Prevalence of Malocclusion and Evaluation of Orthodontic Treatment Need amongst Patients in Pokhara, Nepal

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ABSTRACT

Introduction: Prevalence of malocclusion and orthodontic treatment need varies according to different region based on ethnic diversity.

Objective: To assess the prevalence of malocclusion and orthodontic treatment need amongst patients visiting College of Dental Surgery, Gandaki Medical College, Pokhara, Nepal.

Materials & Method: A cross-sectional study based on WHO-Oral Health Survey Basic Methods using Community Periodontal Index (CPI) probe and mouth mirror was conducted. The malocclusion based on Angle's classification, overjet, overbite, open bite, crowding, spacing and cross bites were recorded. Dental Health Components (DHC) of Index of Orthodontic Treatment Need (IOTN) was recorded. The frequency distribution was calculated and chi square test was used to assess the gender difference.

Result: The prevalence of normal occlusion was 5.8%, Angle's Class I malocclusion was 67.9%, Class II was 19.5% and Class III was 6.8%. Crowding (51.07%) was more common malocclusion trait than spacing (24.46%). There were no significant differences in distribution of various occlusal traits between male and female subjects. Orthodontic treatment need based on DHC showed: 19.40% were in definite/extreme need of treatment (Grade 4/5), 21.93% had borderline need (Grade 3) and 58.67% had no/little need of treatment (Grade 1/2).

Conclusion: Angle's Class I was the most common malocclusion trait (67.9%) followed by anterior crowding (51.07%). 19.40% patients visiting the teaching hospital in Pokhara are in definite or extreme need of orthodontic treatment.

Keywords: Dental Health Component, Index of Orthodontic Treatment Need, malocclusion

INTRODUCTION

Prevalence of malocclusion and the need of orthodontic treatment are deemed important and included in national health surveys in various countries.[1-3] The major etiology of malocclusion is attributed to genetic, racial and environmental factors.[4] Malocclusion has been shown to affect the person psychologically, reducing the self-esteem and resulting in fewer opportunities in life.[5]

Various methods are used to assess orthodontic treatment need; while Index of Orthodontic Treatment Need (IOTN) is most commonly used to assess occlusal traits.[6]

Prevalence of malocclusion and the treatment needs have been established in few regions of Nepal.[7-10] Few prevalence studies of malocclusion were done in Western region of Nepal but the need for orthodontic treatment has not been established.[11,12] Therefore the objective of this study is to assess prevalence of various malocclusion traits and to evaluate the orthodontic treatment need based on DHC of IOTN among the patients visiting Gandaki Medical College, Pokhara.

MATERIALS AND METHOD

This is a hospital-based cross-sectional study conducted at College of Dental Surgery, Gandaki Medical College, Pokhara over a period of six months from October 2017 to March 2018. Sample size was calculated using the formula $N=4pq/L^2$ (where, *p*=prevalence rate 62.28%,[13] q=1-p, L=permissible error in the estimation of 'p', L=5% of 62.28=3.114). The sample size was estimated to be 969. The total sample size consisted of 1026 patients of age group 11 to 30 years. Patients undergoing fixed orthodontic treatment, history of extractions, systemic

health problems and developmental anomalies were excluded from the study. Ethical clearance was obtained from the Institutional Review Committee. Consent was obtained from adult patients and from the parents for adolescent group.

The examination was done by a single examiner on a dental chair with illumination. The parameters were recorded based on WHO- Oral Health Survey Basic Methods using Community Periodontal Index (CPI) probe and mouth mirror.[14] Malocclusion based on Angle's classification, over jet, over bite, open bite, crowding, spacing and cross bite were recorded in a performa. Dental Health Component (DHC) of IOTN index was recorded for various malocclusion traits. This was classified into three categories of treatment need: Grade 1 and 2 (no or little need of treatment), Grade 3 (borderline need), Grade 4 and 5 (definite or extreme need).

The data were entered in MS Excel and analyzed in SPSS Version 17. The frequency distributions were calculated and chi square test was used to assess the differences in malocclusion traits between male and female subjects; p-value <0.05 was considered significant.

RESULT

Out of 1026 patients screened; 512 (49.9%) were female and 514 (50.1%) were male. The mean age was 23.06 + 4.7 years.

The distribution of occlusal trait was normal occlusion 5.8%, Angle's Class I malocclusion 67.9%, Class II 19.5% and Class III 6.8% (Table 1). Excessive overjet was seen in 39.4%, excessive overbite in 46.9%; while only 27.8% exhibited normal overbite. Open bite was prevalent in 2.8% of the patients. Crowding was more common than spacing, which were 51.07% and 24.46% respectively. Midline diastema was present in 251 (24.46%) patients. Anterior crossbite was more common than posterior cross bite; which were 10.3% and 6.8% respectively. No statistically significant difference was observed in any of the occlusal traits studied among male and female subjects. The IOTN-Dental Health Component showed treatment need as given in Table 2.

Table 1: Distribution of different occlusal traits

Occlusal traits		Total	Male	Female	*p*-Value
Angle's Classification	Normal Occlusion	59(5.8%)	25(42.4%)	34(57.63%)	0.34
	Class I malocclusion	697 (67.9%)	361 (51.8%)	336 (48.21%)	
	Class II malocclusion	200 (19.5%)	97 (48.5%)	103 (51.5%)	
	Class III malocclusion	70 (6.8%)	31(44.3%)	39 (55.7%)	
Overjet	Normal (1-2mm)	485 (47.3%)	248 (51.1%)	237 (48.86%)	0.81
	Excessive (>2mm)	404 (39.4%)	198 (49%)	206 (51%)	
	Reduced (<1mm)	137 (13.4%)	68 (49.6%)	69 (50.4%)	
Overbite	Normal (25-40%)	285 (27.8%)	132 (46.3%)	153 (53.7%)	0.63
	Excessive (>40%)	481 (46.9%)	257 (53.4%)	224 (46.6%)	
	Reduced (<25%)	260 (25.3%)	125 (48.1%)	135 (51.9%)	
Open bite	Present	29 (2.8%)	15 (51.7%)	14 (48.3%)	0.86
	Absent	997 (97.2%)	499 (50.1%)	498 (49.9%)	
Anterior Crowding	Present	524 (51.07%)	271 (51.72%)	253 (48.28%)	0.23
	Absent	502 (48.93%)	243 (48.4%)	259 (51.6%)	
Anterior Spacing	Present	251 (24.46%)	131 (52.19%)	120 (47.81%)	0.62
	Absent	775 (75.54%)	383 (49.42%)	392 (50.58%)	
Midline Diastema	Present	143 (13.9%)	69 (48.3%)	74 (51.7%)	0.63
	Absent	883 (86.1%)	445 (50.4%)	438 (49.6%)	
Anterior Cross bite	Present	106 (10.3%)	50 (47.2%)	56 (52.8%)	0.52
	Absent	920 (89.7%)	464 (50.4%)	456 (49.6)	
Posterior Cross bite	Present	70 (6.8%)	29 (41.4%)	41 (58.6%)	0.13
	Absent	956 (93.2%)	485 (50.7%)	471 (49.3%)	

Table 2: Dental Health Component grades of IOTN

DHC Grade	Need for Treatment	Total	Male	Female
Grade 1 & 2	No/ little need of treatment	602 (58.67%)	304 (59.14%)	298 (58.20%)
Grade 3	Borderline	225 (21.93%)	120 (23.35%)	105 (20.51%)
Grade 4 & 5	Definite treatment need	199 (19.40%)	90 (17.51%)	109 (21.29%)
Total		1026	514	512

DISCUSSION

It is the first study of Western region of Nepal to evaluate the prevalence of occlusal traits and correlate them with Dental Health Component of the Index of Orthodontic Treatment Need. It was found that, normal occlusion was 5.8%, Angle's Class I was 67.9%, Class II was 19.5% and Class III was 6.8%. This report is comparable to the previous study of this region by Baral;[11] which showed Angle's Class I in 71%, Class II in 24.6% and Class III in 3.9%. There is also an unison with the study done among eastern population of Nepal by Sharma;[7] which showed Angle's Class I in 67.5%, Class II in 28.6% and Class III in 3.7%. The normal occlusion group in our study was 5.8% which is relatively less than the report by Shrestha *et al*[8] and Singh *et al*[10] which showed 27% and 14.4% respectively. In contrary, Karki *et al*[15] showed that Angle's Class III malocclusion was more prevalent than Class II amongst Tibetan ethnic group in the same region; which were 9.40% and 5.10% respectively. This could be due to racial variation in occlusal traits. Similarly, increased prevalence of Angle's Class III malocclusion was also seen is Saudi Arabia population (15.5%).[16]

The present study showed that 39.4% of the subjects had increased overjet. Similar findings were documented by Shrestha *et al*[8,9] and Ciuffolo *et al*;[17] which were 43% and 41% respectively. In contrary, Karki *et al*[15] in Tibetan samples showed increased overjet in only 10.8%.

The present study showed 46.9% of the samples having overbite; which was slightly more than the samples examined by Sharma[13] (40%).

According to the present study, open bite was present in 2.8% while Karki *et al*[15] and Sharma *et al*[13] showed prevalence of open bite in 10.86% and 5.1% respectively.

The present study showed that crowding was more common occlusal trait than spacing which was 51.07% and 24.46% respectively; which are similar to Maltese and Brazilian studies.[18,19] This study showed midline diastema in 13.9%, anterior cross bite in 10.3% and posterior cross bite in 6.8%; while another study on eastern part of Nepal showed midline diastema in 16%, anterior cross bite in 12.9% and posterior cross bite in 3.7%.[13] The differences could be due to ethnic diversity and study design.

In this study, no statistically significant differences were observed in the distribution of occlusal traits between male and female samples; similar results were exhibited by Baral.[11]

The present study showed various degrees of orthodontic treatment need among western Nepalese samples. The comparison with similar studies within the country and outside is given in Table 3. The results are comparable to Burden and Holmes[22] and Hamdan[23] which showed more number of subjects fall under Grade 1 and 2 (no or little need of treatment) category. In contrary Gyawali[20] and Shrestha[21] showed more number of patients to be on Grade 4 and 5 (Definite need of treatment). This could be because of the fact that, present study was done in general dental patients visiting dental OPD while Gyawali[20] and Shrestha[21] conducted their studies among patients seeking orthodontic treatment.

Table 3: Comparison of IOTN (DHC) data

Study	Geographic Region	Grade 1 & 2 (No/ little need of treatment)	Grade 3 (Borderline need)	Grade 4 & 5 (Definite treatment need)
Burden, 1994[22]	United Kingdom	45.99%	24.02%	29.47%
Hamdan, 2001[23]	Jordan	50.23%	22.18%	27.49%
Shrestha, 2012[21]	Central Nepal	16%	19.9%	64.1%
Gyawali, 2016[20]	Eastern Nepal	10.2%	24.2%	65.7%
Parajuli, 2018 (present study)	Western Nepal	58.67%	21.93%	19.40%

The present study comprise of few limitations as it was conducted without ethnic specificity. Multi-centric study with ethnic specificity could provide the national prevalence of occlusal traits with the assessment on need of treatment. This could be implemented in national insurance policy (Social Health Security Program) to cover economic burden for patients with extreme need of orthodontic treatment.

CONCLUSION

The most prevalent malocclusion traits in patients visiting GMC-College of Dental Surgery is Angle's Class I followed by anterior crowding. Almost 20% of the patients are in definite or extreme need of orthodontic treatment in Pokhara.

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OJN

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