Type of Study : Original Research

Prevalence of Posterior Cross Bite in Children Visiting a University Hospital in Chennai - A Retrospective Study

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Abstract

Posterior crossbite refers to inadequate transversal relationship of maxillary and mandibular teeth. Posterior crossbite can be unilateral left, unilateral right or bilateral. The causes of this malocclusion are deleterious oral habits, early loss of primary teeth, hereditary factors and environmental factors. It is important to know the prevalence of posterior crossbite in order to provide proper treatment as early as possible. Posterior crossbite when not treated early, can result in skeletal changes. The aim of the study was to assess the prevalence of posterior crossbite in children of chennai. The present study was a retrospective observational study conducted in a university dental hospital located in Chennai. Data of 7415 Pediatrics patients between June 2019-March 2020 were reviewed. Patients from 6 to 13 years who had posterior crossbite were noted. This was followed by Excel tabulation . Data analysis was done in SPSS software using Chi square test for comparison of groups. About 1.4% children visiting university dental hospitals among 4292 children had posterior crossbite. Children of 10 to 13 years had more prevalence of posterior crossbite (P=0.349, statistically not significant) and prevalence of posterior crossbite was more in boys than girls (P= 0.175, statistically not significant) .

Keywords: *Posterior crossbite; Malocclusion;Prevention;Children;Prevalence.*

Introduction

Posterior crossbite refers to inadequate transversal relationship of maxillary and mandibular teeth. Posterior crossbites are of two type unilateral posterior crossbite or bilateral posterior crossbite. The etiologies of this malocclusion are deleterious oral habits, early loss of primary teeth, hereditary factors and environmental factors. According to a study, posterior crossbite begins with primary canine eruption [1]. These are evidence that high prevalence of posterior crossbite is associated with pacifier-sucking habits[2]. There is an increased trend of prevalence of posterior crossbite observed in primary dentition than in permanent dentition [3].

These are only very few studies investigating the prevalence of posterior crossbite in children. If posterior crossbite is untreated it may result in development of skeletal asymmetrics, alteration of soft tissue growth and changes in the TMJ. Posterior crossbite is a common malocclusion problem in the primary and mixed dentitions.

The status of primary occlusion affects the development of the permanent occlusion. Thus a posterior crossbite is transferred from primary dentition to permanent dentition and has a long term ill effect on the patient. Posterior crossbite is due to occlusal interference which is due to deviation of mandible during jaw closure. Early diagnosis of posterior crossbite and treatment is possible only if the parents

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don't fail to fulfil the child's oral health needs [4]. Early treatment of posterior crossbites has been recommended due to the fact that these malocclusions are transferred to the permanent dentition [5,6]. Thus, Early diagnosis and treatment is very important in case of posterior crossbite.

Posterior crossbite may result in various dental problems and other health, emotional effects. If this condition is not corrected, the child's face grows asymmetrically which can result in reduction of self-esteem of the child. Dentition of Children with posterior crossbite are prone to caries . To minimize the risk of caries in such children fluoride paste can be used [7, 8]. A chewable brush can also be used for effective plaque removal and reduces S. mutans counts in saliva [9]. The levels of Malondialdehyde (MDA) in saliva of children should be checked in children with posterior crossbite to diagnose possibility of caries in children [10]. In this way incidence of caries can be prevented in patients with malocclusion such as posterior crossbite.

In a caries affected teeth pulpal exposure occurs . It is important to treat the caries infected tooth prior to orthodontic treatment for posterior crossbite. Pulpectomy is the conservative treatment used to preserve the primary tooth infected by caries [11]. Hand instrumentation technique is the conventional method for root canal preparation in pulpectomy procedure [12,13], but with recent advancements use of rotary instrumentation is used for pulpectomy [14,15]. Obturation was found to be more proper in rotary files than in hand files [16,17]. Our study aims in understanding malocclusion and alignment problems in order to prevent further complications.

Diagnosis of posterior crossbite is by proper history taking, clinical examination, study models, radiographs such as lateral cephalogram and PA view of cephalogram. It is important to examine the soft tissue and hard tissue structures properly prior to treatment [18,19,20]. Knowledge of the etiology and prevalence of malocclusion in a population is very essential for implementing preventive strategies and in determining the success of orthodontic treatment. Hence,this study aimed at assessing prevalence of posterior crossbite in children of chennai.

Material and Method

Study setting

This was a university dental hospital based retrospective , cross sectional study conducted among patients visiting a University dental hospital in Chennai. Since this was a university hospital setting, large sample size and distribution of population contributes to a major advantage for this study. Data collected was reliable and with evidence. The only limitation was that it is a single centered study.This study was approved by the Institutional Review Board, Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320.

Sampling

The study population was 7415 Pediatric patients visiting university hospitals from June 2019 to March 2020. The sample included patients in the age group of 6 to 13 years . Sample size was 4292 children. Independent variables were demographics such as age , gender etc. Dependent variable was the presence of posterior crossbite . Incomplete dental records were excluded from the study. The parameters assessed were Age, gender, presence or absence of posterior crossbite and type of posterior crossbite. The data collected were tabulated in excel.

Data Analysis

Microsoft Excel was used for tabulation of the parameters and then the data was exported to the SPSS software version 20.0. Descriptive statistics and relation between variables was determined using the chi square test, where $p<0.05$ was considered statistically significant.

Results & Discussion

Primary teeth start to erupt at 6 months of age and complete their eruption at the age of 3 years[21]. The primary dentition in children should be ideal in order so that during future adulthood, the children may exhibit normal dental features [22]. The causative factors of malocclusion can be related to congenital, environmental, genetic, functional, or from oral habits [23]. One such type of malocclusion is posterior cross bite. Posterior crossbite is the transverse discrepancy in the arche relationship in which the palatal cusps of one or more of the maxillary posterior teeth do not occlude in the central fossae of the opposing mandibular teeth [24]. Study of posterior crossbite can help in proper early diagnosis and treatment of the malocclusion. Posterior

crossbite when not treated early, can lead to skeletal changes and also can affect the permanent dentition.

Among the 4292 children 2044 (47.62%) belongs to six to nine years and 2248 (52.38%) belongs to ten to thirteen years (Figure 1). About 2355 (54.9%) boys and 1937 (45.1%) girls were analysed in this study (Figure 2) .

About 4169 (97.1%) children did not have crossbite and only 123 (2.9%) children had crossbite (Figure 3). According to a study by Ferro.R, the prevalence of crossbite was 3.7% which was of similar evidence to the current study [25]. Similar evidence was also seen in a study by N. Venugopal Reddy according to whom the prevalence of crossbite was 14.01% [26]. The reason for such findings is that occurrence of crossbite is rare and mostly due to habits such as using pacifiers, thumb sucking etc.

Among the total study sample, 66 (1.5%) children had anterior crossbite, 28 (0.7%) children had posterior crossbite, 29 (0.7%) children had both anterior and posterior crossbite and 4169 (97.1%) children did not have crossbite (Figure 4). According to a study by Kahraman Gungor, prevalence of posterior crossbite was 15.6% which was less than no posterior crossbite establishing a similar evidence to the current study[3]. The reason is that development of any crossbite is rare compared to normal dentition. The development of crossbite can be due to deleterious oral habits, early loss of primary teeth, hereditary factors and environmental factors.

Among the total children with posterior crossbite , 4 (7.02%) children had unilateral left posterior crossbite, 21 (36.84%) children had unilateral right posterior crossbite, 32 (56.14%) children had bilateral posterior crossbite (Figure 5). Similar evidence was seen in the study of Kahraman Gungor [3] whereas different evidence was seen in the study by Da Silva Filho OG, this is mainly because only less number of children with crossbite were examined in this study whereas Silva examined a large number of children [27].

There were a higher number of children with posterior crossbite in the age group of 10 to 13 with 33.33% (only posterior crossbite-16.26%; both anterior and posterior crossbite-17.07%) (Figure 6). According to the chi square test, P=0.349 is statistically not significant. Similar evidence was seen in a study by Rajendra Reddy according to whom the prevalence of posterior crossbite was more in children aged between nine to ten years [28]. Higher prevalence of posterior crossbite was seen in boys with 26.44% (only posterior crossbite-10.74%; both anterior and posterior crossbite-15.70%). According to the chi square test, P = 0.175 is statistically not significant (Figure 7). Different evidence was seen in the study by E. Rajendra Reddy [28], this is mainly because only a smaller number of children with crossbite were examined in this study.

Development of posterior crossbite was rare but it is important to study about this malocclusion as it can cause many problems. Early diagnosis and treatment should be followed in these patients to improve the quality of their life by preventing the posterior crossbite to progress to permanent dentition and leading to temporomandibular disorders. This study helped in identifying the prevalence of the posterior crossbite and will help in formulating effective preventive strategies. The limitation of this study was that it cannot be generalised to another population since our study was a unicenter study conducted in the south Indian population.

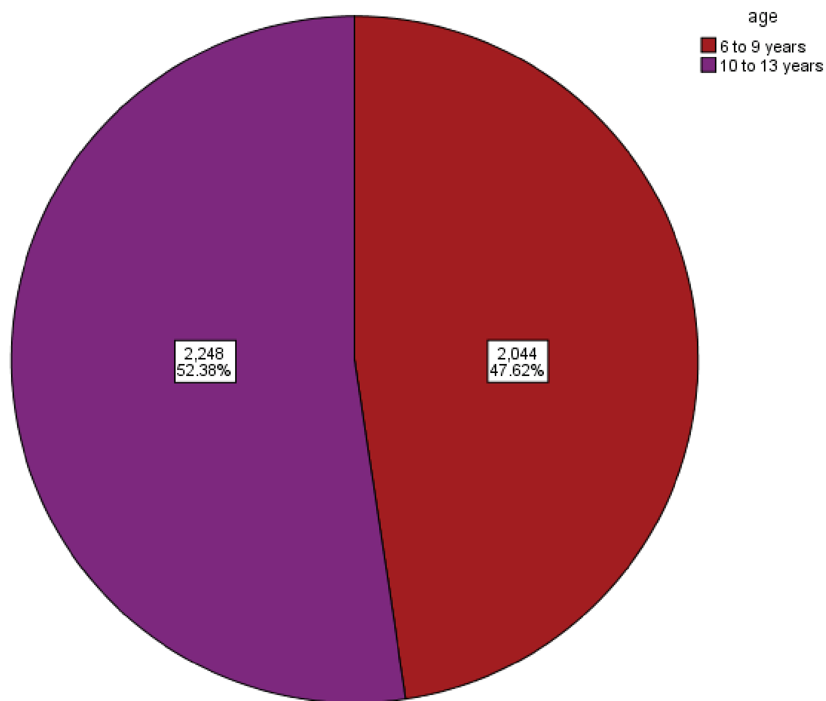

Figure 1: Pie chart showing the Age distribution among the children. Maroon colour denotes children of age group 6 to 9 years and violet colour denotes children of age group between 10 to 13 years. 52.38% children belonged to the age group of 10 to 13 years and 47.62% of the children belonged to the age group between 6 to 9 years.

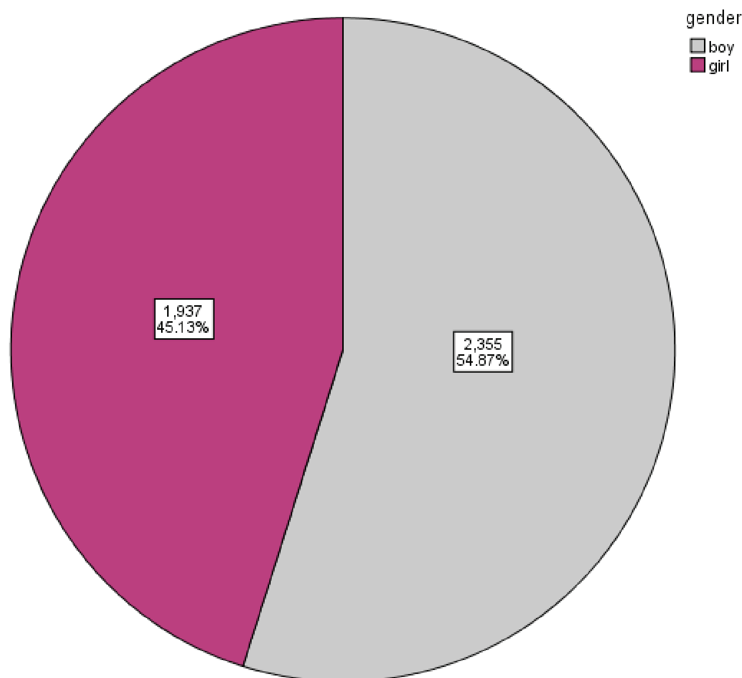

Figure 2: Pie chart showing the gender distribution among children. Grey colour denotes boy and pink colour denotes girl . 54.87% children were boys and 45.13% of the children were girls.

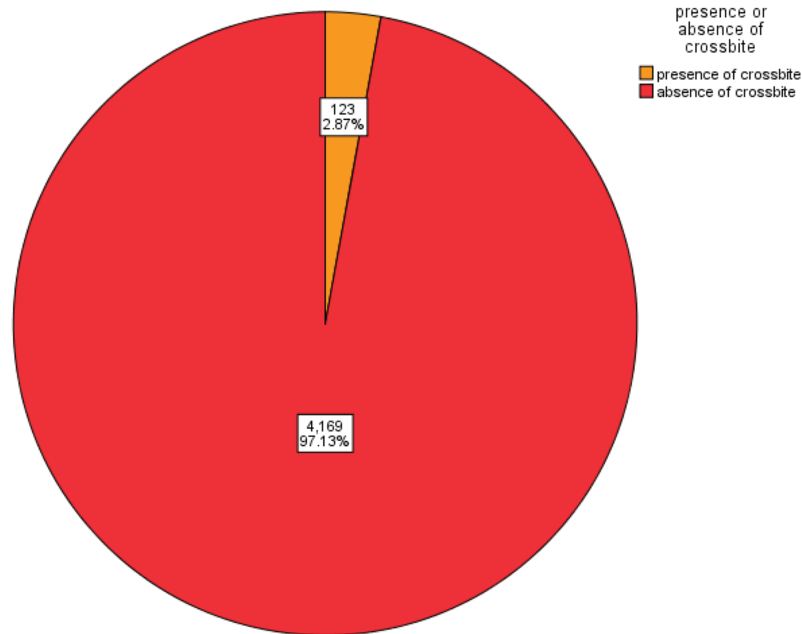

Figure 3 :Pie chart depicting the prevalence of crossbite where red colour indicates absence of cross bite and orange colour indicates presence of crossbite. Prevalence of crossbite was 2.9%.

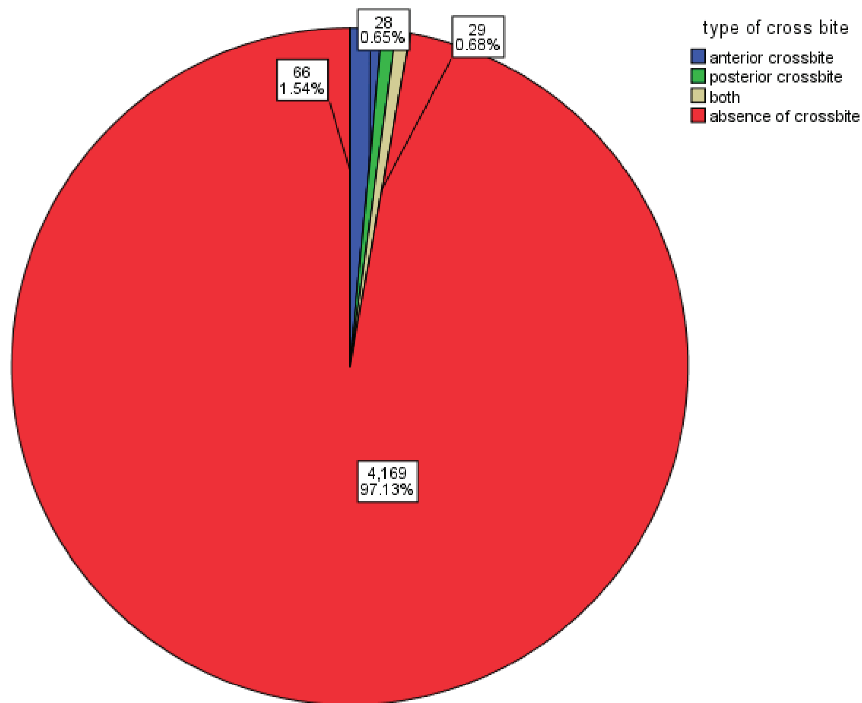

Figure 4: Pie chart showing the prevalence of different types of crossbite in the study population where blue colour denotes anterior crossbite, green colour denotes posterior crossbite , brown colour denotes both anterior and posterior crossbite and red colour denotes absence of crossbite. Prevalence of posterior crossbite was 1.4% (only posterior crossbite-0.7%; both anterior and posterior crossbite-0.7%) among the study population.

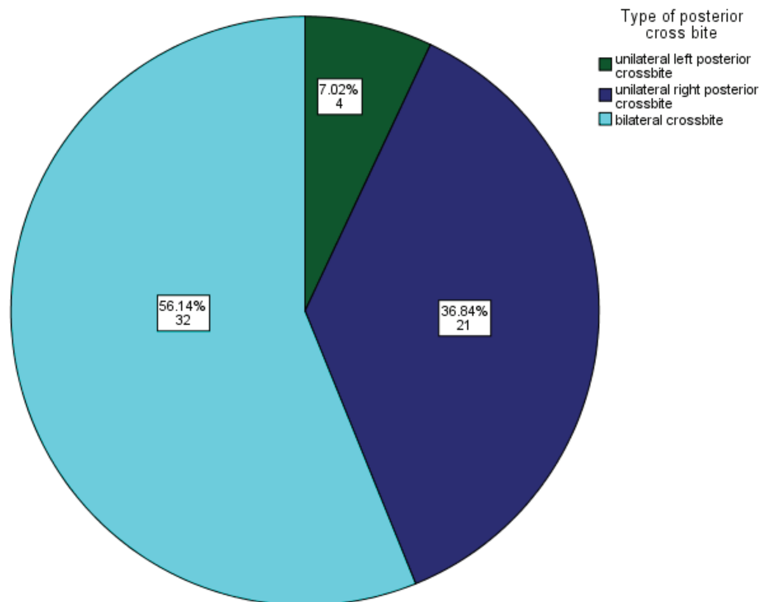

Figure 5: Pie chart depicting occurence of different types of posterior crossbite among patients with posterior crossbite. Dark green colour denotes unilateral left posterior crossbite, dark blue colour denotes unilateral right posterior crossbite and light blue colour denotes bilateral posterior crossbite . Bilateral posterior crossbite was the most frequently occurring type of posterior crossbite (56.14%) among children with posterior crossbite.

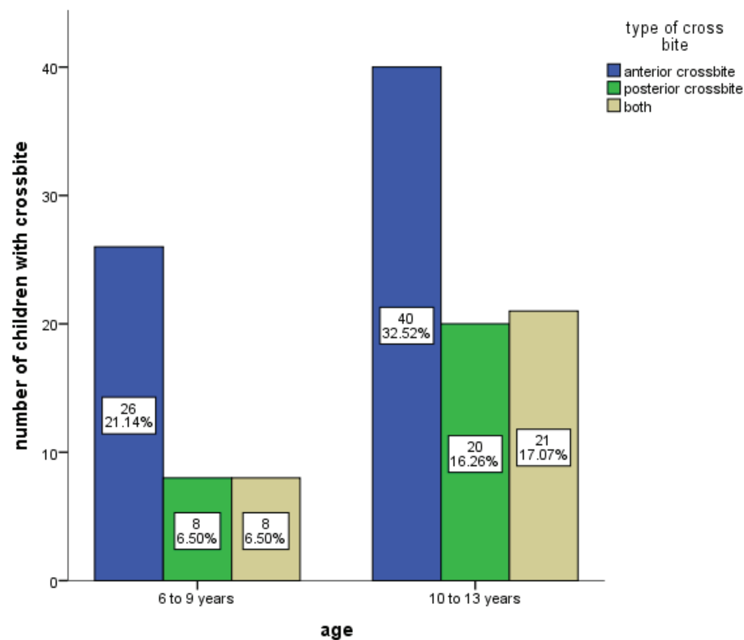

Figure 6: Bar graph shows the association between various age groups and types of crossbite where blue colour denotes anterior crossbite, green colour denotes posterior crossbite and brown colour denotes both anterior and posterior crossbite. X axis represents age groups and Y axis represents frequency distribution of type of crossbite. There were a higher number of children with posterior crossbite in the age group of 10 to 13 with 33.33% (only posterior crossbite-16.26%; both anterior and posterior crossbite-17.07%). Chi square test was done and the association was found to be not significant. (p value = 0.349 >0.05 statistically not significant).

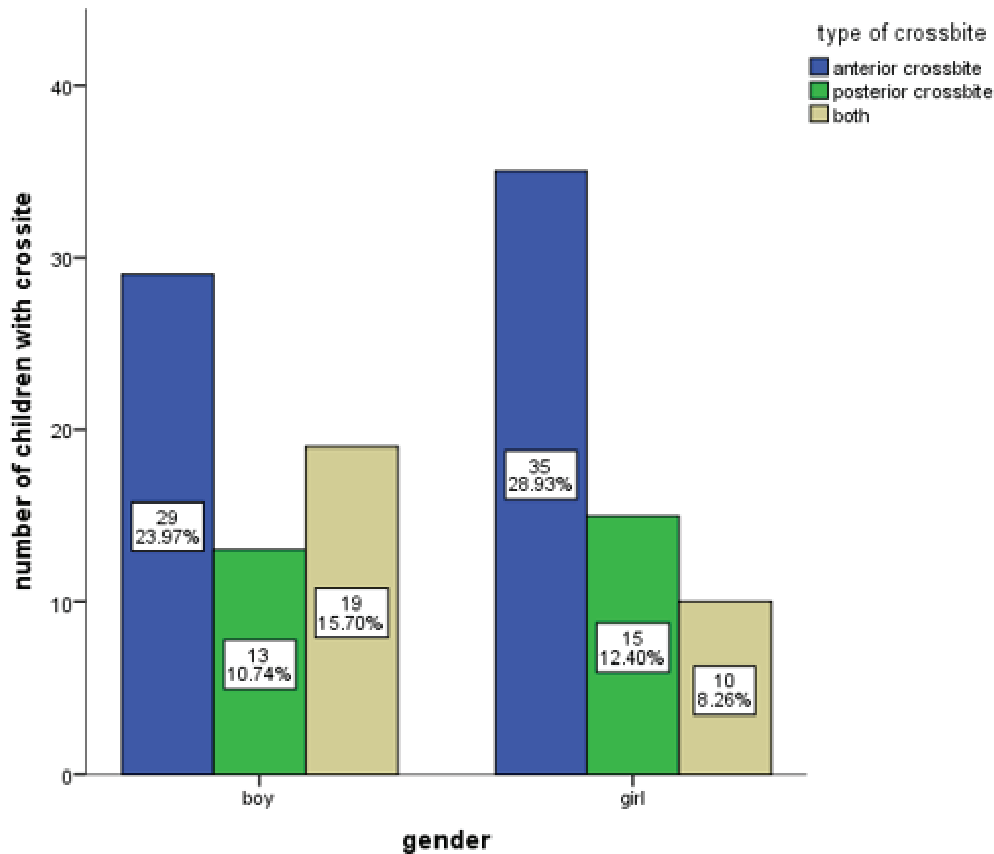

Figure 7: Bar graph shows the association between gender and types of crossbite where blue colour denotes anterior crossbite, green colour denotes posterior crossbite and brown colour denotes both anterior and posterior crossbite. X axis represents the gender and Y axis represents frequency distribution of type of crossbite. Higher prevalence of posterior crossbite was seen in boys with 26.44% (only posterior crossbite-10.74%; both anterior and posterior crossbite-15.70%). Chi square test was done and the association was found not to be significant. (p value = 0.175, >0.05 statistically not significant).

Conclusion

Within the limits of the study, About 1.4% children visiting university dental hospitals among 4292 children had posterior crossbite. Children of 10 to 13 years had significantly higher prevalence of posterior crossbite . Higher prevalence of posterior crossbite was seen in boys than in girls although the difference was not statistically significant.

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Conflict of Interest: There are no conflicts of interest .

Source of Interest: Self

Ethical Clearance- Not Required

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