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ASSESEMENT OF THE DIMENSIONS, FORM AND SIZE OF THE MAXILAR AND MANDIBULAR DENTAL ARCH IN INDIVIDUALS WITH MALLOCLUSION II CLASS 1 BY ANGLE

ПРОЦЕНА НА ДИМЕНЗИИТЕ, ФОРМАТА И НА ГОЛЕМИНАТА НА МАКСИЛАРНИОТ И МАНДИБУЛАРНИОТ ДЕНТАЛЕН ЛАК КАЈ ИСПИТАНИЦИ СО МАЛОКЛУЗИЈА II КЛАСА 1 ОДДЕЛЕНИЕ СПОРЕД ANGLE

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Abstract

Malocclusion represents a morphological and functional change in the orofacial region, including the teeth in both jaws. It is both a skeletal and developmental change, which is mostly genetically determined. Compared to normal occlusion, it is a deviation, and compared to ideal occlusion, it represents an extreme variation. Irregularities in the mutual relationships of the teeth and in their position, as well as the mutual relationship of the jaws are its most striking components. Orthodontic diagnostics places great emphasis on the dimensions of the dental arches. Their dimension, shape and size are mostly genetically determined, but it is often under external influences during craniofacial growth and development. According to the obtained values for each parameter separately, the orthodontist will decide whether to proceed with the extraction of individual teeth or to proceed with the expansion of the dental arches, for each patient individually. **Aim of the study:** is to compare the dental arches of patients with Class II/1 malocclusion according to Angle, with the dental arches of patients with Class I malocclusion according to Angle, by measuring the following parameters: intercanine width of maxillary and mandibular dental arch, interpremolar and intermolar maxillary and mandibular dental arch width, dental arch height, dental arch length, palatal depth, and rotation of the first molars. **Methods and materials:** In order to achieve the set goals, gnatomethric analyzises were performed on 80 subjects from 12 to 18 years old, of which 40 have malocclusion class II/1 according to Angle and the remaining 40 subjects represent the control group of the same age, with malocclusion class I according to Angle, defenses by the method of random selection. Gnathometric analysis was performed with a two-pronged caliper and an orthometer with millimeter division according to Korkhaus. **Results:** The statistical processing of the obtained values for the given parameters indicate that subjects with malocclusion II class 1 grade according to Angle have lower values for intercanine, interpremolar and intermolar width compared to subjects from the control group. Regarding the height of the dental arches and the height of the palate, the values are significantly higher in contrast to the subjects with malocclusion class I according to Angle. Our research observed smaller parameters of the dental arches in the studied group, and the rotation of the first maxillary molars is of a higher degree compared to the subjects in the control group. Our results are similar to the results obtained by numerous authors of papers in the field of orthodontics in the past decades. **Conclusion:** Patients with Angle class II Division 1 malocclusion have narrower dental arches in the transverse plane, have a deep palate, and the maxillary first molars are rotated, thus occupying more space in the maxillary dental arch. Early diagnosis of this malocclusion and its timely treatment will lead to correct orofacial functions, but also emphasizing aesthetics, as a priority of patients and their requirements. At the time, it will enable the proper growth and development of the orofacial region. **Key words:** malocclusion, dental arches, maxillary width, mandibular width.

Апстракт

Малоклузијата претставува морфолошка и функционална промена во орофацијалната регија, вклучувајќи ги забите во двете вилици. Таа е скелетна и развојна промена, која најчесто е генетски условена. Во однос на нормалната оклузија, таа е девијација, а споредено со идеалната оклузија, претставува екстремна варијација. Неправилностите во заемните односи на забите, а и во нивната положба, како и меѓусебниот однос на вилиците се нејзините највпечатливи компоненти. Ортодонтската дијагностика става голем акцент на димензиите на денталните лакови. Нивната димензија, форма и големина се најчесто генетски условени, но често се и под надворешни влијанија за време на краниофацијалниот раст и развој. Според добиените вредности за секој параметар посебно, ортодонтот ќе одлучи дали ќе пристапи кон екстракција на одредени заби или, пак, ќе пристапи кон експанзија на денталните лакови, за секој пациент индивидуално. **Цел на трудот:** Основна цел на оваа студија е да се споредат денталните лакови кај пациенти со малоклузија II класа 1-во одделение според Angle, со денталните лакови кај пациенти со малоклузија I класа според Angle, преку мерење на следниве параметри: интерканинска ширина на максиларен и мандибуларен дентален лак, интерпремоларна и интермоларна ширина на максиларен и мандибуларен дентален лак, висина на денталните лакови, должина на денталните лакови, длабочина на непце и ротација на први молари. **Метод и материјали:** За реализација на поставените цели, извршени се испитувања кај 80 испитаници од 12 до 18 години, од кои 40 се со малоклузија II класа 1-во одделение според Angle, а другите 40 испитаници ја претставуваат контролната група на иста годишна возраст, со малоклузија I класа според Angle, одбрани според методот на случаен избор. Гнатометриската анализа беше извршена со двокрак шестар и ортометар со милиметарска поделба според Коркхаус (Korkhaus). **Резултати:** Статистичката обработка на добиените резултати за дадените параметри укажува на фактот дека испитаниците со малоклузија II класа, 1-во одделение, според Angle, имаат помали вредности за интерканината, за интерпремоларната и за интермоларната ширина во однос на испитаниците од контролната група. Во однос на висината на денталните лакови и висината на непцето, вредностите се значајно поголеми за разлика од испитаниците со малоклузија од 1 класа според Angle. Нашето истражување забележа помали параметри на денталните лакови кај испитуваната група, а ротацијата на првите максиларни молари е со повисок степен во однос на испитаниците во контролната група. Нашите резултати се слични со резултатите добиени од многубројни автори на трудови во областа на ортодонцијата во изминатите децении. **Заклучок:** Пациентите со малоклузија II класа, 1-во одделение според Angle имаат потесни дентални лакови во трансверзална рамнина, имаат длабоко непце и првите максиларни молари се ротирани, со што заземаат поголем простор во максиларниот дентален лак. Раното дијагностицирање на оваа малоклузија и нејзино навремено третирање ќе доведе до правилни орофацијални функции, но нагласувајќи ја и естетиката, како приоритет на пациентите и нивните барања. Воедно, ќе овозможи непречен правилен раст и развој на орофацијалната регија. **Клучни зборови:** малоклузија, дентални лакови, максиларна ширина, мандибуларна ширина.

Introduction

Orthodontics, as a branch of dentistry, primarily aims to achieve proper alignment of the teeth within the dental arches, thereby improving the function of the entire orofacial system. In addition, through orthodontic therapy and correction of orthodontic anomalies, orthodontics plays a significant role in enhancing facial aesthetics and creating a smile that meets patients' aesthetic expectations.

For this purpose, prior to initiating therapy, the orthodontist must assess growth and development individually for each patient, calculate dental, skeletal, and soft-tissue parameters, and identify changes resulting from the orthodontic anomaly. These evaluations serve as a guideline for establishing an accurate diagnosis and implementing appropriate orthodontic treatment.

Normal occlusion and articulation between the teeth of both jaws are prerequisites for proper function of the entire dentoalveolar complex. Any deviation from normal occlusion affects intercuspation and may manifest not only in dentoalveolar structures but also in soft tissues.

According to Moyers, human dentition and dental arch dimensions continuously change until maturity. During craniofacial growth, changes in facial dimensions and proportions occur in the vertical and sagittal planes, while the shape and size of dental arches are significantly influenced by changes in various cranial components[1].

Kanurkova states that postnatal growth of the orofacial complex is a multifunctional and complex phenomenon strongly influenced by genetic factors. In addition to genetics, orofacial functions significantly impact facial morphology. Increasing evidence suggests that impaired orofacial functions can alter the growth, shape, and width of dental arches in both jaws[2].

Orofacial functions are broadly divided into two groups: digestive functions, including sucking, mastication, and swallowing, and non-digestive functions, including respiration, speech, and facial expression.

Early childhood is a critical period for palatal development and represents an ideal time to initiate orthodontic treatment if indicated. If a narrow palate develops during this period and remains untreated, it will persist throughout life. In such cases, the maxillary dental arch is also narrow, resulting in insufficient space for tooth alignment. Consequently, teeth are positioned closer to the median palatine raphe, leading to posterior crossbite formation[2].

Malocclusion represents a morphological and functional alteration of the orofacial region involving teeth in both jaws. It is both a skeletal and developmental anomaly, most commonly genetically determined. Relative to normal occlusion, it represents a deviation, while compared to ideal occlusion, it constitutes an extreme variation. Irregularities in tooth position, interarch relationships, and jaw relationships are its most prominent features.

In 1899, Angle introduced his classification of malocclusions, which remains widely used today. It represents a diagnostic systematization of orofacial anomalies and is the primary classification used in orthodontics[3].

Angle Class II Division 1 malocclusion is characterized by an anteroposterior discrepancy between maxillary and mandibular dental arches, with the mandibular teeth positioned distally relative to the maxillary teeth and labial inclination of the maxillary incisors[3].

However, Angle Class II Division 1 malocclusion is not a simple clinical entity but rather a combination of multiple morphological forms resulting from genetic determinants, muscular activity patterns, and local dentoalveolar factors[4].

This malocclusion occurs in deciduous, mixed, and permanent dentitions. Although genetic factors play a crucial etiological role, impaired orofacial functions and deleterious habits significantly contribute to increased sagittal severity.

Transverse dimensions of dental arches in both jaws are essential for dentoalveolar development. Some authors report a higher prevalence of malocclusions today compared to earlier periods. Comparisons of ancient skulls with modern populations indicate that intermaxillary transverse discrepancies are relatively recent anomalies[5].

Changes in dietary habits over recent centuries have been implicated. Increased consumption of processed foods reduces physiological loading of masticatory muscles, leading to insufficient stimulation of craniofacial growth and resulting in transverse compression of dental arches[5].

Transverse growth of the stomatognathic system is most intense around six years of age, with another growth phase occurring before and during puberty. This growth is most pronounced in the auricular, zygomatic, and gonial regions. Intraorally, transverse growth is most evident in the canine region[3].

In addition to arch width, palatal depth has also changed. Studies of ancient skulls reveal shorter dental arches and shallower palates compared to modern standards[6].

Orthodontic diagnostics place significant emphasis on dental arch dimensions. While arch size, shape, and dimensions are genetically determined, they are also influenced by environmental factors during craniofacial growth[7]. Based on these parameters, orthodontists decide between tooth extraction and dental arch expansion[8].

Key criteria for diagnosing malocclusions include dental arch width and palatal depth. Numerous studies demonstrate correlations between arch form, intercanine and intermolar width, and orthodontic anomalies[9-11].

Transverse parameters of maxillary and mandibular dental arches play a crucial role in smile aesthetics. In transverse discrepancies, maxillary first molars often compensate buccally to prevent crossbite, resulting in palatal cusps positioned below the Wilson curve[9].

Material and methods

This study was performed on study casts of80 individuals aged 12–16 years. Forty subjects presented with Angle Class II Division 1 malocclusion, while 40 subjects with Angle Class I normal occlusion formed the control group, selected randomly.

Gnathometric analyses were performed on plaster models using the methods of Schwartz[4], Korkhaus[4], Howe[12], Lamons and Holmes[13], and Pont[14]. Models were obtained from anatomical impressions of both jaws using elastic impression material (Alligat, Heraeus Kulzer) and articulated with an individual wax bite.

Measurements were conducted using orthodontic instruments including a three-dimensional Korkhaus compass, digital caliper, two-point compass with millimeter scale, agglomerate, and orthocross ruler.

The following parameters were measured:

1. **Maxillary and mandibular intercanine width** – distance between canine cusp tips (Pont method[14]).
2. **Interpremolar width (anterior width) of the maxillary dental arch** – represents the distance between the distal points of the deepest part of the central fissures of the first maxillary molars. It is measured according to the Schwartz method[14].
3. **Interpremolar (anterior width) of the mandibular dental arch** – represents the distance between the points located at the apex of the angle between the mesial and distal sides of the second premolar. It is measured according to the Schwartz method[14].
4. **Maxillary intermolar width** – distance between deepest points of the central fissures of first molars (Schwartz method1[4]).
5. **Mandibular intermolar width** – distance between buccal cusp tips of first mandibular molars (Schwartz method1[4]).
6. **Dental arch height** – the distance from the most labially placed central incisor to the line joining the anterior widths of the dental arches is measured. It is measured in the upper and lower jaw. It is measured according to the Schwartz method[4].
7. **Palatal depth** – measured with a three-dimensional Korkhaus compass (Korkhaus method1[4]).

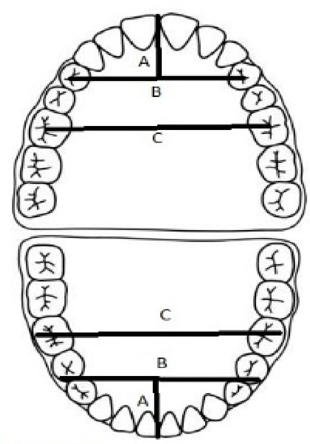

Figure 1. *Illustration of measurement points for anterior and posterior width, and height of dental arch according to Schwatz.*

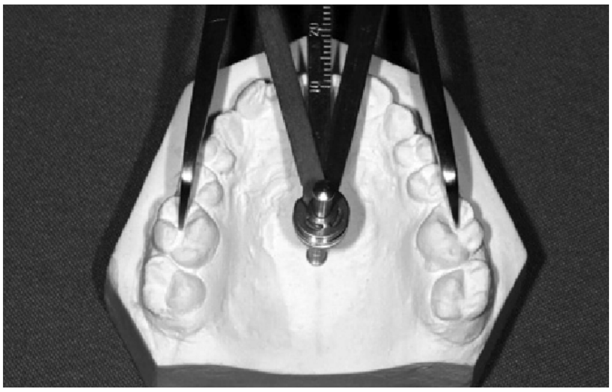

Figure 2. Illustration of measuring palatal depth with a three-dimensional compass according to Korkhaus.

Figure 3. Illustration of a method for measuring the perimeter of a dental arch with a flexible wire.

8. **Dental arch perimeter**-according to the Howe method, it represents the sum of the mesiodistal diameters of the maxillary and mandibular teeth, including the incisors, canines, premolars, and first molar[14].

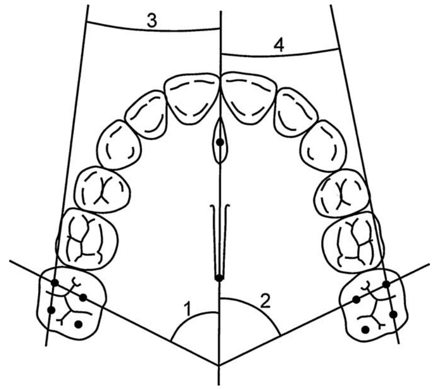

Figure 4. Illustration of the method of measuring the rotation of the maxillary first molars according to the Lamos FF method and Holmes CW.

9. **Rotation of maxillary first molars**-angle formed between the median palatine raphe and a line connecting mesial cusps (Lamons and Holmes method[13]).

The study included anamnesis, clinical examination, impression taking, model casting, and parameter analysis. Written informed consent was obtained from patients and parents.

Results

The study was conducted on study models of 80 subjects, i.e., children aged 12 to 16 years, with permanent dentition, of which 40 had Class II Division 1 malocclusion according to Angle and the remaining 40 had Class I malocclusion according to Angle representing the control group,The following parameters were analyzed: interca-

Table 1. The difference between the study group and the control group for intercanine maxillary and mandibular width and intermolar maxillary and mandibular width.

Parameter	Rank Sum class II/1 by Angle	Rank Sum class I by Angle	U	Z adjusted	P level	N	N
Maxillary intercanine width	1167.5	2072.5	347.5	-4.4	0	40	40
Mandibular intercanine width	1627.5	1612.5	792.5	0.07	0.94	40	40
Maxillary interpremolar width	947	2293	127	-6.52	0	40	40
Mandibular interpremolar width	1445	1795	625	-1.71	0.09	40	40
Maxillary intermolar width	933.5	2306.5	113.5	-6.65	0	40	40
Mandibular intermolar width	1987.5	1252.5	432.5	3.57	0	40	40

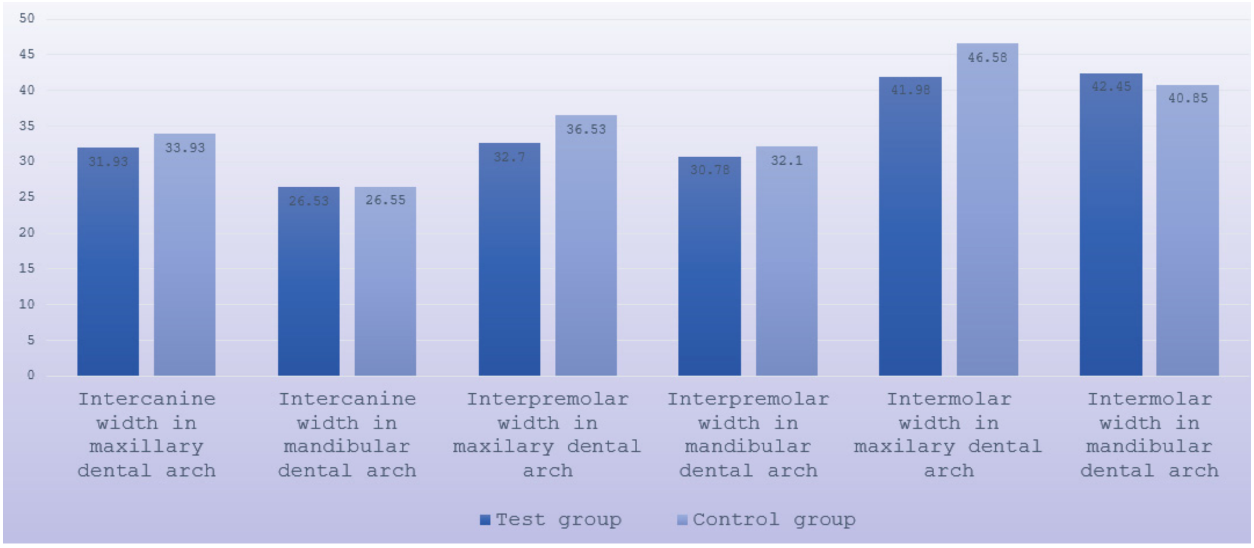

Chart 1. *Graphical representation of the difference between the mean values for intercanine, interpremolar and intermolar width in the maxillary and mandibular dental arches in test and control group.*

nine width, interpremolar width, intermolar width, palatal depth, arch height, arch perimeter, and rotation of the first maxillary molars.

Statistical analysis of the measurements obtained from the study models of both the experimental and control groups highlights the characteristic features of Angle Class II Division 1 malocclusion. The present studyidentified the morphological characteristics of the dental arches associated with this malocclusion, including the dimensions, shape, and size of the maxillary and mandibular dental arches.

Differences between the experimental and control groups in maxillary and mandibular intercanine width, as well as maxillary and mandibular interpremolar and intermolar width, are presented in Table 1.

Statistical analysis showed the following results: the height of the maxillary dental arch in the study group for

Table 2. The difference between the values for the test group and the control group of subjects for height of dental arches

Parameter	Rank Sum class II/1 by Angle	Rank Sum class I by Angle	U	Z adjusted	P level	N	N
Height of maxillary dental arch	1864.5	1375.5	556	2.39	0.02	40	40
Height of mandibular dental arch	1537	1703	717	-0.81	0.42	40	40

Chart 2. *Graphical representation of the difference between the mean values for the height of dental arches in test and control group.*

Table 3. The difference between the values for the test group and the control group of subjects for palate depth.

Parameter	Rank Sum class II/1 by Angle	Rank Sum class I by Angle	U	Z adjusted	P level	N	N
Palatal depth	1304	1936	484	-3.1	**0.002**	40	40

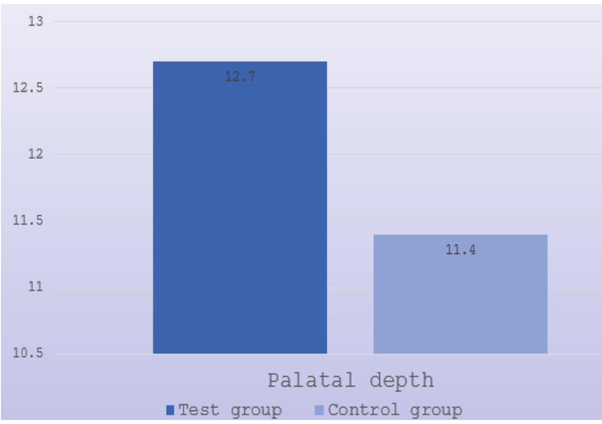

Chart 3. *Graphical representation of the difference between the mean values for the palatal depth in test and control group.*

Z=2.39 and p<0.05(p=0.02) is significantly higher than the height of the maxillary dental arch in the control group.

While the height of the mandibular dental arch in the control group for Z=- 0.81 and p>0.05(p=0.42) is insignificantly higher than the height of the mandibular dental arch in the study group.Differences between the experimental and control groups in the height of the dental arches are presented in Table 2.

Palatal depth was analyzed in individuals with Angle Class II Division 1 malocclusion and in individuals with Angle Class I malocclusion. Based on the obtained results, the difference in palatal depth between the experimental and control groups is presented in Table 3.

The results of the present study indicate that palatal depth in the experimental group was significantly smaller compared to that in the control group ($Z = -3.10$; $p < 0.01$).

Table 4. The difference between the values for the test group and the control group of subjects for height of dental arches

Parameter	Rank Sum class II/1 by Angle	Rank Sum class I by Angle	U	Z adjusted	P level	N	N
Perimeter of maxillary dental arch	1722.5	1517.5	697.5	1	0.32	40	40
Perimeter of mandibular dental arch	1262.5	1977.5	442.5	-3.49	0	40	40

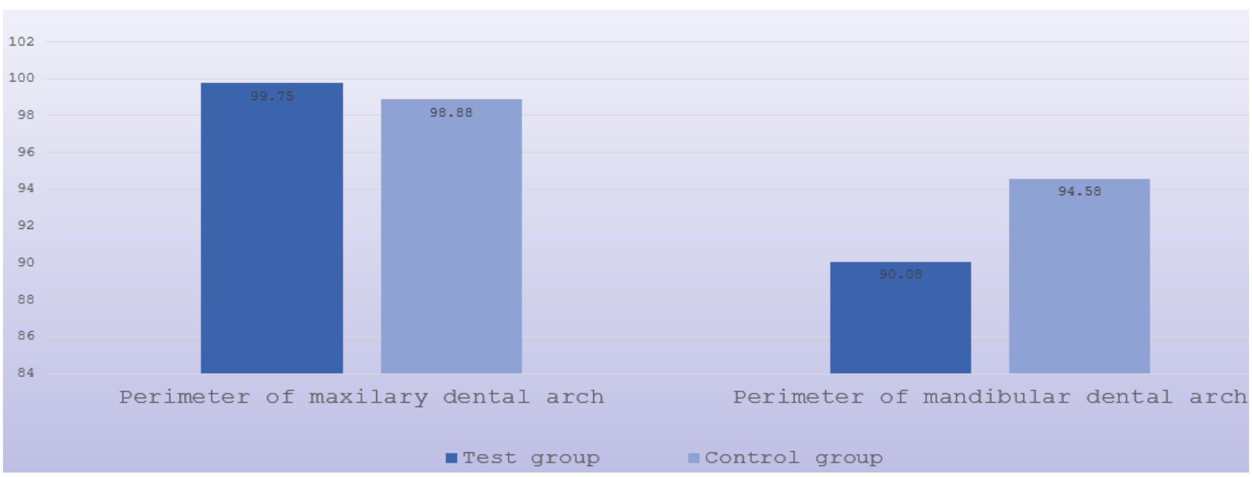

Chart 4. *Graphical representation of the difference between subjects from the study group and the control group for the perimeter of the maxillary and mandibular dental arch in the study and control groups of subjects.*

Table 5. The difference between the rotation values of left and right maxillary molars in the study and control groups of

Parameter	Rank Sum class II/1 by Angle	Rank Sum class I by Angle	U	Z adjusted	P level	N	N
Rotation of left maxilary molars	1361.5	1878.5	541.5	-2.51	0.01	40	40
Rotation of right maxilary molars	1477.5	1762.5	657.5	-1.38	0.17	40	40

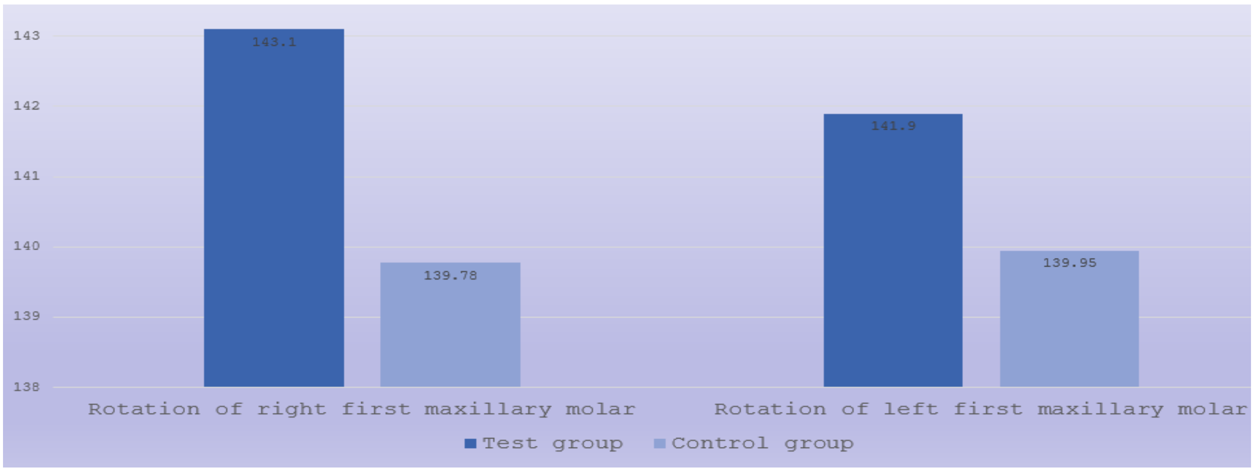

Chart 5. Graphical representation of the difference between the mean values for rotation of the first maxillary molars in the study and control groups of subjects.

According to our research, the maxillary dental arch perimeter in the study group for Z=1.00 and p>0.05(p=0.32) is insignificantly lower than the perimeter of the maxillary dental arch perimeter in the control group.

While, the perimeter of the mandibular dental arch in the control group for Z = - 3.49 and p<0.001(p=0.000) is significantly higher than the mandibular dental arch perimeter in the study group.

Differences between the experimental and control groups in the rotation of left and right maxillary molars are presented in Table 5.

According to the statistical analysis, rotation of the left maxillary molars in the experimental group was significantly greater than that observed in the control group ($Z = -2.51$; $p < 0.05$).

With regard to the rotation of the right maxillary molars, the experimental group showed slightly greater rotation compared to the control group; however, this difference was not statistically significant ($Z = -1.38$; $p > 0.05$).

Discussion

The most important goal of orthodontic treatment is to establish and maintain normal occlusion. Therefore, it is necessary to have a greater understanding of changes ocurring in the dental arches and in the entire orofacial region, particulary in patients during growth and development. Regarding early orthodontic treatment, knowledge of the dental arch parameters and their deviations from normal in the sagittal, vertical, and transverse planes is crucial for orthodontists and their treatment planning. Due to the high prevalence of dental arches crowding, knowledge of the morphological characteristics of this malocclusion is key for treatment planning. Motivated by this, in addition to anamnesis and clinical examination, we performed an analysis of gypsum models of patients with Class II Division 1 malocclusion according to Angle and compared them with a control group consisting of subjects with Angle Class I malocclusion.

To determine the morphological features of the dentofacial system in individuals with Class II Division 1 malocclusion according to Angle, we analyzed gypsum models. The aim of our study was to determine the size, shape, and dimensions of the dental arches, transverse relationships, and displacement of the teeth and bony structures in the orofacial region using gnatometric analysis, which reflects the degree of malocclusion.

Starting from the hypothesis question of whether Class II Division 1 malocclusion according to Angle affects the shape and size of the maxillary and mandibular dental arches, and considering the numerous studies addressing this issue in the scientific literature, we examined the dimensions, shape, and size of the dental arches in patients with this malocclusion.

Analysis and statistical processing of the obtained results indicate differences in the dimensions, shape, and size of the dental arches between the examined and control groups.

The subject of our study was intercanine width in the maxillary and mandibular dental arches. The mean value for intercanine width of the maxillary dental arch in the study group was 31.93 mm, while 33.93 mm in the control group. Thus, it was shown that the maxillary intercanine width in the control group is significantly greater compared to the maxillary intercanine width in the study group. This difference in intercanine width values showed high statistical significance with a coefficient of $p<0.001$ ($p=0.000$).

On the other hand, the mandibular intercanine width in the study group was 26.53 mm, which is insignificantly smaller compared to the mandibular intercanine width in the control group, which was 26.55 mm. This indicates that there is no significant difference in the values for this parameter, with a coefficient of $p>0.05$ ($p=0.94$).

These findings are consistent with the results of Rajiv Yadav15, who found that intercanine width in the maxillary dental arches has higher values in patients with Class II Division 1 malocclusion according to Angle, compared to patients with Angle Class I malocclusion. In contrast, intercanine width in the mandibular dental arches does not show a significant difference between subjects of the two groups.

Intermolar width of the dental arch is a parameter that plays an important role in the transverse dimensions of the dental arches and in occlusion in each individual. During crossbite therapy, the most important parameter for correction is intermolar width, i.e., it is most important to achieve expansion of the dental arch in the transverse plane. However, increasing intermolar width can also be for aesthetic reasons, i.e., filling the buccal corridors to achieve a "broad smile," which is of great importance to patients. The results of our study on the intermolar width of the maxillary dental arch show that its value is significantly greater in the control group, where the mean value for this parameter is 46.58 mm, compared to the study group, where the mean value is 41.98 mm. This indicates high statistical significance with a coefficient of $p<0.001$ ($p=0.000$).

In the analysis of intermolar width in the mandibular dental arch, we concluded that there is a significant difference in the values for this parameter between subjects from the control and study groups, with a coefficient of $p<0.001$ ($p=0.000$). The mean value for intermolar width in subjects with Class II Division 1 malocclusion according to Angle is 42.45 mm, while in subjects with Class I malocclusion according to Angle it is 40.85 mm.

Intermolar width was also examined in the study by Mustafa Raja Abalgadir[16]. He reports that individuals with Class II Division 1 malocclusion according to Angle have narrower maxillary intercanine and intermolar widths. He emphasizes the necessity of therapy to expand the maxillary dental arches in the transverse plane in the treatment of patients with Class II malocclusion according to Angle.

To better and fully explain the morphological characteristics of Class II Division 1 malocclusion according to Angle, we also analyzed palatal depth. Numerous authors[15-17] indicate that a compressed maxillary dental arch together with a "gothic" palate is characteristic of individuals with Class II Division 1 malocclusion according to Angle. However, Aznar T.[17] states that a high V-shaped palate is a genetic characteristic. In the examination of monozygotic twins, it was found that they have the same palatal height. This suggests that palatal height is under genetic control. The morphology of the palate plays an important role in defining the facial pattern of an individual. A symmetrical face is characterized by proper occlusion and good relationships between the bony elements of the entire stomatognathic system. Therefore, analysis of dental arch dimensions is fundamental in orthodontic treatment planning.

In the analysis of the palatal depth parameter, it was shown that this value is significantly greater in the study group, where the mean value is 12.70 mm, compared to the control group, where the mean value is 12.70 mm. This statistical difference showed high significance, with a coefficient of $p<0.01$ ($p=0.02$).

In our study, we analyzed the degree of rotation of the maxillary first molars according to Lamons and Holmes[13]. From the results obtained regarding maxillary molar rotation, it was shown that there is rotation with a higher degree on the left and right sides in patients from the control group compared to the study group. The mean value for the rotation of the first maxillary molar on the left side in subjects with Class II Division 1 malocclusion according to Angle is 139.79°, while in subjects with Class I malocclusion according to Angle it is 143.10°. This statistical difference showed high significance with a coefficient of $p<0.05$ ($p=0.01$). The mean value for the same parameter on the right side in the study group is 139.95°, and in the control group it is 141.90°. Here, the statistical difference indicates no significant difference, with a coefficient of $p>0.05$ ($p=0.17$). Our results are similar to those of Cristiane de Oliveira Viganóand Betânia Pessoa Lima[19]. Cristiane de Oliveira Viganó[20], with her colleagues, analyzed the position of the maxillary first molars and their degree of rotation.

The U-test showed a significant difference in molar rotation between the two groups of subjects, with a greater degree of rotation present in the study group compared to the control group.

The results we obtained from the presented examinations emphasize the need for early diagnosis of Class II Division 1 malocclusion according to Angle. In addition to early diagnosis, there is a need to simplify the approach in studying this malocclusion. For this purpose, multiple diagnostic methods are applied. In addition to anamnesis and clinical examination, gnatometric analysis and cephalometric analysis are necessary. Only in this way, as orthodontists, can we establish a good treatment plan and use adequate orthodontic therapeutic means for this malocclusion.

Conclusion

The position of the teeth within the dental arches, their mutual relationships, as well as the interrelationship of the jaws and their position relative to the remaining cranial and facial bones, play a crucial role in the overall configuration and appearance of the individual. Therefore, analysis of the facial structures and dental arches in both jaws is essential for establishing an accurate orthodontic diagnosis.

Based on the obtained results from studying the dimension, shape, and size of the maxillary and mandibular dental arches in Class II Division 1 malocclusion according to Angle, using analysis of gypsum study models and their statistical processing, the following results were obtained:

1. Class II Division 1 malocclusion most often has a hereditary etiology. Following heredity are bad habits, oral respiration, and adenoid problems.
2. The obtained values for intercanine width in the maxillary dental arch and their statistical processing using the Mann-Whitney U-test indicate that patients with Class II Division 1 malocclusion according to Angle have smaller values for this parameter, with a mean value of 31 mm, while in the control group the mean value is 34 mm.
3. There is no significant difference between the study and control groups regarding intercanine width in the mandibular dental arch and their mean values.
4. There is a significant difference in the values for the interpremolar width in the maxillary dental arch in both groups of subjects (32 mm mean value in subjects with malocclusion II class 1 grade according to Angle and 36 mm mean value in subjects with malocclusion I class), and the difference for the same parameter in the mandibular dental arch is not significant (31 mm mean value in the studied group and 32 mm mean value in the control group).
5. There is a significant difference in the values for intermolar width between the study and control groups, in both dental arches. There is a significant difference in palatal depth values between the study and control groups. Subjects in the study group have much higher values for this parameter.
6. The height of the maxillary dental arch in the study group is significantly higher than in the control group. In the mandibular dental arch, the difference is not significant.
7. The length of the mandibular dental arch is significantly higher in the control group than in the study group. In the maxillary dental arch, the difference is not significant.
8. Rotation of the maxillary molars in the study group has a significantly higher degree compared to the maxillary molars in the control group.
9. From all this, we can conclude that Class II Division 1 malocclusion according to Angle has characteristic deviations from normal values of the parameters in the dental arches.

Considering these changes, we want to emphasize that our study and the results we obtained will contribute to the early diagnosis of this malocclusion, timely and appropriate treatment, aiming to establish proper functions in the orofacial system, such as breathing, chewing, swallowing, and phonation, while also emphasizing aesthetics. The choice of orthodontic therapy will depend on the degree of malocclusion, the age of the patient, and the etiological factor. Early diagnosis and timely treatment of the malocclusion will enable the achievement of functional and aesthetic optimum, which will preserve the characteristics of the individual and allow uninterrupted proper growth and development of the orofacial region.

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