



Retrospective Epidemiological Study of the Width of Maxillary Diastema in Patients from Northeastern Bulgaria

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Abstract

Introduction: A maxillary diastema (MD) is identified when the gap between the central incisors exceeds 0.5 mm. It poses an aesthetic and phonetic concern, often seen in mixed dentition and occasionally continuing into permanent dentition.

Aim: The aim was to conduct a retrospective study on the epidemiology of maxillary diastema among patients in northeastern Bulgaria.

Materials and methods: We analyzed 149 diagnostic plaster models of individuals with maxillary diastema with a mean age of 39.50 ± 1.70 years. To ensure accuracy, we divided the patients into two age groups. People 35 years of age or younger were in the first age group. The second group consisted of those who were older than 35.

Results: Size of maxillary diastema according to sex: the derived 95% confidence interval shows that in the group of patients who met the selection criteria in the study, with 95% certainty, the width of the maxillary diastema was expected to be in the range of 1.389 mm to 1.754 mm. The median maxillary diastema width in males was 1.45 ± 0.78 mm. The median maxillary diastema width in females was 1.41 ± 0.24 mm.

Size of maxillary diastema according to age: data analysis indicates that the average size of a maxillary diastema was 1.43 ± 0.24 mm among those under 35. In such individuals, the maxillary diastema width ranged from 1.07 mm to 2.20 mm, with 1.07 mm being the lowest recorded value. Maxillary diastema in those over 35 had a maximum measurement of 7.88 mm and a minimum of 1.05 mm.

The median width of maxillary diastema in the analyzed 149 models was 1.46 ± 0.23 mm.

Conclusion: Patients' smiles and dental aesthetics are subject to the strict standards set by modern society. This causes one to examine small details like the distance between one's central incisors and feel compelled to have them adjusted. Examining the maxillary diastema width in relation to age and sex facilitates a prompt selection of materials and fabrication methods, leading to outstanding functional and aesthetic results from the treatment that is performed.

Keywords

aesthetic and phonetic issue, maxillary diastema, permanent dentition

INTRODUCTION

Maxillary diastema (MD) occurs when the gap between the central incisors exceeds 0.5 mm. It is an an and phonetic issue that is most usually seen in mixed dentition but less frequently occurs in permanent dentition. It is caused by pathogenic and iatrogenic conditions, as well as those affecting jaw growth. Many researchers have investigated the frequency of MD in the community, yielding results ranging from 1.60% to 25.40% in various populations. There is no consensus on the findings of epidemiological studies because the definition of MD varies and there are numerous factors influencing its prevalence.^[1-4] The prevalence of MD varies substantially with age, sex, studied population, and racial origin. Lavelle's 1970 study in the United Kingdom found that the Negroid-Australoid race had the highest frequency of MD (5.5%), followed by Caucasian individuals (3.4%), and the Mongoloid race had the lowest prevalence (1.7%).^[5] In 1999, Oesterle and Shellhart found it in 97% of the 5-year-olds they evaluated with the frequency dropping dramatically with age.^[6]

AIM

We conducted a retrospective study to investigate the epidemiology of maxillary diastema in patients from north-eastern Bulgaria.

MATERIALS AND METHODS

The study was carried out in accordance with the guidelines of the Medical University's Ethics Committee in Varna, Bulgaria (No. 116/28.04.2022). For this investigation, 149 diagnostic plaster models of individuals with maxillary diastema were examined. All subjects sought dental care from specialized prosthodontic offices due to a concerns. The investigated patients had a mean age of 39.50 ± 1.70 years. The study included 73 male models (mean age: 45.64 ± 1.92) and 76 female models (mean age: 33.59 ± 2.04 years). For accurate analysis, the patients were separated into two age groups. The first age group consisted of people aged 35 and

under. In the second category, we included patients over 35 years.

The selection of models was carried out according to the criteria for inclusion in the experimental study (**Table 1**).

To obtain the plaster models, impressions were taken using condensation silicone impression material (Zeta Plus Putty and Oranwash, Zhermack, Italy), to overcome the retention of intact frontal teeth with maxillary diastema. To neutralize the negative effect of polymerization shrinkage, the plaster models were left to set for up to three hours from the moment the impressions were taken, following the manufacturer's instructions. The models were cast with class IV gypsum (WellsaStone IV, Well-samed, Germany), using the reverse pouring method. For maximum precision, a digital caliper Microtech BIG SCREEN, IP54, 300 mm, 0.01 mm, certified for calibration No. M2212-1941 dated 19.12.2022, was used. The distance was measured between the most prominent points on the mesial approximal surfaces of the central incisors. The width of the frontal teeth was recorded as the greatest distance between the mesial and distal contact points, in a plane perpendicular to the longitudinal axis of the tooth being measured. To justify our decision to conduct the retrospective study on plaster models, we examined the obtained data on the width of the MD from 50 patients, measured intraorally, on plaster models, and on a virtual working models. The obtained values for the width of the MD from 50 patients, measured intraorally, on a plaster model, and on a digital diagnostic model, did not show a statistically significant difference ($p=0.000$) (**Fig. 1**).

RESULTS

Size of MD according to sex

The derived 95% confidence interval shows that in the group of patients who met the selection criteria in the study, with 95% certainty, the width of the MD was expected to be in the range of 1.389 to 1.754 mm. According to the data from the studied models, the average value of the MD size in males was 1.57 ± 0.78 mm. The median of the MD

Table 1. Inclusion and exclusion criteria for participants

Inclusion criteria	Exclusion criteria
Age between 18 and 65 years	Age under 18 and over 65 years old
Presence of maxillary diastema	Presence of periodontal disease
Intact frontal teeth	Presence of erosion, attrition, and abrasion on the frontal maxillary teeth
Physiological occlusion	Pathological occlusion
Caucasian race	Negroid or Mongoloid race
Absence of parafunctions	Presence of parafunctions
Absence of systemic diseases	Presence of systemic diseases

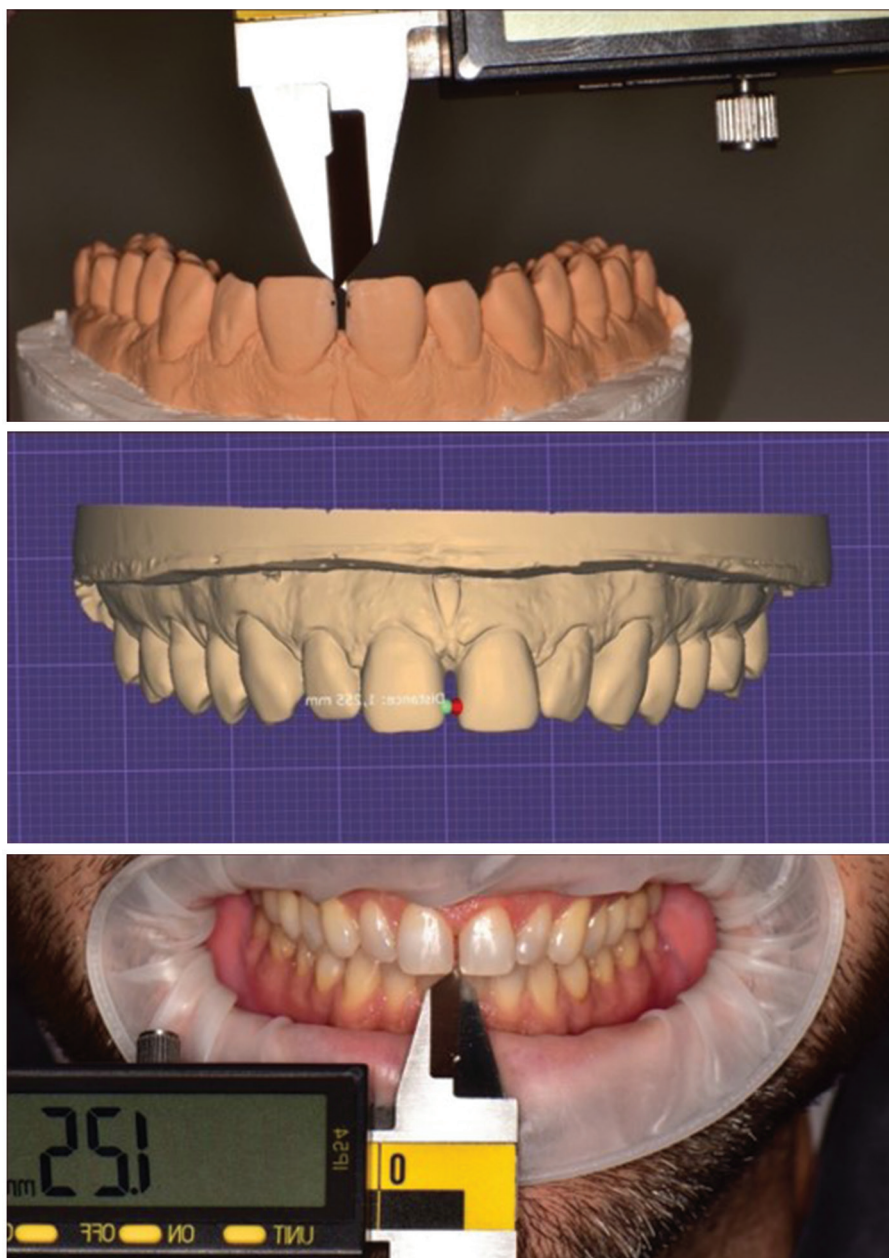


Figure 1. Measuring MD on plaster models, on digital diagnostic models, and intraorally.

width in males was 1.45 ± 0.78 mm. The smallest measured value of the MD in males was 1.09 mm, and the largest was 7.88 mm.

The analysis of the results in females shows an average value of MD of 1.43 ± 0.24 mm and a 95% confidence interval of 1.37 to 1.48 mm. The median MD width in females was 1.41 ± 0.24 mm. This value is remarkably close to the value obtained for males. The smallest measured value of MD in females was 1.05 mm, and the largest was 2.34 mm. The obtained standard errors were negligibly small, ensuring the reliability of the results and allowing the generalization that at the lower limit, the value of the measured MD widths in both sexes in the studied group was very close (males: 1.38 mm; females: 1.37 mm).

Size of MD according to age

The analysis of the data shows that in individuals ≤ 35 years old, the average size of MD is 1.43 ± 0.24 mm. The derived 95% CI indicates that patients from northeastern Bulgaria, meeting the inclusion criteria for the study, are characterized by MD widths ranging from 1.37 to 1.50 mm. The value of the median MD width in the studied group is 1.41 ± 0.24 mm. The smallest measured value of MD width in individuals ≤ 35 years old is 1.07 mm, and the largest is 2.20 mm.

Individuals over 35 years old had an average MD size of 1.544 ± 0.72 mm, with a 95% confidence interval ranging from 1.391 to 1.696 mm. The median MD width among

these participants was 1.44 ± 0.72 mm. The smallest measured value of MD in those over 35 years old was 1.05 mm, while the maximum was 7.88 mm.

The median value for the 149 models evaluated was 1.46 ± 0.23 mm. The data analysis revealed no linear correlation between the age of the examined units and the size of the MD. Thus, non-parametric correlation coefficients were applied. After evaluating the results, a Kendall's tau coefficient of 0.123 (significant at $\alpha=0.05$) and a Spearman's rank correlation coefficient of 1.148 (significant at $\alpha=0.05$) were found. A positive but weak correlation was found between the age of the examined patients and the size of MD. The diastema widens with age.

DISCUSSION

The processed data from our study show that the average size of MD in the studied male patients (1.57 mm) was larger than that in the studied female patients (1.43 mm). Similar results were also reported by Sękowska and Chałas.^[7] Several researchers analyzed the prevalence of MD and reported different results. This is due to the fact that the epidemiology of MD is directly related to the ethnicity, race, and age of the studied patients. Logeswari et al. investigated 500 individuals aged 18-35 years in Chennai, India. They reported a prevalence rate of 21.8%, with no statistically significant association between sex and the presence of MD.^[8] In 2020, a similar study was conducted in Southern Kurdistan by Hasan et al. They examined 1000 individuals with a mean age of 19 years, evenly distributed between both sexes. They observed MD when the distance between the maxillary incisors was greater than 0.5 mm in 23.2% of the studied patients. The authors indicate a significantly higher frequency in females (26.4%) compared to males (20.3%).^[9] A study from 2010 aiming to analyze the prevalence of orthodontic malformations in the Turkish population reported a frequency of maxillary diastema of 4.5%, distributed equally between both sexes. Celikoglu et al. investigated 1507 orthodontic patients, including 884 women and 623 men. They found that maxillary diastema was more common in women, while mandibular diastema is more common in men. They also noted that diastema was transmitted through generations and was more likely to be inherited by male children.^[10]

CONCLUSION

Today's society places a high value on patients' dental as and smiles. This leads to a focus on tiny details such as the distance between central incisors and a desire to fix them.

Despite the availability of many procedures, prosthetic methods remain preferred due to the long-term nature of treatment, ease of execution, and predictable results. Studying the width of MD based on sex and age allows for a rapid selection of materials and construction procedures, resulting in superior functional and a outcomes from the treatment.

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Competing Interests

The authors have declared that no competing interests exist.

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Ретроспективное эпидемиологическое исследование ширины диастемы верхней челюсти у пациентов из северо-восточной Болгарии

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Резюме

Введение: Диастема верхней челюсти (ДВЧ) определяется, когда зазор между центральными резцами превышает 0,5 mm. Она представляет эстетическую и фонетическую проблему, часто наблюдается при смешанном прикусе и иногда продолжается в постоянном прикусе.

Цель: Целью было провести ретроспективное исследование эпидемиологии диастемы верхней челюсти среди пациентов в северо-восточной Болгарии.

Материалы и методы: Мы проанализировали 149 диагностических гипсовых моделей лиц с диастемой верхней челюсти, средний возраст которых составил 39.50 ± 1.70 года. Для обеспечения точности мы разделили пациентов на две возрастные группы. В первую возрастную группу вошли люди в возрасте 35 лет и моложе. Вторая группа состояла из лиц старше 35 лет.

Результаты: Размер верхней челюсти в зависимости от пола: полученный 95% доверительный интервал показывает, что в группе пациентов, которые соответствовали критериям отбора в исследовании, с 95% уверенностью ожидалось, что ширина верхней челюсти будет в диапазоне от 1.389 mm до 1.754 mm. Медиана ширины верхней челюсти у мужчин составила 1.45 ± 0.78 mm. Медиана ширины верхней челюсти у женщин составила 1.41 ± 0.24 mm.

Размер верхней диастемы в зависимости от возраста: анализ данных показывает, что средний размер верхней диастемы составил 1.43 ± 0.24 mm среди лиц моложе 35 лет. У таких лиц ширина верхней диастемы варьировалась от 1.07 mm до 2.20 mm при этом 1.07 mm было наименьшим зарегистрированным значением. Верхняя диастема у лиц старше 35 лет имела максимальный размер 7.88 mm и минимальный 1.05 mm.

Средняя ширина верхней диастемы в проанализированных 149 моделях составила $1,46 \pm 0,23$ mm.

Заключение: Улыбки пациентов и эстетика зубов подчиняются строгим эстетическим стандартам, установленных современным обществом. Это заставляет человека обращать внимание на такие мелкие детали, как расстояние между центральными резцами, и чувствовать необходимость их корректировки. Изучение ширины диастемы верхней челюсти в зависимости от возраста и пола способствует быстрому выбору материалов и методов изготовления, что приводит к выдающимся функциональным и эстетическим результатам проведённого лечения.

Ключевые слова

эстетическая и фонетическая проблема, диастема верхней челюсти, постоянный прикус