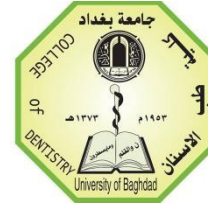


Republic of Iraq
Ministry of Higher Education
and Scientific Research
University of Baghdad
College of Dentistry



Prevalence of Maxillary Median Diastema Among Dental Students

A Project
Submitted to the College of Dentistry,
University of Baghdad, Department of Orthodontics
in Partial Fulfillment for the
Bachelor of Dental Surgery

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Certification of the Supervisor

I certify that this project entitled “**prevalence of maxillary median diastema among dental student**” was prepared by **Zahraa Ali Abd Alhussien** under my Supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Supervisor's name:

Assist.Prof.Dr.Ali Mohammed Hameed

Dedication

To express thanks to all who contributed in many ways to the success of this study and made it an unforgettable experience for me.

To my God who is always there when I am in need. thank you for guiding me , giving me strength in my everyday life and always looking out for me. thank you for making all these happened and ended it with good outcome.

To my parents, thank you for giving me the support to reach my dreams. Accomplishing this would hopefully make you proud of me as much as I am proud of having you as my parents.

I would like to sincerely thank my supervisor Dr Ali Mohammed Hameed for your guidance, support, and patience throughout this study.

Thank you very much.

Zahraa Ali Abd Alhussien

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Introduction

Median diastema is a dentoalveolar disorders that cause special concern to parents and patients (**Gkantidis *et al.*, 2008**). It is a gap that is occasionally seen either between the maxillary central incisors or the mandibular central incisors or seen in both arches of an individual that is greater than 0.5mm. It is also referred to in literature as 'open teeth' or 'gapped teeth (**Al-Rubayee, 2013**). Median diastema in mixed dentition is the so-called “ugly duckling” stage for children, the space can be characteristic of normal growth in primary and mixed dentition and generally is closed by the time the maxillary canines erupt (**Govindaraju *et al.*, 2017**). However in some individuals the space does not close spontaneously, the continuing presence of a diastema between the maxillary central incisors in adults often is considered an esthetic or malocclusion problem (**Hussain *et al.*, 2013; Jeevanandan and Govindaraju, 2018**).

Maxillary median diastemas are a common esthetic problem that dentists must treat. Many innovative therapies have been used, varying from restorative procedures to surgery (frenectomies) and orthodontics. At times, these procedures have been performed by the dentist without full appreciation of the factors contributing to the diastemas (**Muthu *et al.*, 2007**).

The presence of a diastema between the teeth is a common feature of the anterior dentition that remains until the completion of the permanent dentition. The needs for treatment are primarily attributed to aesthetic and psychological rather than functional reasons. Carefully developed diagnoses and advanced planning enable the identification of the most appropriate treatment to address the needs of each individual patient (**Subramanyam *et al.*, 2018**).

Aim Of Study

This study aimed to determining the prevalence, etiological factor, acceptance and type of treatment of median diastema among a sample of dental students at College of Dentistry / University of Baghdad.

Chapter one: Review of literature

1.1 occlusion

Occlusion is the manner in which the lower and upper teeth intercusped between each other in all mandibular positions or movement (**Muhamad *et al.*, 2015**).

1.1.1 Ideal Occlusion Is a condition when maxilla and mandible have their skeletal bases of correct size relative to one another, and the teeth are in correct relationship in the three spatial planes at rest (**McDonald and Ireland, 1998**).

1.1.2 Normal occlusion was first clearly defined by Angle (1899) which was the occlusion when upper and lower molars were in relationship such that the mesiobuccal cusp of upper molar occluded in buccal cavity of lower molar and teeth were all arranged in a smoothly curving line (**Angle, 1899**).

Six keys of normal occlusion:(Andrew's, 1972)

1- Molar relation

The distal surface of the distobuccal cusps of the upper first permanent molar made contact and occluded with the mesial surface of the mesiobuccal cusps of the lower second molar, the mesiobuccal cusp of the upper first permanent molar fell within the groove between the mesial and middle cusps of the lower first permanent molar. (The canines and premolars enjoyed a cusp- embrasure relationship).

2- Crown angulation “The mesiodistal tip”

The term angulation refers to angulation (or tip) of the long axis of the crown. The gingival portion of the long axis of each crown was distal to the incisal portion varying with the individual tooth type, the long axis of the crown for all teeth except molars is identified to be the mid developmental of ridge which is the most prominent part and center most vertical portion of the labial or buccal surface of the crown. The long axis of the molar crown is identified by the dominant vertical groove on the buccal surface of the crown.

3- Crown inclination (Labiolingual or buccolingual inclination)

Crown inclination refers to the labiolingual or buccolingual inclination of the long axis of the crown not to the inclination of the long axis of entire tooth. The inclination of all the crowns has a consistent scheme:

A- Anterior teeth (Central and lateral incisors)

The labial inclination of upper and lower anterior crown is sufficient to resist over eruption of anterior teeth and sufficient also to allow proper distal positioning of the contact points of the upper teeth in their relationship to the lower teeth, permitting proper occlusion of the posterior teeth.

B- Upper posterior teeth (Canines through molars)

A palatal crown inclination existed in the upper posterior crown was a constant and similar from the canines through the second premolar and was slightly more pronounced in the molars.

C- Lower posterior teeth (Canines through molars)

The lingual crown inclination in the lower posterior teeth progressively increases from the canine through the second molar.

4- Rotation

There are no undesirable rotations. Rotated molar and bicuspid occupy more space than normal while rotated incisors occupies less space than normal

5- Spaces

There were no spaces with tight contact point.

6- Occlusal planes

The plane of occlusion varied from generally flat to a slight curve of spee (which measured from most prominent cusp of lower second molar to the lower central incisor), no curve deeper than 1.5 mm is accepted from a stand point of occlusal stability.

Recently the authors believe that the correct crown diameter represents the seventh key to normal occlusion this key (the seventh key) had to be present in Andrews non-orthodontic normal study models.

1.1.3 Malocclusion

Defined as those irregularities of the teeth beyond the accepted range of normal. (**Hashim and Al-Fatlawi, 2006**).

A malocclusion is a misalignment or incorrect relation between the teeth of the two dental arches when they approach each other as the jaws close (**Gruenbaum, 2010**).

1.2 Median Diastema

1.2.1 Definition

It is a space between the two maxillary central incisors, is considered a normal developmental phenomenon in children and requires no treatment. Lindsey conducted a study that showed about two thirds of children in whom only central incisors had erupted exhibited an maxillary median diastema (**Kumar *et al.*, 2011; Phulari and Modley, 2017**). An median diastema more than 2mm in mixed dentition is unlikely to close spontaneously and may persist in permanent dentition also. An median diastema can be inherited and is more prevalent in certain ethnic groups (**Dali *et al.*, 2011**).

1.2.2 Etiology

Etiological factor of median diastema is multi- factorial phenomenon (**Gass *et al.*, 2003 ; Hussain *et al.*, 2013**). Several etiological factors have been identified as the possible cause of this dento alveolar disproportion. They are broadly divided into developmental, pathological, and iatrogenic (**Koirala, 2010**) and genetics factors (**Gass *et al.*, 2003**).

1.2.2.1 Developmental causes (Koirala, 2010; Umanah *et al.*, 2015; Newman *et al.*, 2016).

- 1- ugly duckling phenomenon which is an intra arch features resulting from the developing maxillary canines exerting pressure on the apical root portion of the lateral incisors around the age of 9 years.
- 2- Impacted teeth in the anterior maxilla (mesiodens).
- 3- Supernumerary teeth.
- 4- Muscle attachment high on the ridge (labial frenum).
- 5- Small teeth (hypodontia) +/- peg-laterals or absent laterals.
- 6- Proclined arrangement of incisors.
- 7- Tooth size/arch shape discrepancy.
- 8- Impacted canines.
- 9- Rotated incisors.



Fig.1.1: Median diastema due to peg lateral incisors.

1.2.2.2 Acquired causes (Umanah *et al.*, 2015; Newman *et al.*, 2016)

- 1- Periodontal disease, causing labial proclination and/or drift of teeth.
- 2- Open bites associated with habits like thumb-sucking or a protrusive tongue thrust.
- 3- Primary or secondary occlusal trauma.
- 4- Drift and/or proclination of teeth caused by a poorly designed occlusion.
- 5- Trauma changing tooth position.
- 6- Artificial creation .



Fig.1.2: oral habits, (a) thumb/finger sucking, (b) abnormal tongue posture (Abu-Hussien and Watted, 2016).

1.2.2.3 Pathological causes (Gkantidis *et al.*, 2008; Tanaka *et al.*, 2012; Al-Rubayee, 2013; Sondankar *et al.*, 2013).

- 1- Ahypertrophic labial frenum .In a thick and flesh labial frenum the fibro elastic band crosses the alveolus and inserts into the incisive papilla, preventing the approximation of the maxillary central incisors.
- 2- proclination of incisors following finger sucking oral habits.
- 3- Muscular imbalance.
- 4- Tooth size- arch length discrepancy.
- 5- Microdontia.
- 6- Mesiodens.
- 7- Dental anomalies (peg shaped lateral incisors).



Fig.1.3: Median diastema due to high frenul attachment.

1.2.2.4 Iatrogenic causes

includes the self-inflicted diastema, in which case an individual desiring to have diastema create one by reducing the size of natural teeth. This has some level of cultural attachment as diastema is regarded in some culture as a sign of beauty (**Obiechina and Oji, 1994**).

1.2.2.5 Genetic causes

A possible genetic basis as well suggested, with greater role of environmental factors in the black than the white population (**Gass *et al.*, 2003**).

1.2.3 Incidence and Prevalence

Numerous studies have investigated the frequency/prevalence of diastema. differences in epidemiological study findings may be attributed to the increased number of factors contributing to median diastema, to the definitions used to explain its presence and to gender and race differences in the distribution of the hereditary feature in question (**Sullivan *et al.*, 1996**). The incidence of median diastema varies greatly with the age group, gender, population and race. This condition is very common in the paediatric age-group at the early stages of dental development. The diastema remains after the eruption of the permanent incisors and canine, such may not close on its own (**Azzaldeen and Muhamad, 2015**). A study among Turkish population showed that median diastema was observed in (4.5%) of the patients and it was almost equally distributed between the females and males (**Athumani and Mugonzibwa, 2006**). The percentage of the prevalence of median diastema in United Kingdom 3.4 % of Caucasians and 1.6 % of South India (**HamedullahJan *et al.*, 2010**).

The prevalence of the diastema in female was more than male (**Kadhom and Sadoon, 2019**). This result disagree with (**Al-Huwaizi, 2003**) which found that the prevalence of median diastema in male more than female. Genetic factors most likely play a leading role in male-female differences. (**Omotoso and Kadir, 2010**) found that

maxillary median diastema occurs more frequently than mandibular median diastema, and that females are more likely to have a maxillary median diastema, while males are more likely to have a mandibular median diastema. Diastema runs in families, and it is suggested that male children are more likely to inherit it.

1.2.4 Acceptance

The aesthetic importance varies in relation to culture, age group and racial background. Influenced by such culture and social forms, individuals without a diastema may desire to have it created through cosmetic dentistry, while some others with diastema would rather want it closed or removed, because they find it aesthetically displeasing (**Andrews, 1972**).

In Africa, maxillary median diastema is regarded as an attractive dental feature, a sign of beauty, especially in the females, and is used as notable successful trademark (**Abdulgani et al., 2014**). Meanwhile, a study by Oboro in 2008 reported that majority of patients interviewed did not support the artificial creation of median diastema (**Oboro et al., 2008**).

1.2.5 Diagnosis

Median diastema can be diagnosed by a few characteristic traits. The first is a direct visualisation of the space seen in the anterior region (**Rath et al., 2018**). Secondly, blanching of the tissue in the incisive papilla region palatal central incisor when the labial soft tissue stretched (**Kamble et al., 2017**). Subsequently, the discrepancy by measuring the mesiodistal width of the teeth (**Pinzan et al., 2017**). The more subtle way of diagnosing includes observation of spacing in the interdental alveolar bone seen via a periapical radiograph and revealing the presence of any existing pernicious oral habits. (**Abraham and Kamath, 2014**). The early diagnosis of median diastema, which easily noticed by parents or general practitioners or pediatric dentists make easily the treatment (**Uematsus et al., 2004**).



Fig.1.4: A- Diagnosis of an abnormal labial frenum by observation alone. B- The diagnosis by stretching the upper lip and observing the ischemia caused to the interdental papilla. C- The diagnosis by observation of an unusually wide frenum with no apparent zone of attached gingiva along the median (Gkantidis *et al.*, 2008).

1.2.6 Treatment of median diastema

Before the practitioner can determine the optimal treatment, he or she must consider the contributing factors. These include normal growth and development, toothsize discrepancies, excessive incisor vertical overlap of different causes, mesiodistal and labiolingual incisor angulation, generalized spacing and pathological conditions. A carefully developed differential diagnosis allows the practitioner to choose the most effective orthodontic and/or restorative treatment. Diastemas based on tooth-size discrepancy are most amenable to restorative and prosthetic solutions. The most appropriate treatment often requires orthodontically closing the median diastema. Treatment of diastema varies and it requires correct diagnosis of its etiology, and early intervention relevant to the specific etiology (Chu *et al.*, 2001).

Correct diagnoses include radiological and clinical examinations and possibly tooth size evaluation (Abraham and Kamath, 2014).

1.2.6.1 No treatment

No treatment is usually done, if the diastema is physiological/transient as it spontaneously closes after the eruption of permanent maxillary canines. Spontaneous correction of a childhood diastema is most likely when its width is not more than 2mm (Chu *et al.*, 2001).

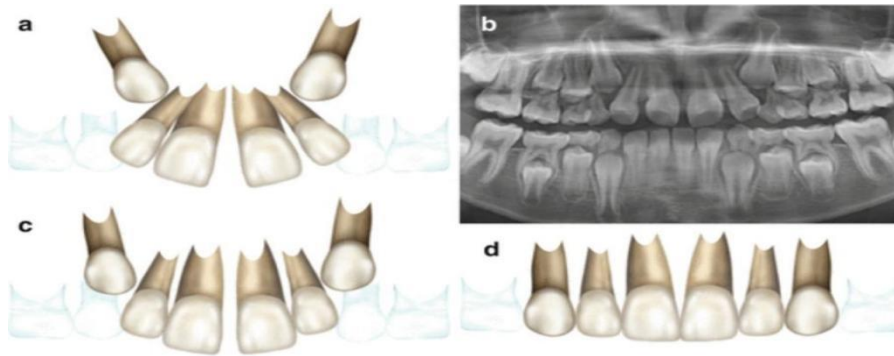


Fig.1.5: Ugly duckling stage. (a, b) Obvious distal inclination of the maxillary incisors creating a midline diastema in the mixed dentition. (c) Maxillary incisors tend to upright by the eruption of the permanent canines. (d) Spontaneous closure of maxillary midline diastema after the canines are fully erupted (Yildiz *et al.*, 2016).

1.2.6.2 Orthodontic treatment

A- Enlarged labial frenum

It is an error to surgically remove the frenum at an early age and then delay orthodontic treatment in the hope that the diastema will close spontaneously. If the frenum is removed, while there is still a space between the central incisors, scar tissue forms between the teeth as healing progresses, and a long delay may result in a space that is more difficult to close than it was previously (Van *et al.*, 2011).

It is better to align the teeth before frenectomy. Sliding them together along an arch wire is usually better than using a closing loop, because loop with any vertical height will touch and irritate the frenum. If the diastema is small, it is usually possible to bring the central incisors completely together before surgery. If the space is large and frenal attachment is thick, it may not possible to completely close the space before surgical intervention. The space should be closed at least partially and the orthodontic movement to bring the teeth together should be resumed immediately after the frenectomy, so that the teeth are brought together quickly after the procedure. When this is done, healing occurs with the teeth together and the inevitable post-surgical scar tissue

stabilizes the teeth instead of creating obstacles to final closure of the space (**Azzaldeen and Muhamad, 2015**).



Fig.1.6: Management of the maxillary median diastema caused by an abnormal labial frenum. (A)Result of the orthodontic treatment. (B)Surgical intervention. (C)Retention of the orthodontic appliances during the healing phase (Gkantidis *et al.*, 2008).

B- Oral habits

Deleterious habits have to be corrected by using habits breaking appliances and by psychological approaches. The use of fixed tongue cribs were found to be effective in breakage tongue thrusting habits (**Chu *et al.*, 2011; Hwang *et al.*, 2012**).

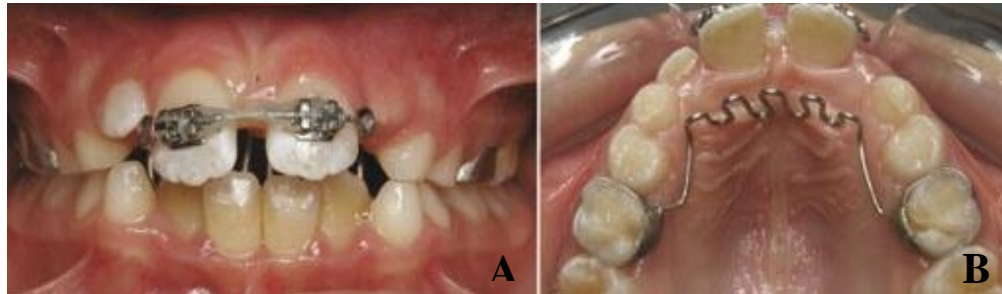


Fig.1.7: Closure of diastema by habit breaking appliance (a)frontal view (b)maxillary arch view (Machado *et al.*, 2010).

C- Peg laterals

If the reason for median diastema is peg laterals, the space between the central incisors is closed; respecting the median and the space necessary for the prosthetic restoration of the peg-shaped lateral is created by moving the peg lateral into a position between the central incisor and the cuspid. The best contour and aesthetics will be achieved if the peg lateral is more mesial in space. This can be done by simple

removable orthodontic appliances incorporating finger springs or split labial bows. Depending on the complexity of the occlusion, a fixed orthodontic appliance can also be considered (**Counihan, 2000**).

D- Missing teeth

If the diastema is due to missing teeth, prosthetic replacement or a combination of orthodontic and prosthetic rehabilitation is the treatment option. If the absence of a lateral incisor is the cause of the diastema, there are two available options following median diastema closure, ie mesial movement of the canine to the position of the missing lateral incisor or distalization of the canine to allow prosthetic replacement of the missing lateral incisor (**Beasley *et al.*, 2004; Thilander, 2008**).

E- Supernumerary teeth/ mesiodens

Russell and Folwarczna have suggested the extraction of a mesiodens in the early mixed dentition period. According to them this will help in better alignment of teeth and will also minimize the need for orthodontic treatment(**Russel and Folwarczna, 2003**). Some authors, like Mitchell and Bennett, have advocated the late extraction of mesiodens when the adjacent permanent incisors have completed their root formation (**Mitchell and Bennett, 1992**). If the mesiodens exists during the permanent dentition period, extraction of the mesiodens followed by space closure utilizing fixed orthodontic appliances will be the line of treatment (**Van and Bailleul, 2008**).

F- Tooth size, arch size discrepancy

One treatment option will be to retract the teeth in order to reduce the arch perimeter, considering a patient's profile as well as aesthetic and functional aspects. Another option will be to realign the teeth and close the spaces with a combination of orthodontic and prosthodontic approaches (**Beasley *et al.*, 2004**).

G- Tumor in the maxillary median

The treatment of choice is surgical removal of the tumour and closure of the median diastema using composites, jacket crowns or orthodontic appliances, depending on the size of the diastema (**Frank, 2000**).

1.2.6.3 Conservative treatment

Highly esthetic restorations made of composite resins are now possible due to constant improvements in techniques, materials, and technology (**Ferracane, 2011**).

One important aspect of composite resins is their capacity of mimic dental enamel, with overall survival rate higher than 88% up to 10 years. On the other hand, the major causes of failure are chipping and color mismatch, which can many times be solved by repairing and polishing (**Lempel *et al.*, 2017**).

Recently, alternative techniques have been described for performing diastema closures. The use of posterior stainless-steel matrix has been described in order to facilitate the building of the proximal anatomy and although it helps on creating the incisors proximal angles, again, it does not help on assuring an adequate width for the incisors themselves (**Goyal *et al.*, 2016**).

The success in closing median diastema depends upon the following treatment phases (**Hariprasath and Sadeep, 2022**).

1. Accurate diagnosis of specific etiology.
2. Pretreatment considerations of appropriate orthodontic appliances.
3. Long term retention and stability.

The need for treatment is mainly attributed to esthetic and psychological reasons, rather than functional ones. Patient's perceptions and expectations regarding their appearance play a significant role in treatment planning (**Singla *et al.*, 2019**).



Fig.1.8: (A)Acase with median diastema.(B)Closure with composite restoration (Abrahams and Kamath, 2014).

1.2.8 Stability after diastema closure

Relapse is a major concern in the correction of median diastema. Exact diagnosis and removal of the aetiology is the key to obtaining a stable result. Long term use of retainers or even permanent bonded lingual retainers are advocated, especially in cases with large diastema(**Zachrisson, 1997; Durbin, 2001**).Large pre-treatment diastema and the presence of at least one family member with a similar condition increases the risk of relapse(**Shashua and Artun, 1999**).

Chapter two: Material and methods

2.1 participant

A cross-sectional study was conducted from January 2023 to April 2023 on undergraduate students at collage of dentistry/ university of Baghdad.

1064 students were examined in this study,729 females and 335 males whose age range was 18-24 years, The students with diastema were recruited and a special case sheet was assigned to each one of them (appendix 1).

2.1.1 Inclusion criteria

The following inclusion criteria was selected in this study:

- 1- All teeth should be erupted except the third molar
- 2- Both maxillary incisors should be present.
- 3-The students from different skeletal and dental classification.

2.1.2 Exclusion criteria

The exclusion criteria was:

- 1- Extracted of the maxillary centrals incisors
- 2- Student have congenital deformity like cleft lip and/ or palate
- 3- Trauma to anterior teeth

2.2 Method

Each individual was seated on a dental chair, before the clinical examination the patient's complete history was recorded include (name, age, address, medical history).

The skeletal and dental examination was done, the chair in upright position while the patient was guided to occlude in centric occlusion and the head parallel to floor of

the room. The anteroposterior relation was examined by two fingers method (**Foster, 1990**), horizontal relation by bird view and the vertical relation by three thirds method (**Proffit *et al.*, 2019**).

The intraoral examination was done under natural day light and/ or artificial light with the use of sterile disposable gloves, dental mirror and probe to thoroughly inspect the oral cavity.

The angle, canine and molar classification were recorded according to the following

2.2.1 Angle classification (Angle, 1899)

Class I malocclusion (Neutroclusion)

A malocclusion in which the buccal groove of the mandibular first permanent molar occludes with the mesiobuccal cusp of the maxillary first permanent molar.

The term "Class I" is sometimes used incorrectly as a synonym for normal occlusion, although in reality, it only signifies a normal relationship of maxillary and mandibular first molars in the sagittal plane.

Class II malocclusion (Distocclusion, Postnormal occlusion)

A malocclusion in which the buccal groove of the mandibular first permanent molar occludes posterior (distal by at least half cusp) to the mesiobuccal cusp of the maxillary first permanent molar. The severity of the deviation from the Class I molar relationship usually is indicated in fractions (or multiples) of the mesiodistal width of a molar cusp.

Class III malocclusion (Mesioclusion, Prenormal occlusion)

A malocclusion in which the buccal groove of the mandibular first permanent molar occludes anterior (mesial by at least half cusp) to the mesiobuccal cusp of the maxillary first permanent molar. The same conventions as described before are used to indicate the severity of deviation from a Class I molar relationship.

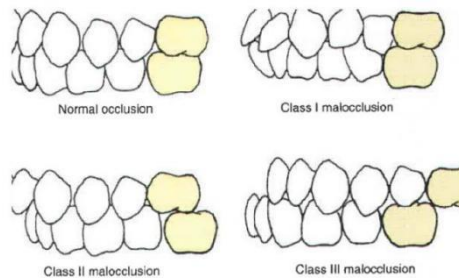


Fig.2.1: Angle classification (<https://medizy.com>).

2.2.2 Canine classification (Littlewood and Mitchell, 2019)

Class I: It is a normal canine relation, when the tip of the upper canines located in the embrasure area between lower canine and first premolar (or the mesial slope of the upper canine coincide with the distal slop of lower canine) in occlusion.

Class II: Abnormal canine relation in which the lower canine will be more backward from normal canine relation in occlusion.

Class III: Abnormal canine relation, when the lower canine will be more forward than from normal canine relation.

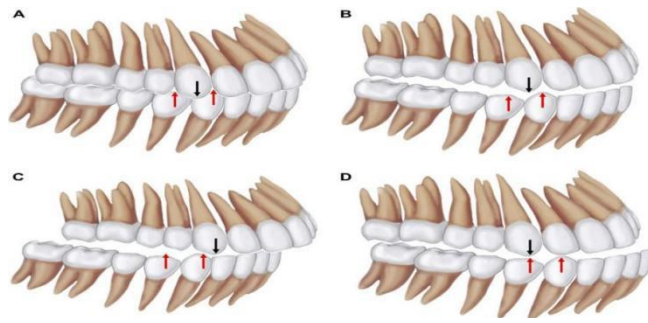


Fig.2.2: Canine classification. (A)Class I. (B)Class I canine with the dental arches separated for illustrative purposes. (C)Class II. (D)Class III canine (Morcos *et al.*, 2007).

2.2.3 Incisor classification (Littlewood and Mitchell, 2019)

Class I: The lower incisor edges occlude with or lie immediately below the cingulum plateau (middle part of the palatal surface) of the upper central incisors .

Class II: The lower incisor edges lie posterior to the cingulum plateau of the upper incisors.

Class III: The lower incisor edges lie anterior to the cingulum plateau of the upper incisors. The overjet may be either reduced or reversed.

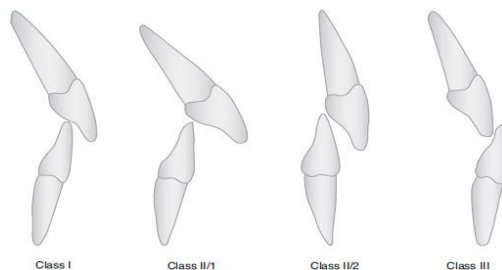


Fig.2.3: Incisor classification (<https://pocketdentistry.com/>).

2.2.4 Median diastema

Measuring the width of diastema with digital Vernier calipers at 1 mm above the incisors edge. Present of a 0.5mm or more space between the maxillary central incisors was considered as positive diastema patient (Al-Rubayee, 2013).

Recorded of the causative factors were identified via intraoral examination (missing teeth, supernumerary teeth, enlarged labial frenum, peg laterals, localized and

generalized space). Positive diastema patients were asked about the presence of diastema in their family members, were they concerned about its presence and will they be opting to treat it in future.

Abnormal frenum attachment was checked by the blanch test along with an examination of the clinical appearance of attachment (**Kamble *et al.*, 2017**). The blanch test is performed by lifting the lip and pulling it outwards. The appearance of blanching indicates a high labial frenum attachment. photographs were taken for specific cases only.

All the examinations were carried out by a single examiner **zahraa.A.A.**

2.3 Statistical Analysis

The data collected from the samples were compiled and statistically analysed using the computer Microsoft Excel spreadsheet 2016.



Fig.2.4: Examination of a student in the dagnostic clinic at collage of dentistry/ university of Baghdad.

Chapter three: Results

In this study, 1064 subjects were selected and examined clinically, all of them were in different skeletal and dental classes. Out of 729 females and 335 males students who were examined, only 29 females (2.7%) and 11 males (1%) were having median diastema. (3.7%) was the total prevalence of median diastema among dental students at collage of dentistry/ university of Baghdad.

3.1 prevalence of median diastema in different graduation grade

prevalence of diastema among the students of second class is more than the other classes, 10 students(25%), and the first grade students were the least number in terms of prevalence 6 students (15%), (Table 3.1).

Table 3.1: The prevalence of students with diastema in different graduation grade.

Grades	No.(%) per grade	Male	Female
Grade 1	6 (15%)	0	6 (20.69%)
Grade 2	10 (25%)	3 (27.27%)	7 (24.14%)
Grade 3	8 (20%)	2 (18.18%)	6 (20.69%)
Grade 4	9 (22.5%)	2 (18.18%)	7 (24.14%)
Grade 5	7 (17.5%)	4 (36.4%)	3 (10.34%)
Total	40 (100%)	11 (100%)	29 (100%)

3.2 prevalence of median diastema in different skeletal class

More than half of the students with median diastema 85% (10 males and 24 females) were from class I and the least prevalence found in class III skeletal classification 2% (2 females).(Table 3.2).

Table 3.2: The prevalence of students with diastema in different skeletal class.

Skeletal classification	No.(%)per skeletal Cl.	Male	Female
Class I	34 (85%)	10 (90.9%)	24 (82.76%)
Class II	4 (10%)	1 (9.1%)	3 (10.34%)
Class III	2 (5%)	0	2 (6.90%)
Total	40 (100%)	11 (100%)	29 (100%)

3.3 prevalence of median diastema in different dental class

It noted that more of the students with median diastema were from class II anlg classification and class I canine and incisor classification.(Table 3.3).

Table 3.3: The prevalence of students with diastema in different dental class.

Dental classification		No. (%) per dental Cl.	Male	Female
Angle	I	13 (32.5%)	4 (36.4%)	9 (31.03%)
	II	17 (42.5%)	5 (45.45%)	12 (41.38%)
	III	10 (25%)	2 (18.18%)	8 (27.59%)
Total		40 (100%)	11 (100%)	29 (100%)
Canine	I	33 (82.5%)	8 (72.73%)	25 (86.21%)
	II	3 (7.5%)	2 (18.18%)	1 (3.45%)
	III	4 (10%)	1 (9.09%)	3 (10.34%)
Total		40 (100%)	11 (100%)	29 (100%)
Incisor	I	26 (65%)	8 (72.73%)	18 (62.07%)
	II	2 (5%)	0	2 (6.90%)
	III	12 (30%)	3 (27.27%)	9 (31.03%)
Total		40 (100%)	11 (100%)	29 (100%)

3.4 Association of median diastema with the etiological factors

Family history (genetic factor) was the most common etiological factor (30%).

High attach labial frenum was the second common etiological factor (27.5%) while the missing teeth was (5%) was the least one.(Table 3.4).

Table 3.4: Prevalence of median diastema in association with the etiological factors.

Etiologic factors	No(%) per etiological factors	Male	Female
Peg lateral	3 (7.5%)	2 (11.8%)	1 (4.35%)
Missing teeth	2 (5%)	0	2 (8.69%)
Enlarged frenum	11 (27.5%)	3 (17.64%)	8 (34.78%)
Generalize space	4 (10%)	3 (17.64%)	1 (4.35%)
Habit	8 (20%)	2 (11.8%)	6 (26.09%)
Family history	12 (30%)	7 (41.17%)	5 (21.74%)
Total	40 (100%)	17 (100%)	23 (100%)

3.5 Treatment modality of median diastema

Revealed that half of the students 50% (7 males and 13 females) were not consider median diastema as an esthetic problem and reject to receive treatment, and the remaining (45%) unpleasant with it and want to treat it with orthodontic or conservative treatment.

Table 3.5: Treatment modality of median diastema

Treatment options	No.(%) per treatment modality	Male	Female
Orthodontic	15 (37.5%)	5 (41.67%)	10 (35.71%)
Conservative	5 (12.5%)	0	5 (17.86%)
No treatment	20 (50%)	7 (58.33%)	13 (46.43%)
Total	40 (100%)	12 (100%)	28 (100%)

Chapter four: Discussion

This is a cross sectional study conducted to investigate the prevalence and etiology of median diastema among the students at collage of dentistry/ university of Baghdad, the results revealed a prevalence of (3.7%).

In previous studies, variations in the prevalence of median diastema among people of different racial background, age-group, and gender are well documented (**Al-Rubayee, 2013; Liu *et al.*, 2013**).

In the present study, the prevalence of median diastema was (3.7%) which is half the result reported in US population (6%) (**Brunelle *et al.*, 1996**), whereas small prevalence 1.9% were observed among South Indian population (**Nainar and Gnanasundaram, 1988**).

This variation in median diastema prevalence could be attributed to the differences in genetic and environmental factors, age group, gender and sample size for study population.

Concerning genders, female had approximately twice percentage of the male , which in agreement with previous studies by Jan (**Jan *et al.*, 2010**), in contrast, Master found it more in male (**Master *et al.*, 2011**).

Worldwide median diastema was considered as a disfiguring dental feature requiring treatment (**Kumar and Gandotra, 2013**). Although among other population it had advantage to the personality, an enhancement of beauty and admirable look on smile (**Umanah *et al.*, 2015**).

In this study, half of students (50%) satisfied with median diastema, not affecting the beauty and reject to receive treatment, and the remaining (45%) unpleasant with median diastema. The same findings had been reported among Saudi population (**Luqman *et al.*, 2011**).

In contrast, study among Baghdadis adults reveal that the percentage of individuals dissatisfied with persisted median diastema were more than the other who satisfy (**Al-Rubayee, 2013**).

Females with median diastema in this study show high satisfaction (68.1%), and less than half of this percentage (31.8%) were reported among males.

Koora, suggested that median diastema can affect the speech in “S” sound (**Koora, 2007**). Further more, Vivek Govila and Smita Govila stated that diastema may lead to phonetic problem particularly with S sound (**Govila and Govila, 2012**) Although the current result showed that in the majority of the students the median diastema had no influence on speech.

It well documented that the etiological factor of median diastema is multifactorial phenomenon (**Hussain et al., 2013**). Numerous studies by (**Nainar and Gnanasundaram, 1988; Gass et al., 2003; Gkantidis et al., 2008; Gabriel and Eniola, 2009; Luqman et al., 2011; Al-Hashimi, 2012; Al-Rubayee, 2013**) revealed a significant hereditary cause of median diastema in families, in this study (30%)of the students had family history of median diastema.

Several Factors have been also implicated as the possible etiology of diastema among which are the presence of a superior labial frenum, a mismatch between teeth and jaws (spacing), supernumerary teeth, missing teeth and peg shape lateral incisors (**Koora et al., 2007**).

In this study, the high labial frenum attachment was found to be the second common cause which found in about (27.5%)of the students, while a higher percentage **33.03% and 30% reported in Pakistani and Saudi population respectively (Jan et al., 2010; Luqman et al., 2011)** . Furthermore, Shashua and Artun found that there was a correlation between the width of the diastema and the presence of an abnormal frenum (**Shashua and Artun, 1999**).

This can be justify by the fact that the frenum attachment does not “migrate nasally” or changes minimally with age and it should not be expected to close spontaneously with the eruption of the maxillary lateral incisors and canines, as it usually happens (**Gkantidis *et al.*, 2008**).

In the present study, only 4 students (10%) with median diastema had generalize spacing, while higher percentage 44.4% and 39% had been reported by Al Hashimi (**Al-Hashimi, 2012**). Similarly, Hashim Nainar (**Nainar and Gnanasundaram, 1988**) described that generalize spacing was a significant etiological factor for median diastema, this mainly due to teeth- jaw size discrepancy.

Missing lateral incisor were the least etiological factor found in (5%) of the study samples, higher result (11%) had been achieved by Moyer (**Moyers, 1988**) Whereas, Hameedalla Jan reported this cause only in 5.4% of their cases (**Jan *et al.*, 2010**). This can be clarifying by the distal movement of maxillary central incisors to occupy the existing space leading to median diastema.

In the exsting study (7.5%) of median diastema is due to the peg lateral incisors, lower percentage (1.35 %) were reported among Pakistani population (**Jan *et al.*, 2010**).

Chapter five: Conclusions and Suggestions

5.1 Conclusions

- 1- Median diastema is a common problem with prevalence of (3.7%) in our sample.
- 2- This study shows that median diastema occurs in females more than males.
- 3- Half of the sample (55%) satisfied with appearance of median diastema, not affecting their beauty, and has no effect on speech.
- 4- Median diastema run in families.
- 5- Median diastema is commonly associated with multi factorial etiology.
- 6- Among the observed etiological factors, the genetic factor was the most common etiological factor.

5.2 Suggestions

- 1- Conduct larger study with larger sample size.
- 2- Compare prevalence of median diastem between dental students at Baghdad university and others universities.
- 3- compare acceptance of median diastema and type of treatment between dental students and others students.

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Appendix



University Of Baghdad / Collage Of Dentistry
 Department Of Orthodontics (Under graduate)
 Prevalence Of Median diastema

Patient Name :

Date of Birth: Age: Gender:

Address:

Medical History: Airway Problems: No Yes

SKELETAL EXAMINATION (CLINICALLY):

Anteroposterior Relation: CI I CI II CI III

Vertical Relation: Normal Increased (Upper Lower) Decreased (Upper Lower)

Horizontal Relation: Symmetrical Asymmetrical Deviation to: R-side L-side

SOFT TISSUE EXAMINATION (CLINICALLY)

Tongue Function: Normal Tongue / Lower Lip Seal Tongue Thrust: Endogenous Adaptive

Lips: Competent Incompetent Potentially Competent / Lip Line : Normal High Low

DENTAL AND LOCAL FACTOR EXAMINATION:

Angle's Classification: R..... L..... / Canines Classification: R..... L..... / Incisors Classification:

Crowding ----- Spacing -----

Overbite (2-4) ----- Overjet (2-4 mm)

Missing Teeth ----- Supernumerary Teeth ----- Median diastema/Distance.....

Generalized space ----- peg lateral..... Localized space -----

Enlarged labial frenum: No Yes

Unerupted																				
Erupted																				
Unerupted																				

Impacted Teeth ----- / Extracted Teeth -----

Periodontal Status : Good Fair Poor / Oral Hygiene : Good Fair Poor

Habits: No Yes

Family history of median diastema: No Yes Acceptance of diastema: No Yes

Treatment in patient's mind: Orthodontics Conservative No treatment