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## Prevalence of malocclusions in patients attended at the orthodontic service of the high specialty center

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### Abstract

**Introduction:** The stomatognathic system is constituted by interconnected anatomical elements, its functions are chewing, swallowing, breathing and speaking. During these the mandibular closure occurs, contacting the arcades, (occlusal relationship). Occlusal abnormalities begin at an early age, causing dentofacial deformities that interfere with overall well-being, affect aesthetics, chewing, respiratory, speech or physical and psychological balance functions. Dental malocclusion is any deviation from the ideal occlusion, alters the intercuspitation of the teeth. In Mexico, 60% of the population presents some malocclusion, placing as a health problem, associated with oral habits. In Veracruz there is no documented evidence of this problem.

**Objective:** To evaluate the prevalence of malocclusion in children in Veracruz.

**Material and Methods:** Epidemiological, observational, cross-sectional, comparative and retrospective clinical study in 85 patients aged 6 to 11 years, served in CAE during 2011-2015.

**Results:** Obtaining that 53.95% presented Class I, 37.8% Class II and 8.2% Class III, 38 of the cases (43.7%) presented oral habits with a higher prevalence in the male sex, being the lingual projection the most frequent, 21.1% in ages of 6 to 7 years.

**Keywords:** Malocclusion, interceptive orthodontics, oral habits, angle classification

### Introduction

#### General background

The human body has been designed to work harmoniously in function with all the organs and systems that compose it, however, there are several both environmental and genetic factors that can alter their structures, breaking the balance and triggering consequences which will cause changes in the size, morphology and spatial arrangement of the annexed structures. Craniofacial structures are essential for health, communication, chewing, phonation, etc; and to act optimally they need to coordinate as a unit, adapting to functional needs.

The stomatognathic system is constituted by interconnected anatomical elements such as teeth, temporomandibular joint, and muscles. In the oral closure, the dental arches come into contact and an occlusal relationship is established. When the dental relationship presents alterations they are called malocclusions<sup>[1]</sup>. Considered as a pathological condition that is characterized by not presenting an ideal or "normal" relationship between the teeth both of the teeth of the same arch and with the antagonist<sup>[2]</sup>.

So it should be understood as a biological fact that affects the intercuspitation of dental organs. Morphological variations in occlusion, both normal and abnormal, are due to changes in development and take part during the growth process. Some are by genetic determinants (hereditary factors of bone growth) and other variations are defined by the functional changes of the soft tissues surrounding the bone during development<sup>[2]</sup>.

To explain malocclusions, there are different theories of facial growth, such as, the environmental theory that holds that facial development can be affected by the influence of abnormal muscle forces (labial, facial and lingual). Genetic theory, which supports the origin of malocclusions by genetic factors on the intervention of environmental factors in growth and

genetic-environmental theory which refers that environmental factors are what determine growth without forgetting genetic predetermination and the role played by the facial type<sup>[4]</sup>.

The etiology of malocclusion is multifactorial, in which there is an interconnection between genetic predisposition and exogenous factors.

The factors that cause malocclusions according to their etiology are divided into:

**a) Predisposing factors**

- Hereditary that are based on size, shape of teeth, relationship with upper jaw and jaw, lingual and lip function
- Embryonic causes that come to be prenatal influences

**b) Local factors**

- Intrinsic: occurs when there is early loss of temporary and / or permanent pieces, supernumerary teeth, congenitally absent teeth and restorations that alter normal occlusion
- Surrounding or environmental: abnormalities at the level of perioral muscle tissues and habits.
- Systemic: chronic diseases, malfunction of metabolism and glands of internal secretion.
- Oral habits, repetitive process that is constantly performed. For example, the habit of mouth breathing considered as the main etiological factor that during inspiration and expiration the air passes through the oral cavity so there is an increase in oral air pressure and the habit of digital suction, the latter creates facial asymmetry, a convex profile, pronounced lips and deep Spee curve, which stops the growth of the jaw and stimulates the protrusion of the upper jaw<sup>[6]</sup>.

The malocclusion, along with tooth decay and periodontal disease, they act as reciprocal causal factors, since the loss of teeth due to caries leads to the shortening of the length of the arch, which causes irregularities in the dental positions<sup>[7]</sup>.

Classify malocclusion in the three planes of space: anteroposterior (sagittal), vertical and transverse, allows to know the impact it generates in the whole stomatognathic apparatus<sup>[8]</sup>, this can be done with the help of various auxiliaries such as x-rays, study models and photographs; thus arises the importance of identifying the stage of maturation of the human skeleton, which can also be done by analyzing the cervical vertebrae.

In a study where a clinical examination was performed on a group of 624 patients of Asian, African, Chinese and Caucasian origin, where malocclusion was recorded to be more prevalent in females, Angle Class I, was the most frequent, followed by Angle's Class II and later Angle's Class III, with Asians being the most affected<sup>[9]</sup>. Patients with Angle Class II tend to have better results when they are in adolescence as the deep bite is improved, and adults experience greater mandibular rotation<sup>[10]</sup>.

Parafunctional habits alter harmonic development, due to the fact that function does form and form does function<sup>[11]</sup>. These usually decrease to a certain degree from 3 to 7 years, when mixed dentition begins<sup>[12]</sup>. In a study in India, when assessing harmful oral habits in a sample of 832 children aged 6-12 years, bruxism obtained the highest frequency, followed in sequence by bottle feeding, digital suction, onychophagia and lingual habit girls being the group with the highest prevalence in clinical evaluation, which shows the need for orthodontic treatment at an early age<sup>[13]</sup>.

Dental malocclusion not only are they considered an oral

health problem, they also have an impact on other aspects such as the social life and self-confidence of patients, since they are directly linked to the quality of life. Many factors that promote them have strong influences on the perception of facial aesthetics (anterior tooth alignment, lip thickness, symmetrical gum, gingival contour, profile, overjet, overbite), which will have an impact on psychological development from early childhood to adulthood. A study evaluated the degree of self-esteem in 516 subjects not treated with orthodontics during 2011, dental crowding and crossbite were the alterations that most affected the psychosocial well-being of individuals<sup>[14]</sup>. At an early age, children are affected by numerous orofacial disorders that have the potential to jeopardize functioning, wellness and quality of life. The timely identification of non-physiological oral habits in the child population is of great help to avoid or intercept some type of malocclusion that can be established in patients who are growing and developing<sup>[11]</sup>.

Malocclusion is a common oral disorder that produces negative impacts on oral conditions, social life and patient confidence.

Around the world, studies have been carried out with the purpose of quantifying the morbidity of malocclusions. In Brazil 83% of malocclusion was found in adolescents aged 12 to 15 years, and were the habits with the highest prevalence of onychophagia, bruxism and digital sucking<sup>[18]</sup>. In India, the severity and prevalence of malocclusions was reported to be higher in urban areas than in rural areas and, at the same time these decrease when the concentration of fluoride in the water increases<sup>[19]</sup>.

In Mexico, there are few descriptive epidemiological investigations as is the case of that carried out by the Mexican Association of Faculties and Schools of Dentistry, A.C. which reported a study of stomatological morbidity in 1984, where occlusion disorders appear with a rate of 48.5 cases per 1000 patients cared for, factor that ranked third in frequency after caries and gingivitis. In an epidemiological study, 153 records of patients at the Children's Hospital of Mexico with permanent dentition from 9 to 19 years of age were reviewed, obtaining a malocclusion of 92% and with open bite 5%. Regarding gender, no major differences were observed in the manifestation of vertical overbite, with the exception of cases that presented a correct overbite relationship, which were distributed in 31% in females and 19% in males<sup>[7]</sup>.

The various anomalies of occlusion usually begin at an early age, causing dentofacial deformities that interfere with the general well-being of the child, as it can affect dentofacial aesthetics, masticatory functions, respiratory, speech or physical or psychological balance, because their appearance makes them appear shy, withdrawn, secluded and even aggressive.

These conditions give us an idea of the magnitude of the problem and that is why the main effort must be aimed at reducing the development of the malocclusion, through an increase in preventive actions linked to early diagnosis, offering the population maxillary orthopedics and interceptive orthodontics<sup>[7,20]</sup>.

### Specific background

Orthodontics, branch of dentistry that is responsible for the study and care of the development of occlusion, as well as its correction making use of mechanical devices that when applying physical force (in teeth and surrounding tissues) seeks to achieve functional occlusion by controlled tooth movement and/or displacement of dental arches.

## Malocclusion

According to Angle (1899), the malocclusion, "is the perversion of normal growth and development of dentures"<sup>8</sup>. So it is defined as an incorrect alignment of the teeth within their arcades, it is usually caused by lack of space, because of this there is no correct relationship of the upper teeth with the lower ones.

The malocclusion are generally clinically significant variations of normal growth fluctuation and morphology, there are two causes that originate them: hereditary or genetic factors and environmental factors, such as trauma, physical agents, habits, and illnesses. They are often the result of a complex interaction between various factors that influence growth and development and it is not always possible to describe what is the factor that originates it.

As part of the etiology of malocclusion, Corruccini observes a higher prevalence of crowding, posterior crossbite, and oral segment discrepancies in youth compared to rural Punjab. Modern life, by modifying the diet has altered the use of the masticatory apparatus due to the softness of food, which has accentuated the presence of malocclusion.

Throughout the nineteenth century Edward H. Angle establishes the concept and highlights the importance of the phenomenon of occlusion in his book "Malocclusions of the teeth", published in 1907. His concepts and particularly his simple classification of malocclusions constitute a remarkable progress for the study of these pathological entities<sup>2</sup>. Carefully observed the mesiodistal relationships of the teeth based on the position of the first permanent molars and described the different malocclusions called Classes.

### Angle's Classification

1. **Angle's Class I:** Identified as the most typical molar relationship is one where the mesiovestibular cusp of the first upper molar occludes in the buccal groove of the first permanent lower molars.
2. **Angle's Class II:** In some patients the maxillary arch is large, presents an anterior displacement, the mandibular arch is small or has a posterior situation. This will cause the first mandibular molar to take a position in a distal direction to the Class I molar ratio of Angle finding the following characteristics: The mesiovestibular cusp of the first upper molar occludes in front of the buccal sulcus of the first lower molars.
3. **Angle's Class III:** It is generally a predominant growth of the jaw, places the mandibular molars in a mesial position with respect to the maxillary molars, as seen in Angle's Class I, it is characterized by finding the occlusal mesiovestibular cusp behind the buccal sulcus of the inferior molar<sup>[6]</sup>.

Dental malocclusion, protrusion and irregularities can cause three types of problems in patients: discrimination (due to facial appearance), problems with oral function (incoordination or muscle pain) and problems of increased susceptibility to trauma, periodontal disorders or dental caries. It has been shown, in several animal studies, that the consumption of soft and refined foods produces lower bite force, as well as shorter chewing time, which affects the stimulation of jaw growth and oral musculature along with improper eruption of dental organs<sup>[19]</sup>.

"Malocclusion, especially protrusion of the upper incisors, can increase the chances that teeth will be injured. There is a likelihood that 1 in 3 children with untreated Class II

malocclusion will suffer significant trauma to the upper incisors, causing a dental fracture and/or pulp deviation". Which is evidence to treat it at an early age and thus avoid injuries when this problem occurs in the incisors. Extreme overbite can cause injuries that trigger loss of the upper incisors although it can also cause tooth wear and tear<sup>[23]</sup>.

## Habits

Oral habits (not physiological) are one of the main etiological factors causing malocclusions or dentoskeletal deformations, which will have a greater or lesser impact depending on the age at which the habit begins, the younger the age, the greater the damage. If we act early we will have more possibility of modifying the growth pattern of the jaws and the development of dental arches.

**The most frequent oral habits related to the etiology of orthodontic and orthopedic problems are**<sup>[6]</sup>: Lingual or labial interposition, suction, onychophagia, mouth breathing, atypical swallowing and lingual interposition or lingual push. Alterations in the development of the craniofacial complex will depend on the duration, intensity and frequency of the habit, as well as the biopathological characteristics of the patient. Through a clinical study it is easy to detect the cause-effect relationship of a habit, the simple observation of the alteration allows to deduce the habit that caused it<sup>[11]</sup>.

**Digital Suction:** habit of inserting one or more fingers into the oral cavity<sup>[11]</sup>. Non-nutritive suction is an etiological agent, because it is brief and requires less effort. Late sucking habits are the result of psychological frustrations due to family and school setbacks, suction provides the child with a refuge to escape the world that is hard for him. It can be pacifier suction, digital or lipstick.

**Onychophagia:** Habit of eating or gnawing on your nails with your teeth<sup>[6]</sup>.

**Mouth breathing habit:** It is called Oral Respirator Syndrome (RBS), which can be diagnosed etiologically by obstructive causes, by habits and by anatomy. It is the breathing in which the person performs it through the mouth instead of through the nose<sup>[6, 11]</sup>. During inspiration and expiration, air passes through the oral cavity, causing a greater intraoral air pressure that causes changes that give way to a characteristic appearance in the patient, long-faced appearance.

**Atypical swallowing:** Also called lingual interposition, occurs when the infant swallowing pattern persists after the anterior teeth erupt. It appears as a substitute for digital suction. Favors disto occlusion or class III malocclusion<sup>[6]</sup>.

## Problem Statement

In Mexico, it has been reported that up to 60% of the population has some type of malocclusion so this condition is positioned as a serious public health problem. Dental malocclusion is of multifactorial origin. Being hereditary, the cause can be a difference between the size of the maxilla and the jaw or between the size of these and the teeth, causing low self-esteem, reason why they go to orthodontic treatment in adulthood. Among other factors, there are oral habits.

Therefore, it is important to know the presence of oral habits in children since they are an etiological factor of malocclusion. That is why the importance of this research since in the state of Veracruz there is no documented evidence

on the prevalence of this problem and because at school age it is time to intercept this public health problem, so it is decided to carry out this study in children.

**Justification**

Malocclusions occur very frequently, which is why it is an important part of the dental área, based on a normal knowledge of oral anatomy, the various types of malocclusions may be diagnosed so we can prevent any alteration that may result in a pathological problem.

The high prevalence of malocclusions that affect schoolchildren today from a very early age and the existence of knowledge about the influencing factors, as well as the necessary preventive actions, leads us to look for what is the rate of malocclusions in children who went to the Orthodontic Clinic of the High Specialty Center (CAE) of Xalapa, Veracruz, Mexico.

This research aims to demonstrate the prevalence of pernicious habits that can alter dental occlusion, as well as its consequences if the infant is not treated in time, having the appropriate knowledge about the importance of knowing, preventing and correcting these alterations.

**Objective**

To establish the prevalence of malocclusions and oral habits in pediatric patients who attended to receive care at the orthodontic clinic of the High Specialty Center of the State of Veracruz (CAE) in the period from August 2011 to August 2015.

**Methodology**

**Type of study**

A clinical epidemiological study was conducted; observational, cross-sectional, comparative and retrospective.

**Target population**

The study was conducted in children aged between 6 and 11 years who attended the Orthodontic Clinic of the High Specialty Center (CAE) of Xalapa, Veracruz, Mexico, between the months of August 2011 to August 2015, of which clinical records already existed.

**Statistical treatment of the data**

The information collected for the realization of this study was handled in the statistical package SPSS v13.0 for Windows, showing the results in graphs that respond to the objectives set. The characterization of the study group was carried out through its percentage distribution by age and gender, the overall percentage of malocclusion classifications and oral habits were calculated, these same variables are presented by percentages by gender.

**Results**

We included 85 records of patients aged 6 to 11 years, who attended the Stomatology Service of the High Specialty Center during the period 2011-2015 with a diagnosis of malocclusion, obtaining the following results.

53.95% of patients had Class I, 37.8% Class II and 8.2% Class III. (Graph 1).

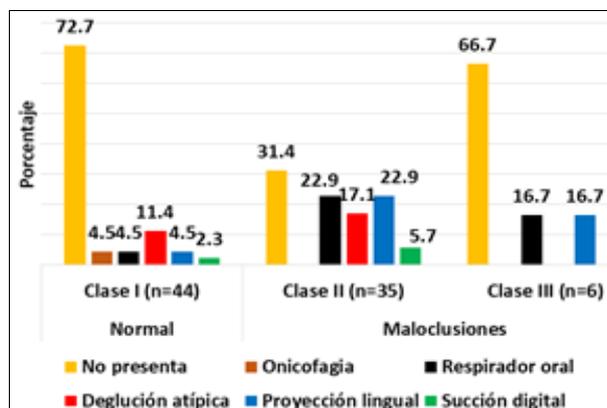


Fig 1: Angle's classification by sex (percentage)

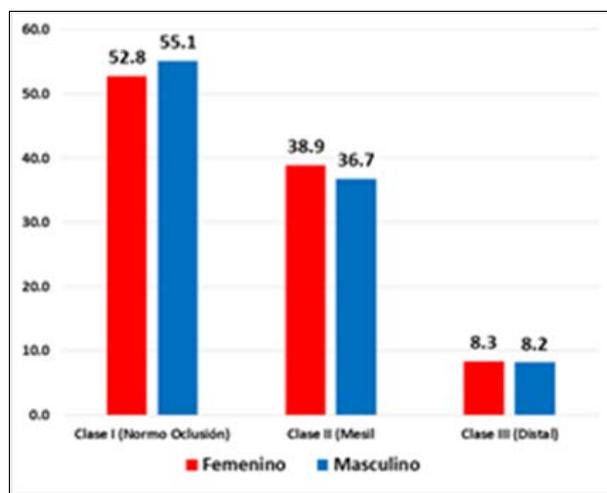


Fig 2: Oral habits according to sex (percentage)

38 of the cases (43.7%) presented oral habits with a higher prevalence in the male sex, being the lingual projection and atypical swallowing the most frequent with 26.1% in the ages of 6 to 7 years. Followed by mouth breathing with 25.4%. (Graph 2).

When relating the type of malocclusion with habits, it was obtained that in Class II oral respirator and lingual projection it occurs most frequently in 22.9% each and in the class presents both with 16.7%. (Graph 3).

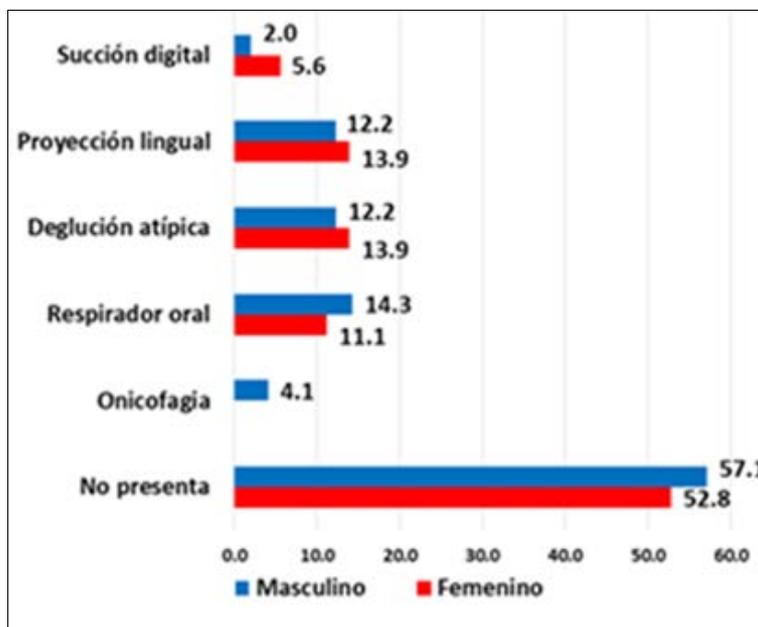


Fig 3: Angle classification relationship and oral habits

### Discussion

In the study conducted by Arroyo-Araya, in which the presence of malocclusion of a population of children aged 8 to 12 years was identified, it was observed that Class I is the one with the highest prevalence with 55.0%, and 30.0% of class II, followed by class III, where a lower proportion was found<sup>39</sup>. This coincides with the results obtained in the study carried out at the High Specialty Orthodontic Clinic in children from 6 to 11 years old, where 54.1% of patients presented Class I malocclusion, 36.7% Class II and 8.2% Class III.

This study also concludes that malocclusions and oral habits are closely related so professional efforts should be directed to explain to patients the importance of attacking these habits<sup>[6]</sup>.

Mouth breathing is closely related to increased overjet, reduced overjet, anterior or posterior crossbite, open bite and displacement of contact points. Therefore, it is necessary to intervene early in these etiological factors of malocclusion to prevent their development or worsening and, if it has already developed, correct it for early orthopedic treatment to promote the direction of skeletal growth. A study conducted in Mexico City on mouth breathing syndrome and its influence on the development of malocclusions in children between 5 and 15 years of age concludes that it produces alterations in the stomatognathic apparatus, alters functionally, aesthetically and psychically; suggesting vigilant behavior on the part of parents, pediatricians and stomatologists to prevent this type of breathing.

Silvola and Rusanen in their publication on severe malocclusion and quality of life, address the incidence of impact on Oral Health and quality of life, among patients with severe skeletal malocclusions requiring surgery. This study highlights the results of severe malocclusion treatments with orthodontics only and combined orthognathic surgery in 51 adult patients, which had a reduction in oral impacts, these treatments are invasive because the malocclusion was not detected in a timely manner. After this treatment, the level of treatment was reduced in this population. The opposite of the study mentioned above is the timely diagnosis in patients who attended the High Specialty Center of the State of Veracruz, which will have an interceptive and preventive attention that

will lead to timely treatments and less invasive and that will prevent orthognathic surgeries.

### Conclusions

It is important to identify malocclusion at an early age since intercepting it allows to improve its prognosis and obtain good results. In most cases where a malocclusion occurs there is not a single causal factor, but there are several interacting and overlapping. However, two main components can be defined in their etiology, which are genetic predisposition and exogenous or environmental factors, which include all the elements capable of conditioning a malocclusion during craniofacial development.

The timely identification of non-physiological oral habits in the child population is of great help to avoid or intercept some type of malocclusion, that can be established in patients who are growing and developing.

Because the city of Xalapa is characterized by having a warm humid climate which allows, in the spring summer season, the existence of a great variety of flowers and in winter the humidity causes the proliferation of fungi which stimulates in sensitive patients respiratory problems which causes many of them to be mouth ventilators, which as already seen is a predisposing factor for malocclusions, deteriorating their quality of life.

Knowledge of bad oral habits and their relationship with malocclusions is essential for the implementation of programs that contemplate actions preventive, interceptive and treatment. There is a great deal of controversy about the optimal time at which orthodontic treatments should be started. Considering this, treatment should always be planned individually for each patient; although at present the trend towards early intervention of malocclusions has increased, when still the changes of the growth and development of the craniofacial complex is about to begin and may, eventually, be used for the benefit of the patient. Its objective is focused on providing a more favorable environment for normal growth and psychosocial improvement.

During childhood, a series of habits and behaviors are created that will significantly influence the health of the individual, this stage is the most important to form healthy attitudes and lifestyles. Promoting oral health at school age is important to

achieve tooth preservation throughout a person's life and with it the integral health of the individual until his old age.

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