Scientific Research Publishing

Open Journal of Stomatology, 2022, 12, 175-182
https://www.scirp.org/journal/ojst
ISSN Online: 2160-8717
ISSN Print: 2160-8709

Retrospective Evaluation of the Prevalence of Diastema among an Adult Population

Kyle Cousineau[1], Tanya Al Talib[2], Neamat Abubakr Hassan[3*]

[1]School of Dental Medicine, University of Nevada, Las Vegas, Nevada, USA
[2]Department of Clinical Sciences, School of Dental Medicine, University of Nevada, Las Vegas, Nevada, USA
[3]Department of Biomedical Sciences, School of Dental Medicine, University of Nevada, Las Vegas, Nevada, USA
Email: *neamat.hassan@unlv.edu

How to cite this paper: Cousineau, K., Al Talib, T. and Hassan, N.A. (2022) Retrospective Evaluation of the Prevalence of Diastema among an Adult Population. *Open Journal of Stomatology*, **12**, 175-182.
https://doi.org/10.4236/ojst.2022.126017

Received: April 19, 2022
Accepted: June 12, 2022
Published: June 15, 2022

Abstract

Purpose: With the increased demand for orthodontic treatments in adults, Diastemas have always been an obstacle for either pre or post orthodontic treatment. The purpose of the present investigation is to identify the prevalence and location of diastema among patients attending the dental clinics, School of Dental Medicine, University of Nevada, Las Vegas (UNLV). **Methods:** A retrospective keywords search of the clinical notes of UNLV School of Dental Medicine (SDM) patient charts in AxiUmTM (dental practice management software) was performed using the search terms "diastema" and "midline diastema" to identify the number of cases that clinically presented with diastema from 1/1/2014-9/30/2020. Demographic data were then analyzed using a Chi-square test and compared against Clark County population data. **Results:** 1182 patients' records were identified to have one of the search keywords. 56.7% of the patients who presented with diastema were female, 43.1% were male and 0.2% were transgender. 31.5% of patients presenting with diastema were between the ages of 12 and 19. The majority of the diastema cases were in maxillary teeth, followed by diastema in both maxillary and mandibular. The least number of cases had only mandibular diastema. In regards to size, most (look up percent) were mild diastema (1 - 2 mm), followed by moderate (2 mm) and severe (above 2 mm). The reported ethnicity with highest diastema was Hispanic followed by Caucasians and 17% were African Americans. Chi square analysis showed ethnicity results are statistically significant ($p < 0.0001$). **Conclusion:** Ethnicity and arch are integral predictors for patients who have diastema.

Keywords

Maxillary Midline Diastema, Prevalence, Diastema

1. Introduction

One of the main reasons patients are addressing the dentist is the improving fa-

cial aesthetics. Face symmetry is considered an importance factor for facial aesthetics. Midline synchronization is considered an essential criterion for achieving harmony for facial esthetics.

A diastema is spacing or a gap in between the proximal surfaces of two adjacent teeth of 0.5 mm or more; spacing of upper or lower central incisors is frequently known as midline diastema [1]. Although commonly associated with maxillary midline diastema, such a spacing may occur between any two adjacent teeth. Most children will develop diastema during the process of normal development, and in many cases, treatment is not indicated [2]. However, maxillary midline diastemas of more than 2 mm are unlikely to close spontaneously and remain in the adult dentition [3]. Most adult patients consider a diastema, especially a maxillary midline diastema, to be unappealing [4]. Studies have shown that people consider those with diastema to be less intelligent, less beautiful, and of a lower social class [5]. Diastema may be brought about by several factors. Familial factors [4], abnormal size, shape, or number of teeth, periodontal defects, fibrous frenum defects, and muscular defects of the tongue [6] are all possible etiologies associated with the formation of diastema. Diastema formation has proven to be a truly multifactorial anomaly [7] [8]. Several studies support the concept of a possible genetic predisposition for the maxillary midline diastema [4] [7] [9] [10]. Genetics or family tree is considered the leading risk factor for the relapse of any orthodontic treatment of midline diastema; the other important factor is the size of the diastema [11].

Some studies concluded that maxillary midline diastema familial incidence was one of significant factors associated with the prevalence of maxillary midline diastema [7] [11]. In 2003, Gass *et al*. suggested that the midline diastema is inherited by an autosomal dominant mode of inheritance [10]. Diastema prevalence has been estimated between 3.7% [12] to 36.8% [13]. There was a variation of the acceptable maxillary to mandibular midline deviation, 1 - 2 mm deviation was considered to be acceptable while 2 - 4 mm was less esthetic or less acceptable, and 4 mm of deviation is considered as unaccepted [14] [15] [16]. The frequency of its occurrence and negative perceptions, it is clear that diastema is a concern for patients and practitioners. In 2007, Bernabe and Flores-Mir concluded that among young adults the maxillary anterior diastema had the most negative impact on self-perceived dental appearance [17].

Many techniques have been demonstrated to attempt to close diastema [18]. The aim of our study was to determine the prevalence of diastema in specific social demographics in our patient population at UNLV.

2. Methods

2.1. Patient Sample

The present retrospective study was approved by University of Nevada, Las Vegas, Biomedical Institutional Review Board and was given the status of exempt [IRB No. 1489457-1]. The data collection methods were inspired by a previous

study where the data were collected from patients records in axiUm by using their clinical notes [19]. The search was conducted in the axiUmTM to find all patients at UNLV, SDM clinics presenting with diastema. The search contained the keywords of "diastema" or "midline diastema" to identify the patients presenting with diastema at UNLV SDM clinic. All patient identifiers were removed from the collected data. Our search resulted in 4859 entries. 2248 duplicate responses were removed from the search results. Inclusion criteria for the selected patients consisted of patients 12 years of age and older and were patients at the UNLV SDM clinic from 1/1/2014-9/30/2019. Only patients over 12 were included in this study because children under 12 will commonly have mixed and primary dentition. This mixed or primary dentition often contains natural diastema to make room for the larger permanent teeth as they erupt. 12 years old was chosen as the age cutoff for our inclusion criteria because most permanent teeth should have erupted by this age. Patients who did not report a race/ethnicity on the forms were listed as "mixed/unknown".

2.2. Data Collection

Excel 2019 (Microsoft Corporation) was used to collect and organize data. Patient charts and exam notes were reviewed to collect data on age, sex, ethnicity, and diastema location. Size of diastema was also obtained through clinical photos, radiographs, and exam notes. This information was separated and organized into Excel. Demographic information and clinical data was evaluated as follows. Age was determined as being the age of the patient at the time of patient selection from the axiUmTM record base. Sex and age of the patient was listed on axiUmTM as filled out by the patient during screening. Ethnicity was also listed on axiUmTM as filled out by the patient during screening. Categories for patient ethnicity were divided into Caucasian, African American, Hispanic, Asian, and mixed/unknown. Diastema location was categorized based on tooth number and arch. Lastly, size of diastema was determined and then recorded into the Excel sheet. To determine diastema size, clinical photos and radiographs were measured. Each diastema was then separated into 3 categories. Diastemas 1 - 1.9 mm were considered mild, 2 mm were moderate, and above 2 mm were considered severe.

2.3. Statistical Analyses

Excel 2019 (Microsoft Corporation) was used to analyze demographic and clinical data. A chi-square test was performed to compare gender and ethnicity compiled from axiUmTM to Clark county population. Each gender and ethnicity's proportion of the patient sample was compared to the respective gender and ethnicity's proportion of Clark County Population. The frequency of each diastema size and their location was calculated as well via Excel. The significance level considered was 5 per cent. All statistical analyses were performed using Statistical software GraphPad.

3. Results

Results showed that 1182 patients' records were identified to have one of the search keywords. The socio-demographic data in Table 1 indicated that females have a higher prevalence of diastema (56.7%). Regarding age, 31.5% of the patients were between 12 - 19 years old. Ethnicity frequency calculations indicated that diastema was more among the Hispanic population (35%), followed by Caucasians (25%) and the African Americans population were 17% (Table 1). Most diastema cases were in the maxillary arch (80.69%), followed by cases with diastema in both the maxillary and mandibular arch (13.49%). Most patients presented with mild diastema (60%), followed by moderate (28.7%), and then severe (11.3%) (Figure 1). The chi-square analysis showed that these ethnicity results were statistically significant ($p < 0.0001$). Figure 2 shows some cases of different sizes of diastema.

4. Discussion

Diastemas are frequently considered as esthetic or malocclusion problems. Once defined their etiology, different treatments can be achieved. When analyzing the present findings, results showed that the prevalence of diastema was higher in females and is of statistical significance; this comes into disagreement with the previous study, which showed a high percentage of males with diastema [20]. Diastema presence can be predicted by ethnicity. Earlier studies showed that the prevalence of maxillary midline diastema was greater in African populations than among Caucasians or Asian [21]. Another research reported that a maxillary midline diastema (MMD) occurrence among African Americans is more

Table 1. Socio-demographic characteristics of the patients.

Gender	**Female**	**56.7%**
	Male	**43.1%**
	Transgender	**0.2%**
Age	12 - 19 years	**31.5%**
	20 - 29 years	**12.5%**
	30 - 39 years	**14.4%**
	40 - 49 years	**14.6%**
	50 - 59 years	**10.8%**
	60 - 69 years	**8.2%**
	70 years & above	**8%**
Ethnicity	African American	**17%**
	Asian	**4%**
	Caucasian	**25%**
	Hispanic	**35%**
	Mixed/Unknown	**19%**

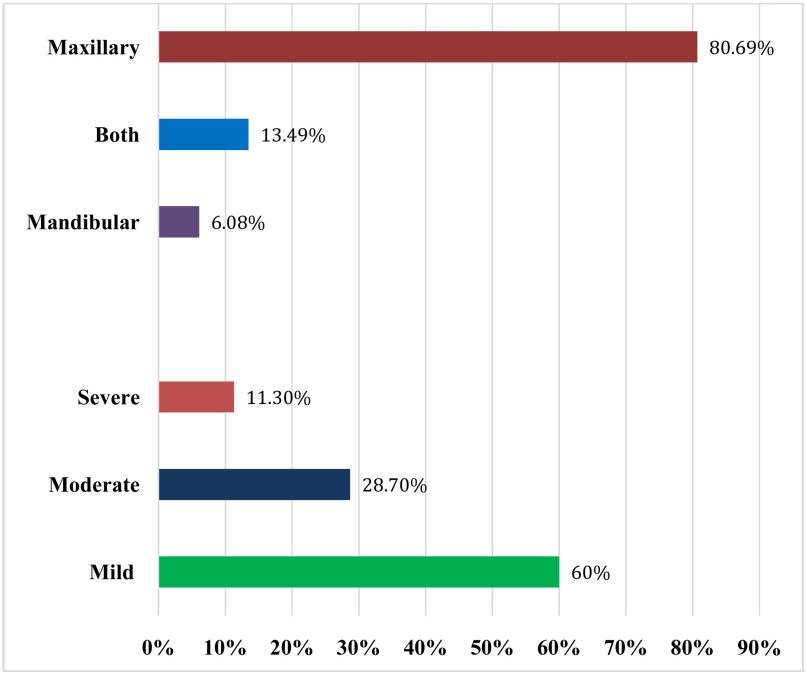

Figure 1. Distribution of diastema according their esthetic threshold were mild diastema (1 - 2 mm), moderate (2 mm) and severe (above 2 mm).

Figure 2. Examples of some diastema cases; (a) Mild; (b) Moderate; and (c) Severe.

than twice as in the whites or Hispanics population [22].

The present investigation provides data that indicates that diastema is more prevalent in certain population groups, and revealed a significant difference where the hispanic population represented 35% of the patients' population with diastema. The present results disagree with previous findings, which indicated that the prevalence of diastema, when examined by race-ethnicity, was high among African America compared to Mexican Americans and non-Hispanic whites [20] [21].

Some cultural influences considered midline diastema as an attractive dental feature that enhance their personality and beauty; Akinboboye in 2015, revealed that most Nigerian ethnic groups considered 2 to 3 mm diastema as esthetic pleasing feature [23]; while others consider it a dental problem that requires orthodontic or restorative intervention [1] [24] [25] [26] [27].

Few studies reported the presence of diastema in both arch diastema; the reported percentage was 6.3% [28]; the present investigation showed that 13.49% of the cases presented with diastema in both arches.

Facial esthetic is considered an essential factor in determining all patients' social interactions and quality of life. To achieve a satisfactory dental esthetic, it is necessary to decide the underlying cause for the midline diastema. One of the limitations of the present study was the investigation of the presence of any family tree for the diastema case. Further research is needed to understand how ethnicity contributes to determining whether a person has diastema. Genetic studies could evaluate the lack of or presence of a gene that contributes to diastema formation. Further research may determine if diastema formation is determined during embryological development, during adolescence, or from periodontal condition.

5. Conclusion

Within the limitations of the present investigation, there was a significant relation between the presence of diastema and ethnicity. The most common type and site of diastema was mild diastema in the maxillary arch only followed by moderate diastema in both arches.

Clinical Relevance

Treatment planning for diastema early in patients of certain social demographics may help avoid esthetics concerns later in life.

Authors' Contributions

KC, TA and NHA planned and performed the study; KC and NHA performed literature review. KC, NHA drafted the manuscript, KC carried out the statistical analyses and interpretation of data. TA and NHA critically revised the manuscript for intellectual content. All the authors have read and approved the final manuscript.

Ethics Approval

This study was approved by the University of Nevada, Las Vegas, Biomedical Institutional Review Board and was given the status of exempt [IRB no. 1489457-1].

Competing Interests

The authors declare no competing interest.

References

[1] Gkantidis, N., Kolokitha, O.E. and Topouzelis, N. (2008) Management of Maxillary Midline Diastema with Emphasis on Etiology. *Journal of Clinical Pediatric Dentistry*, **32**, 265-272. https://doi.org/10.17796/jcpd.32.4.j087t33221771387

[2] Lindsey, D. (1977) The Upper Mid-Line Space and Its Relation to the Labial Fraenum in Children and in Adults. A Statistical Evaluation. *British Dental Journal*, **143**, 327-332. https://doi.org/10.1038/sj.bdj.4804003

[3] Proffit, W.R., Flields, H.W. and Sarver, D.M. (2007) Treatment of Nonskeletal Prob-

lems in Preadolescent Children. In: Proffit, W.R., Ed., *Contemporary Orthodontics*, Elsevier, Amsterdam, 433-494.

[4] Shashua, D. and Årtun, J. (1999) Relapse after Orthodontic Correction of Maxillary Median Diastema: A Follow-Up Evaluation of Consecutive Cases. *The Angle Orthodontist*, **69**, 257-263.

[5] Kerosuo, H., Hausen, H., Laine, T. and Shaw, W.C. (1995) The Influence of Incisal Malocclusion on the Social Attractiveness of Young Adults in Finland. *The European Journal of Orthodontics*, **17**, 505-512. https://doi.org/10.1093/ejo/17.6.505

[6] Attia, Y. (1993) Midline Diastemas: Closure and Stability. *The Angle Orthodontist*, **63**, 209-212.

[7] Nainar, S.H. and Gnanasundaram, N. (1989) Incidence and Etiology of Midline Diastema in a Population in South India (Madras). *The Angle Orthodontist*, **59**, 277-282.

[8] Broadbent, B.H. (1941) Ontogenic Development of Occlusion. *The Angle Orthodontist*, **11**, 223-241.

[9] Schmitt, E., Gillenwater, J.Y., Kelly, T.E. and Opitz, J.M. (1982) An Autosomal Dominant Syndrome of Radial Hypoplasia, Triphalangeal Thumbs, Hypospadias, and Maxillary Diastema. *American Journal of Medical Genetics*, **13**, 63-69. https://doi.org/10.1002/ajmg.1320130111

[10] Gass, J.R., Valiathan, M., Tiwari, H.K., Hans, M.G. and Elston, R.C. (2003) Familial Correlations and Heritability of Maxillary Midline Diastema. *American Journal of Orthodontics and Dentofacial Orthopedics*, **123**, 35-39. https://doi.org/10.1067/mod.2003.56

[11] Schmitt, E., Gillenwater, J.Y., Kelly, T.E. and Opitz, J.M. (1982) An Autosomal Dominant Syndrome of Radial Hypoplasia, Triphalangeal Thumbs, Hypospadias, and Maxillary Diastema. *American Journal of Medical Genetics*, **13**, 63-69. https://doi.org/10.1002/ajmg.1320130111

[12] Thilander, B., Pena, L., Infante, C., Parada, S.S. and de Mayorga, C. (2001) Prevalence of Malocclusion and Orthodontic Treatment Need in Children and Adolescents in Bogota, Colombia. An Epidemiological Study Related to Different Stages of Dental Development. *European Journal of Orthodontics*, **23**, 153-168. https://doi.org/10.1093/ejo/23.2.153

[13] Onyeaso, C.O. (2004) Prevalence of Malocclusion among Adolescents in Ibadan, Nigeria. *American Journal of Orthodontics and Dentofacial Orthopedics*, **126**, 604-607. https://doi.org/10.1016/j.ajodo.2003.07.012

[14] Pinho, S., Ciriaco, C., Faber, J. and Lenza, M.A. (2007) Impact of Dental Asymmetries on the Perception of Smile Esthetics. *American Journal of Orthodontics and Dentofacial Orthopedics*, **132**, 748-753. https://doi.org/10.1016/j.ajodo.2006.01.039

[15] Erum, G.E. and Fida, M. (2008) Changes in Smile Parameters as Perceived by Orthodontists, Dentists, Artists, and Laypeople. *World Journal of Orthodontics*, **9**, 132-140.

[16] Shyagali, T.R., Chandralekha, B., Bhayya, D.P., Kumar, S. and Balasubramanyam, G. (2008) Are Ratings of Dentofacial Attractiveness Influenced by Dentofacial Midline Discrepancies? *Australian Orthodontic Journal*, **24**, 91-95.

[17] Bernabe, E. and Flores-Mir, C. (2007) Influence of Anterior Occlusal Characteristics on Self-Perceived Dental Appearance in Young Adults. *The Angle Orthodontist*, **77**, 831-836. https://doi.org/10.2319/082506-348.1

[18] Chu, C.H., Zhang, C.F. and Jin, L.J. (2011) Treating a Maxillary Midline Diastema

in Adult Patients: A General Dentist's Perspective. *The Journal of the American Dental Association*, **142**, 1258-1264. https://doi.org/10.14219/jada.archive.2011.0110

[19] Sturgill, R.B. (2017) Prevalence and Clinical Characteristics of Teeth Extracted with a Diagnosis of Cracked Tooth: A Retrospective Study.

[20] Brunelle, J.A., Bhat, M. and Lipton, J.A. (1996) Prevalence and Distribution of Selected Occlusal Characteristics in the US Population, 1988-1991. *Journal of Dental Research*, **75**, 706-713. https://doi.org/10.1177/00220345960750S10

[21] Lavelle, C.L.B. (1970) The Distribution of Diastemas in Different Human Population Samples. *European Journal of Oral Sciences*, **78**, 530-534. https://doi.org/10.1111/j.1600-0722.1970.tb02106.x

[22] Proffit, W.R., Fields Jr., H.W. and Sarver, D.M. (2006) Contemporary Orthodontics. Elsevier Health Sciences, Amsterdam.

[23] Bolanle Akinboboye, B.D. (2015) Transcultural Perception of Maxillary Midline Diastema. *The International Journal of Esthetic Dentistry*, **10**, 610-617.

[24] Abrahams, R. and Kamath, G. (2014) Midline Diastema and Its Aetiology—A Review. *Dental Update*, **41**, 457-464. https://doi.org/10.12968/denu.2014.41.5.457

[25] Rodrigues, L., Jawale, B., Kadam, A. and Rajani, P. (2020) Single Phase Correction of Tongue Thrust Habit Alongside Fixed Orthodontic Treatment for Closure of Spaced Dentition and Midline Diastema in a Male Patient with Class I Malocclusion without Need for a Two Phase Appliance Therapy—A Case Report. *IP Indian Journal of Orthodontics and Dentofacial Research*, **6**, 163-169. https://doi.org/10.18231/j.ijodr.2020.032

[26] Konstantonis, D., Brenner, R., Karamolegkou, M. and Vasileiou, D. (2018) Torturous Path of an Elastic Gap Band: Interdisciplinary Approach to Orthodontic Treatment for a Young Patient Who Lost both Maxillary Central Incisors after Do-It-Yourself Treatment. *American Journal of Orthodontics and Dentofacial Orthopedics*, **154**, 835-847. https://doi.org/10.1016/j.ajodo.2018.08.009

[27] Maluly-Proni, A.T., Oliveira-Reis, B., Assunção, W.G. and Dos Santos, P.H. (2018) Minimum Intervention Management of Diastema Closure Using Cordless Displacement System and Laminate Veneers: A 2-Year Follow-Up. *European Journal of Dentistry*, **12**, 446-449. https://doi.org/10.4103/ejd.ejd_208_18

[28] Steigman, S. and Weissberg, Y. (1985) Spaced Dentition: An Epidemiologic Study. *The Angle Orthodontist*, **55**, 167-176.