

A Study Assessing the Prevalence of Crossbite in Patients Reporting for Orthodontic Therapy in a Private Dental Institution

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ABSTRACT

Crossbite should be visible seen in orthodontic practice. It very well may be clinically distinguished, when the lower teeth are in a buccal or labial position in regards to the upper teeth, in a one-sided, respective, foremost and additionally back way. In the cross over aspect, ordinary impediment is the point at which the palatine cusps of the upper molars and premolars block in the fossa of lower molars and premolars. In the anteroposterior plane, the upper incisors impede on the labial parts of lower incisors. During the period from June 2019 to March 2021, we reviewed the case record of 86000 patients out of which 116 samples were collected. A customized examination form was used to collect the data and a special table for data collection was prepared. Data were analysed using descriptive statistics and a chi square test was done. P value less than or equal to 0.05 was considered as statistically significant. 110 individuals who had crossbite were filtered from the dias, out of which 52.59% were found to be around 15-25 years and around 31.19% were between 26-35 years. From our study it is noted that the majority of the patients were male (60.55%) and around (39.45%) of the patients were female. Within the limits of present study, it is shown that the majority of the individuals who had crossbite also had spacing and proclination and also proves that Class I occlusion was seen in the majority of cases from our study.

Keywords: Crossbite; Innovative technology; Maxilla; Mandible; Orthodontic practice.

INTRODUCTION

A crossbite is an error in the buccolingual relationship of the upper and lower teeth. Crossbite should be visible regularly in orthodontic practice. It tends to be clinically recognized, when the lower teeth are in a buccal or labial position in regards to the upper teeth and posterior manner ¹. In the cross over aspect, ordinary impediment is the point at which the palatine cusps of the upper molars and premolars block in the fossa of lower molars and premolars. In the anteroposterior plane, the upper incisors impede on the labial parts of lower incisors ².

The term buccal crossbite means to the buccal cusps of the lower teeth that occlude buccally to the buccal cusps of the upper teeth ^{3,4}. Scissor bite condition when the buccal cusps of the lower teeth block lingual to the lingual cusps of the upper teeth. Crossbite malocclusion can have a skeletal or dental part or mix of both. The etiology of a cross-chomp deformation incorporates: Inherited impact, Deficient dental curve length, Over held deciduous teeth, Effusive teeth, Propensities like digit sucking, Skeletal-anteroposterior disparity of curves, Congenital fissure and sense of taste ⁵. Anterior crossbite can occur in primary, and mixed dentition due to a disharmony between the skeletal, functional and dental components of the ⁶. This is characterized by one or more anterosuperior teeth occluding behind the lingual aspect of anteroinferior teeth ^{3,7}.

In dental foremost crossbite, at least one teeth are involved. The profile is straight in driven impediment and driven connection. Class I molar and canine connection should be visible. SNA, SNB, and ANB points are inside typical cutoff points. It tends to be because of unusual pivotal dental inclination ⁸.

The term Pseudo Class III or functional foremost crossbite can be brought about by mandibular hyper drive, which incites a lower tongue position and an untimely canine contact that entangles the upper maxilla ². The mandible is progressed mesially every so often to get most extreme intercuspation. The patient can arrive at an edge-to-edge incisal connection in driven connection. There is a Class III molar connection in driven impediment and a Class I connection in driven connection. The facial profile is straight in driven connection and curved in greatest intercuspation ⁹.

Skeletal is portrayed by molar and canine Class III connection in driven impediment and driven connection. An edge to edge incisor connection can't be gotten in driven connection. The etiology of the malocclusion and the tendency of the impacted teeth ought to be assessed. The upper curve development is bound to be steady if teeth to be moved are at first shifted palatally ^{10,11}. Appliance that are used for development are Casket spring, Quad helix apparatus, carefully helped quick maxillary extension, Ni Ti palatal expander.on. The patient has an inward profile and a retrusive upper lip, transcendent jawline and ANB point is negative.

Graber has characterized crossbite as a condition where at least one teeth might be strangely malposed either lingually or labially concerning restricting teeth. Serious foremost crossbites rather than back crossbites are normally not remedied until the second phase of traditional treatment or could stay forthcoming for careful rectification. The early blended dentition stage gives an optimal stage to utilize Catlan's apparatus and opposite the nibble. To utilize this apparatus, the specialist needs to initially recognize crossbites of dental beginning from those of skeletal beginning.

A forward functional shift of the mandible is a significant problem that can cause both functional and aesthetic complications for many patients. This shift usually occurs in growing patients, and it is unusual to see in adult patients ¹². They might be lateral functional shifts, which leads to unilateral posterior crossbites, or forward functional shifts, which cause pseudo class III malocclusions ¹³. A mandibular functional shift usually poses a challenge for orthodontists, especially when it is accompanied by a temporomandibular disorder (TMD). Diagnosis and complete elimination of the etiologic factors are the keys to an esthetic and stable outcome ¹⁴⁻¹⁵.

Hence, the aim of this study is to evaluate the prevalence of crossbite in patients visiting private dental institutions.

MATERIALS AND METHODS

This study is a retrospective cross sectional study conducted in a Private Dental Institution, in chennai to determine the incidence of crossbite with the approval from the Institutional Review Board. It included demographic data of the patients along with dental status of each individual. The data collection was done by reviewing the patient's record and analysed the data of 86000 patients between June 2019 and March 2021. Based on the previous study, 110 samples were then filtered from patients' records of age group 15 - 40 years. A customised examination was used to collect data and a specified table for data collection was prepared. The following parameters such as age, gender, individual arch variation, dental malocclusion were recorded. The data recorded was cross verified by another examiner. Data collected was analysed using SPSS software version 20. Descriptive statistics and Chi square test was done to determine the correlation between the variables with P value less than 0.005 was considered as statistically significant.

RESULTS AND DISCUSSION

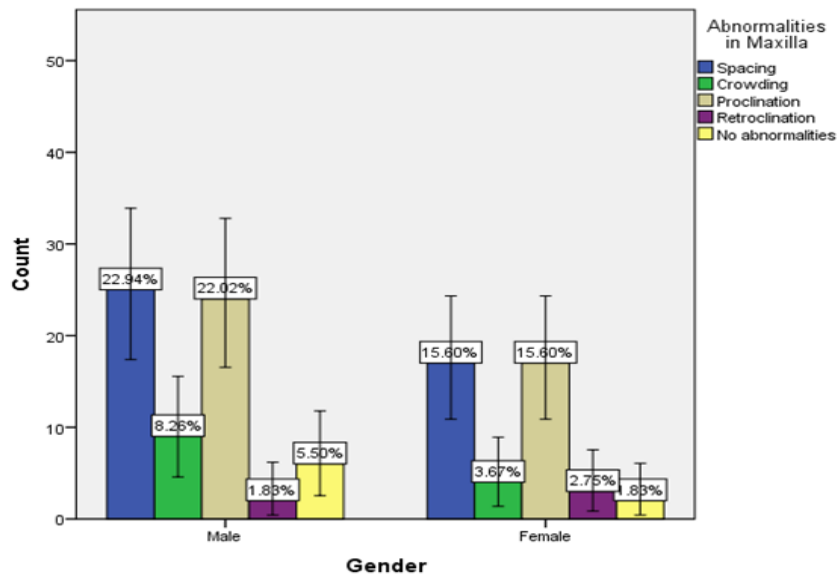


Figure 1 - Association between gender and malocclusion in the Upper arch were done. X axis represents the gender and the Y axis represents the malocclusion in the Upper arch. Around 22.94% males individuals and 15.60% females individuals had spacing (Blue) followed by 22.02% males and 15.60% females had proclination (Wheat) followed by 8.26% males and 3.64% females had crowding (green) followed by 1.83% males and 2.75% females had retroclination followed by 5.50% males and 1.83% females had no abnormality (Yellow). Chi square analysis was done and P value was found to be $0.721 > 0.05$, which is statistically not significant.

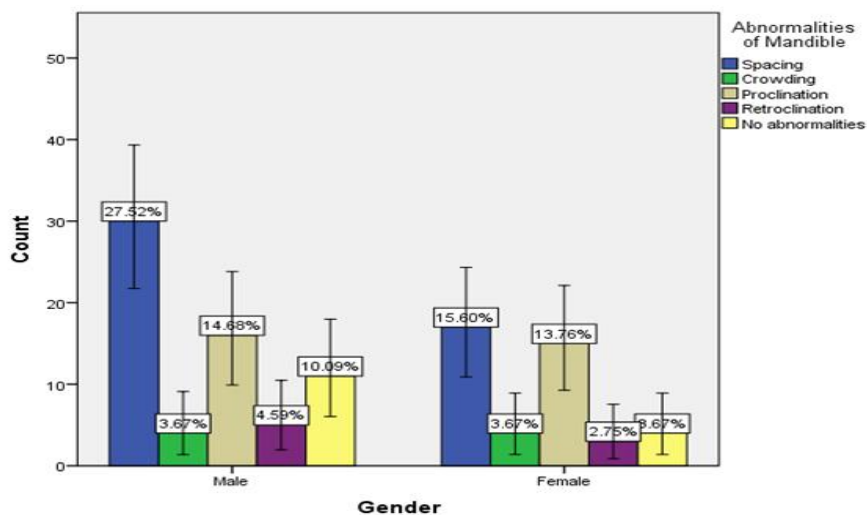


Figure 2 - Association between gender and malocclusion in the Lower arch were done. X axis represents the gender and the Y axis represents the malocclusion in the Lower arch. Around 27.52% males individuals and 15.60% females individuals had spacing (Blue) followed by 14.68% males and 13.76% females had proclination (Wheat) followed by 10.09% males and 3.67% females had no abnormality (Yellow) followed by 3.67% males and 3.67% females had crowding (green) followed by 4.59% males and 2.75% females had retroclination. Chi square analysis was done and P value was found to be $0.616 > 0.05$, which is statistically not significant.

110 individuals who had crossbite were filtered from the dias, out of which 52.59% were found to be around 15-25 years and around 31.19% were between 26-35 years which correlates with the study done by Yasunaga et al., 2021 ¹¹

Orthodontic procedures are done worldwide for a major correction of aesthetics. As we know good look is one of the most important signs for the upcoming generation and treatments have been widened for specific problems in specific fields. So from our current study it is noted that, majoritively younger aged individuals have undergone more crossbite correction ¹⁶.

From our study it is noted that the majority of the patients were male (60.55%) and around (39.45%) of the patients were female which contradicts with the study done by Arthur et al., 2018 ¹⁷.

This contradicts with our present study explaining that young females are the category of patients which most often apply for orthodontic treatment, probably because of their higher aesthetic demands, despite their objective needs being no greater. Aesthetic, skeletal and dental analyses reveal an obvious dimorphism with larger dimensions in males, especially for the nose, cheekbones, mouth and mandibular canines ¹⁸.

The findings from our current study proves that in case of abnormalities in maxilla, spacing (38.5%) and proclination (37.6%) are seen more in the maxillary arch for the patients than crowding or retroclination which correlates with the study done by Moly et al., 2021 ¹⁹. From the article discussed it is proven that, restoring the spacing in anterior teeth can be done with either direct composite veneering or with porcelain laminate veneers but better results with the natural teeth can be gained by undergoing orthodontic procedures ²⁰. Association between gender and abnormalities in maxilla. Chi square analysis was done and P value was found to be $0.721 > 0.05$, which is statistically not significant. Our current study proves that spacing (43.1%) and proclination (28.5%) are the most commonly seen abnormalities in case of mandible as well which correlates with the study done by Jackson et al., 2010 ²¹. Association between gender and abnormalities in mandible. Chi square analysis was done and P value was found to be $0.616 > 0.05$, which is statistically not significant.

Malaligned anterior teeth, affecting the esthetics is one the common problem, which is most effectively corrected by various types of orthodontic therapies. Orthodontics is always the first line of treatment modality for the esthetic and functional rehabilitation of labially proclined or rotated anterior teeth, but in some rare cases, the unwillingness of the patient for the orthodontic correction poses a tough challenge to the dentist ²². In such exceptional cases, the only other treatment option for the successful restoration of such teeth to the satisfaction of the patient is the change in mesio-distal and labio-palatal angulation of the tooth by restorative therapy, which requires the intentional root canal treatment of the involved teeth followed by change in angulation with custom cast post and core and esthetic crown and fixed dental prosthesis ^{22,23}.

From our current study it is proven that around 85.3% of the individuals had a shallow type of palate which correlates with the study done by Hormdee et al., 2020 ²⁴. Association between age group and palatal vault was done. X axis represents the age group and Y axis represents the palatal vault. Around 49 individuals of 15-25 years and 33 of 26-35 year individuals had shallow type of vault. Chi square analysis was done and P value was found to be $0.01 < 0.05$, which is statistically significant. The findings from our study shows that around 69.7% of the individuals had Class I occlusion on a basis which correlates with the study done by Moses et al., 1941 ²⁵. Class I occlusion doesn't indicate that the profile is normal. Only the molar relationship of the occlusion is normal but the incorrect line of occlusion or as described for the maxillary first molar, but the other teeth have problems like spacing, crowding, over or under eruption, etc.

CONCLUSION

Within the limits of present study, it is shown that the majority of the individuals who had crossbite also had spacing and proclination and also proves that Class I occlusion was seen in the majority of cases from our study.

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AUTHORS CONTRIBUTION

The first author (Tasleem Abitha S) performed the analysis and interpretation and wrote the manuscript. The second author (Dr. Remmiya Mary Varghese) contributed to the conception, data design, analysis, interpretation, and critically revised the manuscript. All the authors have discussed the results and contributed to the final manuscript.

CONFLICT OF INTEREST

All the authors declare that there was no conflict of interest in present study.

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REFERENCES

- [1] Thilander B, Wahlund S, Lennartsson B. The effect of early interceptive treatment in children with posterior cross-bite. *Eur J Orthod* 1984; 6: 25–34.
- [2] Pinto AS, Buschang PH, Throckmorton GS, et al. Morphological and positional asymmetries of young children with functional unilateral posterior crossbite. *Am J Orthod Dentofacial Orthop* 2001; 120: 513–520.
- [3] Preeti B. Rapid bite raiser for anterior crossbite' (rbrac) appliance for rapid correction of anterior crossbite - a new appliance design. *annals and essences of dentistry* 2011; 3: 54–55.
- [4] Felicita AS, Sumathi Felicita A. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor – The sling shot method. *The Saudi Dental Journal* 2018; 30: 265–269.
- [5] Dixon MJ, Marazita ML, Beaty TH, et al. Cleft lip and palate: understanding genetic and environmental influences. *Nat Rev Genet* 2011; 12: 167–178.
- [6] Varghese RM, Subramanian AK, Sreenivasagan S. Comparison of dentoskeletal changes in skeletal class II cases using two different fixed functional appliances: Forsus fatigue resistant device and powerscope class II corrector—A clinical study. *Journal of International Oral Health* 2021; 13: 234.
- [7] Miyajima K, McNamara JA Jr, Sana M, et al. An estimation of craniofacial growth in the untreated Class III female with anterior crossbite. *Am J Orthod Dentofacial Orthop* 1997; 112: 425–434.
- [8] Waldman LK, Nosan D, Villarreal F, et al. Relation between transmural deformation and local

- myofiber direction in canine left ventricle. *Circ Res* 1988; 63: 550–562.
- [9] Yu C-C, Chien-Chih Yu. ISW for the Treatment of Bilateral Posterior Buccal Crossbite. *jdoh* 2019; 1: 1–5.
- [10] Lindner A. Unilateral Posterior Cross-bite in Preschool Children with Special Reference to Sucking Habits: A Clinical and Experimental Study. 1991.
- [11] Yasunaga M, Ishikawa H, Yanagita K, et al. An orthodontic perspective on Larsen syndrome. *BMC Oral Health* 2021; 21: 111.
- [12] Sarkar A. Functional Instability or Paradigm Shift? Epub ahead of print 2012. DOI: 10.1007/978-81-322-0466-4.
- [13] Guo X, Watari I, Ikeda Y, et al. Effect of functional lateral shift of the mandible on hyaluronic acid metabolism related to lubrication of temporomandibular joint in growing rats. *Eur J Orthod*. Epub ahead of print 29 February 2020. DOI: 10.1093/ejo/cjaa012.
- [14] Wattanachai T, Yonemitsu I, Kaneko S, et al. Functional Lateral Shift of the Mandible Effects on the Expression of ECM in Rat Temporomandibular Cartilage. *The Angle Orthodontist* 2009; 79: 652–659.
- [15] Preethi KA, Auxzilia Preethi K, Sekar D. Dietary microRNAs: Current status and perspective in food science. *Journal of Food Biochemistry*; 45. Epub ahead of print 2021. DOI: 10.1111/jfbc.13827.
- [16] Romanova J. The procedure of Anteroposterior Tooth Contact Adjustment (APTCA) in Orthodontic patients. *Journal of Dental Problems and Solutions* 2017; 044–047.
- [17] Watkinson S, Harrison JE, Furness S, et al. Orthodontic treatment for prominent lower front teeth (Class III malocclusion) in children. *Cochrane Database Syst Rev* 2013; CD003451.
- [18] Batista KB, Thiruvengkatachari B, Harrison JE, et al. Orthodontic treatment for prominent upper front teeth (Class II malocclusion) in children and adolescents. *Cochrane Database of Systematic Reviews*. Epub ahead of print 2018. DOI: 10.1002/14651858.cd003452.pub4.
- [19] Molyneaux C, Sherriff M, Wren Y, et al. Changes in the Transverse Dimension of the Maxillary Arch of 5-Year-Olds Born With UCLP Since the Introduction of Nationwide Guidance. *Cleft Palate Craniofac J* 2021; 10556656211028511.
- [20] Incidence of Impacted Canines in Maxillary Arch. *Indian Journal of Forensic Medicine & Toxicology*. Epub ahead of print 2020. DOI: 10.37506/ijfmt.v14i4.12561.
- [21] Jackson J. Mandibular dental abnormalities in Roe deer (*Capreolus capreolus*) from the New Forest. *Journal of Zoology* 2009; 177: 491–493.
- [22] Decision letter: Hedgehog signaling patterns the oral-aboral axis of the mandibular arch. Epub ahead of print 2018. DOI: 10.7554/elife.40315.037.
- [23] Suzuki A, Arai K, Oda I. Mandibular dental-basal arch forms in skeletal Class III patients with mandibular prognathism. *Orthodontic Waves* 2017; 76: 174–183.
- [24] Hormdee D, Yamsuk T, Sutthiprapaporn P. Palatal Soft Tissue Thickness on Maxillary Posterior Teeth and Its Relation to Palatal Vault Angle Measured by Cone-Beam Computed Tomography. *Int J Dent* 2020; 2020: 8844236.
- [25] Moses ER. Some resultant changes after filling (high) palatal vault. *Speech Monographs* 1941; 8: 102–113.