http://dx.doi.org/10.1590/1981-86372023003820220081

| ORIGINAL

Study of the cephalometric standards of individuals with normal occlusion and prevalence of the malocclusion in the city of Rio de Janeiro, Rio de Janeiro, Brazil

Estudo dos padrões cefalométricos de indivíduos com oclusão normal e prevalência das maloclusões no município do Rio de Janeiro[1]

Priscila Pinto Brandão de **ARAÚJO**[2] 0000-0002-5514-0911

Paulo Roberto Aranha **NOUER**[2] 0000-0003-3239-4780

ABSTRACT

Objective: The accomplishment of this cephalometric objective to evaluate the face characteristics of this cefalometric work individuals had to the city of this cephalometric prevalence, as well as measure the objective of malocclusion. **Methods**: For this study, 531 sort of individuals of the masculine organizations of Rio de Janeiro had been submitted to the clinical chait of the course of Master in Orthodontics of the Center Research Leopold Mandic, of which if it got prevalence of malocclusion. **Results**: Of this sample, it was observed that 22 individuals with normal occlusion and that if they had never submitted the orthodontic treatment. In these patients they had been made taken from normal head in lateral cephalometric radiographs and evaluated the cephalometrics largeness: SNA, SNB, ANB, Axle "Y", NS.Go-Me, FMA, FMIA, IMPA, 1.NA, 1- NA, 1.NB, 1-NB, 1.1, 1.SN, 1.Go-Gn, SN.PLO, AO-BO, Line H, Z angle, P-NB, AFA, AFP and IAF. The gotten date had been submitted to the analysis with a level of significance of 5% ($p< 0.05$) and used descriptive statistics and the error of Dalbergh. The results showed that of the total of the evaluated sample, the malocclusion of 44.3% of Classroom I; 29.5% of Classroom II; 17.2% of Classroom III and 9.2% of normal occlusion. **Conclusion**: The individuals with normal occlusion of the city of Rio De Janeiro had presented equal cephalometric characteristics with many standard measures described in literature, except for the superior incisor that were presented vestibulate and the well inclined inferior incisor for vestibular contest.

Indexing terms: Cephalometrics. Malocclusion. Orthodontics. Prevalence

RESUMO

***Objetivos**: A realização deste trabalho teve como objetivo avaliar cefalometricamente as características faciais de indivíduos pertencentes ao município do Rio de Janeiro-RJ, bem como mensurar a prevalência de maloclusão. **Métodos**: Para este estudo, 531*

▼▼▼▼▼

[1] Article based on Priscila Pinto Brandão de Araújo's dissertation entitled Study of cephalometric patterns of individuals with normal occlusion and prevalence of malocclusions in the city of Rio de Janeiro.

[2] Faculdade São Leopoldo Mandic, Instituto de Pesquisa São Leopoldo Mandic, Curso de Ortodontia. Rua José Rocha Junqueira, 13, Swift, 13045-755, Campinas, SP, Brasil. Correspondence to: PPB Araújo. E-mail: <priscilabrandaoaraujo@gmail.com>.

▼▼▼▼▼

How to cite this article

Araújo PPB, Nouer PRA. Study of the cephalometric standards of individuals with normal occlusion and prevalence of the malocclusion in the city of Rio de Janeiro, Rio de Janeiro, Brazil. RGO, Rev Gaúch Odontol. 2023;71:e20230038. http://dx.doi.org/10.1590/1981-86372023003820220081

indivíduos do gênero masculino pertencentes às organizações militares do Rio de Janeiro foram submetidos à ficha clínica do curso de Mestrado em Ortodontia da Faculdade São Leopoldo Mandic, dos quais se obteve a prevalência de maloclusão. ***Resultados****: Dessa amostra, observou-se que 22 indivíduos possuíam oclusão normal e que nunca haviam se submetido a tratamento ortodôntico. Nesses pacientes foram feitas tomadas de telerradiografias de cabeça em norma lateral e avaliadas as grandezas cefalométricas: SNA, SNB, ANB, Eixo "Y", NS.Go-Me, FMA, FMIA, IMPA, 1.NA, 1-NA, 1.NB,1-NB, 1.1, 1.SN, 1.Go-Gn, SN.PLO, AO-BO, Linha H, ângulo Z, P-NB, AFA, AFP e IAF. Os dados obtidos foram submetidos à análise com nível de significância de 5% (p< 0,05) e utilizadas estatísticas descritivas e o erro de Dalbergh. Os resultados mostraram que do total da amostra avaliada, a maloclusão foi de 44,3% de Classe I; 29,5% de Classe II; 17,2% de Classe III e 9,2% de oclusão normal.* ***Conclusão****: Os indivíduos com oclusão normal do município do Rio de Janeiro apresentaram características cefalométricas condizentes com muitas medidas padrões descritas na literatura, exceto para o incisivo superior que apresentou-se vestibularizado e o incisivo inferior bem inclinado para vestibular.*

Termos de indexação: *Cefalometria. Maloclusão. Ortodontia. Prevalência.*

INTRODUCTION

There has always been a great interest on the part of orthodontists about knowing the characteristics of the population that they offer their services, knowing that some malocclusions are more frequent in certain racial groups, hence the need to individualize the studies whenever is possible. The diagnosis and treatment plan of orthodontic patients of different ethnicities requires a differentiated cephalometric pattern, due to craniofacial characteristics related to the ethnicity that's being studied. Thus, the individualization of cephalometric norms for different races is extremely relevant [1].

Tweed [2] described the IMPA, FMA and FMIA angles determining that the calculation of the discrepancy of their cephalometric analysis should be obtained from the IMPA and that the normal values for FMA and FMIA are respectively 25º and 65º, with um síhothe IMPA having a value of 90º; when the FMA increased or decreased, there should be a compensation in the value of the IMPA. Tweed [2] determined that each individual should be evaluated individually, observing the position of the lower incisor in the basal bone.

Downs [3] determined patterns of normality for the skull and face through cephalometric analysis, obtained from 20 young people with normal occlusion between 12 and 17 years from both genders, noticing that when the "Y" growth axis deviated from the mean obtained, it indicated a horizontal or vertical growth, according to the angulation found, concluding that the results obtained varied a lot from the measures studied, and therefore, the importance that the skeletal pattern should be evaluated individually.

A study was carried out to compare the positioning of the lower incisor in the symphysis in leukoderm, melanoderm and feoderm Brazilian young people, in order to obtain the mean values of normality and compare the values obtained between these racial groups. The sample consisted of 115 lateral cephalograms of young Brazilian individuals with normal occlusion. The melanoderm individuals had the symphysis more inclined towards the vestibular, the maxilla and the lower incisor more protruded and the profile more convex than the leukoderms and feoderms. The melanoderms presented different characteristics in relation to the leukoderms and pheoderms, therefore it is important to recognize the values to obtain a harmonious profile [4].

Bauman et al. [5] evaluated the prevalence and distribution of malocclusion in Brazilian preschoolers and its relationship with macro-region, place of residence, gender and self-reported race. There were differences in the presence of malocclusion in the different Midwest regions (1.08/95%CI-1.01-1.15), Northeast (1.21/95%CI-1.14-1.28), Southeast (1.27/CI95%-1.20-1.34) and South (1.34/CI95%-1.26-1.42), when compared to residents in the North region. It was also higher among female children (1.06/95%CI-1.02-1.09). The findings can contribute to the expansion of public policies and access to treatment for this population.

Martins [6] evaluated the prevalence of malocclusion in teenagers and tested its association with an indicator of social vulnerability, performing a cross-sectional representative study with 1,612 teenagers between 11 and 14 years old, from public and private schools in Belo Horizonte, Brazil. Dental crowding was the most prevalent type of malocclusion. The most socially vulnerable adolescents had worse indicators of malocclusion.

Malocclusion is a public health problem due to its high prevalence, possibility of treatment and for interfering with the quality of life of individuals. Therefore, orthodontic planning is based on diagnostic methods, cephalometry being an indispensable element for a correct diagnosis and prognosis of an orthodontic treatment; Cephalometric analyzes are based on a definition of normality for a given population, and research has shown that measures traditionally used in orthodontic planning cannot be used generically for all populations. It is necessary to individualize these measures considering gender, age, ethnicity and facial pattern, in addition to the good clinical sense of beauty required by the local society and by the patient.

From radiographic cephalometry, several cephalometric analyzes were elaborated and obtained from different ethnic groups. However, such analyzes when applied to Brazilian individuals from different Brazilian regions may present comparison errors. Thus, values that characterize the differentiation of each ethnic and regional group should be sought, in order to use correct patterns of diagnosis and treatment plan. Based on what has been exposed, this study aimed to evaluate malocclusion in a population of individuals from the city of Rio de Janeiro as well as to individualize cephalometric patterns of individuals with normal occlusion.

METHODS

The examination of the military was performed only after obtaining approval from the Research Ethics Committee of the Dental Study Center - São Leopoldo Mandic (Protocol 05/322) and the authorization of those selected with clinically normal occlusion, and only then it was started.

Material

The sample of this study was obtained from the population of soldiers belonging to military organizations in the state of Rio de Janeiro - RJ. A total of 531 individuals with the age of 18 to 25 years, male, feoderms, born in the city of Rio de Janeiro and not submitted to any type of orthodontic treatment were evaluated.

From the sample of 531 soldiers, those who had an occlusion considered clinically normal were selected, complying with the following inclusion criteria:

- Adequate oral health, without cavities, periodontal problems or pathologies;
- Passive lip seal;
- Vertical and horizontal symmetry;
- Absence of deleterious oral habits;
- Midline coincidence;
- Absence of crowding and dental rotations in all segments;
- Presence of all permanent teeth, except the third molars;
- Molar relationship in normal occlusion key;
- Class I canine relationship;
- Absence of noise/clicks in the ATM;
- Interference-free incisal and canine guides.

Of the total, 49 individuals were selected who had these characteristics, but only 22 individuals agreed to participate in the research.

Methods

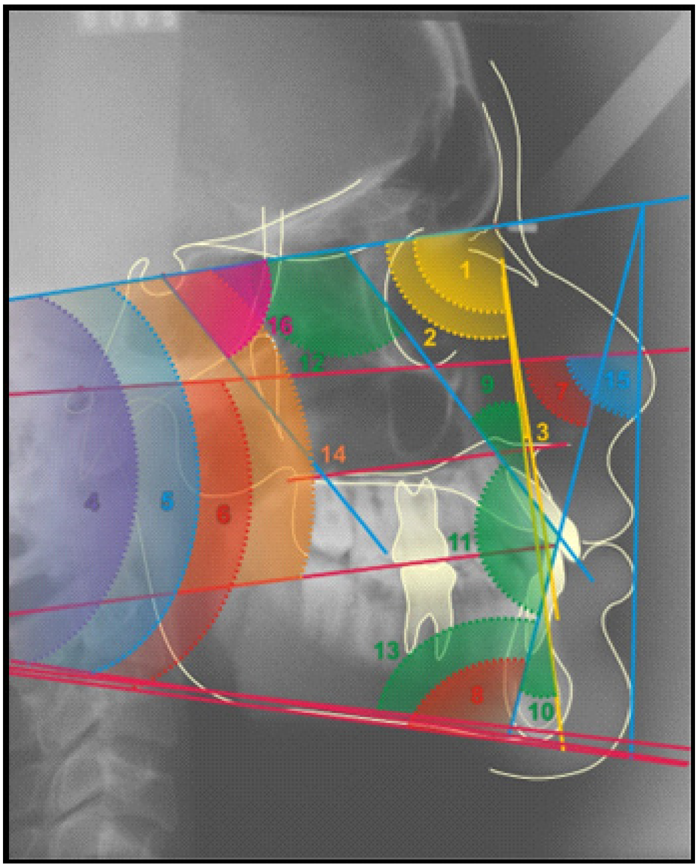
Obtaining the teleradiographies

After selecting the 22 individuals with clinically normal occlusion, they were referred to a dental documentation center (COR, Rio de Janeiro, Brazil) to perform lateral radiographs of the head, following the cephalostat positioning technique recommended by BROADBENT [4].

Cephalometric tracing

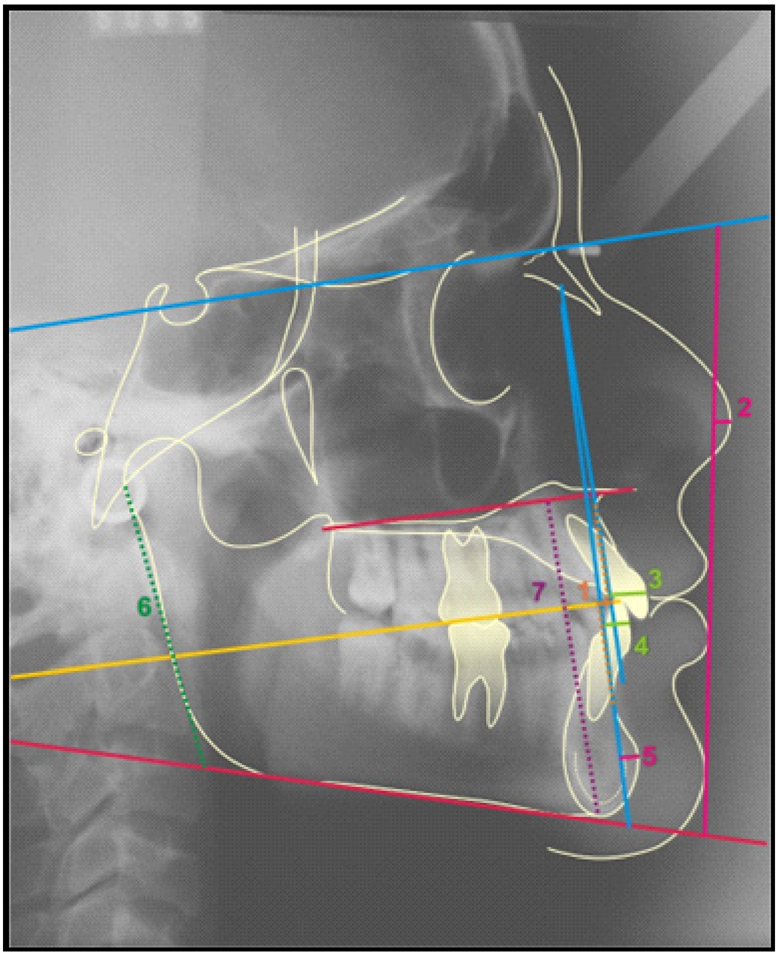
In each teleradiography, a sheet of transparent acetate paper "ultraphan" (GAC, Bohemia, New York, USA) of size 17.5 x 17,5 cm, thickness was adapted 0,07 mm and then with a mechanical pencil 0,7 mm (Faber-Castell, São Carlos, Brazil) and a "template" (GAC, Bohemia, New York, USA) the cephalogram was traced on a negatoscope (VH, Araraquara, São Paulo, Brazil) in an obscure room to improve the observation of the anatomical structures. Tracings were performed by a single researcher.

The cephalograms were traced, delimiting the anatomical structures of the skull and face, where lines and planes were traced, which gave rise to the angular and linear cephalometric magnitudes (figures 1 and 2), which are part of the Orthodontics Master's Course protocol from CPO - São Leopoldo Mandic according to the Manual of Cephalometry recommended by Nouer [7].



Subtitle
1. SNA
2. SNB
3. ANB
4. NS.Go-Me
5. SN.Go-Gn
6 FMA
7. FMIA
8. IMPA
9. 1.NA
10. 1.NB
11. 1.1
12. 1.SN
13. 1.Go-Gn
14. SN.PLO
15. Z Angle
16. "Y" Growth Axis

Figure 1. Obtaining the angular cephalometric quantities.



Subtitle
1. AO-BO
2. Line H
3. 1-NA
4. 1-NB
5. P-NB
6. AFP
7. AFA
8. IAF

Figure 2. Obtaining linear cephalometric quantities.

Statistical analysis

In the statistical analysis, the limit of significance was set at 5% ($p<0.05$) and descriptive statistics (minimum, mean, maximum and standard deviation) and the Dahlberg error were used.

RESULTS

Prevalence of malocclusion

The results of the prevalence of malocclusion are shown in table 1. The sample was divided according to the classification of malocclusion, resulting in a higher prevalence of Class I malocclusion, which was 44,3%, followed by Class II (29,5%), where Class II, Division 1, Class III (17.2%) and normal occlusion (9.2%) prevailed.

Angular and linear cephalometric quantities

Table 2 shows the mean values obtained from the angular quantities evaluated in the study. It is observed that there were significant differences for the angular magnitudes IMPA, 1.NB, 1.1 and 1-GoGn. Table 3 shows the average values obtained for the linear quantities. Regarding linear quantities, there were significant differences for 1-NA and 1-NB.

Table 1. Distribution of patient's classification according to malocclusion.

Classification	normal	Class I	Class II	Class III	total
0 (cl. I)	49 (100)	235 (100)	-	-	284 (53.5)
1 (cl. II d1)	-	-	64 (41.0)	-	64 (12.1)
2 (cl. II d2)	-	-	26 (16.7)	-	26 (4.9)
3(cl. III)	-	-	-	63 (69.2)	63 (11.9)
4(cl.II d1 sub.D)	-	-	25 (16.0)	-	25 (4.7)
5(cl. II d1 sub.E)	-	-	26 (16.7)	-	26 (4.9)
6(cl. II d2 sub.D)	-	-	12 (7.7)	-	12 (2.3)
7(cl. II d2 sub.E)	-	-	3 (1.9)	-	3 (0.6)
8 (cl. III sub. D)	-	-	-	16 (17.6)	16 (3.0)
9(cl. III sub.E)	-	-	-	12 (13.2)	12 (2.3)
Total	49 (100)	235 (100)	156 (100)	91 (100)	531 (100)

Table 2. Mean, standard deviation, minimum, maximum and median of all angular measurements

	no	average	s.d.	Minimum	median	maximum
SNA (º)	22	84.3	4.7	74	84.5	93
SNB (º)	22	81.3	4.8	72	80.5	92
ANB (º)	22	3.0	1.2	1	3	5
"Y" angle (º)	22	67.0	5.0	57	67.5	80
NS.Go-Me (º)	22	29.7	5.6	20	32	40
FMA (º)	22	22.8	5.4	15	22.5	32
FMIA (º)	22	57.0	5.7	47	56.5	70
IMPA (º)	22	**100.2***	5.9	90	100	110
1.NA (º)	22	24.3	5.3	16	23.5	35
1.NB (º)	22	**31.7***	4.4	24	31.5	40
1.-1 (º)	22	**122.2***	7.3	112	120	138
1.SN (º)	22	72.8	6.1	60	73	82
1.GO-GN (º)	22	**100.9***	6.1	88	101	111
SN.GO-GN (º)	22	28.4	5.7	18	30	38
SN.PLO (º)	22	11.3	3.7	4	11	20
Z angle (º)	22	73.8	6.9	60	72	85

Note: Significant difference ($p>0.05$).

DISCUSSION

The prevalence of malocclusion found in the studied sample was 44.3% of Class I; 29.5% Class II and 17.2% Class III [6]. The percentage of individuals with normal occlusion was 9.2% (table 1).

The cephalometric quantities that indicate the position of the incisors are 1.NA; 1-NA; 1.NB; 1-NB; IMPA; 1.1; 1.SN and 1. Go.Gn. The angles 1.NA; and 1.SN indicate the inclination of the upper incisors, demonstrating their inclination in relation to the skull base and their relationship with the lower incisor, whereas the angles 1.NB; IMPA; 1.Go. Gn indicate the inclination of the lower incisor in relation to the mandibular plane, the values of 1-NA and 1-NB indicate the protrusion of the upper and lower incisors, respectively. In the present work, the values found were: for 1.NA = 24.3º; 1-NA = 7,5 mm; 1.NB = 31.7º; 1-NB = 7,9 mm; IMPA = 100.2º; 1.1 = 122.2º; 1.SN = 72.8º; 1.Go.Gn = 100.9º (tables 2 and 3), relating to studies [1,2,4,9].

Table 3. Mean, standard deviation, minimum, maximum and median of all linear measurements.

	no	average	s.d.	Minimum	median	maximum
Line H (mm)	22	4.7	4.3	0	3.5	15
1-NA (mm)	22	**7.5***	2.6	3	7	12
1-NB (mm)	22	**7.9***	2.4	3	8	11
P-NB (mm)	22	2.3	2.2	0	two	10
AO-BO (mm)	22	4.1	2.2	1	4	9
AFP (mm)	22	65.4	4.7	59	64.5	74
AFA (mm)	22	74.0	3.5	67	74.5	80

Note: Significant difference ($p>0.05$).

The cephalometric measurements that indicate the growth trend evaluated were AFP, AFA, LAI, "Y"[2] angle, Ns. Go-Me, FMA, Sn.Go-Gn and SN.Plo. In the present study, it was found for the measures that indicate the tendency of growth, average values that indicated a horizontal growth of the studied sample, our values found were: AFA = 74 mm, AFP = 65,4 mm, LAI = 0.88, "Y" angle = 67º, Ns.Go-Me = 29.7º, FMA = 22.8º, SN.Go.Gn = 28.4º, SN.PLO = 11.3º (tables 2 and 3)

For the magnitudes indicative of the positioning of the maxillary bones in relation to the base of the skull, the SNA, SNB, ANB and AO-BO. The values found in this study were for SNA = 84.3º, SNB = 81.3º, ANB = 3º, AO-BO = 4,1 mm (tables 2 and 3), quantities that relate the skull base with the maxilla and the occlusal plane with point A and point B, respectively. These values showed a greater protrusion of the maxilla and discrepancy between the bone bases in the anteroposterior direction [1,4].

The profile was evaluated using the quantities FMIA, Angle Z, Line H and P-NB[1]. According to the values found in this study for the measurements FMIA = 57º, Z angle = 73.8º, H Line = 4,7 mm and P-NB = 2,3 mm (tables 2 and 3), a more convex profile was observed for the studied sample [4].

In this way, it was observed that each population has its individual characteristics, all evaluations of this research and previous research diverged in some result. Therefore, it is important to individualize different populations both within Brazil and around the world, aiming a correct diagnosis and orthodontic planning.

CONCLUSIONS

a) The prevalence of malocclusions in the city of Rio de Janeiro in individuals with age from 18 to 25 years belonging to military organizations was 44.3% for Class I, 29.5% for Class II and 17.2% for Class III and for occlusion. normal 9.2%;

b) In the cephalometric measurements evaluated, there were no differences with the measurements of normality, only the measurements 1-NB = 7,9 mm; 1.NB = 31.7º; IMPA = 100.2º; 1.Go.Gn = 100.9º and 1-NA = 7,5 mm, showing a greater inclination of the lower incisors and protrusion of the upper incisors;

c) There is a need for individualization of cephalometric patterns according to the population to be evaluated.

Collaborators

PPB Araujo, responsible for bibliographic survey, collection, analysis and interpretation of data, elaboration and revision of the manuscript. PRA Nouer, responsible for guiding the work and final revision of the manuscript.

REFERENCES

1. Fernandes, LPL. Changes in cephalometric variables in different ethnic groups [dissertation]. Coimbra: University of Coimbra; 2017.
2. Tweed CH. The Frankfort-mandibular plane angle in orthodontic diagnosis, classification, treatment planning and prognosis. Am J Orthod Oral Surg. 1946;32(4):175-230. http://dx.doi.org/10.1016/0096-6347(46)90001-4
3. Downs WB. Variations in facial relationships: their significance in treatment and prognosis. Am J Orthod. 1948;34(10): 812-840. http://dx.doi.org/10.1016/0002-9416(48)90015-3
4. Yarleque, MPS. Comparison by force analysis of the position of the lower incisor in the symphysis in young Brazilians Leukoderm, Melanoderm and Feoderm with normal occlusion [dissertation]. São Paulo: University of São Paulo; 2018
5. Bauman JM, Souza JGS, Bauman CD, Flório FM. Sociodemographic aspects related to the severity of malocclusion in 12-year-old Brazilian children. Cien Saude Colet. 2018;23(3):723-732. http://dx.doi.org/10.1016/10.1590/1413-81232018233.07702016
6. Martins, LP. Malocclusion and social vulnerability: a representative study of adolescents from Belo Horizonte, Brazil. Cien Saude Colet. 2019;24(2):393-400. http://dx.doi.org/10.1590/1413-81232018242.33082016
7. Nouer PRA. Cephalometry applied in radiology and orthodontics. São Paulo: Editora Santos; 2003.
8. Kerber PZ. Differences in skeletal, dental and integumentary cephalometric measurements of blacks and whites – a review of the literature. J Med Biol Sci. 2018;17(1):71-77.
9. Antas BP. Facial and cephalometric pattern analysis related to smile line and bite type. Unifeso Dental Notebooks. 2022;4(2):30-44.

Received on: 24/10/2022
Approved on: 20/12/2022

Editor: Ney Soares de Araújo