

Association of crossbite with vertical skeletal growth patterns: A retrospective study

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ABSTRACT

Crossbite is a type of malocclusion in which teeth are positioned more buccally or lingually than their corresponding opposing tooth in the upper or lower dental arch, resulting in a lateral mismatch of the teeth in the dental arches. Crossbite can be unilateral or bilateral, and it can be anterior or posterior. The link between crossbite and skeletal growth pattern remains uncertain. The current study aimed to find the prevalence of crossbite in subjects visiting a private dental hospital and evaluate if there is any association between crossbite and skeletal growth pattern. Data required for the study were procured from the dental information archiving software. The data were sorted and entered into an Excel spreadsheet. IBM SPSS software version 23 was used to conduct the statistical analysis. Graphs and tables were used to interpret the findings. the prevalence of crossbite was found to be 6.4%. Subjects with horizontal growth pattern commonly had crossbite, but no statistical significance ($P = 0.07$), standard deviation (1.011), was noted. There was no statistically significant association between different skeletal growth patterns however subjects with horizontal growth pattern reported more commonly with crossbite.

Key words: Crossbite, innovative, malocclusion, prevalence, skeletal growth pattern

INTRODUCTION

A commonly observed discrepancy seen during orthodontic practice is the buccolingual relationship of the maxillomandibular dentition which results in a crossbite.^[1] Clinically, it is evident that when the mandibular teeth are in a buccal or labial position with respect to the maxillary arch, it can be anterior and/or posterior crossbite, either unilateral or bilateral. The occlusion in the transverse

dimension is said to be normal when both mesiopalatal and distopalatal cusps of the upper molars and palatal cusps of premolars are in occlusion with the central fossa of lower premolars and molars. Maxillary incisors occlude on the labial surface of the mandibular incisors in the anteroposterior plane. A crossbite can be caused by a wide variety of factors such as over-retention of deciduous teeth, genetic inheritance, the presence of supernumerary teeth, inadequate dental arch length, and habits such as thumb sucking. Furthermore, crossbite is seen in cleft lip and palate and skeletal anteroposterior discrepancy of arches.^[2-4]

The various types of crossbite include anterior, posterior, unilateral, and bilateral crossbite. A skeletal or dental component, or a combination of both, can be present in crossbite malocclusion. In dental anterior crossbite, one or more teeth are involved and more commonly associated

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with a class 1 malocclusion.^[5,6] A thorough examination of the etiology of the malocclusion and the inclination of the affected teeth is required.^[7,8] If the maxillary posteriors are initially tilted palatally, then the arch expansion is more likely to be stable. The commonly used expansion appliances are hyrax, quad-helix appliance, coffin spring, and nickel–titanium palatal expander. A predominant chin, concave profile, retrusive upper lip, and negative ANB angle are some of the patient characteristics that can be seen.

The sagittal skeletal growth pattern can be classified broadly as average, vertical growth pattern, and horizontal.^[9,10] Our team has a multitude of information and studies that have been translated into high-quality publications.^[11-30] The goal of this study is to determine the prevalence of crossbite in patients visiting a private dental clinic and to see if there is a link between skeletal growth pattern and crossbite.

MATERIALS AND METHODS

Study population

The current research was conducted at Saveetha Dental College and Hospitals in Chennai, India, in the Department of Orthodontics. The samples were taken of patients reporting from June 2019 to February 2021. A total of 1380 patients who came to the Orthodontic Department for fixed appliances had their records reviewed. The Institutional Ethical Committee provided Ethical Clearance (IHEC/SDC/ORTHO/21/235), and all study participants signed a written informed consent form.

Inclusion criteria

The study included case records of healthy subjects between the ages of 18 and 40 who came to the outpatient department for malocclusion correction and had no previous orthodontic treatment done.

Exclusion criteria

The study eliminated case records from participants who had multiple missing teeth or a periodontally impaired dentition.

Parameters assessed

The following parameters' data were gathered from the records:

1. Age
2. Sex – male/female
3. Crossbite – present/absent
4. Type of growth pattern – horizontal/vertical/average based on cephalometric analysis.

Statistical analysis

Chi-square test was performed using SPSS (version 20.0; SPSS, Chicago, Ill). Analysis was performed to find if there was any association between the presence of

type of crossbite and type of growth pattern. The data were analyzed by performing descriptive statistics and interpreted as graphs and tabulations with significance level and standard deviation (SD).

RESULTS AND DISCUSSION

Crossbite prevalence was determined to be 6.4% in this investigation. Table 1 gives the frequency distribution of subjects with crossbite based on gender and growth patterns. Table 2 gives the frequency distribution of subjects based on gender and type of crossbite present as observed in the study. Figure 1 is the bar chart representing the association of growth pattern with the type of crossbite based on the region involved. From the study, the horizontal growth pattern was found to be more frequently associated with individuals having crossbite, both anterior and posterior.

Table 1: Frequency distribution of subjects with crossbite based on gender and growth pattern

	Males	Females
Horizontal	15	24
Average	7	13
Vertical	10	20

Table 2: Frequency distribution of subjects based on gender and type of crossbite

	Males	Females
Anterior crossbite	18	30
Posterior crossbite	14	27

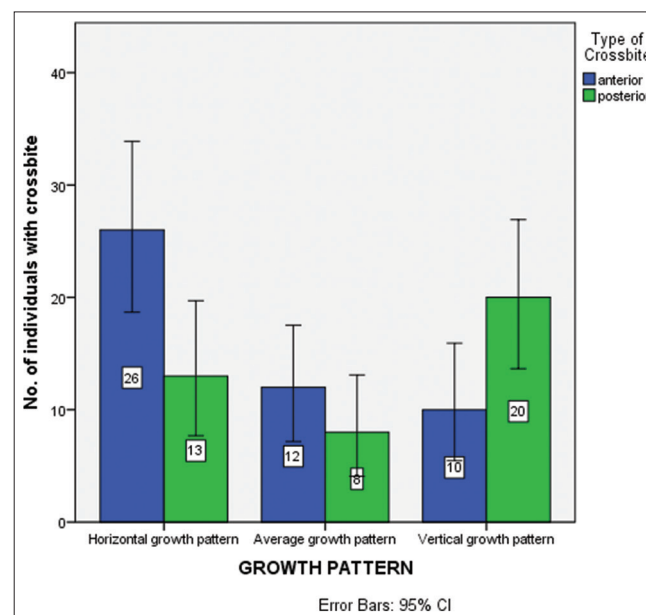


Figure 1: Bar diagram depicting the association of growth pattern with the type of crossbite based on the region involved. No significant association is noted (Chi-square $P = 0.07$)

Possible causes of anterior crossbite include long-term retained deciduous dentition, any trauma to deciduous teeth resulting in the displacement of the corresponding permanent tooth germs from its ideal position, supernumerary teeth, odontoma, and other pathological conditions.

A posterior crossbite is a deviation in the transverse relation between upper and lower arches, which may persist postelimination of the causal factors, as it does not get corrected spontaneously.^[31] The etiology of posterior crossbite occurs as a resultant due to various factors such as skeletal, dental, or neuromuscular components, but one of the most common causes can be attributed to the reduced transverse width of the maxillary basal arch. The goal of crossbite treatment should be to improve the tooth-skeletal link, which will improve masticatory efficiency, as well as to develop a symmetrical condyle/fossa relationship.^[32]

The type of malocclusion is determined by an individual's skeletal growth pattern. An individual might present with horizontal growth pattern, average, and vertical growth pattern. In this study, the prevalence of crossbite was found to be 6.4%; previous literature has cited a prevalence of 3%–8% of crossbite in mixed dentition stages.^[13] Previous articles cite that in cases with congenitally missing teeth, crossbite was found to be more prevalent. Our study results are in concordance with previous studies.

In this study, it was found that individuals having anterior crossbite were increased in number compared to posterior crossbite. However, previous studies cite an increased case of posterior crossbite compared to anterior crossbite.^[33,34] This study was a unicentric study and the geographic variation among various populations were not assessed. One of the most common malocclusions in which early treatment is indicated is the anterior crossbite. It is crucial to figure out how common it is before planning orthodontic treatment.

The association between crossbite and skeletal growth pattern has not been concretely established in any studies earlier. The correlation between crossbite and skeletal growth pattern was not statistically significant in this study ($P = 0.07$), SD (1.011). However, it was discovered in this study that crossbite was most usually connected with horizontal growth pattern, followed by average growth pattern, and finally vertical growth pattern. This may be attributed to the factors that horizontal growth pattern is more common in the population analyzed.

The interpretations of the study results should be taken with caution as this study has certain limitations like smaller sample size, retrospective data. Hence, future research with more samples and a better methodology should be planned and executed.

CONCLUSION

Crossbite malocclusion was more common in subjects with horizontal growth than other skeletal patterns; the study found no significant link between crossbite and skeletal development pattern.

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Conflicts of interest

There are no conflicts of interest.

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