

FREQUENCY AND CHARACTERISTICS  
OF MALOCCLUSION IN ADULT PATIENTS

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**Abstract**

The aim of the current research was to study the frequency of the most usual malocclusion in adult Bulgarian non-growing orthodontics patients, referred for orthodontic treatment, as well as the correlation between examined malocclusions. 405 patients were included in this study. They were divided into two groups depending on age (21–44 and over 45 years of age). Each patient passed orthodontic check-up in an orthodontic clinic. Dental mirror, periodontal probe, caliper and articulation paper were used for diagnostics of the existing malocclusions. Angle's classification was applied for determining the dental class. The most common malocclusion were registered. The data was introduced and processed with statistical package SPSS 13.0.1. A descriptive analysis and accurate test of Fisher were applied. It was established that 69% of the patients have crowding, 51.0% have deep overbite, and 3.0% have open bite. The dental class was distributed as follows: 57.52% Class I Angle, 34.35% Class II Angle (uni- or bilaterally), and 7.91% Class III Angle (uni- or bilaterally). The gender distribution was in correlation only with crowding. The age correlated with crowding, inclination of single/group of teeth, abrasion and diastema. The presence of deep overbite showed correlation with abrasion, uni- or bilateral dental Class II. The current study showed a relatively high frequency of malocclusion in adults. This suggests an early prevention of malocclusions with the aim of optimal functional, aesthetic and long-term results to be achieved.

**Key words:** malocclusion, adults, orthodontics

**Introduction.** The World Health Organization [1] defined malocclusion as an anomaly which causes disfigurement or impedes function, and requiring treatment “if the disfigurement or functional defect is likely to be an obstacle to

the patient's physical or emotional well-being". According to the WHO reports, malocclusions feature the third highest prevalence among oral pathologies, after tooth decay and periodontal disease [2]. It is proved that malocclusions are local factor for development of dental caries and periodontal diseases [3].

With increasing age, the complicated pathology results in conditions for a secondary displacement of teeth and development of malocclusions. The trauma of occlusion is also increasing. The prevalence and frequency of malocclusions have been studied many times and various values ranging from 11% to 93% have been registered in different parts of the world and in different races [5].

Savara (1955) in his study of children between 14 and 17 years of age reported for normal occlusion in 21.1%; Class I in 51.1%, Class II in 19.4% and Class III in 9.4% of all the studied cases [4].

KASHIF et al. [6] examined the frequency of malocclusions according to the classification of Angle seeking for correlation with age and gender (2012–2013). 600 untreated orthodontic patients were included in the examination (15–50 years of age) with at least 28 permanent teeth. The study excluded patients with prosthodontic bridges and recent tooth extractions in view of possible change in the initial occlusion. Results showed the ratio of women to men 1.6:1. Observations showed Angle Class I at 62.6%, Class II at 27.1% and 10.1% of Class III cases. Kashif et al. did not establish a correlation between malocclusions and gender, as well as between malocclusions and age.

GOYAL and GOYAL [7] in their study of 243 patients between 10 and 30 years of age established dental Class I in 60.9% of cases, dental Class II in 28.8% and dental Class III in 10.3% of the reviewed patients. Crowding was established in 71.2%, spacing – in 9.9%, open bite – in 24.3%, deep overbite – in 31.7%, and increased overjet – in 44.4%. The authors did not establish significant gender differences observed to malocclusions, with the exception of deep overbite, which was more common in men.

PROFFIT et al. [8] examined untreated orthodontic patients of American origin between 8 and 50 years of age. They found dental Class I in 52.2%, 42.4% with dental Class II and less than 5% with dental Class III.

According to our previous study [9], which included 600 students at the age of 12, 28.23% of examined patients had deep overbite. Crowding in the frontal segment was observed in 17.50%, open bite in 0.33%, edge to edge bite in 1.39%. Dental Class II relationships were observed in 22.23% and dental Class III in 2.33% of cases.

JONSSON et al. [10] examined 829 patients from Iceland at random, of which 342 men and 487 women aged between 31 and 44. It was found that 45.5% of examined patients had no malocclusions, 33.9% had one malocclusion, 20.5% had from two to four malocclusions. The most often established malocclusion was dental Class II (27.7%), followed by crowding in the lower frontal area (13.4%), cross-bite (11.9%), deep overbite (11.8%), crowding in the upper frontal area (7.1%),

dental Class III (6.9%) and overjet (5.3%). Jonsson et al. established greater frequency of mandibular overjet, dental Class III and edge to edge bite in men.

Most of the epidemiological studies have been done on growing patients. There is still incomplete information about oral pathology and its correlations in adult orthodontic patients.

The aim of the current research was to study the frequency of the most usual malocclusion in adult Bulgarian non-growing orthodontics patients, referred for orthodontic treatment, as well as the correlation between examined malocclusions.

**Material and methods.** 405 patients were included in this study. They passed orthodontic check-up in an orthodontic clinic during the period 2010–2013. 81 (20.0%) of them were male and 324 (80.0%) were female. The patients were divided into two groups depending on their age. The first group included 348 patients (85.9%) between 20–44 years of age. The other group included 57 (14.1%) patients over 44 years. A clinical examination for diagnostics of the existing malocclusions and the dental class (according to Angle's classification) was done by an orthodontist. The examinations were performed with the use of dental mirror, periodontal probe, caliper and articulation paper. During maximal intercuspitation the antero-posterior relationships of the first permanent molars in both jaws according to the Angle's classification were registered.

The most common malocclusions were registered as follows: deep overbite, crowding, inclinations, edge to edge bite, cross bite, overjet (more than 2.00 mm), diastemas.

The data was introduced and processed with statistical package SPSS 13.0.1. For level of significance in rejecting the null hypothesis  $p < 0.05$  was chosen. A descriptive analysis and accurate Fisher's test were applied.

**Results.** Patients with crowding were the highest percentage, followed by the patients with deep overbite (51.0%). Open bite was most rarely observed – only 3.0% of examined patients. The comparative analysis of malocclusions in both genders shows that only crowding is gender dependent – significantly higher among females (Table 1).

Figure 1 shows that patients with bilateral dental Class I are the highest percentage (57.52%), followed by patients with bilateral dental Class II (21%) and unilateral dental Class II – 13%. Patients with unilateral dental Class III (2.72%) and bilateral dental Class III (5.19%) are the fewest.

Table 2 shows that the age correlates with crowding, inclinations of single or group of teeth, pathological abrasion and diastema/spacing. Crowding has a significantly higher rate in younger patients, while other malocclusions are more common in adults.

There is a significant correlation between malocclusions – deep overbite and abrasion. The analysis shows that 64% of patients with abrasion have deep overbite and 43.30% of the patients with deep overbite have no abrasion. The presence

T a b l e 1

Frequency distribution of malocclusions and comparative analysis between both genders

Malocclusion	Male		Female		Total		Sp
	No	%	No	%	No	%	
<b>Crowding</b>	48	59.30	231	<b>71.30</b>	279	<b>68.89</b>	2.30
Deep overbite	45	55.60	161	49.80	206	50.86	2.48
Edge to edge bite of single tooth or group of teeth	14	17.30	40	12.30	54	13.33	1.69
Cross bite of single tooth or group of teeth	20	24.70	66	20.40	86	21.23	2.03
Open bite	3	3.70	10	3.10	13	3.21	0.88
Inclination of single tooth or group of teeth	25	30.90	104	32.10	129	31.85	2.32
Overjet	18	22.20	91	28.20	109	26.91	2.20
Abrasion	37	45.70	113	35.00	150	37.04	2.40
Diastema	11	13.60	30	9.30	41	10.12	1.50

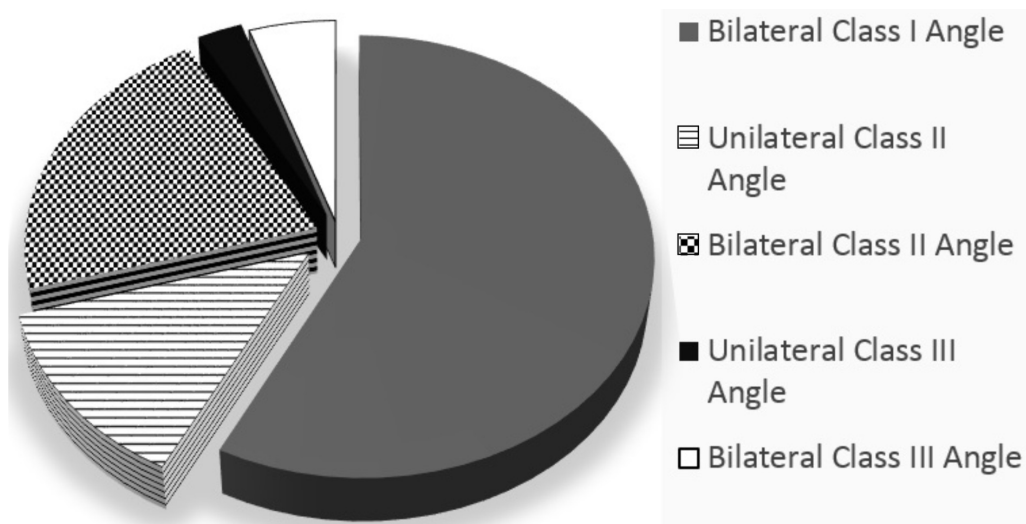


Fig. 1. Frequency distribution of patients according to the dental Class

T a b l e 2

Comparative analysis of malocclusions in both age groups

Malocclusion	Age				<i>p</i>
	20–44 years of age		45 + years of age		
	No	%	No	%	
Crowding	249	71.60	30	52.60	0.005
Deep overbite	180	51.90	26	45.60	0.395
Edge to edge of single tooth or group of teeth	46	13.20	8	14.00	0.835
Cross bite of single tooth or group of teeth	76	21.80	10	17.50	0.600
Open bite	10	2.90	3	5.30	0.406
Inclination of single tooth or group of teeth	103	29.60	26	45.60	0.021
Overjet	92	26.50	17	29.80	0.630
Abrasion	113	32.60	37	64.90	< 0.001
Diastema	30	8.60	11	19.30	0.029

T a b l e 3

Analysis of the relationship between the deep overbite and dental class

Dental Class	Deep overbite				<i>p</i>
	Absence		Presence		
	No	%	No	%	
Bilateral dental Class I Angle	139	34.32	94	23.21	
Unilateral dental Class II Angle	15	3.70	38	9.38	0.002
Bilateral dental Class II Angle	23	5.68	64	15.80	< 0.001
Unilateral dental Class III Angle	5	1.23	6	1.50	1.000
Bilateral dental Class III Angle	17	4.20	4	0.98	0.003

of one of these malocclusions is associated with significantly higher share of the other malocclusion and vice versa, i.e. correlation is unidirectional.

Deep overbite is associated with a significantly higher percentage of unilateral and bilateral dental Class II, and a significantly lower proportion of bilateral dental Class III (Table 3).

The analysis of the relationship between deep overbite and crowding shows that 73.30% of patients with deep overbite have crowding and only 26.60% of patients with deep overbite do not have crowding. These results demonstrate that the deep overbite is in correlation with crowding. The correlation is unidirectional – the presence of one malocclusion is associated with a higher percentage of the other and vice versa. We found that there is no significant correlation between recessions and crowding.

**Discussion.** Malocclusions are often observed deviations from the correct alignment of teeth. In adult patients as a result of complicated pathology associated with tooth loss, traumatic occlusion and periodontal disease, there is a secondary displacement of teeth, leading to the appearance of new malocclusion or worsening of the already existing ones.

For determination of the dental class, Angle's classification is used [11], as it is applicable in a clinical examination, suitable for recording and analysis and is also an international means of communication among orthodontists, which facilitates the comparative analysis with other studies.

We established the highest prevalence rate of dental Class I, followed by dental Class II. The most rare dental class was Class III. These results are similar to other authors' studies [4, 6–8].

Crowding is the most common deviation from the norm, which correlates with studies of other authors [12]. Crowding is significantly more common in women (71.30%). Almost the same is the result (71.2%) obtained by Goyal and Goyal in their study of 243 patients [7].

Crowding can start its development during the formation of the permanent dentition or to appear and worsen with age. According to several studies, crowding is typical for younger patients and is inversely related to age. In our study, the crowding is observed at a significantly higher rate in younger patients aged 21–44. The high rate of crowding can be explained as evolutionary trend in the jaw growth [13] and also as a result of medialization of the posterior teeth (untreated caries, premature deciduous molars extraction).

The percentage of cases with crowding decreases with age due to secondary displacement of teeth expressed most frequently in the buccal inclination (due to periodontal disease), partial loss of teeth and muscle activity. This hypothesis was confirmed in our study, where inclinations and occurrence of diastema and spacing almost doubled in patients over the age of 45. While in the first age group we found 29.60% cases with inclined frontal teeth, the inclinations of patients over 45 years of age were diagnosed in 45.60%.

The presence of gaps between teeth (diastema, spacing) is 8.90% in the first age group and 19.30% in the second. We can conclude that with advancing age secondary displacement of teeth associated primarily with frontal proclination in both dental arches, loss of approximal contacts, and appearance of gaps between teeth can be observed. The reasons for this phenomenon are muscle activity, increased number of parafunctions disharmony in muscle balance between the external and internal muscle zone, increasing number of patients with periodontal pathology complicated by the presence of bone loss [14].

Our study shows no statistically significant relationship between the presence of recessions and crowding.

We established a border significant unidirectional correlation between crowding and overbite.

**Conclusion.** The need for orthodontic treatment for the territory of Bulgaria was examined only for growing patients [15]. Such a research for the adult non-growing orthodontic patients is still not registered. Most of the malocclusions start their development at an early age and the literature suggests that over time their pathology deepens which leads to more complicated and compromised treatment. The present study shows a relatively high frequency of malocclusions in adults. This suggests an early prevention of malocclusions with the aim of optimal functional, aesthetic and long-term results to be achieved.

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