DOI: https://doi.org/10.53350/pjmhs221651147

ORIGINAL ARTICLE

Frequency of Midline Diastema in patients reported To OPD of Bacha Khan Medical College Mardan

BIBI MARYAM[1], JAVARIA IMTIAZ[2], UMAR NASIR[3], SHAHEEN[4], AQSA MUMTAZ[5], NAUMAN ULLAH[6]
[1]*Institute of Dental Sciences, Khyber Medical University, Kohat, Pakistan.*
[2]*Department of Oral Pathology, Bacha Khan College of Dentistry, Mardan, Pakistan.*
[3]*Institute of Dental Sciences, Department of Oral Biology, Khyber Medical University, Kohat, Pakistan.*
[4]*Dental Surgeon, Health Department, Khyber Pakhtunkhwa, Pakistan.*
[5]*Institute of Dental Sciences, Khyber Medical University, Kohat, Pakistan.*
[6]*Dental Technology Institute of paramedical sciences Khyber Medical University Peshawar, Pakistan.*
Corresponding Author: Nauman Ullah, Email: naumankmu25@gmail.com/Javariaimtiaz93@gmail.com

ABSTRACT

Background: A space between adjacent central incisor teeth is termed "diastema or diastemata". Midline diastema in mixed dentition is a great center of concern for parents as well as their children, therefore, determining the time of closure of midline diastema is essential for clinical practice in Orthodontic and the study was aimed to determine the frequency of midline diastema in both maxillary and mandibular arches in patients.

Material and Method: The current study was carried out at Bacha Khan Medical College Mardan, Khyber Pukhtoon Khwa to determine the frequency of midline diastema in both maxillary and mandibular arches in patients for which a total of 200 responders have examined 100 responders were males while 100 were female.

Results: The frequency of Midline diastema was 12%, out of 200 hundred in which Maxillary midline diastema was 5% and Mandibular midline diastema was 5.5% and both the arches were found to be 1.5% in females.

Conclusion: The finding of the current study is that the population of Khyber Pukhtunkhwa has several Midline diastemata affecting their esthetic. A similar study to find out the etiology of Midline diastema is suggested which requires a large sample size.

Keywords: Midline diastema, Frequency, Orthodontic

INTRODUCTION

A space between adjacent central incisor teeth is termed "diastema or diastemata". Midline diastema in mixed dentition is a great center of concern for parents as well as their children; therefore, determining the time of closure of midline diastema is essential for clinical practice in Orthodontics(1). Midline diastema is found in approximately 98% of children at age of 6 years, 49% at age of 11 years, and 7% in 12 to 18-year-old individuals(2). The frequency of maxillary midline diastema declines with age. It also becomes less in size with a second (lateral) incisor and cuspid eruption. Liu J-F et al reported a 14.5 % prevalence of maxillary midline diastema after the eruption of canine(1).

Midline diastema in the mixed dentition stage is also termed the "ugly duckling stage" for children(4). In this condition Midline diastema, there is a space between the upper central incisors. But it is the characteristic of normal growth in primary and mixed dentition stages and usually is closed when the upper permanent canines erupt(5). It is due to erupting crown pressure of the maxillary canine on the root of the upper permanent lateral incisor when tipped distally. Due to this distal tipping, space is created between two maxillary central incisors present as centerline diastema (6, 7). In most children, it closes spontaneously when the cuspid erupts fully but in some cases, it does not close completely especially when more than 2mm. The continuing presence of a diastema between the maxillary central incisors in adults often is considered an esthetics or malocclusion problem. The mandibular diastema is not a normal growth characteristic. The spacing, in mandibular midline diastema, is less common than in maxillary midline diastema. The primary etiologic factor in mandibular diastema is tongue thrust in a low rest position(8).

The etiology of central line diastema may be genetic,(10) physiological as in ugly duckling stage, dentoalveolar, hypodontia(11), peg-shaped maxillary lateral incisor(12), supernumerary tooth in anterior maxilla(13), increased proclination of upper incisor as in class II division 1 cases, low frenum(14), self-inflicted pathology by tongue piercing. Midline diastema has a racial tendency and this has been well reported in the literature(15). So far no specific genes have been determined for its genetic etiology but there are several syndromes and congenital anomalies which have midline diastema as one of their features e.g. PaiSyndome(16), Ellis-van Creveld syndrome (17), cleft palate (18), lateral incisor agenesis(19) and median cyst(20). Protracted deleterious habits can alter the equilibrium forces among the cheeks, lips, and tongue and can lead to undesirable changes in the dentofacial region. This pressure in an outward direction from protracted deleterious oral habits with improper lips seal can flare the maxillary incisors in an outward direction, which creates midline diastema. Examples of these deleterious oral habits include digit sucking and lower lip biting(21). Midline diastema in the upper arch may be due to the insertion of the frenum into the notch of anterior alveolar bone, clinically a heavy band of fibrous tissue can be seen between the two central incisors (22). The upper two central incisor teeth may exhibit a large space in between. In the case of a low frenum, no bone is found inferior to the frenum. A V-shaped bony notch occurs between two central incisors (23). Trans-septal fibers are not crossing across the midline notch, and the space may never close(14). Angle and Sicher assigned abnormal frenum to be a cause of midline diastema (24, 25), while Tait(26) in his study stated that frenum is an effect and not etiology for the diastema incidence. The practitioner should evaluate the cause of this condition before formulating the treatment plan. The factor may be hyperdontiamesiodens when a supernumerary tooth is located in the central area of maxillary incisors known as mesiodens, so the mesiodens strongly advise that the diagnosis of mesiodens should be made it as early as possible because it cause disturbance in eruption such as the eruption of the permanent incisor is delay produce crowding so create interference with the alignment of anterior teeth, restriction of adjacent teeth, and development of follicular cyst type of odontogenic cyst most common cause of midline diastema related with hypodontia, microdontia, enlarged frenum, deleterious oral habits or advanced periodontitis. Complete medical history and history of hat the duration of diastema should be obtained(27). Proper diagnosis requires inspection of teeth and occlusion, examination of lips and labial frenum, and complete evaluation of periodontal health. Periapical x-ray help diagnoses periodontal health (28). In the case of restorative closure of diastema diagnostic wax-up will be done to illustrate the possible treatment results(27). In case of abnormal oral habits (thumb sucking and pen biting) and mesiodens, the following treatment protocol is followed. After completion of diagnosis, treatment is to remove the mesiodens and use a habit-breaking device like palatal crib therapy to discontinue the thumb habit. Before starting treatment with the palatal tongue, it is better

to discuss with patients and parents the cessation of the habit. The next therapy for cessation of habits is reminder therapy. Before palatal crib insertion reminder and reward, therapy should be tried as much as feasible. Then, fixe appliances should be bonded on maxillary central incisors and the diastema close. When acceptable levels of overbite and overjet are achieved and the habit will be controlled satisfactorily, the orthodontic appliances and retainer should be given(29). A variety of surgical techniques had been practiced by oral surgeons, Orthodontists, and periodontitis. The easy way of frenectomy is to make two parallel incisions on each side of the frenum joined in the vestibule with a scissor. The incision margins are closed with a single suture (30). Other techniques are Z-plasty, Vestibular sulcus extension, and Morselli's procedure also can be done (31). The last three techniques have less chance of scar but techniques are sensitive. Frenectomy should be performed after space closure(8).Treatment of upper midline diastema with lateral incisor agenesis in early mixed dentition is space closure 2×2 appliance, space created between permanent central incisor and cuspid and is closed by prosthetic replacement with implant or fixed prosthesis .but today mostly used for this condition is 2×2 fixed appliance initially for this condition inti archwire 0.016 size to level and align the teeth and Progressively 0.019 and 0,025 niti and stainless steel wire were used. For better control of dental alignments such as a crown, root angulation, and torque of the incisor was used fixed appliance after the closure of midline diastema, and space between incisors teeth and deciduous canine was maintained by an acrylic partial denture(32). Retention is very important especially in permanent dentition because there is a lack of trans-septal fibers, which hold the teeth together. Therefore, a fixed spiral wire retainer should be placed on the lingual side of the upper incisors permanently(8).

Midline diastema is very rare in the mandibular arch because it is a generalized part. As midline diastema is an important aesthetic issue because it is visible to everyone. Knowing its frequency in the Mardan population will be very helpful as no study had been performed on this subject. This helps the clinicians to divert attention to this condition timely. The objective of this study was to determine the frequency of midline diastema in both maxillary and mandibular arches in patients reporting to Bacha Khan Medical College Mardan.

MATERIALS AND METHODS

This cross-sectional prospective study was conducted in Bacha Khan Medical College Mardan in November 2016 after the approval of the Principal. Subjects fulfilling the inclusion criteria were invited to take part in the study. The purpose, procedures, risks, and benefits of the study were explained to them. Informed consent and their willingness and participation in the study were ensured. They were assured of maintaining the confidentiality of their personal and other data collected from their records. Well-cooperative patients, having permanent dentition and all-natural teeth along with the presence of teeth from canine to canine were included in the study. While patients have a previous history of orthodontics treatment, mixed dentition, missing teeth in the anterior region, and non-Pakistani were excluded from the study
The sample size was calculated to be 200 using the following formula;

$$n=\frac{z^2p(1-p)}{d^2}$$

The midline diastema was recorded clinically from each participant in the prestructured questionnaire. Each patient was examined under illumination using a mouth mirror and probe. While sitting in the dental unit.

Data analysis was done using SPSS version 20.0. Graphs and frequency distribution were calculated for numerical variables like age and frequencies and percentages were calculated for categorical variables like frequency of midline diastema and genders post-gender stratification.

RESULTS

According to statistical calculations out of 200 responders, 24 were diastemas. According to gender distribution, 15 were male while 9 were female out of 24 diastemic patients. So males were more affected as compared to females.

According to maxillary and mandibular distribution in the same sexes frequency of maxillary midline diastema was greater as compared to mandibular midline diastema in males (9:6) while in the females frequency of mandibular midline diastema was greater than maxillary midline diastema (5:1).

Both mandibular and maxillary midline diastema was found only in the female. The below-mentioned statistical analysis explains all the results got through the study in the year 2016.

Table3.1: Data Distribution According to gender

Male			Female		
Response	Frequency	Percent	Response	Frequency	Percent
Male	100	100.0	Female	100	100.0

Table-3.1 shows that out of 200 individuals (total data) taken for midline diastema 100 were male while 100 were female.

Table 3.2: Frequency Pattern of Diastema

Male			Female	
Response	Frequency	Percent	Frequency	Percent
Maxillary midline diastema	9	9.0	1	1.0
Mandibular midline diastema	6	6.0	5	5.0
Maxillary and mandibular madline diastema	0	0.0	3	3.0
Absent	85	85.0	91	91.0
Total	100	100.0	100	100.0

Table-3.2 and figure 3.3 Indicates that most of the male respondent was found to have 9 % of Maxillary midline diastema and the frequency of Mandibular midline diastema was 6% while both Mandibular and Maxillary Midline diastema in Male was absent. Females had Maxillary midline diastema at 1% and the Mandibular midline diastema was 5% and the Frequency of Both Mandibular and Maxillary Midline diastema was 3%.out of 100 the frequency of Maxillary midline diastema was (9/100) is the highest shown by the male.

Fig. 3.3: Frequency Pattern of Diastema

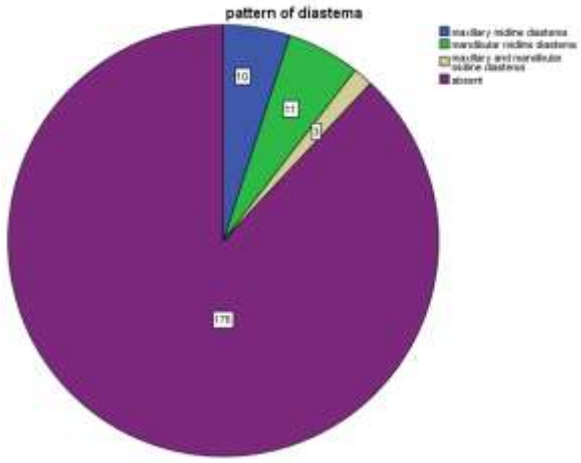

Table.3.3: Percentage and Frequency of Diastema According To Gender

Type	Male	Female	Total
maxillary midline diastema	9 (60%)	1 (11.1%)	10 (5%)
mandibular midline diastema	6 (40%)	5 (55.6%)	11 (5.5%)
maxillary and mandibular midline diastema	0 (0%)	3 (33.3%)	3 (1.5%)
Total	15 (100%)	9 (100%)	24 (12%)

Table 3.4 and figure 3.4 shows that Maxillary midline diastema in males is 60% Mandibular midline diastema in males is 40% and both Maxillary &Mandibular are absent. Maxillary midline diastema in females is 11.10% while mandibular midline diastema is 55.6% and both Maxillary& Mandibular midline diastema is 3.33%.

DISCUSSION

A diastema is a space or "gap," most often seen between the two upper front teeth. The space which is present in the interproximal surface of the upper incisors teeth is known, as maxillary midline diastema while the space which presents between the lower central incisors is known as mandibular midline diastema. (1) At some stages of dental development, it is normal to have a diastema but it eventually closes during further development often, parents are more aware of the spaces between the front teeth of their children and attempt to find treatment for cosmetic reasons even during the preschool period. However, a diastema can also affect the speech thereby certain sounds like "S" is not pronounced properly. During this, the tongue pushes forward to close the space thereby a constant tongue pressure can make the diastema worse over time. (5, 6, 7) Campbell *et al*. stated that midline diastema could be transient or created by developmental, pathological, or iatrogenic factors. Like oral habits examples of oral habits include digit sucking and lower lip biting. Such habits can change the equilibrium forces among cheeks, lips, and tongue and can lead to undesirable changes in the dentofacial region, soft tissue imbalance, physical impediment, dental anomalies, and/or skeletal disharmonies; Usually, the space closure in the anterior segment is delayed as a well as normal dentoalveolar development. While some pathological and congenital anomalies which cause midline diastema e.g. PaiSyndome, Ellis-van Creveld syndrome, cleft palate, lateral incisor agenesis, and median cyst can occur. (16,17,18,19) The previous work done on the topic showed that there is much difference in the prevalence of Midline diastema. The data compiled by Lavelle and associates according to their report result showed that the prevalence of the Maxillary midline diastema had high frequency in Africa (West Africa) as compared to Caucasians (British) or Monogoloids (Chinas, Hongkong). Moreover, they added that racial and gender discrimination was also found to confirm diastema. (4) According to the study by Hurwitz, when they examined the MLD in black and white children whose age was between 10 to 12 years, the frequency of MLD was founded at 19% in the block and 8% in white so the study of Hurwitz showed that the black children ware more affected than white. (4) Becker worked to confirm racial differences and he said that the Mediterranean white and black had midline diastema. (4) In A study carried out in Saudi Arabia in the region of Aseer for this study 200 patients were taken for the prevalence and etiology of Maxillary midline diastema (MMD). According to this study, 23% of MMD was detected in the population while a study performed at Jeddah to investigate Maxillary midline diastema (MMD) in the population came up with a result of 4.46%. (6) The similar study was carried out in Pakistan in the area of Rawalpindi to see the frequency and etiology of Maxillary midline diastema in the people for which 1747 patients were examined and the data was analyzed and reported 12.59 % Maxillary midline diastema (29)

The frequency of Midline diastema seen in Kuwait is 26.8%. So the frequency of MLD in a current study is close to the frequency of MLD that is found in Kuwait. A study carried out on the Turkey population concluded with the results that midline diastema was found in 4.5% of the patients and in this study the sample size was 35 males while 33 were females and a study carried out on Tanzanian people. The occurrence of Maxillary midline diastema is 26%, Mandibular midline diastema at 11%, while both Maxillary midline diastema and Mandibular midline diastema were 8%.(2,6,8) while the current studies carried out at Bacha Khan Medical College Mardan in 2016 the incidence of maxillary midline diastema was 10% and the mandibular midline diastema 11% and both the maxillary and mandibular midline diastema was 3%. The difference was seen in the studies because of inclusion criteria, sampling Techniques, or genetic predisposition. But the current study which was performed in the Pakistan Khyber Pakhtunkhwa Mardan region in 2016 in which the patients were assessed for Maxillary midline diastema concluded with the results of 10% (table 3.4). As our study is a bit different from the above-mentioned studies because in this study we tried to focus on the presence of Maxillary midline diastema, Mandibular midline diastema, and the prevalence of both in patients. This study was carried out at Bacha Khan Medical College Mardan Pakistan, For this study, 200 hundred patients had assessed from both the gender and that ended with the conclusion that the frequency of Maxillary Midline Diastema in males was 9% while Mandibular midline diastema was 6% and the ratio of Maxillary midline diastema in females was1% and the Mandibular midline diastema was 5%. And the presence of Maxillary and Mandibular midline diastema was 3% in females while in males it was0%. A strong correlation was observed between the occurrences of MLD in the sample population I was interested to note the frequency of MLD that 24% of midline diastema positive patients were found to be esthetically disturbing while all of them wanted to get treatment to close the space. The available treatment options for MLD are surgical correction of high frenal attachment, orthodontic closure, composite restoration, esthetic crowns, etc.

This study has some limitations like sample size is small, limited time and money, No assistance available, and the approval from Institutions for data collection. The presence of Maxillary midline diastema in our society is a matter of concern and proper measurements should be taken and a strong strategy must be implemented to avoid wrong practices regarding this problem as this study was carried out with a small sample size so a similar study with addition to etiology of Midline diastema must be carried out with large sample at different areas of Khyber Pukhtoon Khwa Pakistan.

CONCLUSION

The study regarding the frequency of midline diastema in the population found that there were discrepancies in the presence of midline diastema in different areas. According to the available data analyzed out of 200 individuals, 24 were diastemas. When distribution was performed gender-wise 15 were male while 9 were female out of 24 diastemic patients. So males were more affected as compared to females. When male patients were examined for the frequency of maxillary and mandibular diastema. Maxillary midline diastema was greater as compared to mandibular midline diastema. While in females frequency of mandibular midline diastema was greater than maxillary midline diastema. The frequency of both Maxillary and Mandibular midline diastema was present only in females. A strong correlation was observed between the occurrences of MLD in the sample population. I was interested to note the frequency of MLD that 24% of midline diastema-positive patients found to be esthetically disturbing and all of them wanted to get treatment to close the space. The findings of the current study are that the population of Khyber Pukhtoon Khwa has several Midline diastemata affecting people's esthetics. As this condition has become an esthetic problem so ortho-dentistry needs to give focus on Midline diastema.

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