

EPIDEMIOLOGY OF MALOCCLUSIONS AND ASSESSMENT OF ORTHODONTIC TREATMENT NEED FOR THE POPULATION OF EASTERN NEPAL

Aim: To evaluate the prevalence of malocclusions in eastern Nepal, estimate the treatment need, and compare the findings with those of other populations. **Methods:** Seven hundred patients between 7 and 48 years of age were evaluated. Their orthodontic treatment need was assessed subjectively and via the Index of Orthodontic Treatment Need (IOTN) (dental health component [DHC]). Dependency of the subjective assessment grades and those of the IOTN (DHC) on sex were checked with the chi-square test. Age and Angle class were cross-tabulated to test for relationships using analysis of variance (ANOVA). **Results:** The prevalence of Class I, II, and III were 67.5%, 28.8%, and 3.7%, respectively. The most common age group was 12 to 24 years. The female to male ratio was 2:1. The subjective assessment indicated that treatment was indicated in 66.9%, urgently indicated in 30.9%, and not indicated in 2.2%. The IOTN (DHC) showed that 62.0% had a severe/extreme need of treatment, 28.1% a moderate/borderline need, and 9.9% little/no need. The mean age was not related to any specific malocclusion. Also, there was no relationship among sex, IOTN, and the subjective assessment grades (except for IOTN grade 4, which was found significantly more frequently in females). **Conclusion:** Class I malocclusion is the most common, while Class III is the least prevalent in eastern Nepal. The most prevalent age group seeking treatment was that of 12 to 24 years of age, with more females than males. The majority of those visiting the orthodontic department actually needed treatment. World J Orthod 2009;10:311–316.

Key words: IOTN, DHC, epidemiology, treatment need, subjective assessment

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Epidemiology of malocclusions and assessment of orthodontic treatment need is of national importance in many countries and were thus included in numerous national-level health surveys.^{1–16} These assessments are necessary to plan sufficient treatment facilities and develop adequate training programs for respective specialists. Many studies reported on the general prevalence of malocclusions in populations, but only a few evaluated it in a referred population.^{17–19}

Malocclusions can be assessed with various methods,^{20–25} but not one has gained universal acceptance. The Index of Orthodontic Treatment Need (IOTN) was developed to grade malocclusions on the basis of the significance of various occlusal traits for dental health and esthetic impairment.²⁵ The IOTN incorporates a dental health component (DHC) based on the recommendation of the Swedish Medical Board²⁴ and an esthetic component.²⁶ Being widely accepted, the IOTN (DHC) was used in

Table 1 Age (in years) and sex distribution

Sex	n	%	Mean age	SD
Males	253	36.1	18.5	5.7
Females	447	63.9	19.9	5.7
Total	700	100.0	19.5	5.8

n = number of patients; SD = standard deviation.

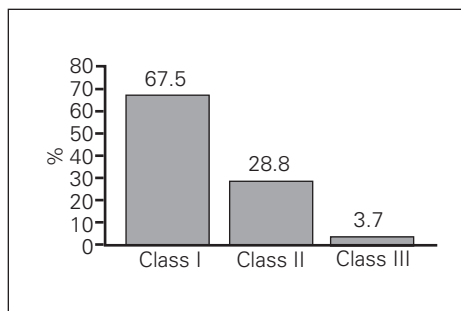


Fig 1 Distribution of the malocclusion according to the Angle classification.

this study to identify the treatment need of the eastern Nepalese population. Further, the aims of this study were to estimate the respective orthodontic treatment need and compare these data with that of other populations.

MATERIAL AND METHODS

This study was conducted after approval by the Research Committee, BP Koirala Institute of Health Sciences, Dharan, Nepal. Consent was obtained from all patients before recording their data. The sample comprised 700 patients (447 females, 253 males) who were referred from district and zonal hospitals of eastern Nepal to the Department of Orthodontics at BP Koirala Institute of Health Sciences. Their ages ranged from 7 to 48 years. All were permanent inhabitants of Nepal. None had previously undergone orthodontic treatment or suffered from any systemic disease. A standard form was prepared to record all relevant data. Alginate impressions were taken and plaster casts prepared to define Angle classes, other occlusal traits, and the IOTN. The IOTN (DHC) was used to assess orthodontic treatment need. The treatment need was also appraised subjectively in three grades: grade 1, treatment not required; grade 2, treatment required; and grade 3, treatment urgently required.

All data were analyzed with SPSS software (SPSS). The level of significance was set at .05. To test the intraexaminer agreement, the records of 150 patients were reexamined 1 month after the initial examination and checked with kappa statistics. The dependency of sex and IOTN (DHC) on the subjective assessment grades were tested with the chi-square test. Mean age and the various Angle classes were cross-tabulated, so they could be compared with analysis of variance (ANOVA) for any significant relationship.

RESULTS

The mean age of the population was 18.5 ± 5.7 years for males and 19.9 ± 5.7 years for females (Table 1). The age was categorized in four groups: younger than 12 years (10.5%), 12 to 24 years (76.7%), 24 to 36 years (11.7%), and older than 36 years (1.1%).

As demonstrated in Fig 1, 28.8% had a Class II relationship, of which 22.0% (154) were classified as Class II, Division 1, 4.1% (28) as Class II, Division 1 subdivision, 2.7% (19) as Class II, Division 2, and 3.7% (26) as Class III.

Three hundred four (43.4%) of the 67.5% (473) Class I patients had a crowded dentition, 17.1% (120) an incisor protrusion, 4.9% (34) an anterior crossbite, 1.7% (12) a posterior crossbite, and 0.4% (3) a mesial migration of their posterior teeth.

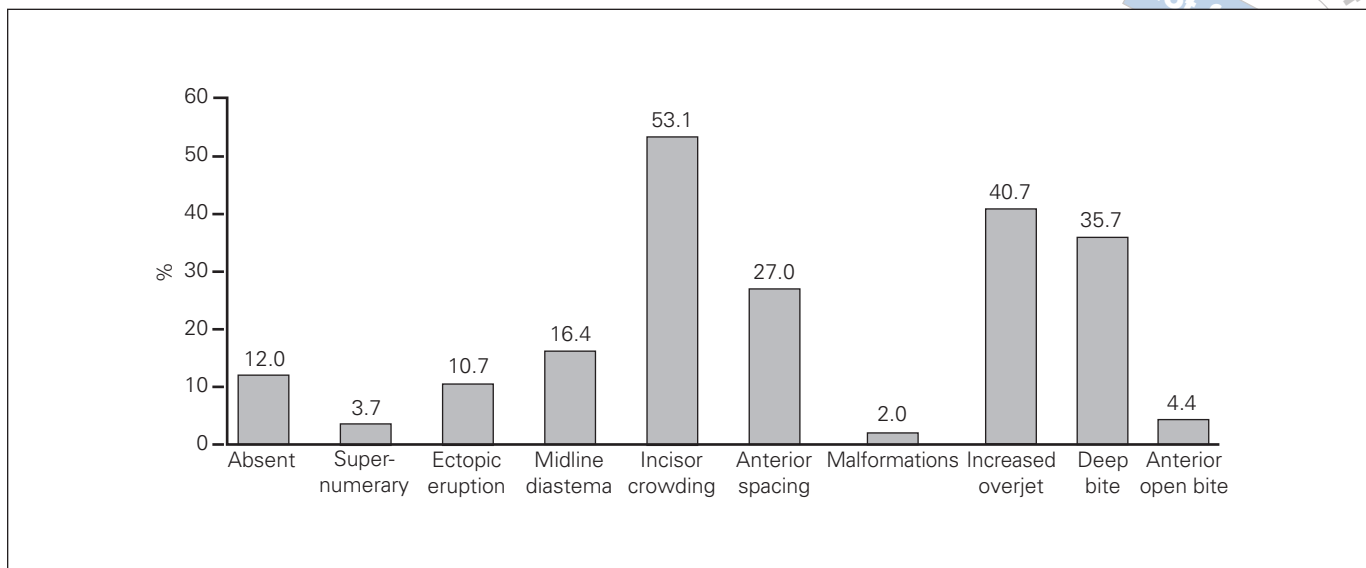
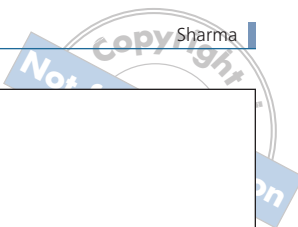


Fig 2 Distribution of various occlusal traits.

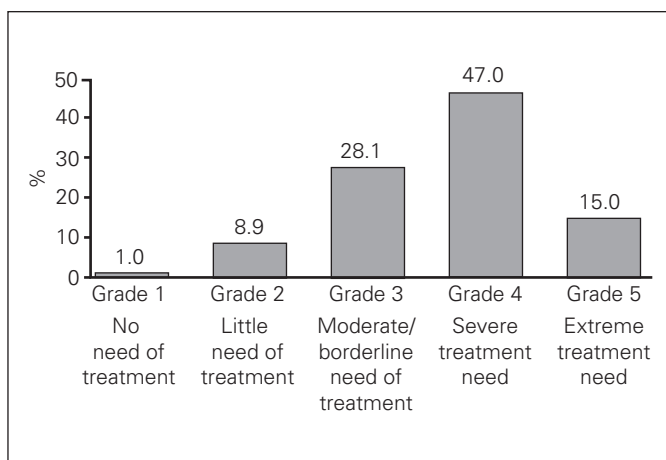


Fig 3 Treatment need as per IOTN (DHC).

Table 2 Relationship between mean age and malocclusions			
	Age (y)	SD	P
Class I (n = 473)	19.5	5.8	.79
Class II, Division 1 (n = 182)	19.3	5.3	.77
Class II, Division 2 (n = 19)	19.8	8.8	.80
Class III (n = 26)	4.3	0.2	.26

n = number of patients; SD = standard deviation.

Other occlusal traits were absent teeth 12% (84), supernumerary teeth 3.7% (26), ectopic eruption 10.7% (75), midline diastema 16.4% (115), maxillary/mandibular incisor crowding 53.1% (372), anterior spacing 27.0% (189), malformations 2.0% (14), increased overjet (> 4 mm) 40.7% (285), anterior open bite (> 4 mm) 4.4% (31), and deep bite (> 4 mm) 35.7% (250) (Fig 2).

The IOTN (DHC) showed the following distribution: grade 1, 1.0% (7); grade 2,

8.9% (62); grade 3, 28.1% (197); grade 4, 47.0% (329); and grade 5, 15.0% (105) (Fig 3). Subjective assessment of orthodontic treatment need showed that treatment was required in 66.9% (468), urgently required in 30.9% (216), and not required in 2.2% (16).

There was no significant relationship between age and the various Angle classes (Table 2). The same was true for the relationship between sex and the IOTN (DHC) and the subjective assessment

Table 3 Relationship between the IOTN (DHC) grades and both sexes

IOTN (DHC)	Females	Males	Total	P (chi-square test)	
				%	
Grade 1: no need of treatment	5	2	7	1.0	.51
Grade 2: little need of treatment	41	21	62	8.9	.41
Grade 3: moderate/borderline need	133	64	197	28.1	.12
Grade 4: severe treatment need	198	131	329	47.0	.03*
Grade 5: extreme treatment need	70	35	105	15.0	.30
Total	447	253	700	100	

* = significant.

Table 4 Relationship between the grades of subjectively assessed treatment need and sexes

Grade	Females	Males	Total	%	P
1 (Treatment not required)	10	6	16	2.2	.42
2 (Treatment required)	300	168	468	66.9	.46
3 (Treatment urgently required)	137	79	216	30.9	.51
Total	447	253	700	100.0	

grades except for IOTN grade 4, which was significantly (.03) more frequent in females (Tables 3 and 4).

The kappa value for the intraexaminer variability was 0.90, indicating a high agreement among repeated observations.

DISCUSSION

The distribution of malocclusions among patients living in eastern Nepal who were referred for orthodontic treatment had not yet been reported in the literature. Sari¹⁸ evaluated 1,602 Turkish patients and showed that 61.7% of them had a Class I; 25.1% a Class II, Division 1; 3.2% a Class II Division 2; and 10.2% a Class III. Thus, the frequency of Class I occlusions was lower than in the present study, whereas that of Class IIIs was considerably higher. Proffit et al¹ reported that 30.0% of their sample had a normal occlusion 50.0% a Class I, 15.0% a Class II, and 1.0% a Class III. Lew et al¹⁶ evaluated 1,050 Chinese children and stated that 7.1% had a normal occlusion; 58.8% a Class I malocclusion; 18.8% a Class II, Division 1; 2.7% a Class II, Division 2; and 12.6% a Class III. Sayin et al¹⁷ studied 1,356 patients and found in 64.0% a

Class I, in 19.0% a Class II, and in 12% a Class III. The difference in the frequency of the various Angle classes in all these studies can mainly be explained by differences in sample size and ethnicity.

In this study, congenitally missing teeth mainly involved lateral incisors. Supernumerary teeth occurred mostly in the form of mesiodens. Ectopic eruption was most often observed in maxillary canines and lateral incisors but also in mandibular premolars. Midline diastemas were typically associated with fibrous frenum. Malformed teeth were usually peg-shaped lateral incisors.

Ucuncu et al²⁷ pointed out that 4.8% of referred Turkish patients had a slight or no need for treatment, 12.0% a moderate need, and 83.2% a great need of treatment. Brook and Shaw²⁵ studied the IOTN (DHC) in 222 individuals and found the following distribution for treatment need: no need 5.9%, moderate need 19.7%, and great need 74.4%. In a study of 1,025 patients by Richmond et al,²⁸ the respective numbers were 3.0%, 19.0%, and 78.0%. A similar distribution was observed by Firestone et al²⁹ in 95 persons (4.1%, 14.3%, and 81.6%). Overall, the results of this investigation are quite comparable with those of previous

Table 5 Treatment need according to the IOTN (DHC) in referred populations studied by various authors

Author	Country	n	No/little need (%)	Moderate need (%)	Great need (%)
Brook and Shaw ²⁵	England	222	5.9	19.7	74.4
Richmond et al ²⁸	England	1,025	3.0	19.0	78.0
Firestone et al ²⁹	Switzerland	95	4.1	14.3	81.6
Ucuncu et al ²⁷	Turkey	250	4.8	12.0	83.2
Present study	Nepal	700	9.9	28.1	62.0

n = number of patients.

publications, though the number of subjects urgently requiring treatment was somewhat lower (Table 5).

The subjective assessment of treatment need in this study by categorizing three grades was felt to be a more realistic approach to assess the severity of existing malocclusions and to determine treatment priority. Besides this, the results of the subjective assessment and the IOTN (DHC) ratings are very comparable.

The age group of 12 to 24 years was the most frequent, which seems to be a consequence of a high self-consciousness for esthetics, ie, the motivation of these individuals for seeking orthodontic treatment was the greatest. The same motivation might apply when females sought for orthodontic treatment approximately two times more frequently than males. Also, parental motivation due to social reasons might explain this difference.

CONCLUSION

Angle Class I was the most prevalent and Class III the least common occlusal trait in this study. The most prevalent age group seeking orthodontic treatment was that of 12 to 24 years. Females showed

more interest than males for orthodontic treatment. The IOTN (DHC) showed that 62.0% had a great need for treatment, 28.1% had a borderline need, and 9.9% little or no need of treatment. Subjective assessment showed that most of the patients who visited the orthodontic department required treatment. Subjective assessment seems to be a more realistic and easy approach to determine treatment necessity. The percentage of individuals with a high need for orthodontic treatment in eastern Nepal draws special attention to the arrangement of treatment facilities and trained orthodontists in this region.

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