ORIGINAL RESEARCH

Prevalence of Dental Malocclusions in Patients admitted to the Department of Orthodontics, School of Dentistry, Tabriz, in 2016

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ABSTRACT

Aim: This study is aimed at investigating the prevalence of disorders among patients referred to Tabriz Dental School in 2016.

Materials and methods: This research was conducted in a cross-section method and taken from all patients admitted during this period. Classification of dental occlusion in patients was based on Angle's definition, skeletal classification was based on Steiner's analysis, and overjet and overbite values and other patient-related information were imported from the records in the extractive sector and in specific forms. After reviewing the data, the forms of individual patients were inputted into the computer and analyzed.

Results: In terms of dental condition, the prevalence of malocclusion CL.I, malocclusion CL.II, and malocclusion CL.III was respectively, 50, 36.8, and 13.2%. In terms of overjet condition, 13.9% of patients had normal overjet, 67.1% had increased overjet, 8.9% had reduced overjet, and 10.1% had reversed overjet. In terms of overbite, 17.7% of patients had normal overbite, 53.2% had increased overbite, 8.9% had decreased overbite, 15.2% had open bite, and 5.1% had deep bite. Skeletally, 24.1% of patients had skeletal abnormalities CL.I, 62% had skeletal deformities CL.II, and 13.9% had skeletal CL.III.

Conclusion: The most common dental malocclusion among patients was related to CL.I and the most common skeletal malocclusion was related to CL.II, and malocclusions of CL.III had the least prevalence both dentally and skeletally. There was no significant relationship between dental and skeletal malocclusions and also between different malocclusions and gender.

Clinical significance: Knowledge of the prevalence of different types of dental and jaw anomalies is considered as the first step in the evaluation and treatment of these disorders. It is worth mentioning that the results of the study can be used in treatment planning required in the province and even in the country.

Keywords: Dental occlusion, Malocclusion, Orthodontic, Prevalence, Skeletal occlusion.

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INTRODUCTION

Normal occlusion is a harmonious relationship between tooth and dental occlusion, which requires a natural, harmonious relationship between the teeth, jaw muscles, temporomandibular jaw joints, and the nervous system, and any disruption in this relationship will result in deformity and malocclusion.[1] Edward Angle can be introduced as the person who played the most significant role in the development of the concept of occlusion of natural teeth. Angle not only defined his normal occlusion of natural teeth very simply but also introduced a variety of abnormalities and their subdivisions.[2]

Malocclusion leads to three categories of problems in individuals: Mental and social issues due to the impact on beauty, disruption of the normal functioning of mouth for

the lower jaw and temporomandibular joint dysfunction, and eventually gum disease and tooth decay.[2]

Malocclusion has been a problem for some people from times immemorial, and attempts to fix these problems can be traced back to at least 1,000 years before Christ.[3] Dental and jaw abnormalities, such as malocclusion in today human societies are considered as one of the most common problems of the present century, and currently, functional devices and extraoral devices are employed for controlling and changing the growth.[3]

The prevalence of malocclusion in adults is a complex case that may be due to relapse of orthodontic treatment, dysfunctional treatment of childhood, loss of teeth, or as a result of occlusive changes over time.[4,5] Knowledge of the prevalence of different types of dental and jaw anomalies is considered as the first step in the evaluation and treatment of these disorders. Based on the survey carried out in a study, the prevalence of dental anomalies in the UK was in a way that 26.8% had normal occlusion, 42.5% had malocclusion CL.I, 42% had malocclusion CL.II, and the remaining 3% had malocclusion CL.III.[6] The same process in Turkey was in a manner that there were 64% of malocclusion CL.I, 24% of malocclusion CL.II, and 12% of malocclusion CL.III;[7] and in Brazil, 22.3% had normal occlusion, 47.6% had malocclusion CL.I, 22% had malocclusion CL.II, and 8.2% had malocclusion CL.III. In the United States, the prevalence of malocclusion ranged from 46 to 87% with an average of 66.7%.[8]

The prevalence of malocclusion CL.I varied from 28 to 72% with an average of 45.8%, the prevalence of malocclusion CL.II varied from 6.6 to 29% with an average of 18%, and the prevalence of malocclusion CL.III ranged from 1 to 9.4% with an average of 3%.[3]

Similar studies were carried out in different countries in which their results are different.[1,9,10] Owing to the impact of environmental and genetic factors and the role of geographic areas in the dispersion of types of malocclusion in different countries, various distribution and prevalence of malocclusions have been reported.[10] In Iran, in spite of few studies on this area, there is still the need to evaluate the prevalence in different cities and treatment centers, from different aspects. According to the aforesaid issues, the aim of the current study was that, with the prevalence of dental malocclusions in patients referred to orthodontic department of Tabriz, it could evaluate the relationship of malocclusion with gender along with specifying the percentage of patients with different malocclusions and the tendency of the community toward the treatment of dentoalveolar anomalies; in addition, by registering these information, it could evaluate the increase or decrease in different malocclusions in the coming years in the city of Tabriz. It is worth mentioning

that the results of the study can be used in treatment planning required in the province and even in the country.

MATERIALS AND METHODS

This study is retrospective and cross-sectional and the target population comprises all patients referred to the orthodontic department of Tabriz in 2016. In this study, 79 patients (31 males and 48 females) were studied. All patients' information was extracted through medical record (diagnostic casts and cephalometric stereotypes) in the Department of Orthodontics, School of Dentistry, Tabriz, and recorded in codified forms with four parts: (1) Demographic data, (2) dental condition, (3) skeletal condition, and (4) functional status.

About 58% of the patients were educated to read and write, 32% of the patients were with diploma education, and the rest 10% were highly educated.

In this study, the type of malocclusion was determined using the indicators used by Björk.[11] The anterior–posterior relationship was assessed based on the canine teeth and permanent molars in central occlusion. Dental malocclusions CL.I, CL.II, and CL.III of patients were classified based on Angle's definition, and skeletal malocclusion was classified based on Steiner's analysis. Criterion for diagnosis of type one or two of dental malocclusion CL.II was the status of maxillary incisors which was determined according to casts and cephalometric radiographs in the patient. Overjet, overbite, and other information related to patients were extracted based on the information contained in the files. After extracting the information concerning the patients and recording them in the forms and finally by two professors of Department of Orthodontics, School of Dentistry, Tabriz, the information was imported into the statistical software and analyzed.

RESULTS

In Table 1, the descriptive statistics regarding the prevalence of malocclusion were stated in terms of the types of dental or skeletal malocclusion of patients admitted to the Department of Orthodontic, School of Dentistry, Tabriz, in 2016. Malocclusions of class II first and second types are presented in Table 2; Table 3 and Graph 1 shows different overjet and finally in Table 4 and Graph 2, different situations of overbite each based on the sex of the patients admitted to orthodontic department of Tabriz in 2016 are provided. Table 5 represents absolute frequency of different statuses of overjet and overbite in dental malocclusions CL.III, CL.II, and CL.I.

In this study, a measure of the cephalometric angle ANB (A point, nasion, B point) was used in Steiner's analysis to determine the prevalence of skeletal malocclusions. According to the results of the research, CL.II

Table 1: Prevalence of dental and skeletal malocclusions in accepted patients of tabriz department of orthodontics, faculty of dentistry, in 2016

Types of malocclusions	Number	Percentage
Dental CL.I	38	50
Dental CL.II	28	36.8
Dental CL.III	10	13.2
Total	*76	100
Skeletal CL.I	19	24.1
Skeletal CL.II	49	62
Skeletal CL.III	11	13.9
Total	79	100

*Three people of the research were removed due to primary dentition system

skeletal malocclusion was the most common among skeletal malocclusions (62%), which was true in the population of females and males (Table 1). The prevalence of malocclusion was slightly more in females than in males, which was not statistically significant (p = 0.17). In addition, 24.1% of patients had skeletal CL.I situation that was similar to the prevalence in boys and girls. The CL.II skeletal malocclusions showed the lowest incidence among the studied participants (14%) that this situation was similar in males and females (Table 1). Comparison of skeletal and dental malocclusions demonstrates that no statistical significant relationship exists between these two types of malocclusion (p = 0.02).

In this study, type I of CL.II malocclusion was found more frequently than type II of CL.II malocclusions (Table 2) that in both types of malocclusion, they showed a higher percentage for girls than boys that, according to statistical data, this difference was not significant (p = 0.14).

The results of this study reveal that increased overjet is the most common overjet situation between groups (67.1%) (Table 3 and Graph 1). The highest prevalence of this condition is in CL.II dental malocclusion. Incidence of other overjet status in the study group was low and is almost identical. Most of the normal overjet was found among those who have CL.I dental malocclusion

Table 2: Distribution of types of malocclusions of class II first and second types in both genders in accepted patients of tabriz department of orthodontics, faculty of dentistry, in 2016

Types of CL.II dental malocclusions	Gender						Total	
	Female		Male					
	Number	Percentage	Number	Percentage			Number	Percentage
First type	10	58.8	8	27.7			18	64.3
Second type	7	41.2	3	27.3			10	35.7
Total	17	100	11	100			28	100

Table 3: Different statuses of overjet in separation of gender in accepted patients of tabriz department of orthodontics, faculty of dentistry, in 2016

Status of overjet	Gender				Total	
	Female		Male			
	Number	Percentage	Number	Percentage	Number	Percentage
Normal[a]	6	12.5	5	16.1	11	13.9
Increased[b]	34	70.8	19	61.3	53	67.1
Reverse[c]	3	6.3	5	16.1	8	10.1
Decreased[d]	5	10.4	2	6.5	7	8.9
Total	48	100	31	100	79	100

[a]2 to 3 mm, [b]more than 3 mm, [c]ahead being of bottom incisors to above incisors, [d]lower than 3 mm (includes relation of edge to edge)
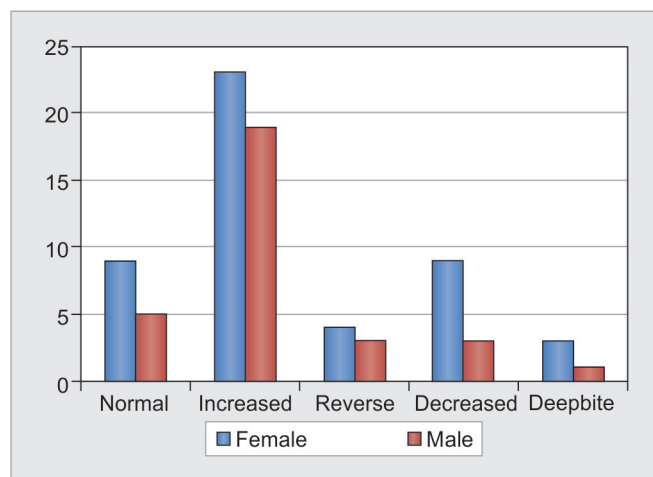
Table 4: Different statuses of overbite in separation of gender in accepted patients of tabriz department of orthodontics, faculty of dentistry, in 2016

Overbite status	Gender				Total	
	Female		Male			
	Number	Percentage	Number	Percentage	Number	Percentage
Normal[a]	9	18.8	5	16.1	14	17.7
Increased[b]	23	47.9	19	61.3	42	53.2
Reduced[c]	4	8.3	3	9.7	7	8.9
Open bite[d]	9	18.8	3	9.7	12	15.2
Deep bite[e]	3	6.3	1	3.2	4	5.1
Total	48	100	31	100	79	100

[a]1 to 2 mm, [b]more than 2 mm, [c]lower than 1 mm, [d]distance of edge of incisors from each other is more than zero, [e]contact of edge of bottom incisors with mucus of palate
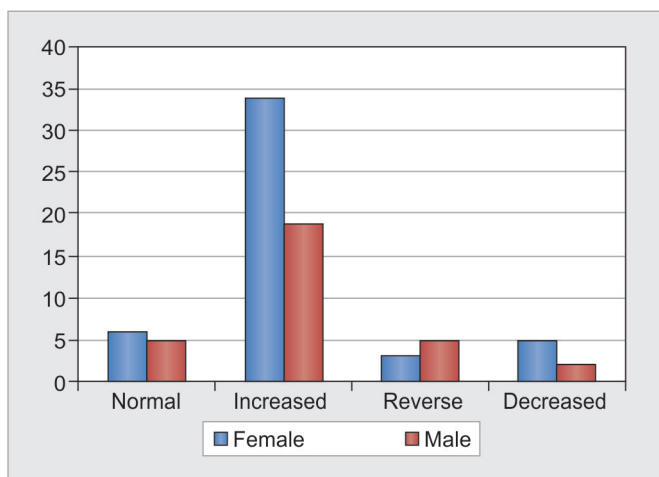
Graph 1: Different statuses of overjet in separation of gender in accepted patients of Tabriz Department of Orthodontics, Faculty of Dentistry, in 2016

Graph 2: Different statuses of overbite in separation of gender in accepted patients of Tabriz Department of Orthodontics, Faculty of Dentistry, in 2016

Table 5: Absolute frequency of different statuses of overjet and overbite in dental malocclusions of CL.III, CL.II, and CL.I

Different situations	Malocclusion	CL.I	CL.II	CL.II	Total
Overjet	Normal	7	1	3	11
	Increased	20	24	4	51
	Reduced	7	–	–	7
	Reverse	4	–	3	7
Total		38	25	10	76
Overbite	Normal	6	4	4	14
	Increased	16	18	5	39
	Reduced	9	2	–	11
	Open bite	4	3	–	7
	Deep bite	3	1	1	5
Total		38	28	10	76

(Table 5). Based on the results, all the people who had decreased overjet had CL.I dental malocclusion (Table 5). Increased overbite is also the most common condition among patients (53.2%) (Table 4 and Graph 2). The highest prevalence of this condition is like overjet in CL.II dental malocclusion. The prevalence of other conditions of overbite except decreased overbite in subjects is low and almost identical. Most of the anomalies in overbite were found in those with CL.I dental malocclusion (Table 5).

DISCUSSION

In a normal occlusion, teeth are placed regularly and beautifully in the fall arch. Such regularity has theoretical aspect and can only be seen in the prosthesis. The condition of normal occlusion is that, in terms of beauty and performance, it should be desirable for community and without any symptoms and tissue damage. Malocclusion also refers to noncompliance or incorrect pairing between upper and lower maxilla between dental arch and as one of the problems that endangers oro-facial system and can create problems in this system, such as loss of function, loss of beauty, temporomandibular problems, and periodontal diseases.[1,10,12,13]

One of the important factors in the treatment and prevention of any disease is determination of epidemiological indicators of that disease, i.e., malocclusion, which is not exceptional from this regulation.[8] A treatment way or prevention method of a disease can never be known to be effective in controlling that disease, except a significant change is made over time in the prevalence of that disease. One problem that exists regarding the evaluation of malocclusion epidemiology is comparison of the results of different researches. Differences in statistical methods, sample volumes, and various criteria are the major factors that reduce the validity of comparison between researches. In order to prevent the incidence of these problems, some researchers believe that evaluation of malocclusion should be done according to standards of the research. If the under-studied samples in a specified location are to be studied during consecutive years, it is possible for the statistical results from the prevalence of malocclusion in that population to be different. Newman[14] by studying 4- to 16-year-old people in the specified population in the United States in 1956 concluded the following: Normal occlusion: 48.1%, CL.I: 38.2%, CL.II: 13.2%, and CL.III: 0.5%.

Brehm and Jackson[15] by studying 6- to 18-year-old people with similar status in the United States in 1961 obtained the following results: normal occlusion: 16.6%, CL.I: 60.1%, CL.II: 12.8%, and CL.III: 0.5%. Comparison of these two researches demonstrates that the variable of time can be effective on the prevalence of different malocclusions, such that normal occlusion had been reduced over time, and conversely, the amount of prevalence of other malocclusions had been increased; of course

Table 6: Prevalence of dental malocclusion in different researches in Iran

Writers	City	Year	Class I	Class II	Class III	Normal
Akhondi[19]	Mehran	1997	56.9%	14.8%	10.7%	17.6%
Atashi[18]	Tabriz	2002	18.1%	35.4%	13.2%	33.3%
Ramezanzadeh and Hosseini[20]	Neyshabour	2002	54%	23.1%	9.2%	13.7%
Atashi[18]	Tabriz	2003	57%	21.9%	17.1%	4%
Borzabadi-Farahani et al[17]	Esfahan	2009	41.8%	27.5%	7.8%	22.9%
Oshagh et al[16]	Shiraz	2010	52%	32.6%	12.3%	3.1%
Present study	Tabriz	2016	50%	36.8%	13.2%	0%

malocclusion of CL.III had not been changed. Evaluation of retrospective and prospective researches shows that the prevalence of different types of malocclusions has increased over time. Such finding can be in relation with the increase in racial interactions in society than in the past, diet, etc. Results of different researches which have been formed regarding the prevalence of dental malocclusions in different years in Tabriz City and some other cities of Iran are expressed in Table 6.[16-20]

In a research that was conducted based on the ages of people in Iran by Akhondi,[19] three age groups of 11, 12, and 13 years were evaluated and the results of the research revealed that in all three age groups, malocclusion of CL.I has the most prevalence and malocclusion of CL.III has the least prevalence.

In the present research, age has not been considered as a variable, and all accepted patients were studied without considering their ages. Evaluation of dental malocclusion was based on the definition of parasite (relationship of first permanent molar and canines), so those patients who had primary dentition were excluded from the research (three people). In terms of dental system, most of the under-studied patients in this research were in the period of early mixed dentition. It is questionable about gender issue that gender can be a variable in the prevalence of malocclusion. According to results of numerous researches, such as the present research in the evaluation of the effect of the gender variable in occlusal relationships, no significant statistical difference was observed between this variable and occlusal relationship.[16,19,20] Of course, based on the research of Borzabadi-Farahani et al,[17] overbite, midline deviation, and crowding have a significant relationship with gender unlike overjet in the maxilla and mandible. Based on the obtained statistic from the conducted researches regarding the prevalence of malocclusion in different countries, it has been observed that the geographical location can be effective on the prevalence of malocclusions as an interfering factor. For instance, the incidence of malocclusion CL.III has been reported in America (0.5%),[15] Sweden (2.8%),[11] Brazil (3.6%),[21] and Turkey (12%),[7] while study on Iranian children and teenagers has estimated same malocclusion to be between 7.8 and 17.1%[16-20] (Table 6).

Such diversity is not limited only to the different countries, but also seen more and less in the obtained results of researches of different cities in a country. Prevalence of malocclusion of CL.I was reported as 72% in 13- to 15-year-old children of Nairobi, whereas based on the research conducted by Ng'ang'a,[12] the prevalence of malocclusion of CL.I in Mandera, a city in 100 km of Nairobi, was 58%.

Comparison of the conducted researches also shows a similar trend such that malocclusion of class II in Akhondi's research[19] has been reported to be 14.8%, whereas the present research shows 36.8%. This difference in the results of malocclusion can be attributed to racial and ethnic diversities and its diverse scattering in different countries. By evaluating patients' demographic information in this research, this result was obtained that the socioeconomic statuses of patients and their parents' education can be found partly based on the father's occupation. The main statistic of referring patients was related to individuals with low-educated parents. Consequently, improving parents' awareness through mass communication and providing information regarding different occlusal abnormalities and expressing their consequences can increase the need feeling for early and interfering orthodontic treatments in the under-studied population and in this manner will be effective on the reduction of the prevalence of malocclusion. According to this issue that the costs of orthodontic treatments are low in the Department of Orthodontics, Faculty of Dentistry, cost of treatment can be considered as an important factor in the under-studied samples. This issue that most of the under-studied people in this research were socially and economically in medium to low–medium levels can be in relationship with low costs of orthodontic treatments in Tabriz Faculty of Dentistry.

Malocclusion of CL.I is the most common type of anterior–posterior malocclusion which most researchers[16-20] agree to and it is also true in this research. Based on the results of the research, malocclusion of CL.I is considered as the most common dental malocclusion which separately develops in half of the entire under-studied people. Prevalence of other dental malocclusions in this research is as follows: CL.II div I: 22.7% and CL.II div

II: 12.7%, and CL.III: 13.2%. These results are somewhat different from the results of the researches conducted in Iran which may be due to the method of sampling and location of conducting the research.[16-20]

Evaluating different statuses of overbite in this research (such as overjet) shows that the increased status has more prevalence than the other overbite statuses (53.2%), like this result which was reported by the research of Oshagh et al[16] (53%) and Atashi[18] (40.25%). The reduced overbite in this research has been defined as the overbite in value lower than 1 mm in which 8.9% of people in the current research have reduced overbite and 15.2% of people have open bite that the frequency of this malocclusion was found in females more than in males, which is more than in some researches.[17]

More prevalence of CL.III in this research than the other societies may be related to one of the following reasons and hypotheses that need to be evaluated in the future. The first hypothesis is that the amount of dental or skeletal CL.III is high in Tabriz City. The second hypothesis is that owing to lack of success of the treatment of CL.III in and out of the Faculty, most of these abnormalities are referred to the Faculty, and the last hypothesis is that CL.III patients require longer treatments, and as a result of this, these patients are introduced from other places to this center more. Of course, perhaps findings of this research are under the influence of special factors, such as introduction of patients by acquaintances in and out of the Faculty and low cost of the treatment.

CONCLUSION

- The most common dental malocclusion among patients referred to Tabriz Faculty of Dentistry in 2016 was related to CL.I and the most common skeletal malocclusion of them was related to CL.II and malocclusions of CL.III had the least prevalence both dentally and skeletally.
- Among the Department of Orthodontics, statuses of increased overjet and overbite were more common compared with other abnormalities.
- There was no significant relationship between dental and skeletal malocclusions and also between different malocclusions and gender.

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