FACIAL, SKELETAL, FUNCTIONAL AND OCCLUSAL CHARACTERIZATION OF PATIENTS AT THE ORTHODONTICS AND MAXILLARY ORTHOPEDICS POSTGRADUATE CLINIC AT UNICOC WITH OCCLUSAL EMPHASIS

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ABSTRACT

***OBJECTIVE**: To describe the occlusal characteristics of the patients who attend the postgraduate clinic of Orthodontics and Maxillary Orthopedics of UNICOC Bogotá, city center headquarters, from 2016 to 2020. **METHODOLOGY**: Descriptive cross-sectional study, with an analytical component, developed within an epidemiological approach, with a convenience sampling of the patients who were admitted to the UNICOC Orthodontics and Maxillary Orthopedics clinic, Bogotá, city center headquarters, between 2016 and 2020, where the occlusal characteristics of the population were evaluated, and the chi-square and z-test for proportions statistical tests were applied for the correlation of the variables with sex and age groups. **RESULTS**: 1049 medical records were reviewed, of which 708 met the inclusion criteria. In the percentage distribution of the sample, it was found that 31.8% belonged to the age group of 6 to 15 years, 44.9% to the age group of 16 to 30 years and 23.3% to the age group over 30 and 57.2% were female and 42.8% male. The class II canine relationship was the most prevalent on both sides, 51% on the right and 49.6% on the left, and the molar relationship presented a higher percentage of class I on both sides, 43.6% left and 40.4% right, both correlating with the female sex. **CONCLUSIONS**: The sagittal diagnosis with the highest percentage is class II with 43.2%, with a predominance of class II division 1 in 31.9%, presenting a significant correlation with the female sex in 35.4%.*

***Keywords:** malocclusion, prevalence, characterization, class II, micrognathism.*

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Introduction

The alteration of the occlusal relationships is called malocclusion and a single tooth or the entire dental arch can be involved (1), malocclusion is considered an imbalance during the growth and development of the orofacial complex, where the teeth, jaws, temporomandibular joint and musculature can be involved (2), they are of multifactorial origin and can be influenced by oral habits, they are capable of generating an alteration in the position of the teeth and, in turn, interfere with the correct growth and skeletal development (3), Edward Angle is considered the father of modern orthodontics and many discoveries in this area of dentistry are attributed to him. In 1899 he made a classification of malocclusions, in an anteroposterior direction, taking the upper and lower first molars as references, considering these teeth static and Being the first molars to erupt are the ones that guide the eruption, Angle refers that this is because "proper" occlusion occurs when the mesiobuccal cusp of the upper first molar is placed in the buccal groove of the lower first molar"(4)(5).

For the World Health Organization (WHO), malocclusions (6) are in the third place of oral health problems worldwide, they do not constitute a vital risk, but they are a public health problem due to their high prevalence and incidence, can be isolated or combined and related to age, sex, habits, syndromes, among others. Colombia, through the ENSAB IV (7) carried out the epidemiological profile of the occlusal characteristics of the population between 12 and 15 years of age from 2013 to 2014, which has not been updated since then. This creates the need to propose epidemiological research that can provide recent information to assess the oral health situation in populations, to influence risk factors (8) and consider reinforcing early treatments as suggested by Díaz, *et al.* (9).

The WHO has widely recommended its implementation because it allows adjusting promotion and prevention programs aimed at the specific conditions of the population (7). Therefore, the present study is established with the objective of describing the occlusal characteristics of the patients who attend the Orthodontics

and Maxillary Orthopedics postgraduate clinic of UNICOC Bogotá, city center headquarters, from 2016 to 2020.

Methodology

Descriptive cross-sectional study, with an analytical component, developed within an epidemiological approach. For the sampling, a census was carried out with a cutoff from 2016 to 2020 of the patients who met the inclusion criteria, who arrived randomly at the institution. The study population that was considered were all the clinical records of the patients who were admitted to the UNICOC Orthodontics and Maxillary Orthopedics clinic, Bogotá, city center headquarters, between the years 2016 and 2020. This study was socialized and authorized by the dean of the Faculty of Dentistry and direction of the postgraduate in Orthodontics and Maxillary Orthopedics and by the ethics committee of the institution, it was classified as risk-free research according to resolution 008430 of October 4, 1993 of the Ministry of Health in article 11 (10).

Within the inclusion criteria, clinical records that were fully completed and registered, that presented clinical cases approved by the postgraduate professors and that had complete diagnostic examinations were considered, also patients without previous orthodontic and maxillary orthopedic treatment were considered; medical records of patients with conditions such as syndromes, orthodontia, and previous orthognathic surgery were excluded.

The variables that were included for the analysis were sex, age which was divided by age groups of 6 to 15 years, 16 to 30 years and over 30 years and the occlusal variables, which are discriminated in Table 1.

Table 1. Occlusal variables.

Variable	Definition	Variable	Definition	Variable	Definition
Horizontal overbite.	Normal 1-3mm, Deep bite >3mm, open bite <3mm y edge-to-edge bite 0mm(11)	Dental midlines	Coincident Non- coincident (12)	Transverse size of the maxilla	Normal Mayoral analysis (13) with figures of 35, 41 and 47 mm respectively, smaller figures would be a transverse micrognathism, and larger ones, a transverse macrognathism.
Vertical overbite.	Normal 1-3mm, increased >3mm, decreased <1mm, edge-to-edge bite 0mm(11)	Cross bite	Present or absent If it is anterior or posterior, unilateral, or bilateral.	Curve of Spee, right and left	Flat 0-1mm, convex <0mm and/or concave >1mm (14)
Shape of the upper and lower dental arch.	Triangular, oval and/or squared	Molar relationship, right and left.	Class I when the mesiobuccal cusp of the maxillary first permanent molar occludes with the mesiobuccal groove of the first permanent molar, class II the mandibular first molar is located distally, class III when it is mesial to this position (5)	Crowding and gaps.	Dentoalveolar discrepancy analysis, negative value indicates crowding and positive values indicate gaps. (15)
Canine relationship, right and left.	Class I when the upper cusp occludes between the lower canine and lower first primary molar or lower first premolar. Class III when the maxillary canine is distal and class II when it is mesial to this position (5)			Dental size of the upper and lower anterior teeth	Analysis of the incisor arch and Peck and Peck (14) (16), normal, macrodontia increased values and microdontia decreased values.

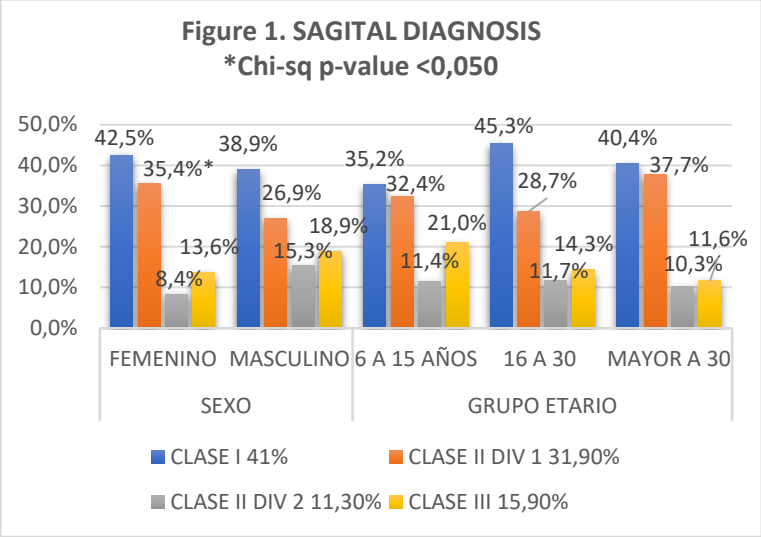
For the data processing in the first instance, the information that was recorded in the medical records was tabulated in a matrix of the Microsoft Excel® 2016 program (Microsoft, Washington, USA), a code was assigned to the variables, which was defined in a glossary and an analysis of the information was carried out in the SPSS version 26 program (IBM, New York, USA), where the occlusal characterization was obtained as a percentage of the patients who attend the UNICOC Orthodontics and Maxillary Orthopedics postgraduate clinic from 2016 to 2020 and finally the chi-square and z-test for proportions statistical tests were applied for the correlation of the variables with sex and age groups.

Results

1049 clinical histories were reviewed, of which 708 met the inclusion criteria, regarding the percentage distribution of the sample, it was observed that 31.8%

corresponded to the age group of 6 to 15 years, 44.9% to the group age group from 16 to 30 years and 23.3% to the age group over 30 and in terms of gender, 57.2% of the sample belonged to the female sex and 42.8% to the male.

Regarding the classification according to Angle (Table 2), it was found that the class II canine relationship was observed in a higher percentage on both sides, 51% on the right and 49.6% on the left, having a significant correlation with the age group from 16 to 30 years old and the female sex, following class I left with 32.1% and right with 30.4%, Class III appeared on both sides with 18.4%. The molar relationship presented a higher percentage in class I on both sides 43.6% left and 40.4% right with a significant correlation with the female sex, followed by class III left 33% and Class II right 32.4%.



Regarding the general occlusal characteristics, the overjet was found normal with 52.2% and the augmented overjet was more prevalent than the negative one 29.1% and 11.9%, respectively. Similarly, a normal overbite was observed with 42.8%, the increased one was found in 33.9%, the edge-to-edge was present in 16.5% and finally the decreased one in 6.8%. The non-coincident dental midlines were present in 78.5% presenting a significant correlation with the female sex with 82%, the oval arch shape was presented in a higher percentage both in the upper jaw with 78.4% and in the lower jaw with 82.3%, being higher in the male sex 79.3% upper and 85.8% lower, there was both upper and lower crowding in 63.9% and 69.6% respectively with a significant correlation in the age group from 16 to 30 years, gaps or gaps were found in 31.6% in the upper jaw and 25.1% in the lower jaw.

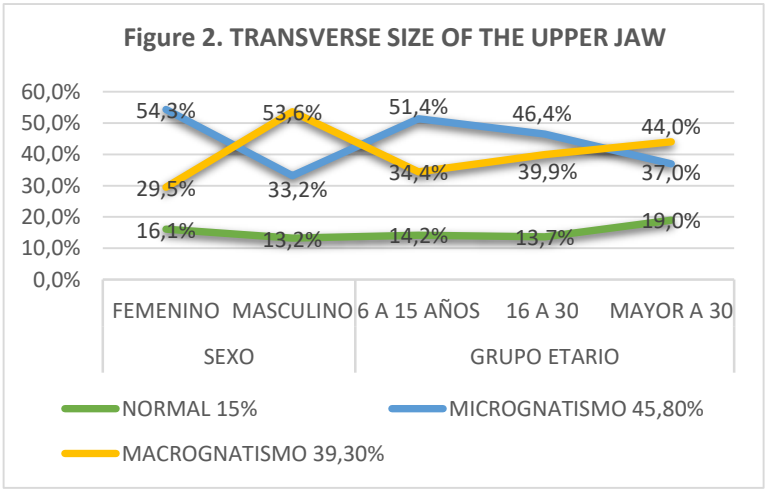
Table 2. Canine and molar relationship according to Angle. % (n)

	Total	Female	Male	6 to 15 years	16 to 30 years	Over 30 years
Right canine						
Class I	30,4% (178)	27,4% (92)	34,4% (86)	23,9% (41)	34,5% (98)	30,4% (178)
Class II	51% (299)	55,7% (187) *	44,8% (112)	50,9% (83)	50,4% (143) *	52,5% (73)
Class III	18,6% (109)	17,0% (57)	20,8% (52)	25,2% (41)	15,1% (43)	18,0% (25)
Left canine						
Class I	32,1% (185)	32,0% (107)	32,1% (78)	28,6% (48)	33,3% (91)	33,8% (46)
Class II	49,6% (286)	54,2% (181) *	43,2% (105)	45,2% (76)	52,4% (143) *	49,3% (67)
Class III	18,4% (106)	13,8% (46)	24,7% (60)	26,2% (44)	14,3% (39)	16,9% (23)
Right molar						
Class I	40,4% (221)	45,0% (143) *	34,1% (78)	37,6% (73)	41,2% (114)	44,7% (34)
Class II	32,4% (177)	34,0% (108)	30,1% (69)	39,7% (77)	27,8% (77)	30,3% (23)
Class III	27,2% (149)	21,1% (67)	35,8% (82)	22,7% (44)	31,0% (86)	25,0% (19)
Left molar						
Class I	43,6% (231)	49,3% (151) *	35,7% (80)	39,4% (76)	47,5% (125)	40,5% (30)
Class II	23,4% (124)	25,5% (78)	20,5% (46)	28,5% (55)	19,8% (52)	23,0% (17)
Class III	33% (175)	25,2% (77)	43,8% (98)	32,1% (62)	32,7% (86)	36,5% (27)

*Chi-sq p-value <0,050

Regarding the characteristics in the anteroposterior direction, it was found that the sagittal diagnosis with the highest percentage is class II with 43.2%, followed by class I in 41%, and finally class III with 15.9%. Regarding classes II, a predominance of class II division 1 was found in 31.9%, presenting a significant correlation with the female sex in 35.4% (Figure 1), anterior crossed occlusion was found in 12.9%. %, the concave curve of Spee presented with a higher percentage of both sides in 78.7% right and 78.4% left, correlating with the age group from 16 to 30 years in 80%, followed by flat with 18 .1% and 17.8% right and left respectively.

Regarding transverse discrepancies, posterior crossbite was present only in 8.5% on the right side and 7.6% on the left side. The size of the upper jaw (Figure 2) was found to be micrognathic in 45.8% with a higher percentage in the age group from 6 to 15



years with 51.4% and a significant correlation with the female sex was presented; macrognathism occurred in 39.3% with a higher percentage in the male sex with 53.6% and normality was 15%.

With respect to vertical discrepancies, anterior open occlusion occurred in 7.8%, the posterior in 2.1%. Regarding the dental size of the 4 anterior teeth, normality was found in 52.7%, macrodontia in 42.2% and microdontia only in 5.1%, with respect to the dental size of the lower anterior teeth it was found in a higher percentage. macrodontia 71.2% the lateral and 57.8% the central (Table 3).

Table 3. Size of the upper and lower anterior teeth % (n)

	Total	**Female**	**Male**	**6 to 15 years**	**16 to 30 years**	**Over 30 years**
Size of the 4 upper anterior teeth.						
Normal	52,7% (287)	58,1% (191) *	44,4% (96)	53,2% (66)	52,4% (153)	52,7% (68)
Macrodontia	42,2% (230)	36,5% (120)	50,9% (110)	42,7% (53)	42,5% (124)	41,1% (53)
Microdontia	5,1% (28)	5,5% (18)	4,6% (10)	4,0% (5)	5,1% (15)	6,2% (8)
Size of the lower lateral incisor.						
Normal	16,5% (93)	15,5% (53)	17,9% (40)	14,2% (18)	16,2% (48)	19,1% (27)
Macrodontia	71,2% (402)	72,7% (248)	68,8% (154)	78,7% (100)	71,4% (212) *	63,8% (90)
Microdontia	12,4% (70)	11,7% (40)	13,4% (30)	7,1% (9)	12,5% (37)	17% (24)
Size of the lower central incisor.						
Normal	17,2% (97)	18,8% (64)	14,7% (33)	13,3% (17)	18%(53)	19,1% (27)
Macrodontia	57,8% (326)	56,8% (193)	59,4% (133)	64,8% (83)	59% (174) *	48,9% (69)
Microdontia	25% (141)	24,4% (83)	25,9% (58)	21,9 (28)	23,1% (68)	31,9% (45)

**Chi-sq p-value <0,050 y p<0,05*

Discussion

The results of this study observed that the sagittal diagnosis with the highest percentage is class II with 43.2%, with a predominance of class II division 1 in 31.9%, presenting a significant correlation with the female sex in 35.4 %, the data found in this study are similar to those of Saghiri, *et al.* (17) who carried out a worldwide systematic review and found that class II division I is the most prevalent, being more frequent in Caucasians, like Traebert E, *et al.* (18) who reported a 57.3% prevalence of class II malocclusion in a Brazilian population, observing a 7% higher prevalence of said malocclusion in females, stating that this trend could be due to the greater presence of oral habits than it is observed in the female sex, which was reported by Laganá, *et al.* (19), for which it is hypothesized that class II malocclusions in women are more common than its presence in men.

In turn, the results of this study contrast with those of Alhammadi MS, *et al.* (20) in their systematic review on the features of malocclusion found that the global prevalence was class I in 74.7 ± 15.17%, ranging between 31% Belgium and 96.6% Nigeria. At the national level according to the ENSAB IV (7) in reference to the state of occlusion in Colombia in the population of 12 and 15 years in 2013 to 2014, they reported that 62.20% at 12 years of age had a class I molar and canine relationship and 71 % at 15 years of age, which contrasts with the results presented in this study, where the canine relationship with the highest percentage was class II, 51% on the right and 49.6% on the left, on the other hand, with respect to the molar relationship In the present study, class I was also observed in a higher percentage, 43.6% left and 40.4% right, which is consistent with ENSAB IV. The higher incidence of canine class II could be associated with the data observed in this study because there is a higher percentage of macrodontia 71.2% and 57.8% in the lower lateral and central incisors respectively, this association can occur because the size of the teeth can alter the position of the teeth, in this case the lower canines are located distally giving as a product to a canine class II, this association can be evidenced in the literature as expressed by Machado V, *et al.* (21) in a systematic review and meta-analysis on the Bolton proportions in normal occlusion and malocclusion where they found that the discrepancy in the size of the intermaxillary teeth can be one of the important factors in the cause of malocclusions, but especially in Angle's Class III, have not found a significant relationship with classes II or I, like Araujo E, *et al.* (22).

Transverse micrognathism was found in 45.8% with the highest percentage in the age group from 6 to 15 years with 51.4% and presented a significant correlation with the female sex, data that agrees with Al-Zubair (23) where they confirmed that the widths of the maxillary arch were greater in males than in females, indicating that it may be due to the fact that women tend to have smaller bone crests and alveolar processes due to the fact that they present a weakness of the musculature with respect to that of men. Regarding what was observed in relation to the highest percentage of transverse micrognathism in the age group of 6 to 15 years, it can be

related to what was reported by Achmad H, *et al.* (24) who report that craniofacial growth and development is influenced by different genetic and environmental factors, in cases where mouth breathing occurs in children, changes are observed in the facial frame and in the morphology of the hard palate, such as compression of the maxilla and/or deep palate (vaulted or ogival-shaped high palate), they in turn reported that the prevalence of children with respiratory problems such as mouth breathing affects approximately 10-15% of the pediatric population (24). Similar results in a Mexican population were obtained by Silva, *et al.* (25) who refers that, of the patients studied, 43% were related to the presence of transverse micrognathism and oral breathing and reported that the sample from 6 to 9 years of age was more affected, with a higher prevalence in females; and that class II malocclusion is the one most associated with this habit (25). Regarding the shape of the arch, the oval was presented in a higher percentage and with a higher percentage in men, coinciding with what was observed by Saghiri (17) where they demonstrated, when conducting a review of the literature, that the shape of the arch is influenced by sex and observed that the male sex has a more ovoid and squarer arch.

Conclusion

In the sample of patients who were admitted to the UNICOC Orthodontics and Maxillary Orthopedics clinic at the Bogotá city center headquarters between 2016 and 2020, the class II canine relationship was presented with a higher percentage on both sides: 51% on the right and 49.6% on the left, the molar relationship presented a higher percentage of class I on both sides, 43.6% left and 40.4% right, both correlating with the female sex.

The sagittal diagnosis with the highest percentage is class II with 43.2%, with a predominance of class II division 1 in 31.9% presenting a significant correlation with the female sex of 35.4%, in turn, transverse micrognathism was found with 45.8% with the highest percentage in the age group from 6 to 15 years with 51.4% and presented a significant correlation with the female sex.

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