Prevalence and Gender Distribution of Dental Crossbite and its Association with Malocclusion: An Institution Based Study

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Abstract

Crossbite is defined as any abnormal buccolingual relationship between opposing incisors, molars or premolars in centric relation. It can either be skeletal crossbite or dental crossbite. The dental crossbite is subdivided into anterior crossbite and posterior crossbite. The purpose of the study was to determine the gender wise distribution of crossbite malocclusion among the study population and also to determine the type of malocclusion among the patients. The study was done in a university set up in a private dental college and hospitals, Chennai. A retrospective study was conducted in patients with crossbite. The final sample size was 934 after reviewing 41190 case sheets. The data was collected from the hospital digital database by reviewing the patients records and analysing them. The data was entered in an excel sheet and imported to SPSS software version 23 and the results were calculated using Chi square test. It was observed that the prevalence of crossbite in male population was 60.06% and in the female population was 39.9%. Crossbite in Class I malocclusion was more common among the male patients (47.64%) followed by class III malocclusion (8.57%). However, it is not significant statistically (P value>0.05). Within the limits of the study, it was observed that crossbite was more prevalent in the male population and crossbite in class I malocclusion was more common among the patients. Thus, the idea of early intervention should be emphasised.

Keywords: Malocclusion; Crossbite; Anterior; Posterior

Introduction

Cross bite is one of the common problems and the most neglected problem. Crossbite is defined as any abnormal buccolingual relationship between opposing incisors, molar or premolar in centric relation. [1] It can either be a skeletal crossbite or dental crossbite or a combination of both. [2]

Dental crossbite is further subdivided into anterior and posterior crossbite. Both Posterior crossbite and anterior crossbite can be a simple single tooth crossbite or the entire segment can get involved. [3] This simple problem of cross bite if left untreated in the developmental stages can result in enamel wear mainly, the incisal edges, [4] periodontal problems namely gingival recession [5] to severe skeletal malocclusion like a skeletal class III which may lead to complex treatments. The present study focuses on dental crossbite, for which the etiology can be from prolonged retention of primary dentition, habits such as thumb sucking, arch size discrepancies. [6] Duncan et al. have found a prevalence of 13%-25% for posterior crossbite in primary dentition. [7,8] Singh et al. in their study has noted a prevalence of 4.5% to 9.5% for anterior crossbite. [9,10]

According to Vithanaarachchi study, 11.4% of 721 patients had both anterior and posterior crossbite. [4]

Most of the malocclusions are gender and race specific. Studies on the presence of the dental crossbite in the south Indian population are not much explored. Hence the prevalence of dental crossbite in the south Indian population and its gender distribution and its correlation with the type of Angle's malocclusion was the design of this research project.

Previously our team had conducted numerous clinical trials [11-20] and few *in vitro* studies [21-25] over the past 5 years. Previously our team has a rich experience in working on various research projects across multiple disciplines. [26-40] Now the growing trend in this area motivated us to pursue this project. Now we are focusing on retrospective studies. The idea for this retrospective study stemmed from the current interest in our community.

The retrospective study focuses on the above discussed protocols. The idea of the study is to find which malocclusion is prevalent in crossbite patients and also their gender prevalence.

Materials and Methods

Study setting

This retrospective study was based on data collected from the digital database of a private dental college and hospitals. Patient's records were reviewed and analysed between June 2019 to March 2020. Approval was obtained from the institutional Scientific Review Board. Two examiners reviewed the study design and approved with the ethical board number (SDC/SIHEC/2020/DIASDATA/0619-0320).

Sampling

Data was collected retrospectively over a nine month period spanning from June 2019 to March 2020. Cross verification of data for error was done by presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. After reviewing 41190 case sheets, it was filtered based on data required. The final sample size was 934 patients with dental crossbite.

Data collection

The data was entered in the system in a methodical manner. For the present study, patient's records were obtained from the hospital digital database. The data was entered in excel manually and imported to SPSS for analysis. Incomplete or censored data was excluded from the study. The data was subdivided into three categories based on the (i) General prevalence of crossbite (ii) Gender prevalence of crossbite and (iii) Association with dental malocclusion.

Analytics

IBM SPSS Software version 23 was used for data analysis. Descriptive and association statistics which included frequency of distribution was used for analysis.

Results and Discussion

The data collected was entered in excel sheet and transferred to SPSS software version 23 to generate results using chi-square test. It was observed that a total of 934 (2.27%) patients had dental crossbite from 41190 patients reviewed. The prevalence of crossbite was compared with gender; it was observed that male population had a prevalence of 60.06% *i.e.* 561 patients. Female patients were found to have a prevalence of 39.94% *i.e.* 373 patients [Table 1 and Figure 1]. Association between gender of the patients with crossbite and Angle's dental malocclusion showed that Class I malocclusion was more common in the male patients with crossbite (47.64%) followed by class III malocclusion (8.57%) for which the P value was found to be statistically not significant (0.271) which is >0.05 [Figure 2]. Frequency distribution between dental malocclusion and number of patients with crossbite showed that patients with crossbite had 80.41% of class I malocclusion [Figure 3].

From the study it is observed that prevalence of crossbite was more among the male population that is 60.06% and the female population with crossbite was found to be 39.91%. Class I malocclusion was more common in male patients with crossbite (47.64%) followed by class III malocclusion (8.57%) (P value >0.05). Patients with crossbite had 80.41% of class I malocclusion.

In Naznin study, it was observed that male patients had more prevalence for crossbite 60% which is in accordance with the present study. [41] Lourdes, in their study recorded 60.1% crossbite in female population and 39.9% in male population which when compared to the present study shows a contrast as in our study, the prevalence of crossbite was more in male population (60.1%). [42]

Fabio, their study has observed that prevalence of anterior crossbite was found to be 47.7% in males and prevalence of posterior crossbite in male population was found to be 50.5%. [43] In Roopastudy, it was observed that the prevalence of crossbite in boys was 17.8% and in girls was 18.3% and also showed a female predominance for class I malocclusion, which is in contrast to the current study. [44] Satinder has found a prevalence of crossbite-unilateral single in males to be 2.6% and in females to be 3.4%. [9]

From Dacosta study, it was observed that the prevalence of anterior crossbite was 66.1% while posterior crossbite was 19.6%. [45] Ferro studied the prevalence of crossbite in Italian preschoolers and observed 3.7% prevalence in crossbite and also found females to have higher prevalence of crossbite, [46] this study shows a contrast to the current study as the present study shows a male predominance. Omar has observed a higher incidence of posterior crossbite (11.65%) in their study. [47]

A study conducted by Maria discusses the prevalence of crossbite in infants and has found a prevalence of 10.4% with respect to posterior crossbite. [48]

Venugopal has observed a 14.01% prevalence of crossbite in 10-12 year old children with a slight female predominance, [49] this study shows a contrast to the current study which shows a male predominance for crossbite.

According to Shobha, there was 89.9% prevalence of class I malocclusion and males showed a higher prediction for individual variations of malocclusion, which is in accordance to the present study. [50]

Mohammad observed 50% prevalence of class I malocclusion with a female predominance; this is in contrast to our study which shows a male predominance. [51]

Few studies have shown that class III malocclusion was more common in patients with delta crossbite, [52,53] to which the current study shows a contrast.

Our institution is passionate about high quality evidence based research and has excelled in various fields. [54-60] We hope this study adds to this rich legacy.

The present study may not be in accordance with few of the previous literature; this may be due to a varied geographical population, oral habits may be more in males and also few parameters on dental crossbite were not assessed in the study.

Therefore, further studies with inclusion of all study parameters with equal distribution of study population, should be carried out for better view on the point of study.

Table 1: Frequency distribution of gender of the patients with dental crossbite.

Crossbite	Female	Male	Total
Count	373	561	934
% of total	39.94%	60.06%	100%

Table 1 shows the frequency distribution of gender of the patients with dental crossbite. It is evident that the male population has high prevalence for crossbite (60.06%).
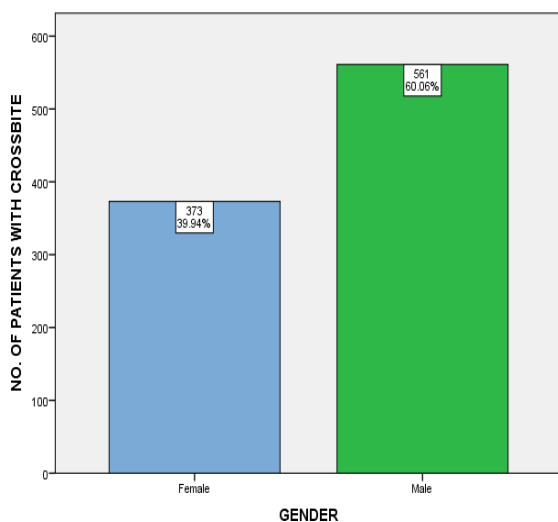

Figure 1: Bar graph shows frequency distribution of gender of the patients with dental crossbite. The X axis denotes gender of the patients and the Y axis denotes the number of patients with crossbite. The graph shows a higher prevalence of crossbite observed in male population (green) than the females (blue).
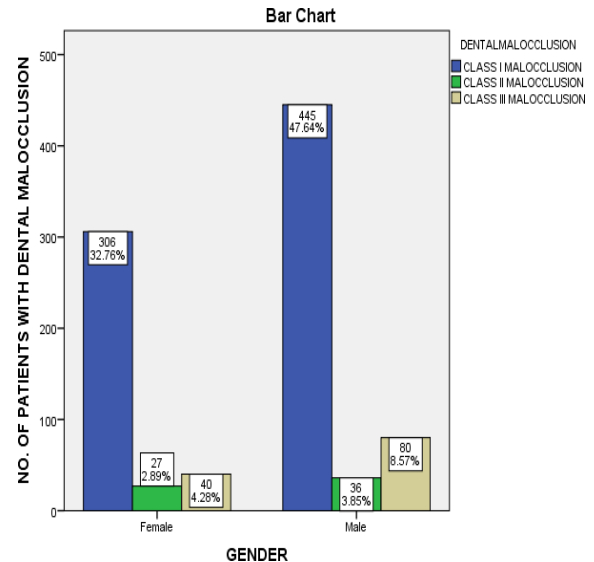

Figure 2: Bar graph showing the association between gender of patients with crossbite and dental malocclusion. The X axis represents gender of the patients and Y axis represents the number of patients with dental malocclusion. It is observed that class I malocclusion (blue) was commonly seen among the male patients. However, this association was found to be statistically not significant. (Pearson Chi square value-2.610, df-2, p value-0.271).
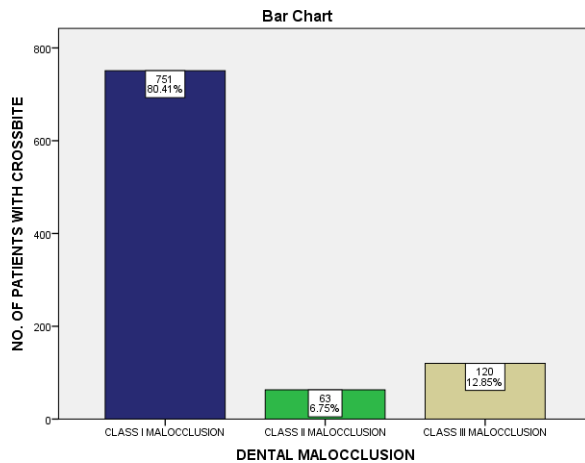
Figure 3: Bar graph showing frequency distribution between Angle's dental malocclusion with number of patients with crossbite. The X axis denotes dental malocclusion and the Y axis denotes number of patients with crossbite. It is observed that patients with crossbite had more of class I malocclusion (blue), followed by class III malocclusion (grey).

Conclusion

Within the limits of the study, it was observed that the crossbite was more prevalent in males than females and crossbite in class I malocclusion was more common among the patients than other classes of malocclusion. Thus, the idea of early intervention in correction of malocclusions must be emphasized.

Author Contribution

Preetha Parthasarathy carried out the retrospective study, planning the study design, collection and analysis of data and drafted the manuscript. Dr. Aravind Kumar and Dr. Sree Devi aided in conception of the topic, supervision and appraisal of the manuscript.

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