



Original Article

Prevalence of Cross-Bite in School-Aged Children in Jeddah: An Observational Study

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ABSTRACT

Cross-bite is a major orthodontic problem that affects a large number of children worldwide. It usually develops during the growth phase and, in some instances, leads to functional impairments and aesthetic concerns. The present study aimed to determine the frequency of different types of cross-bites in school-aged children and to compare prevalence across different age groups within the school children population. A total of 334 students participated in this study, divided into two age groups of 6-9 years and 9-12 years. Different types of cross-bites, including anterior cross-bite, unilateral posterior cross-bite, and bilateral posterior cross-bite were examined in these groups. The collected data were processed using SPSS version 21, using descriptive statistics, frequency distributions, and Chi-square tests, with the results presented in cross-tabulations. Parental consent was obtained for all participating children. In comparing the age groups, the incidence of anterior cross-bite (30%) and unilateral posterior cross-bite (10%) was more common in the 9-12-year-olds age group, while bilateral posterior cross-bite (15%) and no cross-bite (54%) were more common in children aged 6-9 years. Overall, anterior cross-bite was more common than posterior crossbite among children. No significant differences were observed between the age groups regarding the frequency of different types of cross-bites.

**Keywords:** Appliances, Cross-bite, Orthodontics, School children.

Introduction

Cross-bite is a significant orthodontic issue that affects many children around the world. It typically develops during a child's growth phase, leading to functional limitations and, in some cases, aesthetic concerns. Early intervention is crucial to prevent the child from experiencing permanent facial asymmetry. Interceptive orthodontic treatment is considered one of the most effective approaches to address this condition [1]. In terms of treatment, cross-bites, including those involving a single tooth, can be corrected with both fixed and removable orthodontic appliances. But, removable devices may not be effective for patients who lack cooperation. This challenge can be addressed with fixed appliances that do not rely on patient compliance. These appliances may include bonded resin-composite slopes, acrylic inclined planes, and others [2, 3].

Cross-bite is prevalent in various studies conducted around the world. In Sao Paulo, Brazil, a study was conducted to assess the epidemiology of different types of cross-bites among school children. The findings indicated that unilateral posterior cross-bite was the most common, while full cross-bite was the least prevalent [4]. The occurrence of posterior cross-bite has been increasing, with a study in Turkey revealing that bilateral cross-bite was the most common type of malocclusion among adolescents [5, 6].

**HOW TO CITE THIS ARTICLE:** Al-Khotani A, Naimi-Akbar A, Albadawi E, Ernberg M, Hedenberg-Magnusson B, Christidis N. Prevalence of Cross-Bite in School-Aged Children in Jeddah: An Observational Study. Turk J Public Health Dent. 2022;2(1):9-12.

<https://doi.org/10.51847/cG9FlihXIO>

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**Received:** 21/03/2022

**Accepted:** 11/06/2022



One of the leading causes of cross-bite is the use of pacifiers or thumb-sucking during childhood. A Brazilian study aimed at identifying the prevalence of cross-bites in children with a history of pacifier use found that unilateral cross-bites occurred more frequently than bilateral cross-bites [7]. Another study in Lahore, Pakistan, focused on the prevalence of cross-bites in male and female children and found that females had a significantly higher incidence of cross-bites than males [8, 9].

#### *Aims of the study*

- To determine the frequency of different types of cross-bites in school-aged children.
- To compare the prevalence across different age groups within the school children population.

#### **Materials and Methods**

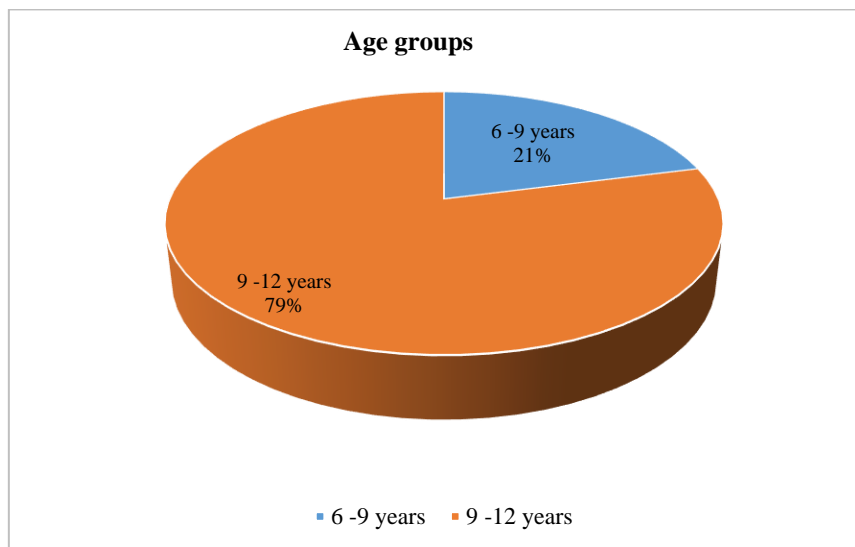
This research was a cross-sectional study carried out between July and December 2021, involving an assessment of school children in Jeddah city. A total of 334 children were included, divided into two age categories: 6-9 years and 9-12 years. The study focused on different types of cross-bites, including anterior cross-bite, bilateral posterior cross-bite, and unilateral posterior cross-bite. The collected data was analyzed using SPSS version 21, applying descriptive statistics, frequency analysis, and the Chi-square test. The findings were presented in cross-tabulated form. Parental consent was obtained for all participating children.

#### *Clinical examination*

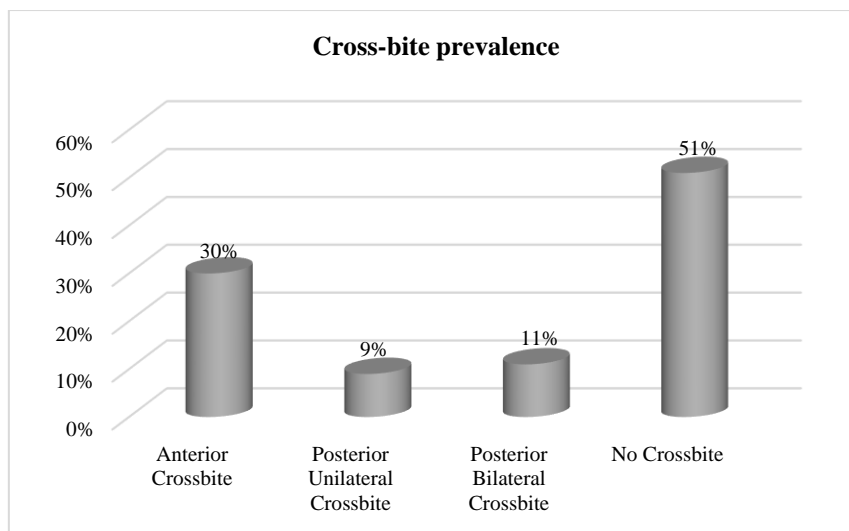
Each dental student assessed an average of  $55 \pm 1$  schoolchildren using a mouth mirror, disposable gloves, and tongue retractors. The study included children between the ages of 6 and 12 years, with other age groups being excluded from participation.

#### **Results and Discussion**

The children in the study were divided into two age groups: 6-9 years and 9-12 years, representing 21% and 79% of the participants, respectively. Clinical examination revealed different types of cross-bites among these children, with 30% exhibiting anterior cross-bite, 9% exhibiting unilateral posterior cross-bite, and 10% presenting with bilateral posterior cross-bite. Notably, 51% of the children had no cross-bite (**Figures 1 and 2**).



**Figure 1.** Age group distribution of study subjects.



**Figure 2.** Distribution of different types of cross-bites in the children.

When comparing the age groups, anterior cross-bite (30%) and unilateral posterior cross-bite (10%) were more prevalent among the 9-12 years group. Conversely, bilateral posterior cross-bite (15%) and the absence of cross-bite (54%) were more common in the 6-9 years group. However, these differences were not statistically significant (P-value = 0.258) (Table 1).

**Table 1.** Distribution of cross-bite types across different age groups of children

Age groups	Type of cross-bite				P-value
	Anterior cross-bite	Posterior unilateral cross-bite	Posterior bilateral cross-bite	No cross-bite	
6-9 years	28%	2%	15%	54%	0.258
9-12 years	30%	10%	10%	49%	
Total	29%	6%	13%	52%	

Cross-bites and their various forms can arise due to habitual behaviors at a young age, such as thumb-sucking, as well as genetic factors. In some cases, cross-bites can develop as early as eighteen months [10]. This research aimed to assess the prevalence of different types of cross-bites among schoolchildren in Riyadh, focusing on male students from the aforementioned age groups.

A study conducted by Kaur *et al.* [11] in South India examined the prevalence of various malocclusions in adolescents, revealing that 8% of the sample had anterior cross-bite, while only 1% had posterior cross-bite [11]. In comparison, our study showed a higher prevalence of both types of cross-bites, though the differing sample sizes in the two studies may have contributed to these contrasting results.

Many studies on cross-bites in children have highlighted anterior cross-bites as the most common type. For instance, Vithanaarachchi and Nawarathna [12] found that 27% of children had anterior cross-bite, which closely aligns with our finding of 29%. Conversely, a study from Kuwait reported relatively low prevalence rates of cross-bites, with only 2% showing anterior cross-bite and 1.5% showing posterior cross-bite [13].

The etiology of cross-bites and their subsequent effects on oral health have been explored in several studies, with sucking habits often cited as the primary cause. The negative impacts of cross-bites can include TMJ disorders, cavities, and gum diseases [14, 15]. However, our study did not investigate these factors, which represents a limitation of our research. Moving forward, we plan to expand our study by increasing the sample size and incorporating these additional variables.

## Conclusion

Based on the results of this study, anterior cross-bite is more common in children compared to posterior cross-bite. No notable differences were observed between age groups regarding the prevalence of different cross-bite types.

**Acknowledgments:** None

**Conflict of Interest:** None

**Financial Support:** None

**Ethics Statement:** The ethical committee of Riyadh Elm University has approved this study.

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