

Prevalence of midline diastema in school children in Chennai - A cross-sectional study

Jyotsna Sanjeevi¹, A. V. Arun², M. H. Rathna Subhashini^{3*}

ABSTRACT

Objective: Midline diastema most commonly occurs in children during mixed dentition. Midline diastema always creates an unpleasant appearance and interferes with speech depending on its width. If it continues even after the ugly duckling stage, then the effective treatment is required to correct the diastema. The study is carried out to assess the prevalence of midline diastema in school children of age group from 15 to 19 years old in Chennai city. **Materials and Methods:** A cross-sectional study was done in 400 school children of 15–18 years in various schools of Chennai 15–18 years old, after providing prior information. Measurements were recorded by measuring the gap between two central incisors for maxilla and mandible. **Results:** Of the 400 school children who were screened, only 39 of them presented with midline diastema. Hence, the incidence of maxillary midline diastema in this population is 9%. The prevalence type had no gender difference. **Conclusion:** The present study showed that midline diastema is a rare dental anomaly in Chennai population which shows increased awareness of the dental anomaly and early treatments obtained for it.

KEY WORDS: Frenal attachment, Maxillary midline, Midline diastema, Mixed dentition, Ugly duckling stage

INTRODUCTION

Midline diastema is a gap or space between the maxillary and mandibular central incisors. The space is commonly a normal growth characteristic during the primary and mixed dentition. True midline diastema is defined as one with no periodontal/periapical involvement and with the presence of all anterior teeth in the arch.^[1] The space usually varies in width with the diastema being from one to four and sometimes maybe 5 mm wide, presenting an unpleasant appearance and interfering with a speech in proportion to its width. Enlarged labial frenum was blamed for the majority of persistent diastemas, but the etiologic role of this structure is understood and now known to influence only a small proportion of cases. The several other etiologies associated with diastema include oral

habits, muscular imbalances, physical impediments, abnormal maxillary arch structure, and various dental anomalies.^[2]

Supernumerary teeth, which occur in both the primary and permanent dentitions, cause a variety of pathological disturbances,^[3] the most common of which is midline diastema. During stages of mixed and early permanent dentitions, median diastemas can be transient or created by developmental, pathological, or iatrogenic factors and are a major aesthetic concern for patients and/or their parents.^[4]

In anterior dentition diastema between the teeth is a common feature that remains until the completion of the permanent dentition.^[1] Carefully developed diagnoses and advanced planning enable the identification of the most appropriate treatment to address the needs of each individual patient.^[5] For an effective treatment of diastema, correct diagnosis of its etiology is the key. Further, an intervention relevant to the etiology, medical and dental histories, radiographic and clinical

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¹Undergraduate Student, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India, ²Department of Orthodontics, Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India, ³Department of Public Health Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

*Corresponding author: M. H. Rathna Subhashini, Department of Public Health Dentistry, Saveetha Dental College, Saveetha University, Saveetha Institute of Medical and Technical Sciences, 162 Poonamallee High Road, Chennai - 600 077, Tamil Nadu, India. Phone: +91-9047904768. E-mail: dr.rathna1907@gmail.com

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examinations, and possibly tooth-size evaluations is required.^[2]

Midline diastema in mixed dentition is the so-called “ugly duckling” stage for children, which usually resolves after the eruption of permanent maxillary canines.^[2] Often for the adolescent age group, diastema between the maxillary central incisors is a major aesthetic concern. In general, maxillary midline diastemas occur in approximately 50% of children between 6 and 8 years of age but a decrease in size and prevalence with age. The various possible causes of midline diastema are abnormal frenum, midline bony clefts, and pernicious habits such as lower lip biting and digit sucking, tongue thrusting soft tissue imbalance, and physical impediments such as supernumerary teeth, retained primary dentition, and midline pathology, abnormal maxillary arch structure. A possible genetic basis has been suggested for diastema. Treatment of midline diastema mainly attributed to esthetic and psychological reasons, rather than functional one.^[1] Treatment should not initiate if the diastema is physiological and usually if the canines have not erupted. The mandibular diastema is not a normal growth characteristic. Even though it is less frequent than maxillary diastema, often is more dramatic. The primary etiologic factor in mandibular diastema is tongue thrusting in a low rest position.^[6] Thus, the purpose of this study was to investigate the prevalence of midline diastema in adolescents in Chennai to determine the closure time and to intercept with the help of orthodontic interventions.

MATERIALS AND METHODS

This was a cross-sectional study done using a convenience sample of 400 school children of age 15–18 years. The selection criteria were as follows:

- Patient with no history of previous or present orthodontic treatment.
- Patients with no obvious dental or dentofacial abnormalities were included.
- Patients with hypodontia of maxillary and mandibular incisors, cleft palate/cleft lip or other congenital deformities of jaws or face and with orofacial syndromes were excluded.
- Patients with missing one or both central incisors were excluded.
- Patients who had suffered a trauma involving injuries to the mucosa of the maxillary and mandibular incisor region were excluded.
- Patients with clinical evidence of supra-gingival calculus.

All clinical examination was carried out by direct inspection of the oral cavity with the use of sterile disposable gloves in the dental chair under natural/artificial light. The examination consisted of an overall

evaluation of the oral condition using mouth mirror. Thus, the children who were healthy and regular attendance had participated for a clinical examination. The measurement was made for both maxillary and mandibular midline diastema. Only the diastema > 0.5 mm was determined by measuring the distance between the midpoints of the mesial surfaces of both central incisors using Vernier caliper.

RESULTS

Data were collected and entered in SPSS version 16 and were subjected to statistical analysis. The association of frenum abnormality with age, gender, and arches was calculated. Of the 400 school children who were screened, only 39 of them presented with midline diastema shown in Figure 1. Hence, the incidence of midline diastema in this population is 9.7%. $P = 0.005254$. This result is significant at $P < 0.05$. 39 children out of 400 showed midline diastema, where maxillary diastema was more prevalent than mandibular diastema. Table 1 showed that 7% of children had maxillary diastema and 2% of children had mandibular diastema.

DISCUSSION

There are several etiological factors which contribute to midline diastema, i.e., dental anomalies, oral habits, and soft tissue imbalances.^[2,6] In our study, midline diastema was checked in children of age group from 15 to 18 years as all teeth get erupted and aligned in arch completely. In a study done by Elfadel and Abuaffan, sample size of 2200 students

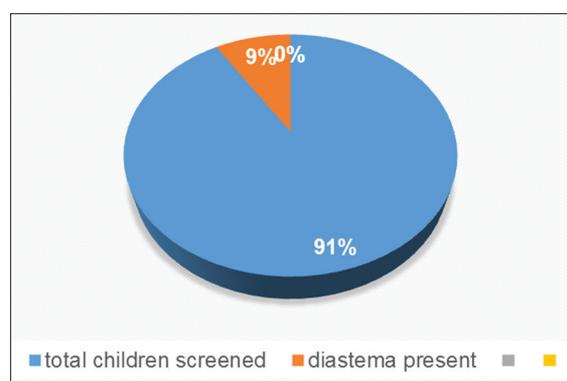


Figure 1: Percentage showing the midline diastema in school children of Chennai

Table 1: Prevalence of midline diastema in school children of age group from 15 to 18 years

Maxilla	Present (N)	Absent (N)	Row totals (N)
n (%)	28 (0.07)	372 (0.93)	400
Mandible	Present (N)	Absent (N)	
n (%)	11 (0.027)	389 (0.97)	400
Column total	39	761	800

was included in the study. Among this population, in Sudanese University, the prevalence rate of midline diastema was 7.3% obtained from the results of the study.^[1] According to a study done by Ghimire *et al.*, 900 children were examined. The results of this studies show that maxillary midline diastema was present among 26.6% of children.^[7] The study conducted by Liu *et al.* included 917 children for the study. The results showed that the prevalence of diastema was 64.6% among 6-year-old children and 53.2% among 7 years old, whereas it was 17.1% among 11 years old and 14.3% among 12 years old. Thus, the prevalence of maxillary midline diastema decreased with age as well as with lateral incisor and canine eruption.^[8] This illustrates a dramatic drop in the prevalence of diastema from 64.6% among the 6 years old to 14.3% among the 12 years old. In the study conducted by Nainar *et al.*, a total of 9774 patients were screened. The true maxillary midline diastema in this population was found to be 1.6%. The result of this study showed a prevalence of 6.75% in 400 school children which is slightly less when compared to the above studies.^[9] This variation in midline diastema prevalence could be attributed to the differences in genetic and environmental factors, age group, gender, and sample size for study population.^[10-13] The samples in this study were selected from a higher secondary school located in Chennai City. The students in the school were from different locations throughout the city. This sample effectively represents the school children population of the central city. Midline diastema usually occurs in many children during the eruption period of the permanent maxillary central incisors. During the eruption of incisors, they are separated by a bone. The incisor crowns incline distally due to crowding of the roots. With the eruption of lateral incisors and permanent canines which is also known as ugly duckling stage, midline diastema gets closed.^[14-16] Small (2 mm or less) but non esthetic diastemas can be closed by tipping the central incisors mesially with removable appliances or the use of an elastic that involves both central incisors. However, if the elastic slides into the soft tissues, it is difficult to retrieve it, and the elastic will continue along the distal surfaces of the roots to destroy the periodontal attachments and produce inflammation.^[17,18] Close to the alveolar ridge maxillary labial frenum is found which migrates upward with age. The frenum undergoes atrophy due to the pressure from the approximation of six anterior teeth. The existence of frenum in the diastema is a result of failure of approximation. Although a frenum plays a close relationship with the diastema during developmental stages, the diastema is not due to a persistent frenum as some would consider it.^[10,19,20]

Hence, only if the diastema persists post eruption and approximation surgical resection or frenectomy of the frenum should, therefore, be considered. Current

literature also suggests that orthodontists now consider frenectomy only after the orthodontic treatment is complete.

The diagnostic test to diagnose the abnormality is to pull the upper lip forward and to see whether blanching of the tissue occurs interproximal from labial to lingua. It was suggested by Behrents that the application of elastics for tooth movement in orthodontics can be advantageous and efficient. However, their disadvantages and risks should also be noted and considered by practitioners.^[21] Fixed orthodontic retention is the most appropriate type of retention when a maxillary midline diastema is mechanically closed. In cases of deep overbite, bonding with a different retention wire design may be recommended.^[19,22,23] Even though the abnormal attachment of the frenum is corrected and the midline diastema is treated, timely and appropriate parent counseling about maintaining proper oral hygiene are certainly recommended. Hopefully, these results should reassure concerned parents about the benefits of dental treatment for the children to prevent further problems.^[24-28] Due to the possibility of relapse, retention must always be considered in either interceptive or corrective treatment, regardless of how carefully space was initially handled.

CONCLUSION

Variation abound in the occurrence of midline diastema from one population to the other. According to the present study, midline diastema is a rare dental anomaly in Chennai population which shows increased awareness of the dental anomaly and early treatments obtained for it. Proper diagnosis and timing are the important part of management. Proper observation and follow-up, orthodontic treatment, space closure, and restorative treatment should be done for the midline diastema.

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