

Prevalence of Malocclusion and its Psychosocial Impact in a Sample of Chilean Adolescents Aged 14 to 18 Years Old

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Abstract

Malocclusions, also known as alteration or variation of normal occlusion, are very common. The World Health Organisation (WHO) places the malocclusions as the third priority after caries and periodontal diseases. Malocclusions produce both functional and aesthetic alterations and thus have a psychosocial impact on people's quality of life. The aim was to evaluate the prevalence of malocclusion and its psychosocial impact in a sample of adolescents (14-18 years) from Hualqui, Chile.

The prevalence and psychosocial impact of malocclusion were investigated in 130 students (14-18 years) at San Juan Bautista High School, Hualqui, Chile. Participants' dentition was evaluated using the Dental Aesthetic Index (DAI) and they also completed the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ). Data were analysed using univariate and bivariate statistics, graphics, and frequency charts. The overall prevalence of malocclusions was 63.8%, and reached 72.7% in 17-year-olds. The combined prevalence of severe and very severe malocclusion was 28.5% in 14-year-olds and 38% in 18-year-olds.

There was a low direct correlation between the severity and psychosocial impact of malocclusion (Spearman's $r = 0.21$; Pearson's $r = 0.014$). The high prevalence of malocclusion in this sample indicates that public health strategies aimed at tackling the issue should be implemented.

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Introduction

Malocclusions are the clinical manifestation of dentomaxillary abnormalities, i.e. alterations or variations in normal occlusion.¹ The aetiology is multifactorial and both hereditary factors and bad habits play a large role.^{2,3} Malocclusions can produce functional disorders and aesthetic effects that have a psychosocial impact, especially on adolescents,⁴⁻⁶ leading to a deterioration in quality of life.⁷⁻⁹

Malocclusions affect a broad segment of the world's population, with variations by ethnic group, age and the diagnostic criteria used.^{10,11} The WHO ranks malocclusions third on a dental health problems priority scale. In Chile

dentomaxillary abnormalities are the third most prevalent oral pathology.^{11,12} Regrettably Chile currently has no public oral health policy aimed at addressing the problem of malocclusion. The first step in addressing this is to carry out unbiased, reliable epidemiological research to reveal the extent of the problem.

Many different indices are used to evaluate malocclusions, including the Dental Aesthetic Index (DAI). The DAI is a simple, highly reproducible orthodontic index with cross-cultural validity. It is quick to use because it does not need radiographs and it is recommended by the WHO.^{7,13,14} The DAI is used not only to evaluate the features of occlusions and their functional impact, but also their aesthetic impact on the patient, which is important as concern about appearance is often the main reason for undergoing orthodontic treatment.^{7,15} The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) is one of many tools used to measure the impact of dental health on quality

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of life. The PIDAQ is used to evaluate the psychosocial impact of dental aesthetics in adolescents and middle-age adults, focusing how orthodontic factors affect quality of life.¹⁶⁻¹⁸

In Chile there have been few studies of the psychosocial impact of dental aesthetics on adolescents. This lack of evidence is a barrier to the development and implementation of public policy aimed at ensuring that deontological and specifically orthodontic treatment is universally available.

The main objective of this research was to evaluate the prevalence of malocclusion and its psychosocial impact in a sample of adolescents (14-18 years) from Hualqui, Concepción, Chile.

Materials and methods

This was a cross-sectional study. The study was approved by the Bioethics and Investigation Committee of the Faculty of Dentistry, University of Concepción (CIYBN°29/16).

The population of interest was students of San Juan Bautista High School, Hualqui, aged between 14 and 18 years old on June 1st, 2016. Students with a history of orthodontic treatment or syndromes compromising their craniofacial estate were excluded from the sample.

The required sample size was estimated at 122, based on 95% confidence interval, a 6% of accuracy, expected prevalence of malocclusion of 82%^{8,11} and a population of 530 students and so 130 students were examined. Simple random sampling with a random number generator was used to select participants.

Two ordinal qualitative variables were assessed: severity and psychosocial impact of malocclusion. Malocclusion severity was assessed through an examination based on the DAI. This index combines aesthetic and dental components to yield a single score. The DAI is based on 10 features of occlusion which are each given a numerical score; the value for each feature is multiplied by the corresponding numerical score. The 10 resulting scores are summed and a 13 is added to give the overall DAI score. Scores are divided into 4 categories: normal occlusion or mild malocclusion (≤ 25), definite malocclusion (26 to 30), severe malocclusion (31 to 35) and very severe or disabling malocclusion (>36).

Psychosocial impact of malocclusion was

measured using the PIDAQ, which consists of 23 items divided into one positive and three negative domains. The first domain deals with dental aesthetic-related self-confidence (6 items); the second with social impact (8 items); the third with psychosocial impact (6 items) and the last with aesthetic concerns (3 items). Responses are given using a five-point Likert scale ranging from 0 (dental aesthetics have no negative impact on quality of life) to 4 (dental aesthetics have a severe impact on quality of life).

All clinical examinations were carried out by the same person, using the same set of instruments and under the same light conditions. The PIDAQ was administered in a quiet, private environment on days when participants were not academic pressure and they were given plenty of time to answer all the questions.

The data collection period lasted 9 weeks (May 16th to July 25th, 2016). At the start consent forms were distributed; the parents of all participants provided informed consent for their children's participation.

Groups of six participants were taken to a classroom where they underwent an oral health examination. Periodontal probes, frontal lamp, gloves, masks, cotton and alcohol were used for the examination. After this the PIDAQ was administered to the group in the same room, with a researcher available to answer any questions the participants had.

All data were analysed with the Infostat software (Infostat, Argentina) by means of univariate and bivariate descriptive statistics, graphics and frequency charts. The chi-square test for independence was used to assess relationships between variables. T-tests and ANOVA were used to assess differences in means and Spearman's correlation coefficient was used to analyse the relationship between quantitative variables. The statistical significance threshold was set at $p < 0.05$.

Results

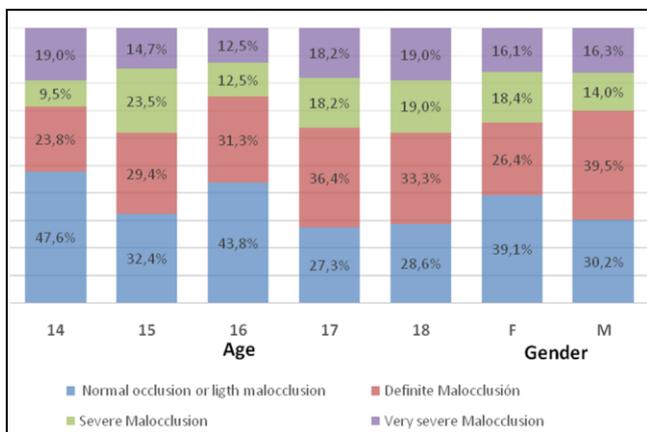
Table 1 shows the demographic profile of the sample. The mean and median age of the sample were 15.9 years and 16 years respectively. The sample comprised 87 (66.9%) female students and 43 (33.1%) male students.

The majority of students (64%, $n = 87$) suffered from malocclusion (definite malocclusion: 31%; severe malocclusion: 17%;

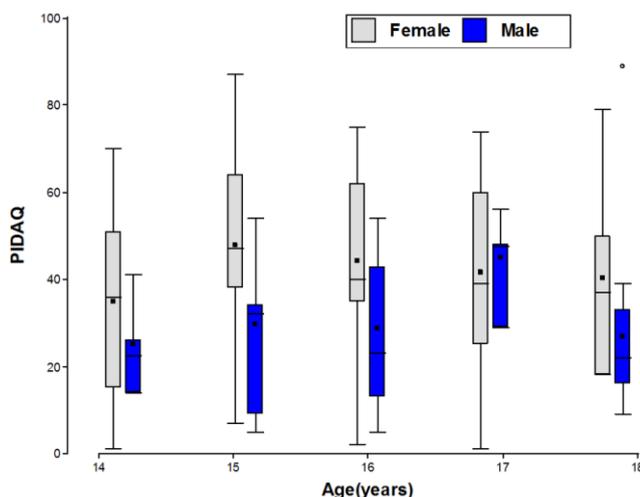
disabling malocclusion: 16%) whilst 36% had normal occlusion or mild malocclusion. Graph 1 shows that severity of malocclusion was similar in both sexes ($p = 0.46$) and all age groups ($p = 0.94$).

AGE (years)	GENDER		TOTAL
	Female	Male	
14	13,1% (17)	3,1% (4)	16,2% (21)
15	20% (26)	6,2% (8)	26,2% (34)
16	16,2% (21)	8,4% (11)	24,6% (32)
17	13,8% (18)	3,1% (4)	16,9% (22)
18	3,8% (5)	12,3% (16)	16,2% (21)
TOTAL	66,9% (87)	33,1% (43)	100% (130)

Table 1. Demographic profile of students from San Juan Bautista High School, Hualqui, Chile, 2016.



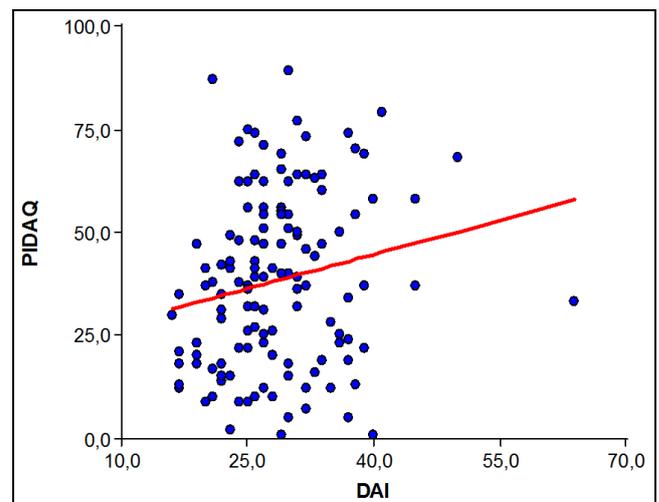
Graph 1. Percentage distribution of difference classes of malocclusion by age and sex in high school students from San Juan Bautista High School, Hualqui, Chile, 2016.



Graph 2. Mean PIDAQ score of students from San Juan Bautista High School, Hualqui, Chile, 2016 organised by sex and age.

The mean PIDAQ score for the sample was 38.3. Graph 2 shows the distributions of PIDAQ by sex and age. Female students had higher scores ($M = 42.6$) than male students ($M = 29.4$; $p = 0.0005$). Age had no effect on PIDAQ score ($p = 0.1064$).

There was a weak, non-significant correlation ($\rho = 0.07$, $p = 0.39$) between age and malocclusion severity. Graph 3 shows the weak correlation ($\rho = 0.21$, $p = 0.014$) between malocclusion severity and psychosocial impact.



Graph 3. Relationship between PIDAQ score and DAI score in students from San Juan Bautista High School, Hualqui, Chile, 2016.

Discussion

Leaving aside mild malocclusions we found that malocclusions were present in 63.8% of the sample, this prevalence is very much in line with the figures reported by Cartes-Velásquez et al.⁸ (67.4%) and Almeida et al.¹⁹ (65.6%). In Frutillar, Chile, the prevalence of malocclusion in children aged 6 to 15 years old reached 96.2%¹¹ and Angle reported that the prevalence of malocclusions in México peaked at 96.4% in children aged 12 to 15 years old.¹⁰ The prevalence of malocclusion in our sample was considerably higher than that obtained in a sample of children from Viña del Mar, Chile (44.3%) and in three Brazilian states, namely Mato Grosso (34.74%)², Santa Catarina (45.6%)²¹ and Rio Grande del Sur (42.2%)²². The wide variation in the reported prevalence of malocclusions within Chile and between Chile and the rest of the world may be due to variance in the ethnicity, age groups, diagnostic criteria

and tools used in the different studies.¹¹

The severity of malocclusions tends to increase with age, this may be due to increasing exposure to factors such as tooth loss, overcrowding of teeth extensive dental caries etc. as adolescence progresses. The prevalence of disabling malocclusions, however, was as high in 14-year-old students as it was in 18-year-olds, at 19%. Disabling malocclusions tend to have a genetic aetiology and so age does not have a significant impact.

In our sample malocclusion had a greater psychosocial impact on female students than male students; this is consistent with studies by Moura et al.⁴ and Puertes¹⁵ although both the earlier studies reported a smaller gender difference. This appear to be due to girls and women having higher dental aesthetic standards, being more aware of their health and more conscious of the impact of dental health on beauty, facial appearance and other factors relevant to quality of life.¹⁵

We found a weak correlation between the severity and psychosocial impact of malocclusions, like Borzabadi's²³ research. In contrast, studies carried out by Jha et al.,³ Moura et al.,⁴ Cartes-Velásquez et al.,⁸ Ferreira et al.,⁹ Puertes,¹⁵ Siluvai et al.,²⁴ Liu et al.²⁵ and Tessarollo et al.²⁶ found a strong correlation between these two variables.

There are many possible explanations for the relatively weak correlation between severity and psychosocial impact of malocclusions in our sample. First, the prevalence of severe and disabling malocclusions, which usually require surgical orthodontic treatment and have a greater aesthetic and psychosocial impact,⁵ was low. Second, all epidemiological indices of orthodontic treatment necessity, including the DAI, have an aesthetic component, but they are based on clinical criteria (occlusive and functional features) that do not accurately represent patients' perceptions of their smiles. International studies have established that clinical and epidemiological criteria for malocclusion overestimate problems relative to individuals' perceptions. Adolescents' are usually motivated to request orthodontic treatment by concern about their appearance or other psychosocial factors, rather than by concerns about dental functions such as chewing efficiency, correct articulation of words etc. This is why patients' opinions about their dental aesthetics are now considered medically

relevant.^{4,24,27} Finally, beauty is a completely subjective concept and malocclusions will not always have a negative effect on self-perception. The psychosocial impact of malocclusion is strongly influenced by personal expectations, psychological resources and sociocultural factors. It should be noted that the participants in this study live in a semi-rural area, where life is different from how it is in urban areas, where people are bombarded with advertising that exposes them to particular aesthetics and a higher value is placed on personal care, appearance and vanity. In rural and semi-rural areas it is common to find people suffering from severe malocclusions who seem satisfied with or indifferent to their own looks and others may only care about smaller dental issues.

Implementation of new epidemiologic indices of orthodontic treatment necessity is essential. These should incorporate indices of patients' subjective perceptions of their own dentition alongside standard clinical criteria to enable prioritisation of patients and planning of treatments and to encourage the allocation of public health funds to orthodontic services.

Conclusions

The most prevalent categories of occlusion in adolescents aged 14 to 18 years old in Hualqui, Chile were mild and definite malocclusions and malocclusion has a relatively small psychosocial impact in this population.

Declaration of Interest

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