion groups (34.5% and 20.0%, respectively). The only performance for which a statistically significant difference between groups was seen in the prevalence of CSIs was smiling ($P = .001$).

Among those adolescents with CSIs attributed to malocclusion, the intensity and extent of the impacts was compared between groups. Although a greater proportion of adolescents in the malocclusion groups reported CSIs of severe to very severe intensity in contrast to the normal occlusion group (Table 3), no

Table 2. Prevalence of Condition-Specific Impacts in Adolescents With Normal Occlusion and Those With Angle Class I, II, and III Malocclusion[a]

	Normal Occlusion		Class I Malocclusion		Class II Malocclusion		Class III Malocclusion		
Prevalence	n	%	n	%	n	%	n	%	*P* Value[b]
Overall	18	32.7	19	34.5	30	54.5	28	50.9	.039
By daily performance									
Eating	11	20.0	8	14.5	11	20.0	19	34.5	.072
Speaking	7	12.7	7	12.7	6	10.9	6	10.9	.982
Cleaning mouth	1	1.8	2	3.6	2	3.6	1	1.8	NC
Sleeping	0	0.0	0	0.0	0	0.0	0	0.0	NC
Smiling	4	7.3	10	18.2	21	38.2	15	27.3	.001
Emotion	0	0.0	1	1.8	4	7.3	0	0.0	NC
Studying	1	1.8	0	0.0	1	1.8	0	0.0	NC
Social contact	0	0.0	0	0.0	2	3.6	0	0.0	NC

[a] Chi-square test was used.
[b] NC indicates not calculable.

Table 3. Intensity of Condition-Specific Impacts in Adolescents With Normal Occlusion and Those With Angle Class I, II, and III Malocclusion[a]

	Very Little to Little Intensity		Moderate Intensity		Severe to Very Severe Intensity	
Group	n	%	n	%	n	%
Normal occlusion	7	38.9	5	27.8	6	33.3
Class I malocclusion	3	15.8	6	31.6	10	52.6
Class II malocclusion	6	20.0	7	23.3	17	56.7
Class III malocclusion	5	17.9	8	28.6	15	53.6

[a] Kruskal-Wallis test was used ($P = .339$).

statistically significant difference was apparent between groups ($P = .339$). Similarly, although the number of affected daily performances was lower in the normal occlusion group than in the malocclusion groups (Table 4), no statistically significant difference was reported between groups in the number of daily performances affected ($P = .694$).

DISCUSSION

A difference in the prevalence, but not in the intensity or extent, of CSIs attributed to malocclusion was observed between groups of adolescents with malocclusion and those with normal occlusion. Although some previous studies have reported that certain malocclusions are associated with impaired masticatory efficiency, abnormalities in speech, pain, and diminished social interaction,[2] no study has been designed specifically to assess the impact of different malocclusions on everyday activities.

A second improvement over previous studies was the use of a random, population-based sample of adolescents. Although clinical or hospital samples are usually preferred because of the greater array of facilities in those places, such samples are often biased convenience samples. They usually consist of patients who are seeking orthodontic treatment. On the other hand, a random, population-based sample reflects the self-perceptions of unbiased sample members of a general population and reports true estimates of CSIs attributed to malocclusion.

The prevalence of CSI was higher among adolescents with malocclusion than in those with a normal occlusion. Adolescents with Class II or Class III malocclusion reported a higher prevalence of impacts than was described by those with Class I malocclusion or normal occlusion. Whereas slightly more than half the adolescents with Class II or III malocclusion reported CSIs attributed to their malocclusions, only one-third of those with Class I malocclusion or normal occlusion reported CSIs. Smiling, laughing, and showing the teeth without feeling embarrassed was the most often impacted daily performance among adolescents with Class II malocclusion, whereas eating was the most often impacted daily performance among adolescents with Class III malocclusion. These findings are consistent with those of previous studies. Class II division 1 malocclusion has been reported to be associated with less enhanced self-concept and a greater number of negative social experiences.[21] Children with Class III malocclusion have the poorest masticatory efficiency and ability, followed by those with Class II and Class I malocclusion.[22]

In the present study, the Class II malocclusion group included only adolescents with Class II division 1 malocclusion because Class II division 2 is an infrequent occurrence (0.4%). Obtaining clinical data on Class II division 2 individuals has always been a challenge because of its low prevalence.

Contrary to what was expected, the intensity and extent of the CSIs attributed to malocclusion did not differ between groups. Investigators decided to assess both indicators—intensity and extent—because earlier study findings had revealed that information about the intensity and extent of impacts represents an alternative method of describing or comparing these impacts in relation to the oral conditions that cause them.[19,20] In this sense, the intensity and extent of impacts are

Table 4. Extent of Condition-Specific Impacts in Adolescents With Normal Occlusion and Those With Angle Class I, II, and III Malocclusion[a]

	Normal Occlusion		Class I Malocclusion		Class II Malocclusion		Class III Malocclusion	
Extent	n	%	n	%	n	%	n	%
Distribution of cases by number of affected performances								
1	14	77.8	11	57.9	19	63.3	16	57.1
2	2	11.1	7	36.8	7	23.3	11	39.3
3 or more	2	11.1	1	5.3	4	13.4	1	3.6
Number of affected performances								
Mean ± SD[b]	1.33 ± 0.69		1.47 ± 0.61		1.57 ± 0.94		1.46 ± 0.58	
Range	1–3		1–3		1–5		1–3	

[a] Kruskal-Wallis test was used ($P = .694$).
[b] SD indicates standard deviation.

useful in planning orthodontic services and in facilitating decision making about who should be treated first.[23]

Although no statistically significant differences were found between groups in terms of these indicators, some patterns were detected. In terms of intensity of CSI, more than half of adolescents in the three malocclusion groups reported impacts of severe to very severe intensity in contrast to only one-third of adolescents in the normal occlusion group (Table 3). Regarding extent of CSI, three-quarters of adolescents in the normal occlusion group reported that only one performance was affected in contrast to three-fifths of adolescents in the three malocclusion groups.

These patterns of impact suggest the possibility of differences between groups regarding the intensity and extent of CSIs attributed to malocclusion, although such differences were masked by the small sample size. Because the intensity and extent of impacts were calculated only for individuals who reported impacts, the number of cases analyzed per group was lower than the initial number of cases in each group (Table 4). Therefore, the assumption of investigators that the intensity and extent of CSI differed between malocclusion groups requires additional study involving larger sample sizes. These studies should be based not only on patient samples, but also on population samples.

This study has two limitations, which do not invalidate the results. First, investigators did not distinguish between skeletal and dental malocclusions. Because this study was based on an epidemiologic survey, the use of radiographs to diagnose skeletal anomalies was not feasible and therefore was not included as part of the study design. Second, although the Angle classification was chosen to define malocclusion because of its wide and accepted use, it assesses only anteroposterior relationships. Therefore, study results reflect only the impact of anteroposterior relationships on quality of life. It is likely that transverse and vertical relationships also have important effects on physical, psychological, and social activities, as has been reported when specific occlusal traits have been evaluated.[8,24]

CONCLUSIONS

- Prevalence, but not intensity or extent, of the CSIs attributed to malocclusion differed between malocclusion groups. Adolescents with Class II division 1 and Class III malocclusion had a higher prevalence of CSIs than adolescents with Class I malocclusion and those with normal occlusion.
- The present findings indicate that malocclusions have physical, psychological, and social consequences that affect quality of life.

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