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Original article

Median Diastema Among Libyan Young Adults: Prevalence and Etiology

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Maxillary midline diastema is a prevalent aesthetic concern in mixed and permanent dentition. The space may be occasioned by either a transient malocclusion or developmental, pathological, or iatrogenic factors. The persistence of a diastema, or gap, between the maxillary central incisors in adults is frequently regarded as an aesthetic or malocclusion problem. Midline diastemas can be categorised as physiological, dentoalveolar, or due to a missing tooth, peg-shaped lateral or midline supernumerary teeth, the proclination of the upper labial segment, a prominent frenum, or self-inflicted by tongue piercing. The present study aims to determine the aetiology and prevalence of midline diastema among a sample of Libyan patients, and to ascertain whether it is more prevalent in males or females. The current cross-sectional study, conducted at private dental clinics throughout Sirte City, employed a random sampling method with a sample size of 482 people (135 males and 347 females) to examine the occurrence and aetiology of midline diastema among orthodontic patients in Sirte City. The measurements collected in the present study were collected in situ as part of the examination of the patient. The subject age range was 15 to 37, and the mean age was 26 years. 482 patients were assessed, and the prevalence of upper midline diastema was 10.37% (50) of subjects. Of these, 9.63% (13) were male and 10.67% (37) were female. There was no statistically significant difference between the prevalence of upper diastema in males and females (p value = 0.720). The most prevalent etiological factors were found to be a highly attached frenum (40%) and generalized spaces (32%). The prevalence of malocclusions was as follows: 10% of patients exhibited flared or rotated incisors, 6% demonstrated supernumerary teeth, and 12% exhibited peg-shaped laterals or congenitally missing laterals.

Introduction

Angle (1907) described the dental midline diastema as a relatively common form of incomplete occlusion, characterized by a space between the maxillary and, less frequently, mandibular central incisors. Furthermore, he demonstrated an understanding of the functional and aesthetic implications of the midline diastema. It was asserted that the interdental diastema invariably engenders an aesthetically displeasing appearance and impedes speech, contingent upon its width [1]. A congruent perspective is proffered by Andrews (1972) in his seminal article, "The six keys to normal occlusion," wherein he advocates, in the fifth principle, the notion that interdental diastemas should not be present and that all contact areas should be optimally aligned, thereby ensuring that the patient is endowed with "straight and aesthetically pleasing teeth, in conjunction with an optimal overall dental occlusion [2].

In this diastema, the incisors are typically arranged in a fan-like arrangement, which can result in an undesirable aesthetic. This phase has been termed the 'ugly duckling stage'. In typical circumstances, the median diastema undergoes a gradual closure through the eruption of the lateral incisors and permanent canines [3]. However, suppose the midline diastema remains until the completion of permanent dentition in adults. In that case, it is often considered to be aesthetically unacceptable or indicative of malocclusion, and may require orthodontic intervention [4]. Moyers (1988) [5] studied 82 patients who presented with maxillary midline diastema and reported the following causes: a) imperfect fusion at midline of premaxilla (32.9%). The prevalence of malocclusions was investigated in a sample of Libyan patients. The following malocclusions were identified: enlarged or mispositioned upper labial frenum (24.4%), midline diastema as part of normal growth (23.2%), congenitally missing lateral incisors (11%), supernumerary teeth at the midline (3.7%), and tiny teeth (2.4%). The present study was undertaken to assess the prevalence and etiological factors of maxillary midline diastema among a group of adult orthodontic patients in private orthodontic clinics in Sirte, Libya. The study also aimed to ascertain whether gender differences exist in the prevalence and etiology of midline diastema.

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Methods

Study design and setting

This was a cross-sectional study conducted among adult orthodontic patients of both sexes, and we were interested in detecting any significant differences between males and females.

Data collection

The data collection procedure was as follows: the study was retrospective and initiated in June 2024, the records encompassed clinical examination charts and radiographs, including panoramic and periapical images of the maxillary incisor region, as is customary for orthodontic patients. The diastema was measured between the midpoints of the mesial surfaces of both central incisors. The measurements were conducted in the patient's oral cavity, utilising a mouth mirror, disposable gloves, a sharp HB pencil, and a digital sliding caliper. Informed consent was obtained from the patients who consented to the utilisation of their data for the present research study.

Statistical analysis

The data were collated and subjected to statistical analysis. Categorical data were presented in the form of frequencies (n) and percentages (%). The measurement data have been collated, compiled, and analyzed using a T-test (P value=0.720).

Results

The present study comprised 482 patients who satisfied the selection criteria, thereby facilitating the exploration of potential sex differences. Patients' ages were distributed between 15-37 years; altogether, there were 135 males (22.5%) and 347 females (77.5%), with an average age of 26 years. Subjects younger than 13 years were excluded due to their physiological diastema. Additionally, a patient aged 32 was excluded in light of the potential for diastema formation resulting from periodontal disease and tooth migration. It was ascertained that none of the subjects had previously undergone extractions, surgical procedures, or orthodontic treatment. The present study found the upper midline diastema to be prevalent in 10.37% (50) of the subjects, with 9.63% (13) of these subjects being male and 10.67% (37) of them being female (Table 1). There was no statistically significant difference between the prevalence of upper diastema in males and females (p value = 0.720).

Table 1. The upper midline diastema

Type	Male (n)	%	Female(n)	%	Total (n)	%
No upper diastema	122	90.37%	310	89.33%	432	89.63%
upper diastema	13	9.63 %	37	10.67 %	50	10.37%
Total	135	100%	347	100%	482	100%

This study was performed in order to determine the incidence of potential etiological factors. The assessment produced the following results: 20 (40%) patients had a frenum with a high attachment (Fig. 1a and b), 16 (32%) had generalized spacing, 5 (10%) had flared incisors (Fig. 2), 3 (6%) had supernumerary teeth, 6 (12%) had peg shaped laterals, and 6 (12%) had congenitally missing laterals (Fig. 3).

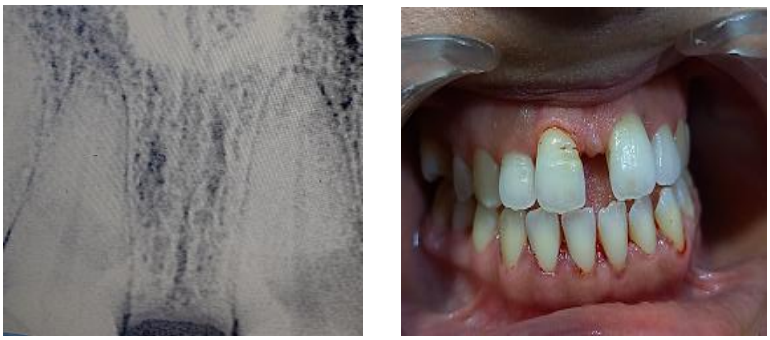

Figure 1. Highly attached frenum (fig 1a and b)

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Figure 2. Flared incisors

Figure 3. Peg-shaped laterals

Discussion

The existence of a diastema, or gap, between two central incisors is what defines a dental midline diastema. This condition is commonly observed in the maxillary arch, while it is rarely encountered in the mandibular arch [6]. A plethora of studies have been conducted to investigate the prevalence and frequency of diastema. Consequently, a broad variety of findings was observed, ranging from 1.6% to 25.4% in adults and encompassing an even broader range in groups of young people. The variations in epidemiological study findings can be ascribed to the increased number of factors contributing to midline diastema. The results of multiple studies clearly show that the prevalence of midline diastema varies among various populations. These studies have produced conflicting findings because they vary in terms of sample size, geographic location, patient population, and diastema percentage. For example, two studies of patients in Tanzania and Iraq found that the prevalence of midline diastema was 26% and 28%, respectively [7, 8].

Chukwudi assessed the prevalence of malocclusion in Ibadan, Nigeria, in 2004 among adolescents who were primarily Yoruba. The epidemiological survey involved a sample of 636 secondary school students, with a midline diastema observed in 37% of the sample [9]. Alhaji (2005) examined the prevalence of malocclusion among schoolchildren in North Jordan in 2001 and discovered that 6.9% of the sample had a median diastema [10]. The prevalence of malocclusion was investigated in a sample of 100 Malaysian adolescents, including both male and female participants, aged 13 to 17, in the study by Mohd et al. (2019). Three (6.1%) cases of midline diastema were found in the randomly chosen subjects who underwent a dental examination; there were notable differences between the male and female subjects. [11]

In African dentistry, maxillary midline diastema is a stunning dental attribute, particularly in female patients, and has served as a distinctive and powerful trademark in many scenarios [12]. Midline diastemas may be classified as follows: firstly, they may be genetic; secondly, they may be physiological; thirdly, they may be dentoalveolar; fourthly, they may be caused by an absent tooth; fifthly, they may be caused by supernumerary, peg-shaped midline or lateral teeth; sixthly, they may be caused by proclination of the upper labial segment; seventhly, they may be caused by a prominent frenum; and eighthly, they may be caused by a self-induced pathology by tongue piercing [13,14]. Midline diastema in the maxilla may be caused by attachment of the labial frenum into the notch of the alveolar bone, resulting in a band of dense fibrous tissue between the central incisors [15]. Angle and Sicher stated that one of the etiologic factors of midline diastema is a frenum anomaly [16, 17], while in his study work, Tait clarified that frenum is not a cause but an effect of the presence of diastema.

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The prevalence of maxillary midline diastema in this study was 65%, with possible etiological factors. The study revealed that 22 (33.8%) patients had highly attached frenum, 13 (20.0%) patients had generalized spaces, 17 (26.2%) patients had flared incisors, and 11 (16.9%) patients had rotated incisors.2% of patients had supernumerary teeth, while 12 (18.5%) patients had peg-shaped laterals and 25 (38.5%) patients had congenitally missing laterals [19]. In contrast, Al-Hashimi [20] reported a higher percentage of 44.4%, and Luqman et al. [21] recorded a percentage of generalized spaces of 39%.

Conclusion

The present study found that the incidence of upper midline diastema in the Libyan population agreed with the incidence reported elsewhere, with no gender difference between male and female patients. The study emphasized the need to consider the etiology of midline diastema as a principal determinant of whether or not orthodontic treatment is required. The study focused on the interaction of environmental and genetic factors in the etiology of midline diastema, in so doing emphasizing the pivotal role of the orthodontist in the evaluation of such factors and the prediction of the risk of midline diastema development in subsequent generations. This information is vital when it comes to patient diagnosis, treatment planning, and management. In this particular case, the retention process assumes special significance.

Conflict of interest. Nil

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