



ESTIMATION OF PREVALENCE OF CROSSBITE IN CHILDREN AGED 8-12 IN SALEM, TAMIL NADU – A CROSS-SECTIONAL STUDY

Dentistry

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ABSTRACT

Introduction: Cross bite is a condition where one or more teeth may be abnormally malposed buccally or lingually or labially with reference to opposing tooth or teeth. **Objectives:** To determine the prevalence of crossbites and identify the distribution of various types of crossbites among the children aged 8 to 12 in Salem, Tamil Nadu. **Materials And Methods:** A descriptive cross-sectional study was conducted among school children aged 8-12 years in Salem. 456 students were evaluated in which 337 were male and 119 were females. The information was gathered between March 2024 and August 2024. **Results:** 34 students out of 456 had crossbites. 7.5% of students were affected by crossbite in which 6.2% are male and 1.3% are female. 4.6% of anterior, 2.9% of posterior, 6.8% of unilateral, 0.7% of bilateral, 3.75% of single and 3.75% of segmental crossbites were observed. **Conclusion:** With the results of this study, we conclude that 7.5% of participants were affected by crossbite, in which anterior crossbites are more prevalent than posterior, unilateral are more common than bilateral crossbites and single and segmental crossbites are equally spread.

KEYWORDS

Crossbite, School Children, Prevalence

INTRODUCTION

Crossbite is one of the most commonly occurring malocclusion, worldwide. The prevalence of crossbite varies between 2 and 12% in India.^[1,2,3,4,5,6,7] It is an irregular relationship between one or more teeth in one arch and the opposing arch in the buccolingual or labiolingual direction.^[8]

There are primarily two forms of crossbite malocclusion: skeletal and dental, with some instances of both. Crossbite may incorporate one or more teeth and may exist as unilateral or bilateral, suggesting that it impacts either one or both sides.^[1] It may be anterior, posterior, bilateral, or unilateral.^[2]

Skeletal crossbite is typically caused by the retrognathic maxilla and prognathic mandible, whereas single tooth crossbite is usually observed in dentoalveolar anterior region.^[9]

It develops during the developmental stage of children, which occasionally brings about functional limits and poor aesthetics. In order to prevent the infant from developing persistent facial asymmetry, these problems must be resolved as soon as feasible. One of the best solutions for this particular problem is interceptive orthodontic therapy.^[6]

Multiple research studies have found a connection between TMJ problems in later life, including pain or locking of the jaw joints, and crossbite with a displacement on closure.^[10,11]

Early crossbite correction can aid in returning function to normal, which will promote normal development and avoid the need for future orthodontic treatment.

Currently, there is not enough information available about how common crossbite is in Salem, Tamil Nadu. In order to ascertain the prevalence of crossbite among school children in Salem, this study was conducted.

AIMS AND OBJECTIVES

The aims and objectives of this study are to determine the prevalence of crossbites among children aged 8 to 12 and to investigate the distribution of crossbite patterns among school children within this age group in Salem. By concentrating on this particular group, the study hopes to provide informative knowledge concerning the prevalence and varieties of crossbite in the area, which can guide future orthodontic treatments and public health initiatives.

METHODOLOGY

The purpose of this study was to ascertain the frequency of malocclusion among students in Salem, Tamil Nadu, who were

between the ages of 8 and 12. Children examined were 456 in number, out of which 337 were male and 119 were female.

The inclusion criteria for the study encompass students between the ages of 8 and 12 who are present on the day of the examination with informed permission from the principal. Additionally, the children must have all of their permanent first molars erupted, and they must be students of schools within the geographical area of Salem.

The exclusion criteria for the research encompass children with medical conditions, children who are recalcitrant, children who have had orthodontic treatment in the past, children whose parents refuse to participate, and children with a history of trauma. These elements are considered in order to eliminate any confounding variables and guarantee that the study's emphasis stays on the target group.

Examination Of The Children

The procedure was explained to the school teachers and children in detail. Voluntary informed consent was obtained from the School Principal. Children were examined using diagnostic instruments and disposable gloves while seated on a chair with good natural or artificial light illumination. All the occlusal relationships were evaluated at centric occlusion position which was obtained by asking the child to swallow and then to bite his/her most posterior teeth. All observations were entered in tabulated sheets.

RESULTS:

The total of 456 school children were participated in the study. Out of 456 participants, 337 were males and 119 were females. Among them, 76 were 8 years old, 84 were 9 years old, 91 were 10 years old, 103 were 11 years old and 102 were 12 years old. (Table 1)

The overall prevalence of crossbite among the study participants was found to be 7.5%, 4.6% had anterior crossbite, 2.9% had posterior crossbite. 6.8% had unilateral crossbite, 8.8% had bilateral crossbite, 3.7% had single crossbite and 3.7% had segmental crossbite. (Figure 1)

Table 1: Demographic Details Of The Study Participants

AGE	NUMBER (PERCENTAGE)
8 years	76 (16.7%)
9 years	84 (18.4%)
10 years	91 (20%)
11 years	103 (22.4%)
12 years	102 (22.4%)
GENDER	
MALE	337 (73.9%)
FEMALE	119 (26.1%)

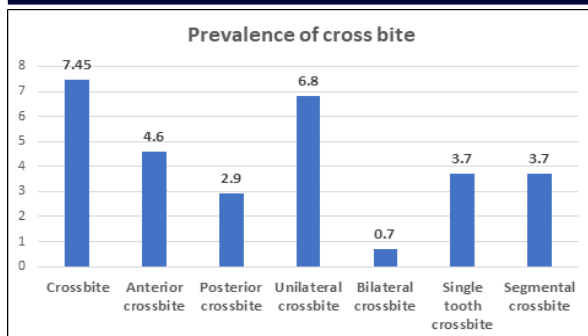


Figure 1: Prevalence Of Crossbite Among The Study Participants

Table 3: Comparison Of Crossbite With Age And Gender

AGE	ANTERIOR CROSSBITE			POSTERIOR CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
8 years	1	75	0.012*	2	74	0.000*
9 years	3	81		1	83	
10 years	0	91		0	91	
11 years	9	94		10	93	
12 years	8	94		0	102	
AGE	UNILATERAL CROSSBITE			BILATERAL CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
8 years	3	73	0.000*	0	76	0.315
9 years	3	81		1	83	
10 years	0	91		0	91	
11 years	17	86		2	101	
12 years	8	94		0	102	
AGE	SINGLE TOOTH CROSSBITE			SEGMENTAL CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
8 years	1	75	0.012*	2	74	0.005*
9 years	2	82		2	82	
10 years	0	91		0	91	
11 years	9	94		10	93	
12 years	5	97		3	99	
GENDER	ANTERIOR CROSSBITE			POSTERIOR CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
MALE	17	320	0.613	11	326	0.297
FEMALE	4	115		2	117	
GENDER	UNILATERAL CROSSBITE			BILATERAL CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
MALE	26	311	0.288	2	335	1.000
FEMALE	5	114		1	118	
GENDER	SINGLE TOOTH CROSSBITE			SEGMENTAL CROSSBITE		
	PRESENT	ABSENT	P VALUE	PRESENT	ABSENT	P VALUE
MALE	14	323	0.577	14	323	0.577
FEMALE	3	116		3	116	

* Statistically significant at $p < 0.05$

Table 4: Pearson Correlation Of Crossbite With Age And Gender

		ANTERIOR	POSTERIOR	UNILATERAL	BILATERAL	SINGLE	SEGMENTAL
AGE	Pearson Correlation	-.125**	-.028	-.120*	-.010	-.102*	-.061
	Sig. (2-tailed)	.007*	.549	.011*	.825	.029*	.194
	N	456	456	456	456	456	456
GENDER	Pearson Correlation	.035	.042	.061	-.013	.038	.038
	Sig. (2-tailed)	.453	.373	.191	.775	.420	.420
	N	456	456	456	456	456	456

* Statistically significant at $p < 0.05$

Table 3 denotes the comparison of crossbite with age and gender. Comparison of anterior crossbite with age revealed the statistically significant of $p=0.012$. Comparison of posterior crossbite with age revealed the statistically significant of $p=0.000$. Comparison of unilateral crossbite with age revealed the statistically significant of $p=0.000$. Comparison of single tooth crossbite with age revealed the statistically significant of $p=0.012$. Comparison of segmental crossbite with age revealed the statistically significant of $p=0.005$

Pearson correlation of crossbite with age revealed the statistically significant for anterior crossbite ($p=0.007$), unilateral crossbite ($p=0.011$) and single tooth crossbite with ($p=0.029$).

DISCUSSION

Table 2: Prevalence Of Crossbite Among The Study Population

TYPES	PRESENT (PERCENTAGE)	ABSENT (PERCENTAGE)
ANTERIOR	21 (4.6%)	435 (95.4%)
POSTERIOR	13 (2.9%)	443 (97.1%)
UNILATERAL	31 (6.8%)	425 (93.2%)
BILATERAL	3 (0.7%)	453 (99.3%)
SINGLE	17 (3.7%)	439 (96.3%)
SEGMENTAL	17 (3.7%)	439 (96.3%)

Out of 456 participants, 34 had crossbite. Among these crossbite patients 21 had anterior crossbite and 13 patients had posterior crossbite, 31 had unilateral crossbite and 3 had bilateral crossbite, 17 had single tooth crossbite and 17 had segmental crossbite.

Cross-bite is one of the most common and frequently neglected problems. Crossbite is defined as any abnormal buccolingual relationship between opposing incisors, molar or premolar in centric relation. There are two types of crossbite: skeletal, dental, or a mix of the two.^[4]

The reason of a crossbite is not always obvious. In addition to dental, bone, soft tissue, or respiratory origins, it may arise from any disease or from behaviors.

It is generally accepted that an abnormal function is the cause of a narrow maxilla. Frequent or prolonged finger sucking can be linked to the dysfunction of the perioral muscles that causes crossbite. It may result from early deciduous tooth loss, harmful oral practices such

thumb sucking, or genetics. Crossbite can also occasionally result from impaired nasal breathing brought on by enlarged tonsils and adenoids.^[1]

The condition known as anterior crossbite occurs when one or more of the upper incisors are in a linguo-occlusal relationship. It is most prevalent in the primary and mixed dentition. It could result from an imbalance between the skeletal, functional, and dental components.^[12]

If left untreated during the developmental stages, the basic problem of cross bite can lead to severe skeletal malocclusion, such as a skeletal class III, which may require complex treatments, periodontal issues, such as gingival recession, enamel wear primarily on the incisal edges, and more.^[4] Untreated posterior crossbite in children, either unilateral or bilateral, causes mandibular asymmetry as the child grows.^[2]

These individuals' quality of life can be enhanced by early identification and treatment, which will stop the crossbite from developing into permanent teeth and causing temporomandibular complications.^[3]

It can cause functional and cosmetic issues if not addressed. Globally, the frequency of crossbite varies based on ethnicity, genetics, environmental conditions, and treatment access.^[2,4]

In cases of crossbite, early intervention can improve appearance and self-esteem, prevent long-term functional issues like mandibular condyle displacement, which can result in temporomandibular joint (TMJ) dysfunction, and make future orthodontic treatment easier, less invasive, and more successful. Crossbite can cause functional and aesthetic problems. Early treatment for crossbite is essential for orthodontic therapy because it can delay the emergence of more complicated problems such as tooth wear, skeletal asymmetry, jaw dysfunction, and facial aesthetics.^[13]

According to this survey, 7.5% of the populations have crossbite. The overall prevalence of crossbite in our study is similar to that of a study conducted in Kozhikode district of Kerala by Narayanan RK et al (2016) which was 7.2% with sample size of 2,424 students.^[7] In contrast to our research, Tabassum R et al (2021) observed a higher prevalence of crossbite (13%) with 900 sample size.^[6] However, the prevalence was lower in the study conducted by Marimuthu S et al, 2020 in Chennai (2.9%) with 7,415 pediatric patients and Ferro R et al (2016) in Italy (3.7%) with 7,364 pre-school children.^[3,5] The prevalence of these studies are much lower because of the larger study population. When crossbite prevalence was analysed with gender, it became apparent that the prevalence was 5% for female patients and 8.3% for male patients.

In accordance with earlier research by Marimuthu S et al (2020) in Chennai, which reported that the crossbite prevalence was found to be more in males than females.^[3] When compared to Tabassum R et al's study (2021) we found that 16.1% of females and 9.1% of males had crossbite which is contrast to our study.^[6]

Anterior and posterior crossbite prevalences in the current research were 4.6% and 2.9%, respectively. Anterior crossbite is more common than posterior crossbite, which is consistent with the studies conducted by Marimuthu S et al (2020) in Chennai and Ajwa N et al (2022) in Saudi Arabia, which found that 1.5% of people had anterior crossbite, 0.7% had posterior crossbite, and 29% had anterior crossbite and 19% had posterior crossbite; respectively, anterior crossbite is more common than posterior crossbite with study population 7,415 and 334 respectively.^[3,14]

In contrast to this study, studies conducted in Lahore by Tabassum R et al (2021) and in Brazil by Almeida MR de et al (2021) found that posterior crossbite is more common than anterior crossbite, with 5.9% of anterior crossbite; 6.3% of posterior crossbite, and 5.05% of anterior crossbite; 13.3% of a posterior crossbite, respectively.^[6,15] This difference may occur due to higher study population of 900 and 3466 respectively, environment or the genetics.

CONCLUSION

In light of the limitations of the study, we discovered that 7.5% of crossbite cases were frequent. In order to reduce the prevalence of crossbite, this study highlights the need of regular dental examinations and the need for preventative care in younger populations.

In summary, knowledge of the frequency and risk factors of crossbite is crucial for enhancing therapeutic results and directing public health initiatives meant to reduce the prevalence of crossbite in the general population.

Crossbite, especially in its dental and skeletal variants, is a prevalent malocclusion with different incidence rates based on age, gender, and location, according to our results.

The results of this study will be extremely helpful for early correction of the malocclusion and early interceptive interventions, which will lessen the severity of the malocclusion in the permanent dentition.

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