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Evaluation of cranio-mandibular dysfunction in patients with dento-maxillary anomalies using the Helkimo index

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ABSTRACT

Introduction. Dento-maxillary anomalies are characterized by changes in the size, shape, position and inclination of the morphological elements that make up the stomatognathic system. Recent studies demonstrate the fact that not only traumatic occlusion (OT) is the etiological factor of TMJ dysfunction. But muscular factors, vicious habits and dento-maxillary anomalies are also involved. Created by the Marti Helkimo in 1972 to investigate the prevalence and severity of signs and symptoms of temporomandibular dysfunction.

Material and method. The study was carried out on a group of 78 patients from the personal case with various dento-maxillary anomalies and TMJ suffering. We statistically processed the data obtained from the clinical examination, in order to compare the situation of patients with temporomandibular dysfunction compared to that of patients without joint disorders at the time of the initial examination.

Results. Most patients with class II/2 anomalies: 42.86% presented an anamnestic index of I, and a percentage of 20.69% had a Helkimo anamnestic index of II. So with this type of anomaly, the patients indicated obvious signs of ATM dysfunction. The Helkimo anamnestic index had the highest scores in the II/2 anomaly in the female sex, followed by class II/1 anomalies in the male gender. This index correlates better with the clinical one in the female for all types of anomalies.

Conclusion. The most important examination in the case of TMJ pathology is represented by the thorough clinical examination. There is a directly proportional relationship between the degree of severity of the malocclusion and the Helkimo index points.

Keywords: temporomandibular dysfunction, craniofacial morphology, dentomaxillary anomalies, Helkimo clinical dysfunction Index

INTRODUCTION

A series of data from the specialized literature evaluated the possible associations between temporomandibular dysfunction, craniofacial morphology, occlusal parameters and the presence of dento-maxillary anomalies. Dento-maxillary anomalies are characterized by changes in the size, shape, position and inclination of the morphological elements that make up the stomatognathic system [1]. The growth and development of the facial mass after birth are genetically programmed, but permanently subject to environmental influences [2].

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Recent studies demonstrate the fact that not only traumatic occlusion (OT) is the etiological factor of TMJ dysfunction. But muscular factors, vicious habits and dento-maxillary anomalies are also involved [3].

Against the background of some malocclusions, the association of multicausal risk factors can trigger cranio-mandibular disorders accompanied by bruxism, headache due to muscle contraction, which has an increased frequency not only in adults, but also in children or adolescents, a fact that determined the orthodontist specialists and prosthetists to support the need to know the morphophysiology and morphopathology of A.T.M [4-7].

Created by the Swede Marti Helkimo in 1972 to investigate the prevalence and severity of signs and symptoms of temporomandibular dysfunction among the Lappish population of northern Finland, the Helkimo classification represented a turning point in the efforts of specialists to objectively assess joint pain. The classification includes three indices: anamnestic (Ai), clinical (Di) and occlusal (Do), currently used in clinical and epidemiological studies to facilitate the statistical processing of the obtained data [8].

The algodysfunctional anamnestic index (Ai) quantifies the patient's answers to ten questions with closed answers (yes/no) proposed by the author, which track the possible presence in the antecedents of symptoms related to TMJ dysfunction.

Depending on the answers to the questionnaire, the anamnestic index can present three variants [8]:

- Ai 0 = absence of symptoms;
- Ai I = mild symptomatology (feeling of tiredness of the jaws, morning stiffness, increased joint noises);
- Ai II = severe symptoms (difficulties opening the mouth, blockages, dislocation/subluxation, joint/muscle pain).

The clinical index (Di) evaluates the severity of the condition by summing up the scores given to the following clinical elements investigated:

1. the amplitude of mandibular movements
2. examination of the mouth opening - closing movement
3. muscle sensitivity to palpation
4. articular sensitivity to palpation
5. the onset of pain when mobilizing the mandible.

Each clinical element is assigned a score of 0, 1 or 5 points, depending on its degree of impairment. In the author's opinion, the numerical difference between the values is large enough, so that the important signs of impairment, marked with 5, cause the significant increase of the index value and thus clearly differentiate the serious forms of dysfunction (Table 1).

The amplitude of mandibular movements is assessed according to the value of the mandibular motility index. To calculate this index, the amplitude of the following mandibular movements is measured:

TABLE 1. Amplitude of mandibular movements

Amplitude of mandibular movements	Points
Normal: maximum opening of the mouth ≥40 mm/ maximum lateral excursion left/right ≥7 mm/ maximum propulsion ≥7 mm	0
Restricted: maximum opening of the mouth = 30-39 mm/ maximum lateral excursion left/right = 4-6 mm/ maximum propulsion = 4-6 mm	1
Severe limitation: maximum opening of the mouth <30 mm/ maximum lateral excursion left/right = 0-3 mm/ maximum propulsion = 0-3 mm	5

maximum active opening, left and right laterality, maximum propulsion. Depending on the measured linear values, each movement is given 0 points (normal amplitude of mandibular movement), 1 point or 5 points (severe limitation of movement). The scores given to each movement are added up to obtain a motility index with values between 0 and 20.

Examining the manner of mandibular movements, 0 points are given for a normal opening and closing path, 1 point if there is a deviation of at least 2 mm on the opening-closing path or joint noises are detected by palpation, 5 points for the existence dislocations or joint blockages along the path of any movement (Table 2).

TABLE 2. Mandibular movements

Clinical signs/evaluation criteria	Points
1. Amplitude of mandibular movements	
Within normal limits (motility index: total 0 points)	0
Slightly reduced (motility index: total 1-4 points)	1
Limited (motility index: total 5-20 points)	5
2. Examination of the opening – closing movement of the mouth	
Without joint noises, with transverse deviation <2 mm	0
Excessive articular noises and/or transverse deviation ≥2 mm	1
Joint dislocation and/or blockage along the path of any mandibular movement.	5
3. Muscle sensitivity to palpation	
Absence of sensitivity	0
Tenderness to palpation in 1-3 points	1
Tenderness to palpation in 4 or more points	5
4. Joint sensitivity to palpation	
Absence of sensitivity	0
Sensitivity to palpation of the lateral area	1
Sensitivity to palpation of the posterior joint area	5

Summing up the points obtained, the severity of the joint pain can be appreciated by significance (Table 3).

The purpose of these study is to compare the anamnestic and clinical index Helkimo in different class of dento-maxilares anomalies in agreement to the age and gender.

TABLE 3. The severity of TMJ disorder

Total points	Helkimo Index	Significance
0	Di 0	Clinically healthy patient
1-4	Di I	Mild temporomandibular dysfunction
5-9	Di II	Moderate TMJ dysfunction
10-25	Di III	Severe temporomandibular dysfunction

MATERIAL AND METHOD

The study was carried out on a group of 82 patients from the personal case file of Prof. Dr. Dragoș Stanciu with various dento-maxillary anomalies and TMJ suffering. We statistically processed the data obtained from the clinical examination (of the 78 patients in the study group), in order to compare the situation of patients with temporomandibular dysfunction compared to that of patients without joint disorders at the time of the initial examination.

The anamnesis was performed based on the Helkimo anamnestic index, and the clinical examination scored the signs indicating the existence of a temporomandibular disorder. Slavicek [9] recommend that the history of a patient suspected of temporomandibular dysfunction be scheduled as a separate meeting, with a duration of 30-60 minutes.

In this study, we granted a 30-minute interval during the first session, thereby also obtaining mental relaxation of the patient who, by answering the questions, was actually telling about the signs of joint pain. In addition, the doctor-patient collaboration relationship is established, and the idea of the necessary therapeutic measures is outlined.

In the second session we performed the actual clinical examination and awarded points to the signs of TMJ distress observed by palpation and auscultation.

For the clinical examination of the temporomandibular joint and related structures, we went through a series of stages and diagnostic procedures:

a. extraoral inspection;

b. palpation of the joint region;

c. analysis of active and passive mandibular movements;

d. analysis of added joint noises

The muscle groups investigated bilaterally by palpation, according to Helkimo, are: the masseter muscles, the anterior and posterior regions of the temporal muscles, the external pterygoid muscles, intraoral, the insertion area of the temporal muscle on the coronoid apophysis, intraoral [10]. We analyzed the joint regions, and noted with 0 the lack of sensitivity to palpation, with 1 point the unilateral or bilateral sensitivity when palpating the lateral joint area, and with 5 points the onset of pain unilaterally or bilaterally when palpating the posterior articular pole inside the external auditory canal.

According to statistical definitions, the data used in our study are:

- Nominal variables – mutually exclusive categories, based on which the study subjects are grouped (age group, sex, type of dento-maxillary anomaly, presence of temporomandibular dysfunction);
- Ordinal variables – parameters that use a value scale for dividing and ordering subjects according to Helkimo dysfunction indices To process the information, we entered the data into tables and analyzed their intrinsic characteristics through descriptive statistics methods, using the Excel program.

Each test has a starting null hypothesis and is characterized by a coefficient of statistical significance *p* calculated automatically by the mentioned computer program. We chose as the threshold of statistical significance the *p* value of maximum 0.05, the level accepted by the scientific community to reject the null hypothesis. Obtaining a coefficient p of the test below 0.05 proves that it is statistically significant.

RESULTS

The study group is heterogeneous both in terms of age and gender. Analyzing the frequency of dento-maxillary anomalies in the study group, we found a higher prevalence for Class I Angle malocclusion, followed by Class II/1, then Class II/2 and Class III a - Angle. For all types of anomalies, the female sex holds a greater share (Figure 1).

Analyzing the distribution of dento-maxillary anomalies by age group, we noted that the most frequent anomaly detected in the group under study is the Class I Angle anomaly, with increased prevalence in the 18-28 and 28-40 age groups: 42.11% (Table 4, Figure 2). There is a statistically significant association between age categories and Class I Angle.

Regarding Class II/1 Angle anomaly, it has a higher frequency in the age group 12-18 years (47.37%) followed by the age group 18-28 years with a prevalence of 36.84% (Table 5, Figure 3).

There is no statistically significant association between age categories and Class II/1 Angle

Regarding the Class II/2 Angle anomaly, this has an increased prevalence of 47.62% in the 12-18 age group followed by the 18-28 age group with a percentage of 28.57% (Figure 4). There is no statistically significant association between age categories and Class II/2 Angle (Table 6).

Regarding Angle class III anomaly, this has an increased prevalence of 41.67% in the 18-28 age group, followed by the 28-40 age group with a percentage of 33.33%. (Table 7, Figure 5) There is no statistically significant association between age categories and Class III Angle.

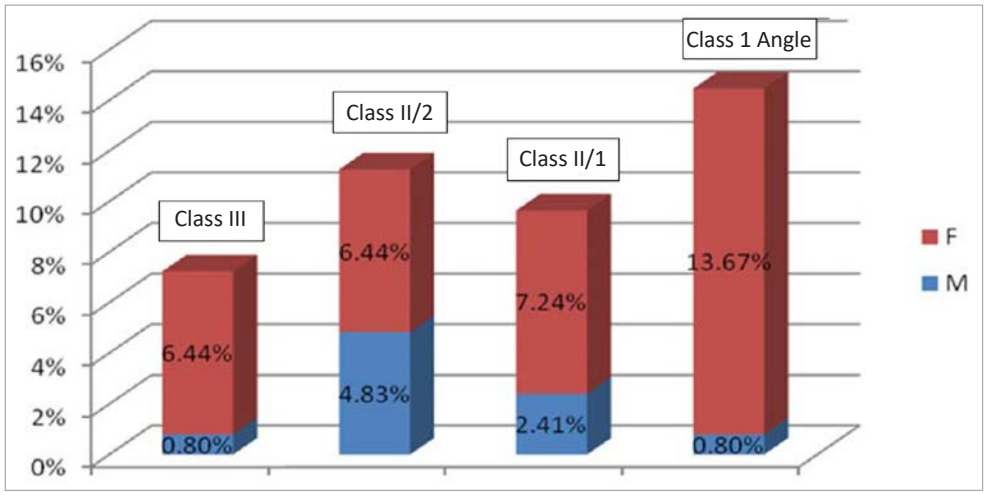

FIGURE 1. Percentage distribution of dento-maxillary anomalies by sex

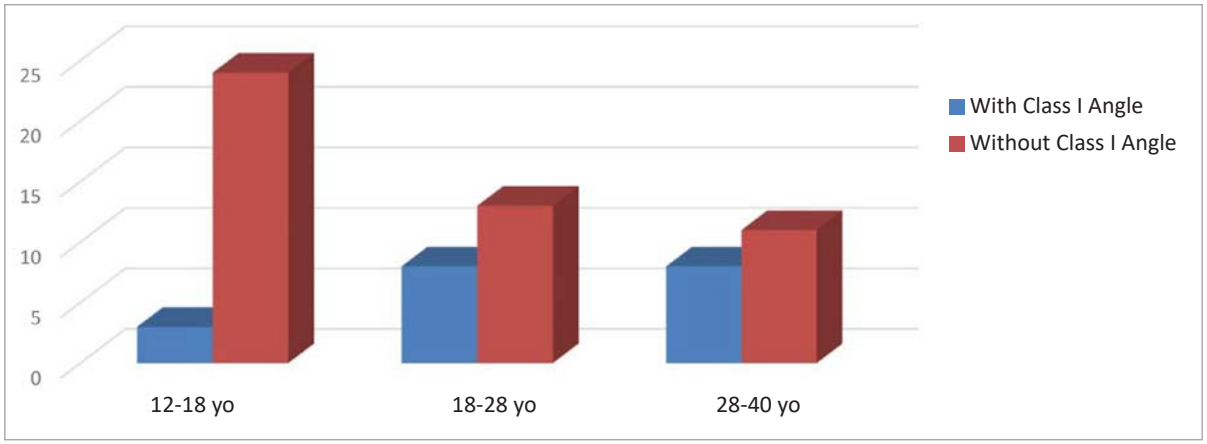

FIGURE 2. Prevalence of class I anomaly by age groups

TABLE 4. Prevalence of class I anomaly by age groups

Age	With Class I Angle	Without Class I Angle	Value p
age 12-18	3 (15,79%)	24 (50,00%)	**0.0351**
age 18-28	8 (42,11%)	13 (27,08%)	
age 28-40	8 (42,11%)	11 (22,92%)	
Total	19 (100,00%)	48 (100,00%)	

TABLE 5. Prevalence of class II/1 anomaly by age groups

Age	With Class II/1 Angle	Without Class II/1 Angle	Value p
age 12-18	9 (47,37%)	18 (37,50%)	**0.3566**
age 18-28	7 (36,84%)	14 (29,17%)	
age 28-40	3 (15,79%)	16 (33,33%)	
Total	19 (100,00%)	48 (100,00%)	

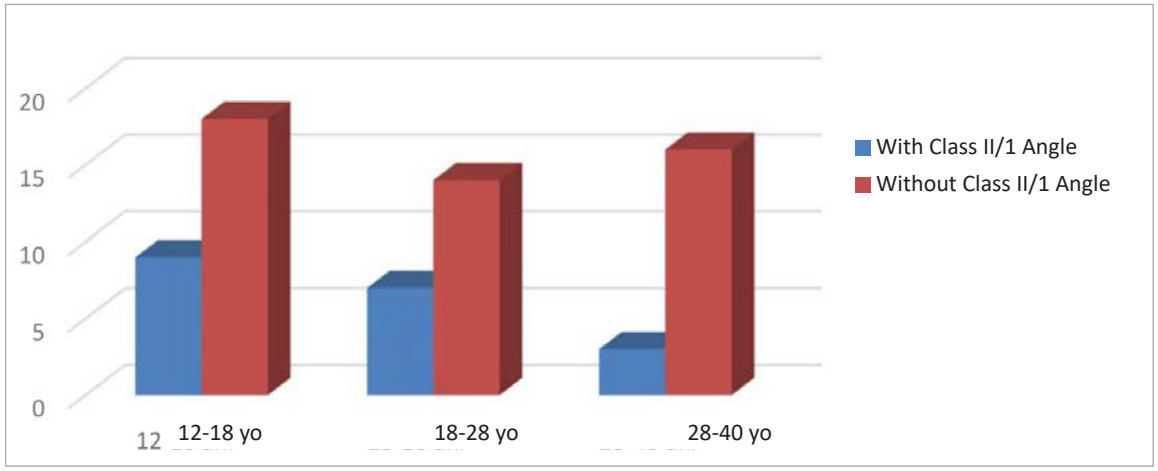

FIGURE 3. Prevalence of class II/1 anomaly by age groups

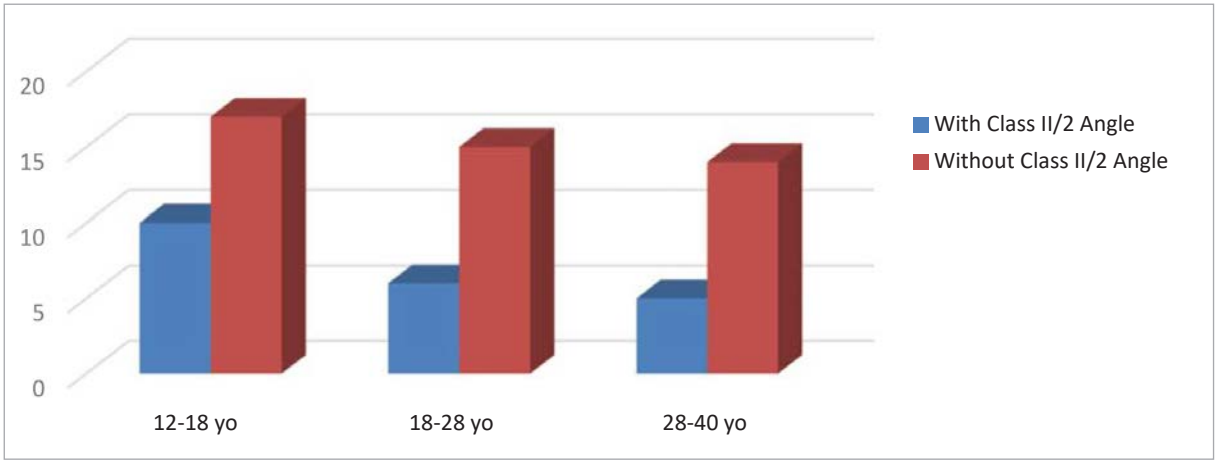

FIGURE 4. Prevalence of class II/2 anomaly by age groups

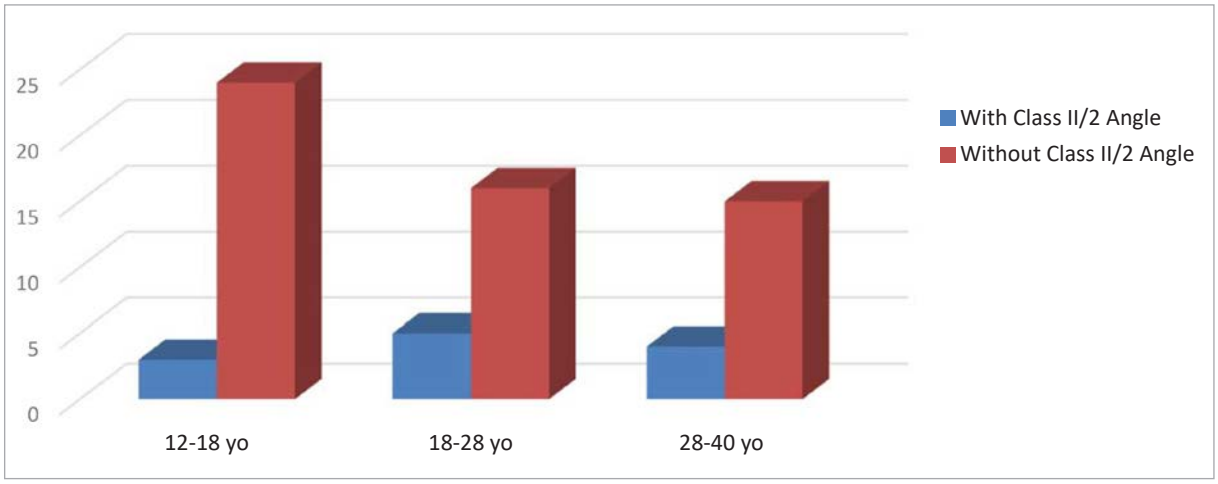

FIGURE 5. Prevalence of class III anomaly by age groups

TABLE 6. Prevalence of class II/1 anomaly by age groups

Age	With Class II/2 Angle	Without Class II/2 Angle	Value p
age 12-18	10 (47,62%)	17 (36,96%)	**0.7030**
age 18-28	6 (28,57%)	15 (32,61%)	
age 28-40	5 (23,81%)	14 (30,43%)	
Total	21 (100,00%)	46 (100,00%)	

TABLE 7. Prevalence of class III anomaly by age groups

Age	With Class III Angle	Without Class III Angle	Value p
age 12-18	3 (25,00%)	24 (43,64%)	**0.4786**
age 18-28	5 (41,67%)	16 (29,09%)	
age 28-40	4 (33,33%)	15 (27,27%)	
Total	12 (100,00%)	55 (100,00%)	

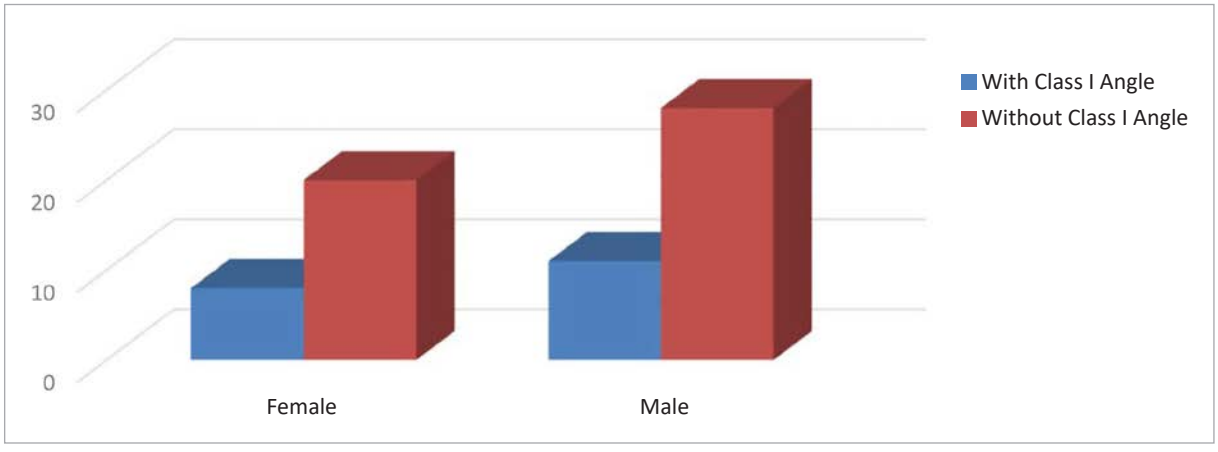

FIGURE 6. Prevalence of class I Angle anomaly by gender

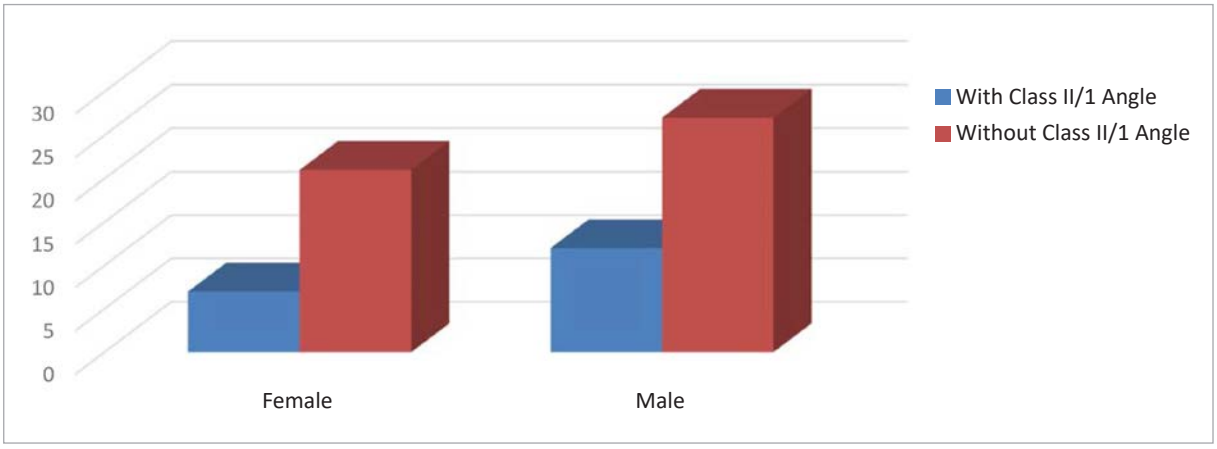

FIGURE 7. Prevalence of class II/1 Angle anomaly by gender

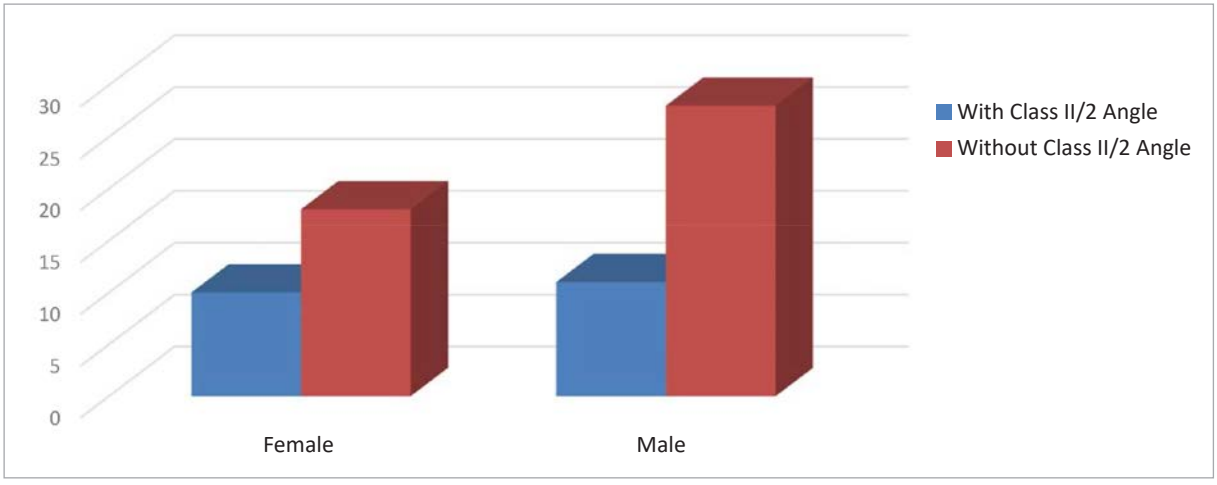

FIGURE 8. Prevalence of class II/2 Angle anomaly by gender

Analyzing the distribution of Class I Angle dento-maxillary abnormalities by gender, we noted that this is more frequent in males, but there is no statistically significant association between sex and Class I Angle (Figure 6).

Class II\1 Angle is more common in males, but there is no statistically significant association between gender and Class II/1 Angle (Figure 7, Table 8).

TABLE 8. Prevalence of class II/1 anomaly by gender

Gender	With Class II/1 Angle	Without Class II/1 Angle	Value p
Female	7 (36,84%)	21 (43,75%)	RR=0.8125 IC(95%): 0.3666-1.801 p=0.7843
Male	12 (63,16%)	27 (56,25%)	
Total	19 (100,00%)	48 (100,00%)	

Class II/2 Angle is more common in men, but there is no statistically significant association between gender and Class II/2 Angle (Figure 8, Table 9).

In our study, Class III Angle malocclusion is more frequent in males, but there is no statistically significant association between gender and Class III Angle (Table 10, Figure 9).

TABLE 9. Prevalence of class II/2 anomaly by gender

Gender	With Class II/2 Angle	Without Class II/2 Angle	Value p
Female	10 (47,62%)	18 (39,13%)	RR=1.266 IC(95%): 0.6253-2.564 p=0.5972
Male	11 (52,38%)	28 (60,87%)	
Total	21 (100,00%)	46 (100,00%)	

TABLE 10. Prevalence of class III anomaly by gender

Gender	With Class III Angle	Without Class III Angle	Value p
Female	4 (33,33%)	24 (43,64%)	RR=0.6964 IC(95%): 0.2323-2.088 p=0.7479
Male	8 (66,67%)	31 (56,36%)	
Total	12 (100,00%)	55 (100,00%)	

We analyzed the grades of the Helkimo Ai anamnestic index, in different anomalies (Table 11) quantified by the following values:

Ai = 0 – absence of symptoms;

Ai = I – mild symptomatology (feeling of jaw fatigue, morning sickness, excessive joint noises);

Ai = II – severe symptoms (difficulties opening the mouth, blockages, dislocation/subluxation, joint/muscle pain, frequent headaches).

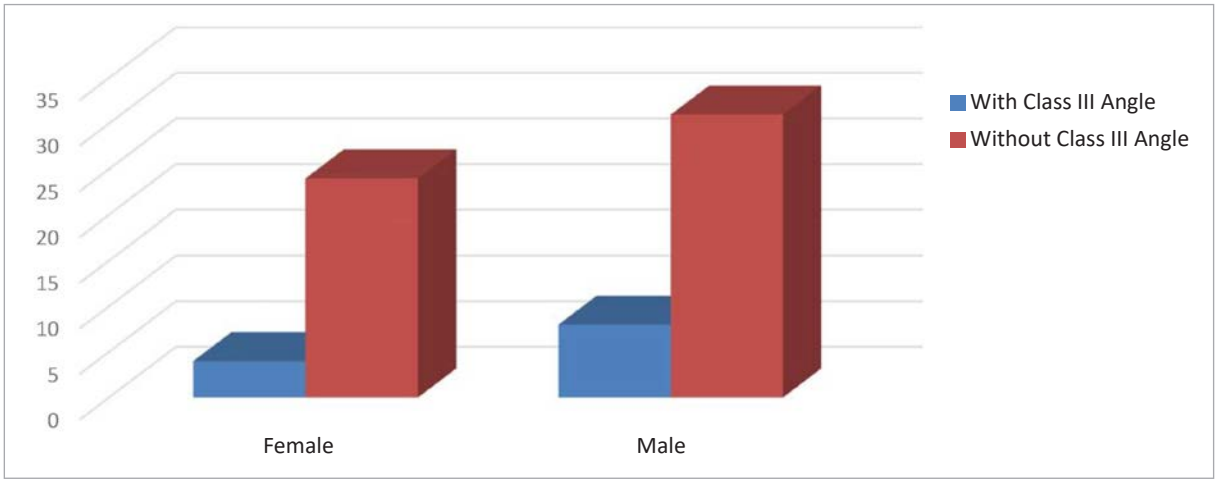

FIGURE 9. Prevalence of Class III Angle anomaly by gender

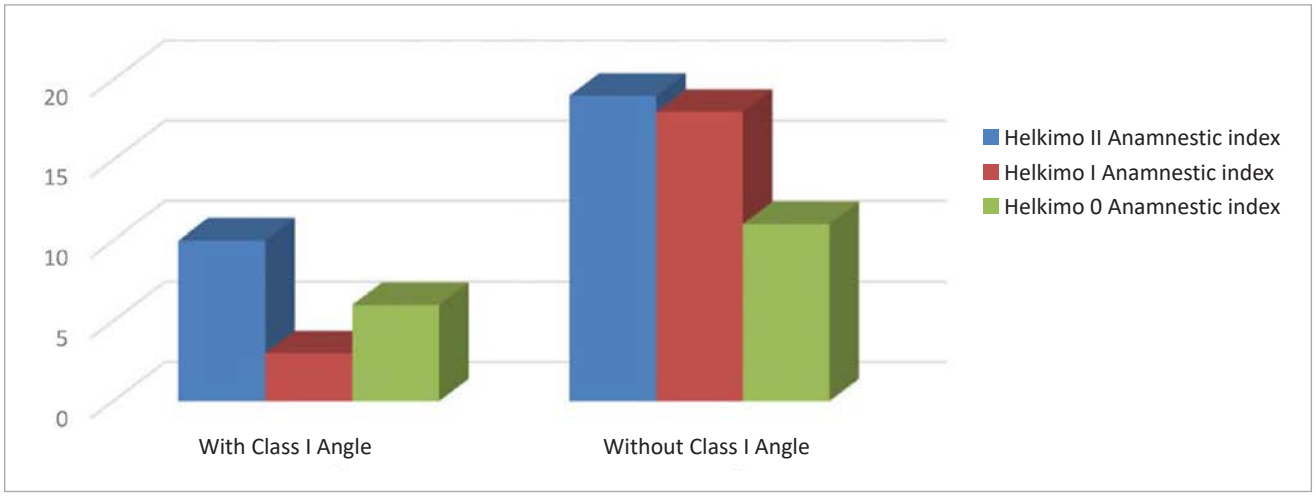

FIGURE 10. Grades of the Helkimo anamnestic index for Class I Angle anomaly

TABLE 11. The grades of the Helkimo Ai anamnestic index in class I anomalies

	Helkimo II Anamnestic index	Helkimo I Anamnestic index	Helkimo 0 Anamnestic index	Value p
With Class I Angle	10 (34,48%)	3 (14,29%)	6 (35,29%)	0.2248
Without Class I Angle	19 (65,52%)	18 (85,71%)	11 (64,71%)	
Total	29 (100,00%)	21 (100,00%)	17 (100,00%)	

Patients with Class I Angle abnormalities had an anamnestic index of 0 in 35.29%, followed by a percentage of 34.48% for index II. There is no statistically significant association between Class I Angle and the grades of the Helkimo anamnestic index (Figure 10). Patients with class I abnormalities did not have joint noises or line deviations.

On the other hand, patients with class II/1 Angle anomalies had an anamnestic index II in a percentage of (31.03%), followed by a percentage of 29.41% for the Helkimo index 0. There is no statistically significant association between Class II/1 Angle and grades of the Helkimo anamnestic index (Table 11, Figure 12).

TABLE 12. Grades of the Helkimo anamnestic index for Class II/1 Angle anomaly

	Helkimo II Anamnestic index	Helkimo I Anamnestic index	Helkimo 0 Anamnestic index	Value p
With Class II/1 Angle	9 (31,03%)	5 (23,81%)	5 (29,41%)	0.8498
Without Class II/1 Angle	20 (68,97%)	16 (76,19%)	12 (70,59%)	
Total	29 (100,00%)	21 (100,00%)	17 (100,00%)	

FIGURE 11. Grades of the Helkimo anamnestic index for class II/1 Angle anomaly

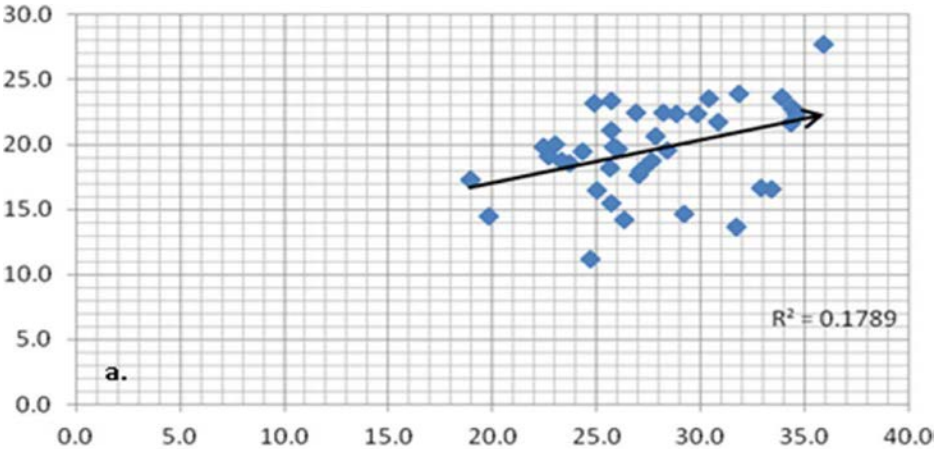

FIGURE 12. Distribution of joint cracking in the study group

During the examination, we evaluated joint noises (cracking or crepitations), and noted their location (right/left), and the moment of appearance (at the beginning, during or at the end of the movement). We also followed the relationship in the transversal and sagittal plane of the lower interincisal line compared to the upper one during the mouth opening movement. Joint pains appear as a consequence of the alteration of the dynamics of the disc-condyle complex, especially in the case of skeletal anomalies.

In 32.22% of the patients of the study group, we detected articular cracking (Figure 12)

- 4.03% belonged to the age group 12-18 years and presented unilateral cracking (Figure 13);
- 5.45% of patients were included in the 18-28 age group, with unilateral cracking, and 1.4% with bilateral cracking (Figure 14);
- 7.25% of patients with unilateral cracking and 3.6% with bilateral cracking belonged to the 28-40 age group;

Unilateral crepitations were detected in 3.22% of patients (female, aged over 19 years) (Figure 15). None of the investigated patients presented bilateral crepitations. The absence of joint noises does not always mean a perfect state of health of the temporomandibular joint.

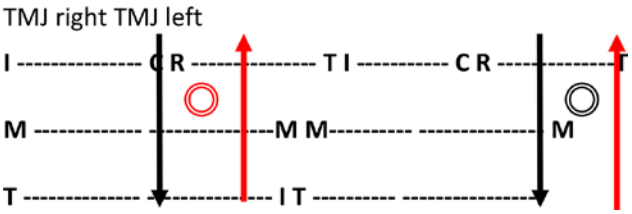

FIGURE 13. Unilateral cracking when opening the oral cavity

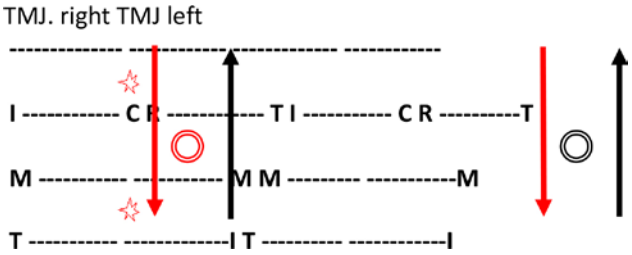

FIGURE 14. Bilateral cracking when lowering the mandible

Most patients with class II/2 anomalies: 42.86% presented an anamnestic index of I, and a percentage of 20.69% had a Helkimo anamnestic index of II. So with this type of anomaly, the patients indicated obvious signs of ATM dysfunction (Figure 16). There is no statistically significant association between Class II/2 Angle and degrees of the Helkimo anamnestic index (Table 13).

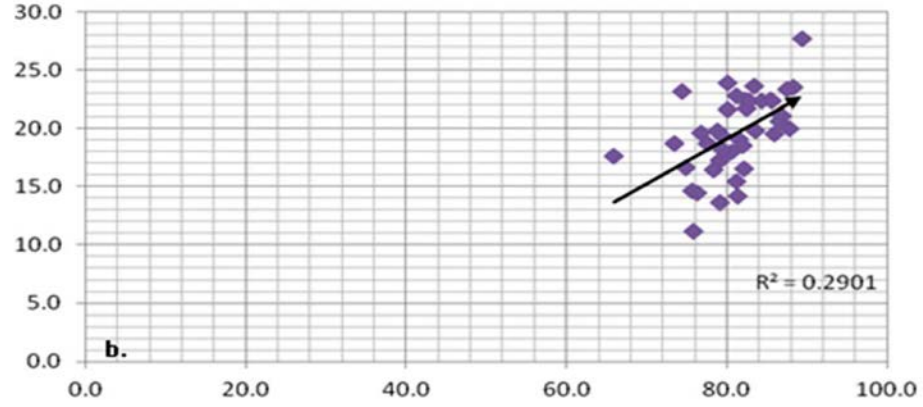

FIGURE 15. Joint crepitations in the study group

TABLE 13. Grades of the Helkimo anamnestic index for Class II/2 Angle anomaly

	Helkimo II Anamnestic index	Helkimo I Anamnestic index	Helkimo 0 Anamnestic index	Value p
With Class II/2 Angle	Anamnestic index	Helkimo I	6 (35,29%)	0.2292
Without class II/2	Anamnestic index	Helkimo 0	11 (64,71%)	
Total	Anamnestic index	Value p	17 (100,00%)	

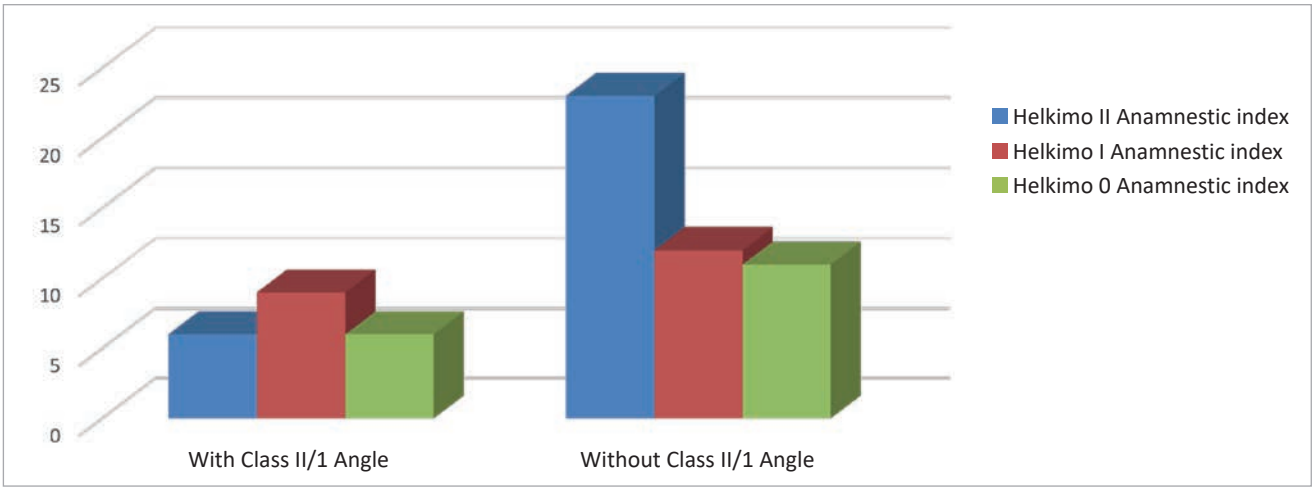

FIGURE 16. Grades of the Helkimo anamnestic index for class II/2 Angle anomaly

FIGURE 17. Grades of the Helkimo anamnestic index for Class III Angle anomaly

Most patients with class III Angle abnormalities: 24.14% presented an anamnestic index II, and a percentage of 9.25% had an anamnestic index Helkimo I (Figure 17). There is no statistically significant association between Class III Angle and grades of the Helkimo anamnestic index (Table 14).

Regarding the clinical index, a relatively small percentage of patients with Class I Angle anomalies:

TABLE 14. Grades of the Helkimo anamnestic index for Class III Angle anomaly

	Helkimo II Anamnestic index	Helkimo I Anamnestic index	Helkimo 0 Anamnestic index	Value p
With Class III Angle	7 (24,14%)	2 (9,52%)	3 (17,65%)	0.4126
Without Class III	22 (75,86%)	19 (90,48%)	14 (82,35%)	
Total	29 (100,00%)	21 (100,00%)	17 (100,00%)	

34.78% presented the value 5, the majority having values of 0 and 1 (Figure 18). No patient with a clinical index of 5 had any symptoms. There is no statistically significant association between Angle Class I and Helkimo clinical index grades (Table 15).

Analyzing the association of the degrees of the clinical index, we observed that patients with class II/1 anomalies have in most cases an index of 5 in percentage of 34.78%. In these patients, we also found the appearance of pains, bilateral, as a consequence of the traumatic occlusion (Figure 19). There is no statistically significant association between Angle Class II/1 and Helkimo clinical index grades (Table 16).

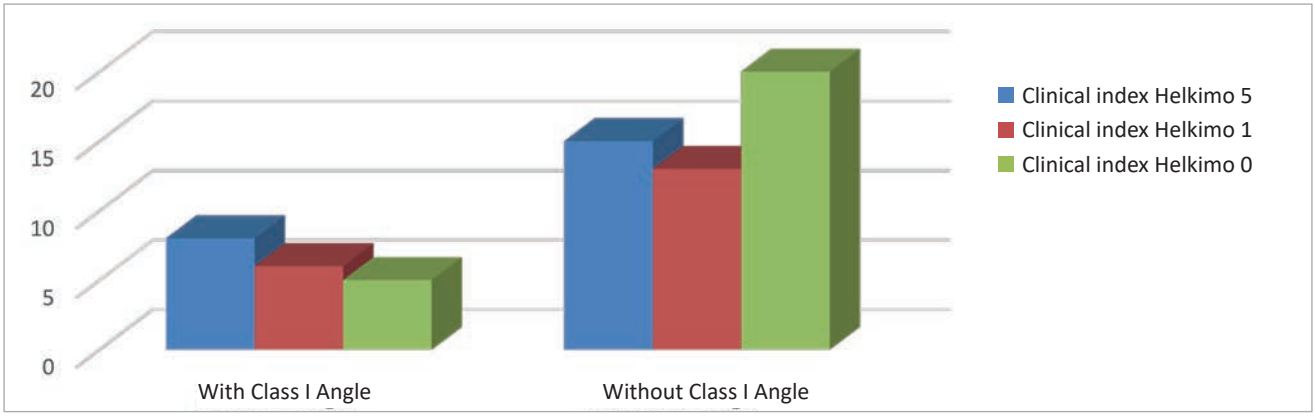

FIGURE 18. Grades of the Helkimo clinical index for Class I Angle anomaly

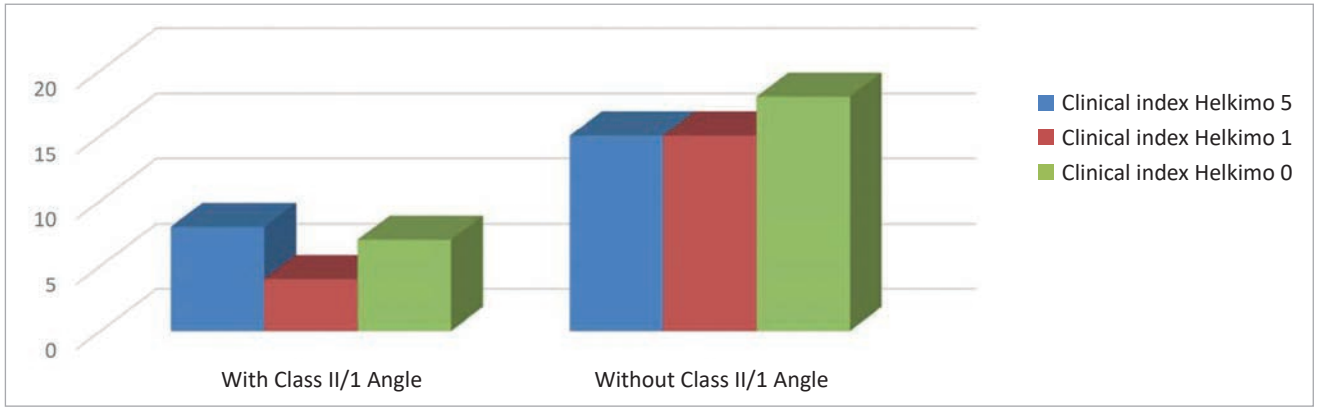

FIGURE 19. Grades of the Helkimo clinical index for Class II/1 Angle anomaly

TABLE 15. Grades of the Helkimo clinical index for Class I Angle anomaly

	Clinical index Helkimo 5	Clinical index Helkimo 1	Clinical index Helkimo 0	Value p
With Class I Angle	8 (34,78%)	6 (31,58%)	5 (20,00%)	0.4907
Without Class IAngle	15 (65,22%)	13 (68,42%)	20 (80,00%)	
Total	23 (100,00%)	19 (100,00%)	25 (100,00%)	

TABLE 16. Grades of the Helkimo clinical index for Class II/1 Angle anomaly

	Clinical index Helkimo 5	Clinical index Helkimo 1	Clinical index Helkimo 0	Value p
With Class II/1 Angle	8 (34,78%)	4 (21,05%)	7 (28,00%)	0.6163
Without Class II/1Angle	15 (65,22%)	15 (78,95%)	18 (72,00%)	
Total	23 (100,00%)	19 (100,00%)	25 (100,00%)	

Patients with class II/2 Angle have statistically significant association between Angle Class II/1 and Helkimo clinical index grades: p has 0.0186 value. The majority had clinical index 0, (52,00%), but the others signs of TMJ are more frequent (Figure 20, Table 17).

Most patients with class III Angle abnormalities presented a clinical index of 5, in percentage of 21.74%, followed by percentage of 21.05% by the value of 1 of the Helkimo index (Figure 21). There is no statistically significant association between Class III Angle and the degrees of the Helkimo clinical index (Table 18).

The Helkimo Clinical Dysfunction Index (Di) is summarized as follow (Table 19):

- 0 points, respectively 1 point, regarding the amplitude of mandibular movements. In the case of 2.4% of patients (female, over 18 years old) we encountered limitations of mandibular motility, which led to the awarding of 5 points;
- Quantifying the data of the clinical examination of mandibular movements, we gave all

TABLE 17. Grades of the Helkimo clinical index for Class II/2 Angle anomaly

	Clinical index Helkimo 5	Clinical index Helkimo 1	Clinical index Helkimo 0	Value p
With Class II/2 Angle	4 (17,39%)	4 (21,05%)	13 (52,00%)	0.0186
Without Class II/2 Angle	19 (82,61%)	15 (78,95%)	12 (48,00%)	
Total	23 (100,00%)	19 (100,00%)	25 (100,00%)	

TABLE 18. Grades of the Helkimo clinical index for Class III Angle anomaly

	Clinical index Helkimo 5	Clinical index Helkimo 1	Clinical index Helkimo 0	Value p
With Class III Angle	5 (21,74%)	4 (21,05%)	3 (12,00%)	0.6216
Without Class III Angle	18 (78,26%)	15 (78,95%)	22 (88,00%)	
Total	23 (100,00%)	19 (100,00%)	25 (100,00%)	

FIGURE 20. Grades of the Helkimo clinical index for Class II/2 Angle anomaly

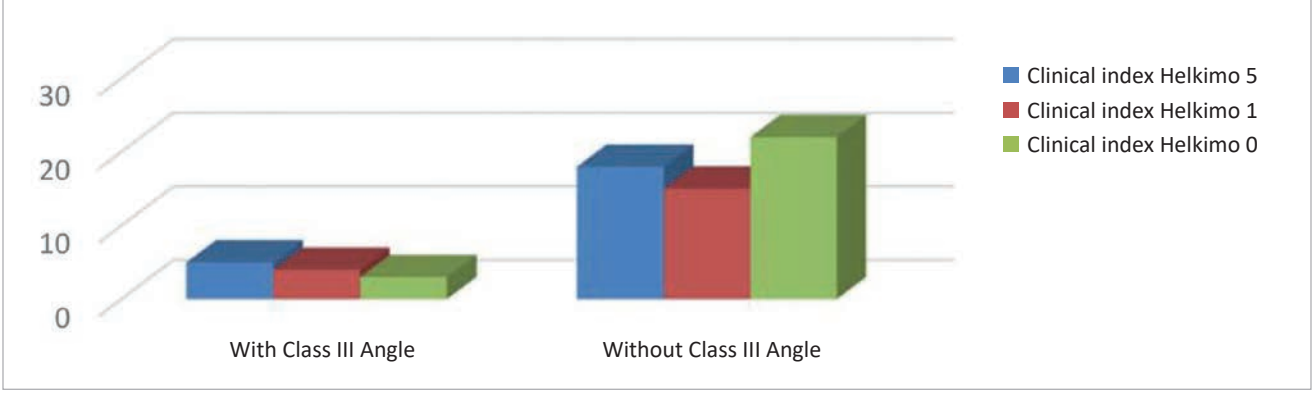

FIGURE 21. Helkimo clinical index grades for class III Angle anomaly

TABLE 19. The values of the Helkimo Clinical Dysfunction Index (Di)

Helkimo Index	Total	Class I		% out of total	Class II/1		% out of total	Class II/2		% out of total	Class III		% out of total
		Male	Female		Male	Female		Male	Female		Male	Female	
Anamnestic	133	16 8,2%	14 31,7%	39,9%	12 13,7%	11 46,3%	39%	14 31,7%	13 30,2%	46%	19 34%	16 21%	37%
Clinical	127	20 15,7%	25 21,3%	37%	15 27,5%	9 35,4%	61%	26 22,3%	24 20,4%	54%	27 24%	22 32%	28%

patients scores above 0 (in all cases we detected changes in the course of mandibular movements). Most patients received 1 point, and 5 points were awarded to 7.14% of patients, female, over 13 years old;

- the parameter related to the onset of pain when mobilizing the mandible recorded 0 points, except for 2.38% of the female patients, over 18 years old, who were given one point;
- 0 points were awarded in most cases also for the expression of sensitivity when palpating the articular structures. 4.76% of the patients received 1 point, and 2.38%, 5 points, all of them being female, over 18 years old (Figure 22 and 23);
- Existence of cracks and crepitations: reciprocal or non-reciprocal.

The statistical analysis of the frequency of occurrence of scores of 0, 1, respectively 5 points at the level of the three age groups and between sexes, with the help of the chi-square test, showed us that there are statistically significant differences in terms of the amplitude of mandibular movements by age groups ($p < 0.05$).

With advancing age, the severity of signs of joint dysfunction (highlighted by Helkimo scores of 1 and 5, respectively) increases.

Compared to the age and gender of the patients in whom signs of joint disorders were detected, we found that the number of affected girls doubles with age, while the number of boys remains at a percentage of 1-2%, except the 18-28 age group, which includes 4.83% of the number of investigated cases.

The higher number of boys with signs of joint damage at the age of 10-18 compared to the other age groups can be explained by the greater initial addressability of the male sex and by the greater intolerance to pain compared to girls of the same age.

DISCUSSIONS

Hansson et al. [11] were the first to support the introduction of examination methods from orthopedics and alternative medicine in the clinical examination of the temporomandibular joint. Later, other authors adopted different orthopedic diagnostic procedures, describing their potential benefits: Magnusson [12].

The clinical examination of the temporomandibular joint is mainly based on the analysis of mandibular movements and palpation of the muscles of the stomatognathic system.

The methods of paraclinical exploration of TMJ are an ongoing controversy, due to the lack of consensus and clear criteria for their use. Certainly, the complexity of mandibular movements often requires the use of additional explorations for a better understanding of joint function. In addition to clinical analysis and imaging studies, we also have at our disposal the graphic analysis of mandibular movements, represented by axiography.

In Helkimo's initial research, 75% of the individuals whose questionnaires were ranked in the Ai II

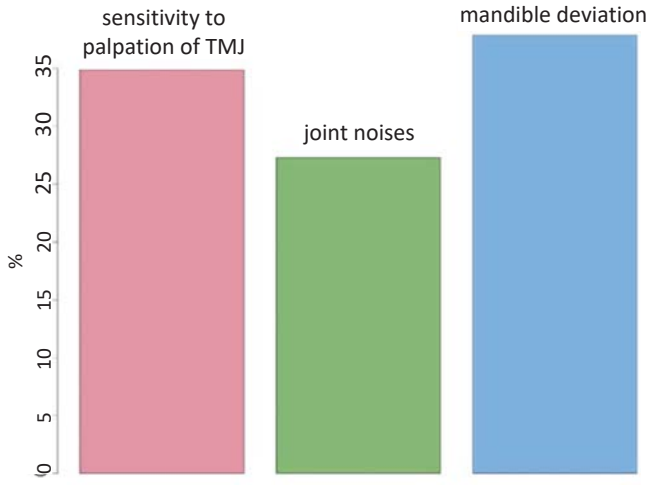

FIGURE 22. Signs of TMJ disorders in girls

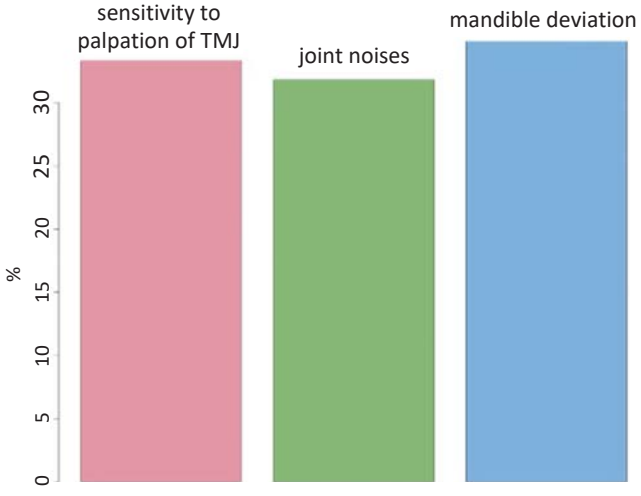

FIGURE 23. Signs of TMJ disorders in boys

group had at least one severe sign of joint damage, and 44% of them had two or more severe signs. Only 21% of the subjects without anamnestic symptoms were diagnosed with serious forms of dysfunction. In this study we did not evaluate the occlusal index, because several authors have demonstrated that there is no correlation between the values of this index and the occurrence of temporomandibular dysfunction (Ionita and Petre) [13].

Currently, the concerns of prosthetists and orthodontists are focused on the early identification of class II/1 and II/2 malocclusions, both against the background of deep occlusion (especially in subjects with an excessive overbite), as a result of the loss multicuspid teeth responsible for the appearance of "occlusal collapse", these anomalies being able to produce cranio-mandibular disorders. In other studies the authors reported a high procent of 41.12% of temporomandibular dysfunction for the patients with maxilares anomalies especially deep bite and open bite Bencze et al) [14].

In malocclusions of class II/1 A.H. Owen points out that the sagittal inocclusion space must be properly interpreted taking into account the character and position of the mandibular condyles in order to intervene therapeutically [15]. Thus, if this space originates from maxillary protrusion, the mandible being in its normal place, upper mechanical retraction will be resorted to. Conversely, if sagittal inocclusion results from the retruded position of the mandible, a functional orthopedic treatment will be given.

In terms of frequency, L Westesson [16] found in a large investigation on adults, that 90% of subjects with painful dysfunction of the TMJ they had posterior condylar dislocation. In comparison, E. H. Williamson [17] detected cranio-mandibular disorders in orthodontically treated children who were over 10 years old in a prevalence of 20%, F. Muraray et al (1992) draw attention to the fact that all those with An.D.M. and TMJ dysfunction, the severity of dyshomeostasis can be assessed based on some radiographic parameters [18].

Orthodontic treatments at growing age usually end before reaching the maturity of the articular structures, therefore a difference of at most 1-2 mm between the maximum intercuspation position and the centric relation position can be accepted, which ensures the prerequisites for the subsequent stabilization of the system stomatognathic through functional demands. In children and adolescents, the capacity for progressive remodeling of bone structures allows adaptive remodeling at the TMJ level during active orthodontic treatment and retention. Orthodontic treatment in adult is recommended to be completed by obtaining a firm position of maximum intercuspation, coinciding with CR, because by finishing the growth processes, the subsequent adaptation of the structures of the stomatognathic system can no longer be expected [19-21].

Ricken [22] found that approximately 80% of the patients undergoing orthodontic treatment had different degrees of damage to the temporomandibular joint before the start of therapy (especially girls between the ages of 12 and 15 show signs of a compensated temporomandibular dysfunction). The symptoms of TMJ dysfunction can appear from a very young age (after 5 years), although children have a great capacity to compensate for functional balances. In our study, we highlighted greater TMJ suffering in adult patients, with Class II/2 and Class III Angle anomalies.

Fonseca [23] published a series of studies suggesting that patients with a hyperdivergent facial pattern, those with open skeletal occlusions and maxillary retrognathion more frequently present signs of joint damage than patients whose skeletal parameters fall within normal limits. In addition, his research provides evidence that untreated intracapsular disorders during the growth period can lead to specific alterations of the craniofacial morphology.

Dawson and Worms [24] compared, in their study, the cephalometric data of 62 patients diagnosed with intracapsular disorders with those of 102 healthy subjects. The results indicated the presence of a higher percentage of hyperdivergent cases and a lower percentage of hypodivergent patients in the study group compared to the control group. No significant differences were recorded in terms of dental, occlusal parameters and the sagittal mandibular-maxillary relationship, materialized by the Angle classification.

Ather authors et al. showed that occlusal factors, namely unstable occlusion, deviation between centric relation and maximum intercuspation, are frequently associated with dysfunctional signs and symptoms. In the present study we found that subjects with Class II/2 and Class III Angle anomalies more frequently presented changes in dynamic occlusion, with the appearance of interference both in the maximum intercuspation position and in propulsion and laterality movements. Dysfunctional signs can thus be correlated with unstable occlusion, both statically and dynamically [25].

The research carried out by Obwegeser H. L, Farmand M [25] demonstrated that there are differences in the way of stressing the joint structures, related to the skeletal pattern of the patient. Studying the disposition of the bone trabeculae at the level of the condyles belonging to some subjects who presented skeletal relationships Cls. I Angle, Cls. IIa with open occlusion, respectively Cls. II/2 with deep occlusion, the authors concluded that the joints of patients

with open occlusion endured greater forces, directed distally, compared to the rest of the investigated group. There are several TMJ disorders in children with diabetes, according the studies of Lica MM, Papai A and Salcudean A [26]. Cracks can have other causes, not just disc displacement. Joint ligaments can be a source for the appearance of cracks. Mainly the lateral collateral ligament can produce such noises during the rotational movement, due to individual ligament fragility [27].

CONCLUSIONS

The presence of anamnestic signs and symptoms of joint dysfunction is higher in class II/2 dento-maxillary anomalies, followed by class II/1, class III Angle. The Helkimo anamnestic index had the highest scores in the II/2 anomaly in the female sex, followed by class II/1 anomalies in the male gender. This index correlates better with the clinical one in the female for all types of anomalies.

Regarding the clinical examination of the patients, the most frequent parameter was represented by the deviation of the chin when opening the oral cavity, the presence of cracking noises and muscle pain. Among the most common crampings were the reciprocal ones during the rotation movement in most patients with class III anomalies. With advancing age, the severity of signs of joint dysfunction (highlighted by Helkimo scores of 1 and 5, respectively) increases.

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