ORIGINAL RESEARCH

Pattern of Malocclusion and Treatment Need in Orthodontic Patients: An Institution-based Study

Lalita Nanjannawar, Jiwan Asha Agrawal, Manish Agrawal

ABSTRACT

The aim of this study was to analyze the malocclusion pattern among patients who visited Department of Orthodontics of BVU Dental College and Hospital, Sangli (Maharashtra) as a baseline data for proper treatment planning, teaching and further research.

Materials and methods: This study was conducted on 125 patients who attended the orthodontic department from December 2008 to June 2010. Information regarding age, sex, type of malocclusion, dentofacial patterns and dentofacial characteristics was obtained from patients records. Orthodontic treatment need was assessed using DHC component of IOTN.

Results: The results of the study showed that the patients age ranged from 10 to 33 years with mean age of 16 years 9 months (+ 3.92). There were 91 (72.8%) females and 34 (28.2%) males. Chief complaints of majority of patients were 'upper front teeth forward' and 'irregular teeth'. The commonest type of malocclusion was Angle's class II which was seen in 60 (48%) of patients. There was an increased overjet in 81% of subjects. Statistically significant association was found between skeletal and Angle's classes ($p < 0.01$). Assessment of need for orthodontic treatment using the DHC component of IOTN showed that 59 (47.2%) were in great need of orthodontic treatment and 53 (42.4%) had definite need of treatment.

Conclusion: The results give a detailed pattern of malocclusion in orthodontic patients and may provide a baseline data for research and planning orthodontic services.

Keywords: Pattern of malocclusion, Dentofacial characteristics, IOTN.

INTRODUCTION

The demand for orthodontic treatment is increasing in most countries. Therefore, rational planning of orthodontic measures is essential in assessing the resources required for such a service. This stresses the importance of studies in order to obtain knowledge about the prevalence of different types of malocclusion and need for orthodontic treatment.

For many years, studies have been conducted to determine the prevalence of malocclusion in different populations. A comparison of these results is almost impossible, since studies conducted in a population of the same origin, may also show great variability. Instead of differentiating normal and abnormal in a population, determining frequencies of different types of malocclusions in a referred population may also give valuable information.

There have been several studies investigating the prevalence of various dentofacial characteristics in different populations[1-7] but only a few have been conducted on an orthodontic population.[8-13]

The aim of the study was to provide quantitative information regarding the pattern of dentofacial characteristics in orthodontic patients and to find the frequencies of Angle's classes and other dentofacial characteristics. Finally, the correlations of Angle's classes and skeletal classes were also derived.

MATERIALS AND METHODS

This study was done on orthodontic patients who visited Department of Orthodontics of Bharati Vidyapeeth University Dental College and Hospital Sangli from December 2008 to June 2010.

Pretreatment orthodontic records of 125 patients were obtained and used for study. Data collection was based on written case history, clinical examination, dental casts, lateral cephalogram and OPG.

A qualitative analysis with Angle's classification was used to describe the anteroposterior relationship of maxillary and mandibular first molars.[14,15] Incisor classification was described based on British standard classification of incisor relationship.

The following dentofacial characteristics were recorded using initial records: Angle's malocclusion, arch length discrepancy (crowding and spacing; 0 to 1 mm normal, 2 to 3 mm mild, 4 to 6 mm moderate, >7 mm severe), chief complaint, facial type, facial profile, overjet (1-2 mm normal, 3 to 4 mm mild, 5 to 6 mm moderate, >7 mm severe, reverse), overbite (0-2 mm normal, 3-4 mm moderate, 5-7 mm severe, reverse, open bite), and cephalometric skeletal analysis (ANB= Skeletal class I: 0-4°, skeletal class II: >4°, skeletal class III: <0°). Orthodontic treatment need was assessed by using dental health component (DHC) of index of orthodontic treatment need (IOTN).

The DHC was developed to reduce the subjectivity in measurement by using well-defined cut-off points. Malocclusions were divided into five different groups

ranging from very great need (grade V) to no treatment need (grade I).[16,17]

Twenty sets of study casts were randomly selected from the main sample and were reassessed to calculate the method error for each variable, which was found to be 0.138.

Descriptive statistics were calculated to find the means and standard deviations. Data collected were pooled to determine frequencies and cross tabulations of dentofacial characteristics with Angle's classes using Chi-square for facial type, facial profile and Kruskal-Wallis for crowding, spacing, overjet and overbite. Chi-square test was also used to find the association and Cramer's V for correlation between the skeletal and Angle's classes. p-value less than or equal to 0.05 was considered statistically significant. The software used for data analysis was SPSS version 17.

RESULTS

Age and Gender

Out of 125 patients, 91(72.8%) were females. Ages of patients ranged from 10 to 33 years with mean age of 16 years and 9 months (SD $\pm$ 3.915) as shown in Figure 1.

Chief Complaint

Chief complaints in majority of patients were 'forwardly placed front teeth (60%)' and 'irregular teeth (22.4%)', as shown in Figure 2.

Malocclusion Types

Class II malocclusion was found in 60 patients which represented 48% of the sample. Frequency of class I and III were 46.4 and 5.6% respectively. Incisors type class II div. 1 (56.8%) was most common feature of the sample. The distribution of malocclusion according to Angle's and incisor classification is presented in Table 1. Statistically significant associations were observed between Angle's and skeletal classes (Table 2) (χ^2 = 41.72, df = 4, p < 0.0001) whereas weak correlation was observed between the two (Crammer's V = 0.4085).

DENTOFACIAL PATTERNS

Most patients had orthognathic (46.4%) and normodivergent (62.4%) profile. The prognathic profile was predominantly
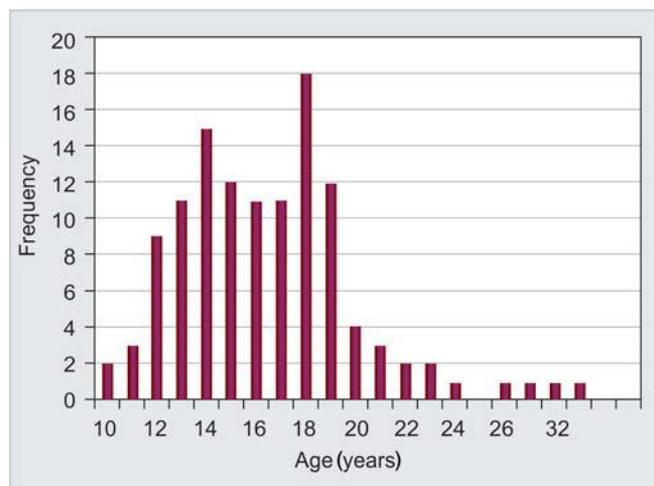

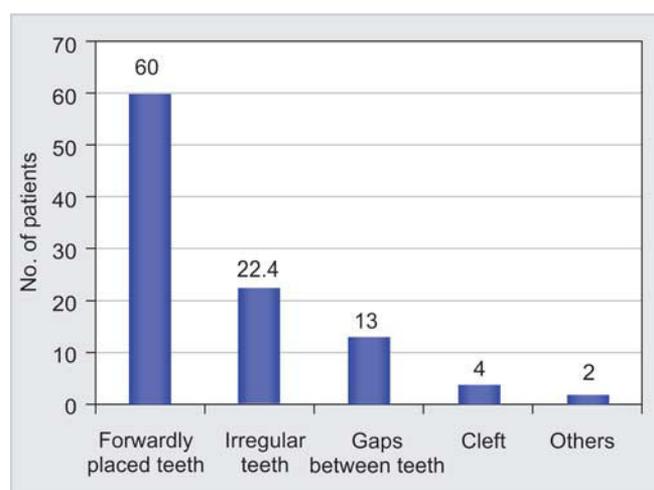**Fig. 1:** Chronological age range of the sample showing its frequency distribution

Fig. 2: Chief complaints of the patients

found in class III patients, i.e. 71.4% while retrognathic profile (38%) mainly existed in class II patients. Statistically significant association (χ^2 = 49.4, df = 4, p < 0.001) was observed between facial profile sagittal and Angle's classes as shown in Table 3.

DENTOFACIAL CHARACTERISTICS

There was increased overjet in 81% of the subjects of which 93.3% belonged to class II malocclusion. There was increased overbite in 71% of the subjects of which 85% were in class II malocclusion. Maxillary crowding was present in 40% of the sample and mandibular crowding was

Table 1: Distribution of sample by Angle's and incisor classifications

Angle's classification	n = 125 (%)	Incisor classification	n = 125 (%)
Class I	58 (46.4)	Class I	40 (32)
Class II	60 (48)	Class II div 1	71 (56.8)
		Class II div 2	03 (2.4)
Class III	07 (5.6)	Class III	11 (8.8)

Table 2: Cross tabulation of Angle's and skeletal classes

Skeletal classes	Angle's classes			Total n = 125(%)
	Class I n (%)	Class II n (%)	Class III n (%)	
Skeletal class I	39 (29.6)	26 (22.4)	2 (0.6)	67 (53.6)
Skeletal class II	15 (12)	31 (24.8)	0 (0)	46 (36.8)
Skeletal class III	4 (3.2)	3 (3.2)	5 (3.2)	12 (9.6)

Table 3: Cross tabulation of dentofacial patterns with Angle's classes

Dentofacial characteristics		Class I 58 (46.4) n (%)	Class II 60 (48) n (%)	Class III 07 (5.6) n (%)	Total n = 125(%)
Facial type	Dolicofacial	16 (27%)	12 (20)	04 (57)	32 (25.6)
	Mesofacial	39 (67.2)	39 (65)	03 (42.8)	81 (64.8)
	Brachyfacial	03 (5.17)	09 (15)	00 (0)	12 (9.6)
Facial profile (s)	Orthognathic	36 (62)	20 (33.3)	02 (28.5)	58 (46.4)
	Retrognathic	18 (31)	38 (63.3)	00 (0)	56 (44.8)
	Prognathic	04 (6.8)	02 (3.3)	05 (71.4)	11 (8.8)
Facial profile (V)	Normodivergent	40 (1.7)	34 (56.6)	04 (57)	78 (62.4)
	Hyperdivergent	13 (22.4)	13 (21.6)	03 (42.8)	29 (23.2)
	Hypodivergent	05 (8.6)	13 (21.6)	00 (0)	18 (14.4)

Table 4: Cross tabulation of dentofacial characteristics with Angle's classes

Dentofacial characteristics			Class I	Class II	Class III	Total
Crowding (mm)	0-1 Normal	Mx	33 (56.8)	38 (63.3)	04 (57.1)	75 (60)
		Md	26 (44.8)	31 (51.6)	05 (71.4)	62 (49.6)
	2-3 Mild	Mx	05 (8.6)	09 (15)	02 (28.5)	16 (12.8)
		Md	13 (22.4)	15 (25)	02 (28.5)	30 (24)
	4-6 Moderate	Mx	07 (12)	08 (13.3)	01 (14.2)	16 (12.8)
		Md	10 (8)	06 (10)	00 (0)	16 (12.8)
	>7 Severe	Mx	13 (10.4)	05 (8.3)	00 (0)	18 (14.4)
		Md	09 (15.5)	08 (13.3)	00 (0)	17 (13.6)
Spacing (mm)	0-1 Normal	Mx	32 (55.1)	28 (46.6)	02 (28.5)	62 (49.6)
		Md	50 (86.2)	46 (76.6)	06 (85.7)	102 (81.6)
	2-3 Mild	Mx	05 (8.6)	13 (21.6)	02 (28.5)	20 (16)
		Md	05 (8.6)	09 (15)	01 (14.2)	15 (12)
	4-6 Moderate	Mx	05 (8.6)	12 (20)	02 (28.5)	19 (15.2)
		Md	01 (1.7)	03 (5)	00 (0)	04 (3.2)
	>7 Severe	Mx	16 (27.5)	07 (11.6)	01 (14.2)	24 (19.2)
		Md	02 (3.4)	02 (3.3)	00 (0)	04 (3.2)
Overjet (mm)	1-2 Normal		10 (8)	02 (3.3)	02 (28.5)	14 (11.2)
	3-4 Mild		14 (24.1	01 (1.6)	01 (14.2)	16 (12.8)
	5-6 Moderate		13 (10.4)	09 (15)	00 (0)	22 (17.6)
	>7 Severe		18 (31)	46 (76.6)	00 (0)	64 (51.2)
	Reverse		03 (5.1)	02 (3.3)	04 (57.1)	09 (7.2)
Overbite (mm)	0-2 Normal		17 (29.3)	09 (15)	04 (57.1)	30 (24)
	3-4 Moderate		22 (37.9)	17 (28.3)	00 (0)	39 (31.2)
	5-7 Severe		16 (27.5)	34 (56.6)	00 (0)	50 (40)
	Reverse		02 (3.4)	00 (0)	03 (42.5)	03 (2.4)
	Openbite		01 (1.7)	00 (0)	00 (0)	01 (0.8)

present in 50.4% of sample. Maxillary spacing was present in 50.4% of sample. Statistically significant associations were found between crowding, maxillary spacing, overjet and Angle's classes (Table 4).

ORTHODONTIC TREATMENT NEED

Out of 125 patients, 59 (47.2%) patients were found to be in great need of treatment, i.e. grade V, 53 (42.4%) patients required definite treatment, i.e. grade IV, 11 (8.8%) with moderate need, i.e. grade III and 2 (1.6%) with mild need (Table 5).

DISCUSSION

According to our results, the mean age of the patients was 16.75 ± 3.92 years. The number of female patients (72.8%)

Table 5: Distribution of male and female subjects into treatment need according to IOTN					
Gender	Grade I	Grade II	Grade III	Grade IV	Grade V
Male	00	00	02	14	18
Female	00	02	09	39	41
Total	00	02 (1.6%)	11 (8.8%)	53 (42.4%)	59 (47.3%)

compared to (27.2%) male patients in this study clearly indicates the concern of orthodontic treatment need of females in our society. This is in consensus with the findings of other similar studies.[9,13,18,19]

Majority of patients had the chief complaint of 'forwardly placed upper front teeth' and 'irregular teeth', this is in accordance with the results obtained with other similar studies.[10,19]

Angle's class II (48%) and incisor class II divison 1(56.8%) were the most frequent pattern of malocclusion found in the sample, while class I malocclusion was 46.4% and class III 5.6%. Similarly, Gul-e-Erum, Mubassar Fida[10] and Ijaz A[20] reported Angle's class II division1 and skeletal class II as the most common pattern of malocclusion.

Jones[8] investigated malocclusion and facial types in 132 Saudi Arabian patients referred for orthodontic treatment and reported that 53.8% had class I, 28.8% had class II division 1, 4.5% had class II division 2 and 2.9% had class III malocclusion. Yang[9] evaluated 3305 patients who had visited Department of Orthodontics, Seoul National University Hospital from 1985 to 1989. He reported that percentages of class I, II division 1, class II, division 2, and class III were 35.9, 13.4, 1.5 and 49.1% respectively.

The results of this study showed that most patients had orthognathic, normodivergent profiles. Gul-e-Erum, Mubassar Fida[10] reported retrognathic and normodivergent profiles as the most common profiles. Ijaz A[20] reported normodivergent vertical pattern as the most frequent one in all skeletal groups. Siriwat et al[21] while correlating malocclusion and facial morphology concluded that 'hyperdivergent pattern is dominant in class II and III malocclusion'.

The results of our study showed an increased overjet in 81% of the subjects as a major occlusal finding, with an increased frequency and severity in class II patients. This trend in overjet values is in agreement with the earlier surveys of orthodontic populations.[8-12] However, 71% of the sample showed increase in overbite which is similar to the finding of another study.[10]

In the present study, results showed maxillary crowding 40%, mandibular crowding 50.4%, and maxillary spacing 50.4% while Ali Borzabadi[22] found severe crowding in 16.7% maxilla and 10.8% in mandible. Obanubi KO[13] found

crowding in 38% and spacing in 42.3% of sample in his Nigerian study. Sayin and Turkkahraman[23] found moderate maxillary crowding and mild mandibular crowding to be the most common finding in all malocclusion types.

Out of 125 patients, 59 (47.2%) were found to be in great need of treatment, 53 (42.4%) patients required definite treatment,[11] (8.8%) had moderate need and two (1.6%) had mild need of orthodontic treatment. Bashir Hameed[24] conducted a study to evaluate orthodontic treatment need on sample of 300 patients irrespective of sex with age range of 12 to 17 years. Sixty percent of patients were found to have definite treatment need according to DHC of IOTN.

Angle's classification of malocclusion can also be utilized for clinically evaluating skeletal sagittal relationship, as statistically significant correlation was observed between Angle's and skeletal classes (Cramer's V = 0.4085 $p < 0.0001$).

This study has incorporated a number of variables while evaluating pattern of malocclusion. Differences in malocclusion characteristics between this study and other studies would be expected because of differences in racial and ethnic composition. Results cannot be representative of the whole of the Indian population and thus expected to vary in degree of prevalence of dentofacial characteristics.

CONCLUSION

In this institution-based study, the frequency of class I, II and III malocclusion was found to be 46.4, 48 and 5.6% respectively. Among the entire dentoalveolar problems studied increased overjet was found to be the most common feature. Chief complaints of majority of patients were 'upper front teeth forward and irregular teeth'. Based on the findings of the present study, Angle's classification of malocclusion can also be utilized for clinically evaluating skeletal saggital relationship. According to DHC component of IOTN, 53 (42.4%) had definite need of treatment and 59 (47.2%) were in great need of orthodontic treatment.

CLINICAL SIGNIFICANCE

Identifying occlusal problems, their incidence and the need for treatment can help to determine the appropriate treatment plan and manpower needed in orthodontics. These results

may provide a baseline data for planning orthodontic services, but still there is a strong need of analyzing the prevalence of malocclusion in Indian population.

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