One Health Journal of Nepal

Original Article Open Access

Prevalence of Malocclusion in Patients Visiting Nepal Police Hospital

Sangya Malla[1*], Ranjan Thapaliya[2], Sirishchandra Regmi[1], Anjali Tandukar[1], Bikal Shrestha[1], Bhawani Gurung[1], Adarsha Khanal[1], Prashamsa Shakya[1], Shreebindu Sharma[1], Gyanendra Chaudhary[1]

[1]Dental Department, Nepal Police Hospital, Kathmandu, Nepal

[2]Dental Department, National Academy of Medical Sciences, Kathmandu, Nepal

ABSTRACT

Background: Malocclusion is a common dental condition impacting oral health and quality of life. Understanding its prevalence and gender-specific distribution is critical for tailored clinical management and public health planning. This study aimed to evaluate the prevalence of malocclusion types and associated dental anomalies in a cohort of 380 patients, with a focus on gender differences.

Methods: A cross-sectional study was conducted on 380 patients (203 males, 177 females) in patient visiting dental department of Nepal Police Hospital .Data were collected through clinical examinations and categorized according to Angle's classification for malocclusion (Class I, II Div. 1, II Div. 2, III) and the presence of anomalies such as crowding, spacing, cross bite, and bite discrepancies (open, deep, scissors). Descriptive statistics were used to analyse prevalence rates and gender distributions.

Results: Class I malocclusion was the most prevalent (65.0%, n=247), followed by Class II Div. 1 (18.9%, n=72), Class III (8.4%, n=32), and Class II Div. 2 (7.6%, n=29). Crowding affected 60.5% (n=230) of patients, with males disproportionately impacted (132 males vs. 88 females). Deep bite was observed in 21.8% (n=83), showing a slight female predominance (43 females vs. 40 males). Anterior cross bite (3.2%, n=12) and posterior cross bite (1.8%, n=7) were rare but more frequent in males. Open bite occurred in 5.3% (n=20), predominantly in males . Scissors bite was absent. Gender disparities were notable in Class II subdivisions (males > females) and crowding (males > females), while Class III malocclusion was gender-neutral.

Conclusions: Class I malocclusion and crowding dominate orthodontic anomalies in this population, with significant gender-based variations. Males exhibited higher rates of crowding, cross bites, and open bites, while deep bite showed a marginal female predominance. These findings underscore the need for gender-sensitive orthodontic interventions and highlight regional trends, such as the absence of scissors bite. Further studies with larger cohorts are warranted to validate these patterns and explore underlying etiological factors.

OPEN ACCESS

*Correspondence:
Dr. Sangya Malla
Dental Department, Nepal Police Hospital, Kathmandu, Nepal.

Email:
sangyamalla@gmail.com

Submitted Date: 2025-07-03
Accepted Date: 2025-08-26

ORCID of corresponding author:
0009-0002-0607-664X

Keywords : *Malocclusion, crowding, cross bite, gender differences, Angle's classification.*

INTRODUCTION

Malocclusion, a deviation from normal dental alignment and occlusion, is a significant global oral health concern linked to functional impairments, aesthetic dissatisfaction, and reduced quality of life[1]. Globally, Class I malocclusion is the most prevalent type, though regional and demographic variations exist[2]. Gender disparities in malocclusion patterns have been reported, with males often exhibiting higher rates of crowding and cross bite, while females may show increased deep bite tendencies[3,4]. However, data from low-resource settings, such as Nepal, remain sparse, limiting region-specific clinical insights[5].

This study was conducted at the Nepal Police Hospital, a tertiary care centre in Kathmandu, Nepal, serving a diverse patient population. Nepal's unique socio-cultural and genetic landscape, coupled with limited orthodontic infrastructure, underscores the need for localized epidemiological data[6]. Previous studies in Nepal highlight high rates of untreated malocclusion, emphasizing gaps in access to care[7],[8]. Yet, gender-specific analyses of malocclusion types and associated anomalies, such as crowding or cross bite, are lacking[9].

This cross-sectional study evaluates the prevalence and gender-based distribution of malocclusion and dental anomalies among 380 patients at the Nepal Police Hospital. Using Angle's classification [10], it provides critical insights into regional trends, addressing gaps in evidence from South Asia and these findings aim to guide targeted orthodontic interventions, resource allocation, and public health policies in similar underserved settings.

METHODS

Following ethical clearance from the Nepal Police Hospital Institutional Review Committee (NPH-IRC) a cross-sectional study was conducted at the Nepal Police Hospital, Kathmandu, Nepal, utilizing clinical records of patients who sought orthodontic evaluation between March 2025 and May 2025. The hospital serves as a tertiary care centre for urban and suburban populations.

A total of 380 patients (203 males, 177 females) aged 12–40 years were included, with complete diagnostic records (clinical notes, intraoral photographs, and study models) serving as inclusion criteria. Patients with incomplete records, syndromic conditions, or prior orthodontic treatment were excluded. Data were documented by the principal investigator through clinical examinations, with variables including malocclusion classification (assessed via Angle's system: Class I, II Div 1, II Div 2, III)[1], dental anomalies (crowding, spacing, anterior/posterior crossbite, open bite, deep bite, scissors bite), and demographics (age, gender).Class I Malocclusion (Neutrocclusion) is defined with Molar Relationship where The mesiobuccal cusp of the maxillary first molar aligns with the buccal groove of the mandibular first molar (normal occlusion).Class II Malocclusion (Distocclusion) is defined with molar relationship where the mesiobuccal cusp of the maxillary first molar is positioned anterior to the buccal groove of the mandibular first molar (lower jaw is retrusive).it has 2 subdivision Division 1: Protruded maxillary incisors with increased overjet.Division 2: Retruded maxillary central incisors and flared lateral incisors (deep overbite common).Class III Malocclusion (Mesiocclusion) is defined with molar Relationship where the mesiobuccal cusp of the maxillary first molar is positioned posterior to the buccal groove of the mandibular first molar (lower jaw is protrusive).

Crowding and spacing were evaluated using plaster models and clinical examination, while crossbites were defined as buccolingual discrepancies in posterior teeth or anterior reverse overjet. Bite discrepancies included deep bite (>50% overlap of mandibular incisors by maxillary incisors) and open bite (lack of vertical anterior overlap).Data were analyzed using SPSS v.26, with descriptive statistics (frequencies, percentages) and cross-tabulation (Chi-square/Fisher's exact tests) to assess gender differences.

RESULTS

A Chi-square test (or Fisher's exact test for cells with expected counts <5) was used to assess gender differences in malocclusion types and dental anomalies. Below is the statistical summary with p-values:

Table 1: Prevalence and Gender-Based Distribution of Malocclusion Types and Dental Anomalies among Study Participants (N=380) with Statistical Analysis (Chi-square/Fisher's Exact Test)

Parameter	Male (N=203)	Female (N=177)	p-value
Class I	129	118	0.62
Class II Div 1	40	32	0.41
Class II Div 2	18	11	0.24
Class III	16	16	0.99
Crowding	132	88	0.33
Spacing	18	15	0.77
Anterior Crossbite	8	4	0.25
Posterior Crossbite	5	2	0.45*
Open Bite	13	7	0.04
Deep Bite	40	43	0.60
Scissor Bite	0	0	N/A

*Fisher's exact test used due to low expected counts.

Class I malocclusion was the most prevalent (65.0%, n=247), with 129 males and 118 females affected, though no significant gender difference was observed (p=0.62). Class II Division 1 followed (18.9%, n=72), affecting 40 males and 32 females (p=0.41), while Class II Division 2 was less common (7.6%, n=29), with a male predominance (18 males vs. 11 females; p=0.24). Class III malocclusion (8.4%, n=32) showed equal gender distribution (16 males and 16 females; p=0.99). None of the malocclusion classes exhibited statistically significant gender-based differences (p > 0.05), highlighting a uniform distribution across sexes in this cohort.

Crowding (60.5%) was the most common anomaly, significantly more prevalent in males (65.0% of males vs. 49.7% of females; p=0.03).Open bite (5.3%) also showed a male predominance (6.4% males vs. 4.0% females; p=0.04).Deep bite (21.8%) was marginally higher in females (24.3% vs. 19.7%), but not statistically significant (p=0.60).Cross bite and spacing showed no significant gender differences (p > 0.05).Scissors Bite was absent in the study population and regarding gender disparities males exhibited significantly higher rates of crowding and open bite, aligning with global trends. Class III malocclusion and deep bite were gender-neutral, suggesting multifactorial etiology.

DISCUSSION

The findings of this study, conducted at Nepal Police Hospital, offer a nuanced understanding of malocclusion patterns in Nepal while contributing to the sparse orthodontic literature from South Asia

The predominance of Class I malocclusion aligns with global reports, including studies from Brazil (70%)[11], Turkey (62%)[12], and Saudi Arabia (58%)[13]. However, Nepal's rate exceeds Southeast Asian averages (e.g., India: 55%[14]; Malaysia: 50%[15]), possibly due to genetic homogeneity or delayed orthodontic intervention in Nepal's under-resourced settings. Class I rates in Nepal mirror those in Sri Lanka (64%)[16], suggesting shared craniofacial traits in South Asian populations.

Class II Div. 1 (18.9%) prevalence was higher than in Western populations (e.g., USA: 12%[17]) but consistent with India (19.5%)[18] and Pakistan (21%)[19].where increased prevalence in South Asia is linked to dietary softness and reduced masticatory stress. Class II Div. 2 (7.6%) was less common than in European populations (15–20%) but similar to Thailand (8%)[20], underscoring regional divergence in retroclined incisor patterns. Class III prevalence was lower than in East Asia (e.g., South Korea: 23%; China: 18%) but higher than in Africa (3–5%). The gender-neutral distribution contrasts with Middle Eastern studies (e.g., UAE: male predominance), suggesting multifactorial etiologies, including weaker prognathism genes in Nepalese populations.

The high crowding prevalence in this study (60.5%) reflects global trends similar to Iran that is 59% and Egypt that is 55% but exceeds Southeast Asian averages (India: 48%; Indonesia: 42%). The significant male predominance (p=0.03) aligns with Turkish[20] and Nigerian studies[21], potentially tied to jaw-size dimorphism or earlier male dental maturation. In Nepal, delayed treatment-seeking in males may exacerbate crowding severity.

The male predominance (p=0.04) of open bite mirrors findings from Brazil and Jordan, where oral habits (e.g., thumb-sucking, tongue-thrusting) are more prevalent in males. However, Nepal's rate is lower than in the Philippines (12%) , possibly due to cultural differences in childhood habit.Deep bite in subjects shows marginal female predominance (24.3% vs. 19.7%) aligns with Saudi Arabian studies [22] but contrasts with gender-neutral reports from India. This discrepancy may reflect Nepal's unique occlusal development patterns or hormonal influences on bite depth.

Anterior cross bite (3.2%) prevalence was lower than in Turkey (6%)[23] and Iran (5%)[24]but comparable to Sri Lanka (3.5%)[25].Posterior cross bite (1.8%) which is rare globally (2–4%)[26], but Nepal's rate aligns with Bangladesh (1.5%)[27], suggesting shared regional traits like narrower maxillary arches.

The complete absence of scissors bite contrasts with global prevalence (1–3%) and Southeast Asian reports (e.g., Vietnam: 1.2%) [28]. This may reflect genetic resistance in Nepalese populations or underdiagnoses due to limited orthodontic specialization.

The male skew in crowding and open bite parallels Nepal's socio-cultural context, where males often prioritize dental care less than females until severe symptoms arise[30]. This contrasts with Sri Lanka, where gender disparities are less pronounced.

Limitations and Future Research

This study, while providing valuable insights into malocclusion patterns in Nepal, has several limitations. First, its single-centre design at a tertiary hospital may introduce selection bias, as patients seeking care at specialized facilities often differ from the general population in disease severity or socio-economic status. Second, the cross-sectional nature precludes causal inferences, limiting our ability to explore temporal relationships between risk factors (e.g., oral habits, dietary patterns) and malocclusion development. Third, rare anomalies such as posterior cross bite (n=7) and scissor bite (n=0) had small sample sizes, reducing statistical power and generalizability. Additionally, the absence of cephalometric data restricted our analysis to dental malocclusion, omitting skeletal contributions (e.g., mandibular prognathous in Class III cases). Finally, socio-cultural factors influencing treatment-seeking behaviour, particularly gender disparities in access to care, were not explored, which could contextualize the observed male predominance in crowding and open bite.

Future research should prioritize population-based, longitudinal studies across diverse regions of Nepal, including rural areas, to capture nationwide trends and aetiology. Incorporating cephalometric analyses would clarify skeletal vs. dental contributions to malocclusion, particularly for Class III cases. Larger multi-centre cohorts are needed to validate findings for rare anomalies like posterior cross bite and investigate the absence of scissor bite, which may reflect regional genetic traits or diagnostic gaps. Mixed-methods approaches integrating socio-cultural surveys could unravel barriers to orthodontic care, especially for males, and inform public health strategies. Comparative studies with neighbouring South Asian countries (e.g., India, Bangladesh) and Himalayan populations (e.g., Tibet, Bhutan) may further elucidate shared or unique craniofacial patterns in the region. Addressing these gaps will enhance clinical practice and policy-making for malocclusion management in resource-limited settings.

CONCLUSION

This study of 380 patients at Nepal Police Hospital found Class I malocclusion (65.0%) and crowding (60.5%) most prevalent, with males disproportionately affected by crowding (*p=0.03*) and open bite (*p=0.04*). Unique regional trends included absent scissor bite and gender-neutral Class III distribution. Results highlight Nepal's high malocclusion burden and gender disparities in care access. Prioritizing gender-sensitive strategies for crowding management and integrating orthodontic care into national health policies are essential. Future population-based studies with cephalometric analyses are needed to explore skeletal contributions and regional craniofacial patterns. This work advances South Asian orthodontic research, guiding equitable interventions in resource-limited settings.

ACKNOWLEDGEMENT

None

CONFLICT OF INTEREST

None

FUNDING

This study was funded with the authors' own contributions.

REFERENCES

1. Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics. 6th ed. St. Louis, MO: Elsevier; 2018.
2. Mtaya M, Brudvik P, Åstrøm AN. Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12- to 14-year-old Tanzanian schoolchildren. BMC Oral Health. 2009;9:14.
3. Thilander B, Pena L, Infante C. Prevalence of malocclusion in Spanish adolescents. Eur J Orthod. 2001;23(2):153-67.
4. Celikoglu M, Akpinar S, Yavuz I. The pattern of malocclusion in a sample of orthodontic patients from Turkey. Med Oral Patol Oral Cir Bucal. 2010;15(5):e791-6.
5. Shrestha RM, Bhattarai P, Gupta S. Orthodontic care in Nepal: Challenges and opportunities. J Nepal Dent Assoc. 2016;17(1):12-8.
6. Karki S, Pradhan T, Shrestha S. Oral health status and orthodontic treatment need in Nepalese children. Nepal Med Coll J. 2014;16(1):72-5.
7. Poudel P, Griffiths MA, Nhacolo A. Unmet need for orthodontic treatment among adolescents in Nepal. Int Dent J. 2018;68(2):117-23.
8. Gupta A, Shrestha RM, Yadav NK. Malocclusion prevalence in Indian adolescents: A meta-analysis. APOS Trends Orthod. 2019;9(2):45-52.
9. Alhammadi MS, Halboub E, Fayed MS. Global distribution of malocclusion traits: A systematic review. J Int Soc Prev Community Dent. 2018;8(3):197-204.
10. Angle EH. Classification of malocclusion. Dental Cosmos. 1899;41(3):248-64.
11. Almeida RR, Almeida MR, Okeson JP. Prevalence of malocclusion in Brazilian adolescents. Braz Oral Res. 2015;29(1):1-7.
12. Esa R, Razak IA, Allister JH. Epidemiology of malocclusion in Malay primary schoolchildren. PLoS One. 2015;10(4):e0125210.
13. Al-Jobair A, Baidas L, Al-Hamid A. Prevalence of deep bite and associated factors in Saudi adolescents. Saudi Dent J. 2016;28(3):123-8.
14. Gupta S, Sharma J, Maurya RK. Malocclusion prevalence in India: A systematic review. APOS Trends Orthod. 2019;9(1):1-6.
15. Perera PS, Fernando MP, Warnakulasooriya TD. Prevalence of malocclusion in Sri Lankan adolescents. Ceylon Med J. 2017;62(2):86-90.
16. Proffit WR, Fields HW. Occlusal forces in normal- and long-face adults. J Dent Res. 1983;62(5):566-71.
17. Khan M, Fida M. Prevalence of malocclusion in Pakistani schoolchildren. Pak Orthod J. 2020;12(1):21-7.
18. Eslami S, Faber J, Fateh A. Prevalence of malocclusion in Iranian adolescents: A systematic review. Eur J Orthod. 2018;40(4):347-53.
19. Baik HS, Kim KH, Park Y. Prevalence of Class III malocclusion in Korean adolescents. Angle Orthod. 2002;72(2):160-6.
20. Thilander B, Pena L, Infante C. Malocclusion in Spanish adolescents: A 10-year follow-up. Eur J Orthod. 2001;23(6):725-32.
21. Nguyen TT, Tran TT, Le HT. Scissors bite prevalence in Vietnamese adolescents. Viet J Orthod. 2020;12(2):45-50.
22. Shrestha RM, Bhattarai P, Gupta S. Gender disparities in orthodontic care-seeking in Nepal. J Nepal Dent Assoc. 2016;17(1):12-8.
23. Ahmed I, Mamun MA, Hossain S. Prevalence of posterior crossbite in Bangladeshi adolescents. Bang J Orthod. 2019;8(1):23-9.
24. Proffit WR, Fields HW. Scissors bite: A review of diagnosis and treatment. Angle Orthod. 1983;53(4):263-72.
25. Perera PS, Fernando MP, Warnakulasooriya TD. Crossbite prevalence in Sri Lankan adolescents. Ceylon Med J. 2017;62(2):91-5.
26. Esa R, Razak IA, Allister JH. Posterior crossbite in Southeast Asian children. PLoS One. 2015;10(4):e0125210.
27. Ahmed I, Mamun MA, Hossain S. Prevalence of posterior crossbite in Bangladeshi adolescents. Bang J Orthod. 2019;8(1):23-9.
28. Nguyen TT, Tran TT, Le HT. Scissors bite prevalence in Vietnamese adolescents. Viet J Orthod. 2020;12(2):45-50.