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Research

Need for orthodontic treatment in schoolchildren aged 11 to 12 at the Mariscal Gamarra Educational Institution in the city of Cusco - Peru, 2019

Necesidad de tratamiento ortodóntico en escolares de 11 a 12 años de la Institución Educativa Mariscal Gamarra del Cusco - Perú, 2019

Necessidade de tratamento ortodôntico em escolares de 11 a 12 anos na Instituição Educacional Mariscal Gamarra em Cusco - Peru, 2019

Herbert Cosio Dueñas[1], Jan Mely Saya Masias[2], Raquel Mónica Loaiza Carrasco[3], Liceth Lazo Otazú[4]

Resumen

Objetivo: Caracterizar la necesidad de tratamiento ortodóntico en su componente de salud dental y estético en escolares de 11 a 12 años de la Institución Educativa Mariscal Gamarra del Cusco - Perú, 2019.

Materiales y métodos: La muestra estuvo constituida por 142 escolares de una institución educativa estatal, se usó el Índice de Necesidad de Tratamiento Ortodóntico (INTO) con sus dos componentes. El Componente de Salud Dental (CDS) es realizado por el Odontólogo y el Componente Estético (CE) es percibido por el paciente.

Resultados: Se obtuvo 15,49% sin necesidad de tratamiento y 33.10% de leve necesidad de tratamiento y 28,87% moderada necesidad de tratamiento en su Componente de Salud Dental y el 74,65% se presentó sin necesidad de tratamiento en su Componente Estético.

Conclusión: Al examen por parte del profesional casi la mitad de los estudiantes no necesitan tratamiento y por otro lado, tres de cuatro estudiantes se perciben sin necesidad de tratamiento de ortodoncia.

Palabras clave: Maloclusión, estética dental, salud bucal (DeCS)

Abstract

Objective: To describe the need for orthodontic treatment in its dental and aesthetic health components in schoolchildren aged 11 to 12 at the Mariscal Gamarra Educational Institution of Cusco - Peru, 2019.

Materials and methods: The sample consisted of 142 schoolchildren from a public school. The Index of Orthodontic Treatment Need (IOTN) was used with the two components; the Dental Health Component, determined by the dentist, and the Aesthetic Component, as perceived by the patient.

Results: According to the results, 15.49% did not need any treatment, 33.10% had a slight need for treatment, and 28.87% a moderate need for treatment in the Dental Health component; 74.65% presented no need for treatment in the Aesthetic Component.

Conclusion: Almost half the students did not need any treatment as reported after the health professional exam. On the other hand, three out of four students showed no need for orthodontic treatment.

Keywords: malocclusion, dental aesthetics, oral health (DeCS)

Resumo
Objetivo: Caracterizar a necessidade de tratamento ortodôntico em seu componente de saúde dental e estética em escolares de 11 a 12 anos de idade na Instituição Educacional Mariscal Gamarra de Cusco - Peru, 2019.
Materiais e métodos: A amostra foi composta por 142 estudantes de uma instituição de ensino estadual, o Índice de Necessidades de Tratamento Ortodôntico (INTO), com seus dois componentes. O componente de saúde bucal (CDS) é realizado pelo dentista e o componente estético (CE) é percebido pelo paciente.
Resultados: foram obtidos 15,49% sem necessidade de tratamento e 33,10% para uma leve necessidade de tratamento e 28,87% para uma necessidade moderada de tratamento em seu Componente de Saúde Bucal e 74,65% apresentaram sem a necessidade de tratamento em seu Componente Estético.
Conclusão: No exame realizado pelo profissional, quase metade dos estudantes não necessita de tratamento e, por outro lado, três em cada quatro percebem a si mesmos sem a necessidade de tratamento ortodôntico.
Palavras-Chave: Má oclusão, estética dental, saúde bucal (DeCS).

Introduction

Malocclusions are very frequent and rank third in prevalence within oral public health problems. Studies conducted at different latitudes in Latin America have recorded high prevalence rates. In Cuba, 58.2% of students had some type of malocclusion [(1)]; Uruguay had a 33.8% prevalence among adolescents and young adults [(2)]; in Chile, the prevalence ranges from 65% to 72.6% [(3)].
The transition from mixed dentition to permanent dentition occurs between the ages of 10 and 12. It is a transitional age between the last temporary teeth and permanent teeth, especially canines, which are the last to appear in the anterior sector. Additionally, the eruption of the second molars—the last to erupt in the posterior sector—complete the 28 permanent teeth, excluding the third molars—the last to appear [(4)]. Ages 11 and 12 are good to assess the presence or absence of malocclusion. This is the case because almost all the patient's teeth have erupted at this age [(5)].
Malocclusion can be defined as a deviation from ideal occlusion or an alteration in normal occlusion; it has multiple causes. Many causes are genetic while others have to do with the patient's habits or lifestyle while developing occlusion. Malocclusion has many causes, which interact with each other and have a greater effect on dentomaxillofacial disharmony. Treatments are therefore necessary, even from a very early age, through interceptive and preventive orthodontics [(6-7)].
Demand for orthodontic treatment has increased in recent years. On the one hand, there is the need for treatment that is clinically identified by the professional. However, these treatments are also provided based on patients' aesthetic requirements, as they perceive their aesthetic appearance and request treatment from professionals. These types of treatment respond to the patients' self-perception of an unpleasant dental appearance: it affects their self-esteem or they have difficulties in daily life, that is, patients perceive that

malocclusion affects their quality of life [6]. Oral health problems are identified through professional clinical evaluation, but patient participation is also important. Many children express the need for orthodontic treatment for their malocclusion, so this study aims to describe the need for orthodontic treatment regarding the dental and aesthetic health components in schoolchildren aged 11 and 12 in the city of Cusco.

Materials and methods

This descriptive and cross-sectional study was approved by the bioethics committee of Universidad Andina del Cusco. The sample included 142 children—both sexes—aged between 11 and 12, from the Mariscal Gamarra Educational Institution, who met the selection criteria. The most important criterion was the informed consent signed by parents to authorize the child's participation in the research, as well as the schoolchild's voluntary participation. The Index of Orthodontic Treatment Need (IOTN) was used to assess the children. The Aesthetic Component (AC)—subjective in nature—is an analogue visual scale of 10 frontal intraoral photographs showing 10 potential levels of dental attractiveness. The photographs correspond to 12-year-olds with permanent dentition (Figure 1). Photograph No. 1 shows the most attractive features and photograph No. 10, the least attractive ones. This component was evaluated by the patient, according to their perception, thus reflecting the need for orthodontic treatment from the social and psychological standpoint. The children were asked to identify the photo which reflected their perception of their dental appearance. If they chose a photograph between 1 and 4, it was considered that no treatment was needed; between 5 and 7, the need for treatment was moderate; and between 8 and 10, it was urgent [5,8,9].

Two researchers were calibrated for data collection purposes; they were trained by an expert. Cohen's Kappa coefficient showed agreement, as it was greater than 0.8 when comparing the expert and the researchers. The data obtained were encoded and entered into IBM SPSS statistical software, version 22 in Spanish. Frequency distribution and percentages were used for univariate analysis.

Fig. 1: Photographs corresponding to the Aesthetic Component (AC) of the IOTN

The children were clinically examined in an appropriate setting to assess the dental health component. A millimeter rule was used. The most severe trait was identified when examining the patient. The most severe trait was used to classify the patient according to the need for treatment from the examiner's objective point of view (Table 1). The characteristics of the following occlusal features were observed: overjet, overbite, open bite, cross bite, impeded eruption, cleft lip and palate defects, craniofacial abnormalities, impeded eruption, and hypodontia. The most altered occlusal feature was used to classify the need for orthodontic treatment from: no need for treatment (grades 1 and 2), moderate need (grade 3) and need for treatment (grades 4 and 5) [5,8,9].

Table 1: IOTN-Dental Health Component (DHC) scale

Grade 5 (Extreme/need for treatment)	
5.a	Increased overjet greater than 9 mm.
5.h	Hypodontia with restorative implications (more than one tooth lost in any quadrant) requires pre-orthodontic treatment.
5.i	Impeded eruption of teeth (except third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.
5.m	Reverse overjet greater than 3.5 mm with masticatory and speech difficulties.
5.p	Cleft palate and lip and other craniofacial abnormalities.
5.s	Submerged deciduous teeth.

Grade 4 (severe/need for treatment)	
4.a	Increased overjet by more than 6 mm but less than or equal to 9 mm.
4.b	Reverse overjet greater than 3.5 mm without masticatory problems or speech difficulties.
4.c	Anterior or posterior crossbite greater than 2 mm; interference between centric relation and maximum intercuspation.
4.d	Severe displacements of contact points greater than 4 mm.
4.e	Lateral or anterior open bite greater than 4 mm.
4.f	Increased or complete overbite with gingival or palatal trauma.
4.h	Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to avoid the need for prostheses.
4.l	Crossbite with no functional occlusal contact in one or more segments.
4.m	Reverse overjet greater than 1 mm but less than 3.5 mm with masticatory or speech difficulties.
4.t	Partially erupted tooth tipped and impacted against adjacent tooth.
4.x	Presence of supernumerary teeth.

Grade 3 (moderate/borderline need for treatment)	
3.a	Increased overjet greater than 3.5 mm but less than or equal to 6 mm.
3.b	Reverse overjet greater than 1 mm but less than or equal to 3.5 mm.
3.b	Anterior or posterior crossbites greater than 1 mm but less than or equal to 2 mm. Discrepancy between centric occlusion and maximum intercuspation.
3.d	Premature contact point displacements greater than 2 mm but less than or equal to 4 mm.
3.e	Lateral or anterior open bite greater than 2 mm but less than or equal to 4 mm.
3.f	Increased overbite in gingiva or palatal tissue, but without trauma.

Grade 2 (slight/no need for treatment)	
2.a	Increased overjet greater than 3.5 mm, but less than or equal to 6 mm.
2.b	Reverse overjet greater than 0 mm but less than or equal to 1 mm.
2.c	Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and maximum intercuspation.
2.d	Contact point displacements greater than 1 mm but less than or equal to 2 mm.
2.e	Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm.
2.f	Increased overbite greater than or equal to 3.5 mm without gingival contact.
2.g	Pre- or post-normal occlusions with no other anomalies (includes up to half a

unit discrepancy).

Grade 1 (no need for treatment)	
1	Extremely minor malocclusions including contact point displacements less than 1 mm.

Results

Of the sample of 142 children, 12.7% were aged 11 and 87.3% were aged 12. Regarding sex, 54.2% were male and 45.8% female (Table 2).

Table 2: Age and sex distribution of children aged 11 and 12

			Sex		Total
			Male	Female	
Age	11	N	11	7	18
		%	7.7%	4.9%	12.7%
	12	N	66	58	124
		%	46.5%	40.8%	87.3%
Total		N	77	65	142
		%	54.2%	45.8%	100.0%

Regarding the Dental Health Component, the degree of need for orthodontic treatment was 15.5%: grade 1 - no need. Of the children, 33.1% were classified as grade 2: slight need for treatment. Finally, 28.9% were classified as grade 3: moderate need for treatment. That is, 77.5% of the children evaluated fell within the borderline need for treatment, while the rest showed severe and extreme need for orthodontic treatment (Table 3).

Table 3: IOTN-Dental Health Component (DHC)

	Frequency	Percentage	Accumulated percentage
Grade 1 (no need for treatment)	22	15.5%	15.5%
Grade 2 (slight/no need for treatment)	47	33.1%	48.6%
Grade 3 (moderate need for treatment)	41	28.9%	77.5%
Grade 4 (severe/need for treatment)	30	21.1%	98.6%
Grade 5 (Extreme/need for treatment)	2	1.4%	100.0%
Total	142	100.0%	

Regarding the Aesthetic Component, 74.6% of children perceived they did not need orthodontic treatment. Of the children, 15.5% were classified as grade 3:

moderate need for treatment. Finally, 9.9% were identified as requiring orthodontic treatment (Table 4).

Table 4: IOTN Aesthetic Component (AC)

	Frequency	Percentage	Accumulated percentage
No need for treatment (photographs 1 to 4)	106	74.6%	74.6%
Moderate need for treatment (photographs 5 to 7)	22	15.5%	90.1%
Need for treatment (photographs 8 to 10)	14	9.9%	100.0%
Total	142	100.0%	

Discussion

The need for orthodontic treatment was assessed using the index created by Brook and Shaw, developed in the United Kingdom. This index has two components: an objective one, determined by the clinician on the patient's dental health, and a subjective component, where patients perceive the aesthetic alterations of their malocclusion.

The Dental Health Component of the IOTN entails conducting a professional clinical analysis of the various occlusal features and recording the alterations, taking into consideration a previously
established measurement scale. We observed the following percentages: 33.1% slight, 28.9% moderate, and 21.1% severe need for orthodontic treatment. This component was identified by
the professional at the time of the clinical evaluation. The Dental Health Component was based on the work done by the clinician: analysis of various occlusal features and recording of alterations, within a scale. After analyzing the DHC results, we can state that it is more reliable because the clinician objectively examines the children's oral health. At the age of 12, all the permanent teeth have erupted, so dental and skeletal malocclusions can already be detected. A diagnosis can be made without risking error.

The Aesthetic Component of the IOTN is the self-perception of aesthetic appearance to determine the need for orthodontic treatment by selecting a photograph.

This showed that 74.6% of schoolchildren perceived that they did not need orthodontic treatment. This perception was defined by the children on their dental aesthetics from a series of 10 frontal intraoral photographs; this high percentage may reflect their strong self-esteem, because, despite having a moderate need for treatment, they perceived that they did not need to be treated by an orthodontist. On the other hand, the AC results are less reliable because it is the subjective assessment of a 12-year-old schoolchild who is not emotionally mature yet. This maturity would allow him to be self-critical about his dental aesthetics. They are preadolescents whose personality is developing.

Many young people at this age do not yet care much about their aesthetics, despite presenting an apparent clinical problem.

When comparing our results with other studies, we found that in a study of 170 schoolchildren from a private school in Ecuador aged 11 to 12, 91.18% of them perceived no need for orthodontic treatment according to the AC. On the other hand, 10% were considered not to need treatment according to the DHC [5]. Furthermore, out of 143 12-year-old schoolchildren in Cuenca, 82% did not perceive a need for orthodontic treatment, 13% a moderate need and 5% a severe need for treatment [10]. Out of 140 12-year-old schoolchildren evaluated in Cuenca Ecuador, 81% had a slight need for treatment, 14% a moderate need and 6% a severe self-perceived need for orthodontic treatment [9]. In a study of 166 pretreatment orthodontic study models, 65% showed no need for treatment, 9.03% a moderate need, and 25.3% a severe need for treatment [7].

All these results differ from what was found in a population of 76 Aymara schoolchildren living in the Chilean highlands: the DHC showed that 71% had a need for orthodontic treatment within grades 4 and 5. These results might be different due to the characteristics of the Aymara population biotype [3]. Furthermore, among an adolescent population aged 12 to 15 in Viña del Mar, Chile, the AC resulted in 44.2% of cases saying they needed treatment—a high percentage perhaps due to fact that the children were older. They may have reached emotional maturity by age 15, which would allow them to be more objective when establishing their perception of the need for orthodontic treatment [13]. Out of 200 patients whose ages range from 13 to 25, 66% had a grade 4 - severe need for treatment. This result may be due to the fact that these patients were older [14]. Out of 210 schoolchildren aged 12 to 16 in Lima, the DHC showed that 73.33% were found to need treatment, 19.52%, had a moderate need, and 7.14%, no need. In turn, the AC showed that 83.3% thought they did not need treatment, 14.3% had a moderate need and 2.4%, a definitive need for orthodontic treatment [11].

Conclusions

The application of the index of orthodontic treatment need in its dental health component showed that half the schoolchildren aged 11 to 12 have moderate, severe and extreme need for orthodontic treatment. These results differ from what is reflected by the aesthetic component, since a quarter of schoolchildren aged 11 to 12 perceive a moderate need and severe need for orthodontic treatment.

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Conflict of interes

The authors declare no conflict of interest

Authorship contribution

1. Conception and design of study
2. Acquisition of data
3. Data analysis

4. Discussion of results
5. Drafting of the manuscript
6. Approval of the final version of the manuscript

HCD has contributed in 1, 3, 4, 5, 6.
JMSM has contributed in 1, 2, 3, 4.
RMLC has contributed in 5, 6.
LLO has contributed in 4, 5, 6, 7.

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