PREVALENCE OF CLASS II MALOCCLUSIONS IN PAKISTANI SAMPLE — A STUDY

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ABSTRACT

The aim of this study was to determine the frequency of Class II malocclusion in seven different age groups in a local sample of patients seeking orthodontic treatment. Data for the study were retrieved from the patient's orthodontic records who sought orthodontic treatment at Armed Forces Institute of Dentistry (AFID) during the period of Oct 1999 through May 2008.

A total of 1348 patients were screened. All the subjects had full complement of permanent teeth up to second molars. The patients with the history of previous orthodontic treatment, extractions of permanent teeth other than 3rd molars, mixed dentition, congenital malformations like Cleft lip or / and palate and systemic diseases were excluded from the study.

Assigning the subjects to various occlusal traits was based purely on clinical examination, study casts in centric occlusion, facial photographs and lateral cephalograms assessment. An overall prevalence of class II malocclusions within the selected sample was found to be 41%, with a male to female ratio of 1:2.6. The three categories of Angle Class II malocclusion depicted a prevalence of 29.9% for Class II / 1, 0.7% for Class II / 2 and 10.4% for Class II subdivisions. All the three groups of Class II malocclusions reflected higher female ratios, presumably because of the higher number of female gender seeking orthodontic treatment in Pakistan.

Key words: *Malocclusion, Angle's classification, Class II, Prevalence*

INTRODUCTION

The term "malocclusion" encompasses all deviations of the teeth and jaws from normal alignment, including a number of distinct conditions, like discrepancies between tooth and jaw size (crowding and spacing), malrelationships of the dental arches (sagittal, transverse, and vertical) and malpositioning of individual teeth.[1]

Angle's classification of malocclusions is universally accepted because of its simplicity as a method of description and communication between dental professionals. Based on the relationship of the mandibular first molars to the maxillary first molars, this system characterizes the Class II malocclusions as having a distal relationship of the mandibular teeth relative to the maxillary teeth of more than one-half the width of the cusp. Two distinct types of Class II malocclusions

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exist, differing in the inclination of the maxillary central incisors. Class II Division 1 malocclusions exhibit labially inclined maxillary incisors, an increased overjet with a vertical incisor overlap varying from a deep overbite to an openbite. While the class II Division 2 malocclusions show excessive lingual inclination of the maxillary central incisors accompanied by a deep overbite and minimal overjet.

Class II molar relationship may occur unilaterally, depicted or classified as a class II "subdivision" of the affected side.[2] Class II malocclusion is a frequently occurring type of malocclusion, however the real prevalence of Class II malocclusion is difficult to determine because of different methods used in studies and ethnic characteristics of the samples. Studies have shown the prevalence of Class II division 1 and division 2 malocclusions varying from 8.6% to 33.7% and from 0.6% to 6.7% respectively.[3]

Like all other occlusal features class II malocclusions do express racial differences at a significant level and the prevalence of Class II molar relation is significantly greater in white children than blacks.[4] An accurate occlusal analysis performed in Brazil showed that Class II constitutes almost 50% of the malocclusions in the deciduous and mixed dentitions. [3] A Class II malocclusion may be accompanied by an anteroposterior skeletal discrepancy between the maxilla and mandible, either in form of mandibular retrusion, or the maxillary protrusion.

These relationships are superimposed on a broad variation in the vertical facial pattern that ranges between increased, normal or decreased total, and lower anterior facial heights.[5]

Good documentation of diversely occurring occlusal traits is valuable from an epidemiological aspect because it not only describes the range of occlusal variations, but also guides in the assessment of orthodontic treatment needs within a community. Such information provides the platform for the planning and progress of orthodontic delivery service to the public as well as the training of orthodontic specialists to meet the orthodontic need and demand.[6]

Despite a large number of epidemiological studies, representing various regions, races and communities in respect of prevalence of malocclusions, local literature is still lacking in this regard.

METHODOLOGY

Study was carried out at the Orthodontic department of Armed Forces Institute of Dentistry Rawalpindi. Data for the study were collected from the patients' records who reported at the department for orthodontic treatment during a period from May 2000 to May 2008.

A total of 1348 patients were evaluated for the study. All the patients were examined by residents in orthodontics and orthodontists for screening to include subjects with full complement of permanent teeth up to second molars.

The patients with the history of previous orthodontic treatment, extractions of permanent teeth other than 3rd molars, mixed dentition, congenital malformations like Cleft lip or/and palate and systemic diseases were excluded from the study.

In addition to the clinical examination, study casts in centric occlusion, photographs and lateral cephalograms were also evaluated to verify the diagnosis. Patients were labelled for any of three categories of class II malocclusion on the basis of following features;

Class II, division 1 group: Convex soft tissue profile; excessive overjet (more than three mm); protrusive maxillary incisors; Angle Class II molar relationship in centric occlusion.

Class II, division 2 group: Decreased anterior facial height; excessive overbite (more than three mm); retroclination of two or more maxillary incisors; Angle Class II molar relationship in centric occlusion.

Class II subdivision group:

Unilateral molar class II relationship with class I molar relation on opposite side in centric occlusion.

RESULTS

Screening of the total sample of 1348 patients (432 males and 916 females) on the basis of inclusion and exclusion criteria yielded a final sample of 1185 patients (375 males and 810 females) Fig 1. Mean age of the sample was 16.9 years (range 11.2-45.4yrs).

Overall prevalence of class II malocclusions within the sample was found to be 41% (Fig.2), with a male to female ratio of 1: 2.6.
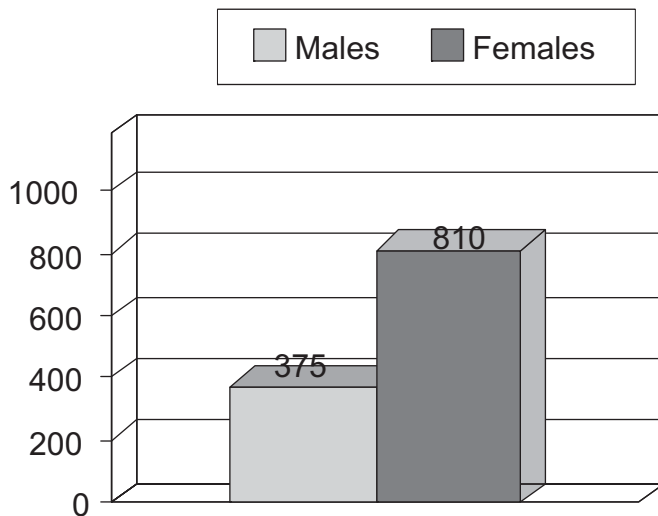
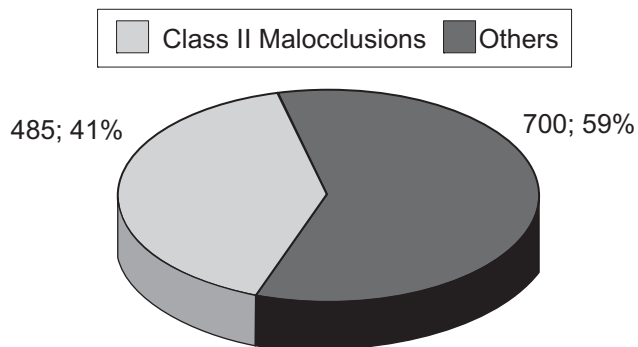Fig 1: Gender distribution of total sample (n=1185)

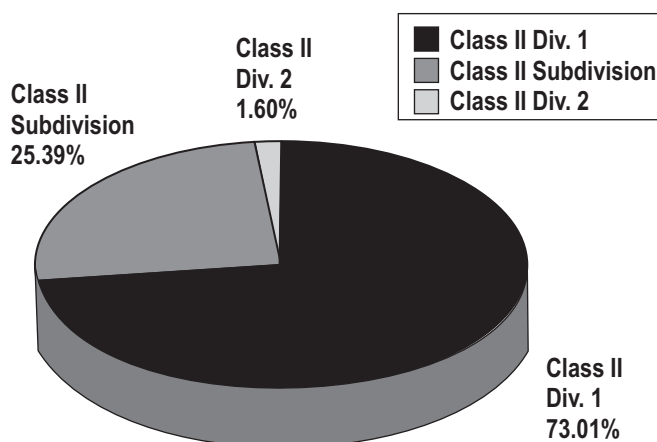Fig 2: Frequency of class II mal- occlusions in total sample (n=1185)

Fig 3: Frequency of different categories of class II malocclusion (n=485).

Among these 485 cases of class II malocclusions, class II/1 was noted in 354 subjects

(102 males and 252 females). Class II/2 was found in only 8 patients (3 males and 5 females), while class II subdivisions were noted in 123 subjects (90 males and 33 females) (Fig 3).

Independent evaluation of three categories of class II malocclusion revealed a prevalence of 29.9% for class II/1, 0.7% for class II/2 and 10.4% for class II subdivisions. All three categories of class II malocclusions depicted higher female ratios (Table 1).

Main bulk of the affected patients belonged to an age group of 11-15 years in all three categories (Table 2).

TABLE:1 GENDER DISTRIBUTION OF CLASS II MALOCCLUSIONS

	Males	Females	*♂: ♀
Class II div1	102	252	1 : 2.5
Class II div2	3	5	1 : 1.7
Class II subdivision	33	90	1 : 2.7

(* Male to female ratio)

TABLE 2: AGE DISTRIBUTION OF THE CLASS II MALOCCLUSION CATEGORIES

Age groups (years)	*Class II/1		•Class II/2		Class II subdivision	
	♂	♀	♂	♀	♂	♀
11-15	66	131	0	3	15	42
16-20	23	72	1	2	14	28
21-25	8	22	2	0	1	11
26-30	1	14	0	0	0	0
31-35	0	5	0	0	1	1
36-40	1	2	0	0	1	0
41-45	3	5	0	0	1	2

(* class II division1; • class II division2; ♂ males; ♀ females)

TABLE 3: AGE DISTRIBUTION OF LEFT AND RIGHT SUBGROUPS OF CLASS II SUBDIVISION

Age groups (yrs)	Class II subdivisions			
	Class II (Left)		Class II (Right)	
	Male	Female	Male	Female
11-15	6	14	9	28
16-20	1	11	13	17
21-25	0	6	1	5
26-30	0	2	0	4
31-35	0	0	1	1
36-40	0	0	1	0
41-45	0	1	1	1

DISCUSSION

Several studies have evaluated the prevalence of malocclusion in different populations. The results of studies may show great variability due to the differences in classification of occlusal relationships, the developmental period of the study sample, examiner differences, and differences in sample sizes. Instead of differentiating normal and abnormal in a population, determining frequencies of different types of malocclusions in an orthodontically referred population may also give valuable information.[6]

This study was conducted in department of orthodontics, AFID, Rawalpindi involving the patients with full permanent dentition, referred for orthodontic treatment. To our knowledge no local study with a patients sample size of this magnitude has been published on the subject. Analysis of a large sample of more mature permanent dentition is mandatory in order to obtain a clear and valid picture of the distribution of occlusal patterns in any given population.[7] The only other local study employing larger sample of Pakistani population, noted the incidence of malocclusion generally (75%) within sample and did not analyzed the incidence of class II or III malocclusions.[8]

Evaluation of a relatively smaller sized sample of local population (345) presented frequency of dental anomalies like hypodontia, supernumerary teeth, peg laterals etc. of exploring categories of malocclusion.[9]

In general, girls report and seek orthodontic treatment more frequently than boys.[8,10,11] This factor was reflected in our sample as well.

The methods of recording occlusal traits can be broadly divided into qualitative and quantitative measurements. These methods are useful in describing the occlusal traits for categorizing various types of dental malocclusions for quick and easy documentation as well as providing a common channel of communication among dental professionals. Literature shows that these methods have been used extensively in malocclusion prevalent studies.[5]

Although the Angle classification was developed more than a century ago, it still remains the most commonly used classification of malocclusions and its universal acceptance by the dental profession is evidence of its practicality.[12] Angle's classification is reliable and valuable in assessing the anteroposterior dental arch relationship. The conflicting evidence seen in results is likely to be related to the type of samples being studied, which may be either clinical samples or random samples drawn from a population.[13]

In most of the surveyed populations Class II malocclusion has been found generally to be more prevalent than the Class III.[14] This finding goes with our results as well. Roughly one-third of the North American population and half of all orthodontic patients present with some sort of Class II malocclusion.[15]

Several genetic and environmental interacting factors are related to the etiology of these malocclusions. Soft diet, mouth breathing, tongue thrusting, sleeping posture, sucking, and other habits as well as specific factors (skeletal growth disturbances, muscle dysfunction, disturbances in embryologic and dental development) interact with heredity in the development of major types of malocclusion. These factors are difficult to separate, in terms of gene– environment interactions. Intraoral environmental change may be a decisive factor, but this change may also reveal previously masked genetic effects. In United States prevalence of Class II malocclusions in population have been quoted from 55.1 per cent (age 8–11) to 67.7 per cent (age 12–17). In comparison to US population being dependent on industrially processed foods, the inhabitants of isolated traditional communities utilize more traditional and home-produced foods providing consistent loading during mastication.[1] An ultra-orthodox Jewish community in Jerusalem has shown prevalence of 32% for class II/1, 2.3% for class II/2 and 8.5% for class II subdivisions in its children. However, low prevalence of normocclusion (7.4%) can be attributed to genetic background, environmental influences and the definition used for normal occlusion.[7]

Population studies in children of Middle East have exhibited class II prevalence of 19% (class II/1- 16.9% and class II/2- 2.2%) in Lebanon and 21% in Egyptians.[16]

Africans have shown a class II prevalence of 14%[17] in epidemiological survey of school children, while a frequency of 15.5%[18] was found for class II malocclusions in orthodontically referred sample. Along with the markedly lower prevalence as compared to ours, they also have higher prevalence in males in contrast to most of female dominant studies. A similar lower prevalence has been presented in Turkish (class II/1- 19% & class II/2- 5%)[6] and Korean (class II/1-13.4% & class II/2- 1.5%)[19] orthodontic patients. However, Caucasian population samples have depicted much higher prevalence for class II malocclusions (class II/1-52% and class II/2- 11%).[20] Sample of Caucasian's orthodon-

tic patients has shown even larger proportion of class II malocclusion around 70%, far above that of the population sample.[21]

A large Indian sample of children from rural areas have exhibited a prevalence of 13.5% for class II malocclusions[22].The Class II/2 malocclusion is relatively rare, with a frequency between 1.5 and 5% of all malocclusions. It is more common in females. Findings quite consistent with our results. Class II/2 malocclusion has not only a specific pathognomonic dental appearance, but it also has several skeletal, sagittal, and especially vertical attributes that differentiate it from both Class I and Class II/1 malocclusions.[23] A strong association of class II/2 with the several congenital dental anomalies has suggested a possible involvement of some specific gene in the development of this particular pattern of malocclusion.[24]

Unilateral Class II cases were classified as subdivision cases by Angle. He reported that a Class II molar relationship developed because of the distal eruption of the mandibular first molars in relation to normally positioned maxillary first molars.[25] This category of class II malocclusion has consistently shown a prevalence of more than class II/2, but less than that of class II/1 [16,18,19,21,23.] The same trend also expressed itself in current study.

CONCLUSION

The prevalence of class II malocclusion in Pakistani orthodontic patients is quite high, representing approximately one third of our orthodontic population. Class II/div1 is prominently more prevalent than the other categories of class II malocclusion. In class II subdivisions, right side is affected most of the times than the left side.

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