International Journal of Medical Science and Health Research

Vol.10, No.03; 2026

ISSN: 2581-3366

Prevalence of Crossbite Among Patients Attending College of Dentistry at Hawler Medical University

Taban Ibrahim Muhialdeen[1]

[1]College of Dentistry, Hawler Medical University, Kurdistan Region, Iraq

https://orcid.org/0009-0000-8827-7431

doi: 10.51505/ijmshr.2026.10304 URL: http://dx.doi.org/10.51505/ijmshr.2026.10304

Received: Mar 25, 2026 Accepted: Apr 09, 2026 Online Published: May 23, 2026

Abstract

Malocclusion is considered a major public health problem. Because of the disruptions in dental health and dentofacial aesthetics, the condition may have an impact on one's quality of life. Crossbite is a major orthodontic problem that affects many individuals across the world. This study aimed to estimate the prevalence of crossbites among patients attending the dental unit of the College of Dentistry at Hawler Medical University. The sample comprised patients aged 7 to 20 years, of both genders, attending the diagnostic department of HMU/College of Dentistry in Erbil City, Kurdistan Region of Iraq. The data was gathered over a three-month interval from November 2021 to February 2022. The convenience sampling method was utilized. The entire sample size comprised 140 patients (71 females and 69 males). The results were analyzed using SPSS version 22. Descriptive statistics and Chi-Square tests were performed. Approximately 70.7% of the sample does not present a crossbite, with a near equal distribution between males and females. 15.7% of the whole sample demonstrates an anterior crossbite. Unilateral and bilateral crossbites exhibit lower prevalence rates within the overall sample, around 9.3% and 4.3%, respectively, indicating a lack of statistically significant differences between genders. This study demonstrates that while the majority of patients did not exhibit crossbite, a significant proportion presented with anterior and posterior crossbite, emphasizing the clinical significance of early diagnosis.

Keywords Prevalence, Anterior crossbite, Posterior crossbite, Malocclusion, Erbil City

Introduction

A crossbite is an abnormality in the buccolingual relationship of the upper and lower teeth that necessitates early intervention to avoid additional discrepancies in the growth of the maxilla and mandible (Remmiya and Sharon, 2022). Various factors may contribute to the development of crossbite, such as heredity, dental arch length, retained deciduous or supernumerary teeth, thumb sucking habit, skeletal-anteroposterior discrepancies and cleft lip and palate (Verma et al, 2020). The discrepancy may be unilateral, bilateral, anterior, or posterior in nature. The treatment for transverse maxillary deficiencies requires either rapid or slow maxillary expansion (Sollenius et

Vol.10, No.03; 2026

ISSN: 2581-3366

al., 2020). Interceptive orthodontic treatments are an early intervention to guide the eruption of teeth and correction of malocclusion and highly desirable (Kumar, 2016).

Anterior crossbite, as defined by Salzman (1968), refers to the lingual positioning of maxillary incisors relative to the opposing mandibular teeth when both dental arches are in centric occlusion. It can be further classified into dentoalveolar, skeletal, and functional. A single tooth crossbite typically occurs in dentoalveolar anterior crossbite, while skeletal crossbite is generally attributed to a retrognathic maxilla and a prognathic mandible. Functional crossbite is frequently observed in pseudo-class III malocclusion. Clinically, anterior crossbite presents with reverse overjet and premature occlusal contact, resulting in mandibular displacement (Jain, 2021). In these conditions, there will be an edge-to-edge relationship of the incisors in the centric position, accompanied by Class III relationships (Warren and Bishara, 2002). Skeletal anterior crossbite is specified by class III centric relation, where an edge to edge incisor relationship cannot be obtained (Chevitarese et al, 2002).

Posterior crossbite can manifest as either unilateral or bilateral, affecting one or many teeth in the functioning occlusal position (Bishara and Saunders, 2001). The mechanism of posterior crossbite involves shifting of the mandible to one side where multiple and stable contacts occur, which results in tooth wear, abnormal growth and development of teeth and jaws (Kennedy and Osepchook, 2005).

Early treatment for posterior crossbite is advised to facilitate maxillary expansion, rectify functional shifts, and avoid unusual transverse growth of the maxilla and mandible, consequently promoting normal occlusal development (Kahraman et al., 2016).

The studies illustrating the prevalence of crossbite among different age groups is essential for diagnosing, comprehending the causes of orthodontic problems, developing treatment and management plans, and providing essential public health resources. This study aimed to evaluate the prevalence of crossbites in patients attending the dental unit of the College of Dentistry at Hawler Medical University.

Patients and methods

This cross-sectional study was conducted in the dental unit of the College of Dentistry at Hawler Medical University in Erbil City, Kurdistan Region of Iraq, from November 2021 to February 2022. Patients aged 7 to 20 years who were attending the diagnostic department of the College of Dentistry were included in this study. The convenience sampling method was employed. The total number of samples included 140 patients, comprising 71 females and 69 males. A written consent form was obtained from the parents or patient. Patients with a history of or currently undergoing orthodontic treatment and patients with a history of a craniofacial deformity were excluded.

Vol.10, No.03; 2026

ISSN: 2581-3366

The examination was performed in a room allocated for patient evaluation. The patients were positioned upright in the dental chairs, while the examiners stood front them. At the first stage of the procedure, the purpose of the examination was elucidated, and agreement obtained from both the patient and their relatives. A written consent form was obtained from the parents or patient. Patients with a history of or currently undergoing orthodontic treatment, patients with a history of a craniofacial deformity were excluded. Before performing any dental examination, general information like name, age, gender and date of examination were recorded.

Crossbite was diagnosed when there was a discrepancy in the buccolingual relationship of the upper and lower teeth. It was classified into four categories: no crossbite, anterior crossbite, unilateral posterior crossbite, bilateral posterior crossbite.

Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS). A chi square test was used to determine the significance within gender and age classes. P value <0.05 was considered to be statistically significant.

Results

The sample's demographic information is broken down by age and gender. The study shows that the number of male and female participants is almost equal (49.3% male and 50.7% female). Table 1 reveals that the 17-20 age group has the highest percentage of females, while the 7-11 age group has a slightly greater percentage of males.

Table (1): Total number of examined patients.

Gender		Age Classes			Total
		7-11	12-16	17-20	
Male	No.	28	23	18	69
	%	20	16.4	12.9	49.3
Female	No.	27	11	33	71
	%	19.3	7.9	23.6	50.7
Total	No.	55	34	51	140
	%	39.3	24.3	36.4	100

The findings of the present study indicate that 70.7% of the sample does not exhibit a crossbite, with a nearly equal distribution between males and females. Conversely, 15.7% of the entire sample exhibits an anterior crossbite. The prevalence among males is slightly higher (9.3%) compared to females (6.4%), although this disparity is not statistically significant (p=0.675).

Vol.10, No.03; 2026

ISSN: 2581-3366

Unilateral and bilateral crossbite reveal lower proportions of the whole sample, approximately 9.3% and 4.3%, respectively, demonstrating a comparable lack of statistically significant between gender as indicated in table 2.

Table (2): Distribution of crossbite according to gender.

Crossbite	Gender				Total		P-value
	Male		Female				
	No.	%	No.	%	No.	%	
No cross bite	48	34.3	51	36.4	99	70.7	0.675
Anterior crossbite	13	9.3	9	6.4	22	15.7	
Uni lateral crossbite	6	4.3	7	5.0	13	9.3	
Bi lateral crossbite	2	1.4	4	2.9	6	4.3	

Anterior crossbite was distributed across the age groups as (6.4%) in 7-11, 6 (4.3%) in 12-16, and 7 (5%) in 17-20. Unilateral crossbite is distributed fairly evenly across all age groups. Bilateral crossbite was the least common, about (4.3%), exclusively in the 12-16 and 17-20 age group. However, there was no significant difference in the prevalence of type of crossbites among the age groups, as seen in table 3.

Table (3): Distribution of crossbite according to age.

Crossbite	Age classes						Total		P-value
	7-11		12-16		17-20				
	No.	%	No.	%	No.	%	No.	%	
No cross bite	42	30	20	14.3	37	26.4	99	70.7	0.330
Anterior crossbite	9	6.4	6	4.3	7	5	22	15.7	
Uni lateral crossbite	4	2.9	5	3.6	4	2.9	13	9.3	
Bi lateral crossbite	0	0	3	2.1	3	2.1	6	4.3	

Vol.10, No.03; 2026

ISSN: 2581-3366

Discussion

This study assesses the prevalence and associated factors of crossbite among patients aged 7 to 20 years attending the dental unit of Hawler Medical University. The study on prevalence helps the orthodontist to rule out early diagnosis and treatment plan for a better treatment outcome.
Out of 140 cases, 41(29.3%) had cross bite which is comparable to the study conducted on the Turkish population, where the prevalence of crossbite was approximately 27.4% (Mtaya, 2009). This prevalence was significantly lower than that reported by Chowdhury et al. (2019) among the Bangladeshi population, where the prevalence of crossbite was approximately 54.3%, considerably higher than among the Indian population, which reported a frequency of about 8.3% (Remmiya and Sharon, 2022). Although crossbite is not the dominant condition, it still affects nearly one-third of the patients examined. The percentage variation may stem from the study involving patients seeking various dental treatments rather than exclusively orthodontic care, and it might be related to the sample size and sampling method.

The prevalence of anterior crossbite in this study was relatively high, 15.7%, as compared with study by Nur et al. (2014) and lower than other studies (Nazir, 2021; Sultana, 2015).

Regarding posterior crossbite, approximately 9.3% of the sample had unilateral crossbite and 4.3% had bilateral crossbite. These results are comparable to those reported by Gungor (2016) in the Turkish population, which indicated a prevalence of 9.5% for unilateral and 6.2% for bilateral posterior crossbite. Conversely, the findings of the current study are much lower than those from previous research conducted in the Indian population, where unilateral crossbite prevalence was approximately 67.24% and bilateral posterior crossbite was 32.75% (Remmiya and Sharon, 2022). The current findings were comparable to those of prior studies, which highlighted the relatively greater prevalence of unilateral crossbite than bilateral crossbite (Vithanaarachchi and Nawarathna, 2017; Dacosta, Utomi, 2011).

Anterior crossbite, unilateral posterior crossbite, and bilateral posterior crossbite were all statistically nonsignificant among males and females. This concludes that the distribution of crossbite among males and females is similar. The finding parallels the results of studies conducted among Turkish and Bangladeshi populations (Nur et al. 2014; Sultana, 2015). In contrast to these findings, a significant association was observed between gender and type of crossbite, with posterior crossbite being more prevalent among females and anterior crossbite more prevalent among males, as described in the study by Remmiya and Sharon (2022).

The findings underscore the significance of early diagnosis and interceptive orthodontic intervention. Recognizing crossbite in childhood can prevent functional shifts, abnormal jaw growth, and subsequent malocclusion complications. Consequently, regular dental examinations and awareness among healthcare providers and parents are crucial for early detection and intervention. Studies on crossbite prevalence informs orthodontists about the significance of interceptive therapy to reduce the risk of crossbite as age increases. The study's limitations were a limited sample size and observer bias. Further study can be conducted to correlate crossbite

Vol.10, No.03; 2026

ISSN: 2581-3366

with other etiological factors and assess different treatment modalities for managing crossbite cases.

Conclusion

This study illustrated that although most patients did not display crossbite, a significant proportion of patients came in with the anterior and posterior crossbite, and the clinical implication of the study is that early detection is important. The lack of major correlations with age and gender implies that multifactorial factors contribute to crossbite formation and not the demographic factors only. Identifying occlusal issues, their frequency, and the need for treatment can aid in determining the best treatment plan and personnel requirements in orthodontics. Such epidemiological surveys are critical because they can help identify the causes of malocclusion and, consequently, assist in developing preventive and intervention strategies, along with public awareness programs.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

Bishara SE, Saunders WB. (2001). *Textbook of orthodontics*. Saunders Book Company; Mar 21.

Chevitarese AB, Della Valle D, Moreira TC. (2002). Prevalence of malocclusion in 4-6 year old Brazilian children. *J Clin Pediatr Dent.*,27(1):81-85. doi:10.17796/jcpd.27.1.an436m284201571p

Chowdhury, M. S. H., Sultana, N., Naim, M. A., Nashrin, T., & Nahar, L. (2019). Prevalence of Cross Bite among the Orthodontic Patients at a Dental Unit of Bangladesh. *Journal of National Institute of Neurosciences Bangladesh*, 5(2), 167–171. https://doi.org/10.3329/jninb.v5i2.43024.

Dacosta OO, Utomi IL. (2011). A clinical review of crossbite in an orthodontic population. *West Afr J Med.*, 30(1):24-8. doi:10.4314/wajm.v30i1.69880.

Gungor K, Taner L, Kaygisiz E. (2016). Prevalence of Posterior Crossbite for Orthodontic Treatment Timing. *J Clin Pediatr Dent.*, 40(5):422-4. doi:10.17796/1053-4628-40.5.422.

Jain R. (2021). Prevalence and Associated Factors for Crossbite Malocclusion in South Indian Subjects - A Retrospective Study. *International Journal of Dentistry and Oral Science,* 8(8):4109-4113. 10.19070/2377-8075-21000839.

Kahraman Gungor, Lale Taner, Emine Kaygisiz. (2016). Prevalnce of Posterior Crossbite for Orthodontic Treatment Timing. *Journal of Clinical Pediatric Dentistry,* 40(5);422-424. doi:10.17796/1053-4628-40.5.422

Kennedy DB, Osepchook M. (2005). Unilateral posterior crossbite with mandibular shift: a review. *J Can Dent Assoc.,* 71(8):569-73. Pubmed PMID:16202196

Kumar S, Roy AS, Chandna AK, Garg A, Chaudhary UK. (2016). Crossbite: An Orthodontic Exigency. *J Clin Diagn Res. ,* 10(9): ZJ09-ZJ10.

Mtaya M, Brudvik P, Astrom AN. (2009). 'Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12 to 14-year-old Tanzanian schoolchildren'. *Eur J Orthod,* 31(5):467-476. doi:10.1093/ejo/cjn125

Nazir, Rozina & Amin, Erum & Bangash, Azhar. (2021). PREVALENCE OF ANTERIOR CROSSBITE AND ITS RELEVANCE IN CLASS I AND III MALOCCLUSIONS. *Pakistan Armed Forces Medical Journal*, , 71. 314.

Nur B, I ˙lhan D, Fisxekc¸iog˘lu E, Oktay I ˙, Arun T (.2014). Prevalence of orthodontic malocclusion and evaluation criteria in 7 geographic regions of Turkey. *Turkish J Orthod.* ,26:154–161. DOI: http://dx.doi.org/10.13076/ TJO-D-13-00008

Remmiya Mary Varghese, Sharon Keziah V. (2022). A Study Assessing the Prevalence of Crossbite among Patients Reporting for Orthodontic Treatment and its Association with Different Factors. *J Res Med Dent Sci*, 10(5): 83-87.

Salzmann JA. (1968). Handicapping malocclusion assessment to establish treatment priority. *Am J Orthod.* ,54(10):749-65. doi: 10.1016/0002-9416(68)90065-1. PMID: 5245740.

Sollenius O, Petren S, Bondemark L.(2020). 'An RCT on clinical effectiveness and cost analysis of correction of unilateral posterior crossbite with functional shift in specialist and general dentistry'. *Eur J Orthod.*, 42(1):44-51. doi: 10.1093/ejo/cjz014. PMID: 31067324.

Sultana, N., Hassan, G. S., Jha, D., Nashrin, T., Nahar, L., & Naim, M. A (2015). Prevalence of Cross Bite Among the Orthodontic Patients in Bangabandhu Sheikh Mujib Medical University. *Bangladesh Journal of Medicine*, 26(1), 9–12. https://doi.org/10.3329/bjmed.v26i1.25647.

Verma Priyanka; Kapoor Seema1; Sait Haseena1; Ghosh Sujoy; Gupta Sunita. (2020). Dental phenotype of multiple impacted supernumerary teeth in Wiedemann–Steiner syndrome. *Journal of Cleft Lip Palate and Craniofacial Anomalies*, 7(1):59-63. | DOI: 10.4103/jclpca.jclpca_12_19

Vithanaarachchi SN, Nawarathna LS. (2017). Prevalence of anterior cross bite in preadolescent orthodontic patients attending an orthodontic clinic. *Ceylon Med J.*, 62(3):189-192. doi:10.4038/cmj.v62i3.8523.

Warren JJ, Bishara SE. (2002). 'Duration of nutritive and nonnutritive sucking behaviors and their effects on the dental arches in the primary dentition'. *Am J Orthod Dentofacial Orthop.* , 121(4):347-356. doi:10.1067/mod.2002.121445.