Original paper

Assessment The Relationship between Upper and Lower Anterior Teeth Segment and Gender Difference: A Sample of AL Muthanna University Students Aged 18-25 Years Old

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Abstract

Background: The assessment of the occlusal features of the anterior segment of the dental arch is considered of vital importance, especially for adult as it affects esthetics greatly. With the increase in esthetic demands and dental awareness with the vital importance of the anterior teeth in esthetic, function and phonetics. The present study was directed to analyze anterior segment in subjects with class one occlusion. This study that dealt with adult subjects while the previous studies mostly analyzed children. Epidemiological studies are one of the most significant methods which provide adequate information and knowledge about the distribution and prevalence of the occlusal features. Direct metric measurements proved to be helpful and effective for this purpose.

Objectives: This study was designed to assess the relationship between upper and lower anterior teeth segment and gender difference and effect of this relationship on malocclusion.

Materials and methods: This study was conducted from 30 September 2012 to 1 may 2014 on (1771) students in University of Almuthanna (College of medicine (255), College of Engineering (437) and College of Science (1079)) were clinically examined, only (300) of them were selected who fulfilled the required specifications, (150) students for each gender. Their age was ranging from 18 to 25 years, were studied with respect to relationship of upper and lower anterior segment , overjet, overbite, anterior crossbite ,crowding and spacing.

Results: The normal overjet were presented in (65.3%) students (64.4%) males and (66%) females, increased overjet were presented (24.3%) students (24%) males and (24.6%) females and decreased overjet were presented in (10.4%) students (11.4%) males and (9.4%) females). Normal overbite were presented in (53%) students (52%) males and (54%) females, increased overbite were presented (16.7%) students (16%) males and (17.4%) females, decreased overbite were presented in (30.3%) students (32%) males and (28.6%) females). The anterior crossbite were presented in (8.6%) students (8%) males and (9.3%) females) .Upper segment crowding were presented in (17%) students (18%) males and (16%) females), lower segment crowding were presented in (19%) students (19.4%) males and (18.6%) females). Upper segment spacing were presented in (16.4%) students (17.4%) males and (15.4%) females), lower segment spacing were presented in (11%) students (12%) males and (10%) females),

Conclusion: This study displays more crowding percentage in the lower segment and display more upper segment spacing for total(male and female students),there was no significant difference between males and females in overjet, overbite, anterior crossbite ,crowding and spacing.

Key words: Relationship between upper and lower anterior segment; Gender differences;

Introduction

Different occlusal concepts were suggested, many of them were based on static view while others adopted functional opinions. However, these concepts were

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principally developed in relation to orthodontics and to some extent to prosthodontics. Those explained by orthodontist stressed to a varying degree on static occlusion (i.e. particular part of the maxillary teeth fit with specified part of mandibular teeth) and/or functional characteristic of occlusion[1,2] .

Many investigators described occlusion with terms, dividing it into categories, among those, Housten [3] classified occlusion into:
- Ideal occlusion.
- Normal occlusion.
- Malocclusion.

Cardoso [4] described the occlusal relations as static and dynamics between the occlusal surfaces of teeth and should be in harmony with other structures of the stomatognathic system. The term occlusion covers three major areas of dentistry, namely:-
a) The basic sciences (anatomy and physiology of the stomatognathic system).
b) The clinical research (related to periodontics, dysfunction of the temporomandibular joint and evaluation).
c) Its clinical application, which handles the occlusion in daily practice, which is important from a simple restoration to a clinical complete dental restoration.

Malocclusion can be considered as a deviation from the normal occlusion as Graber and Swain [5] mentioned that malocclusion may be referred to those irregularities-beyond the accepted range of the normal occlusion.

The real problem is the ability to specify the limit of this normality, as the boundaries between normal and malocclusion are unclear, it is possible to find disagreement even between the experts on the categorization of the border line cases. this normality at each specific dentition period, and deviation from them can be considered as malocclusion [3].

Ferreira [6] Commented on the orthodontic ratings, he quoted the work of Carabelli [7], who divided malocclusions into:-

- Normal mordex: normal occlusion; edge to edge incisal contact.
- Aberrant mordex: absence of occlusal contact, or open bite.
- Protrusive mordex: occlusal imbalance by protrusion.
- Retrusive mordex: occlusal imbalance by retrusion.
- Tortuous mordex: reverse occlusion or lingual cross bite.
-- Anterior relationship
Overjet:- Salzmann [8] refereed it to the labial position of the maxillary incisors in relation to the mandibular incisors permitting the latter to occlude on (the palatal surface of the upper incisors) or over palatal mucosa. More specifically Kinaan [9] defined overjet as "The distance between the most labial aspect of the most prominent lower incisor and the labial surface of the incisal edge of the most prominent upper incisor provided that teeth are in centric occlusion".

Centric occlusion is a static position which can be get through bringing the teeth together [10].

Wheeler [11] defined it as a maximum teeth inter cuspation (tooth-determined position).

Normal range value had been suggested by many investigators, these may be of two groups as follows:
- Foster & Day [12] and Isiekwe [13], all considered the normal overjet has the positive value extended to (3mm), those beyond it termed as increased overjet.
- Haynes [14], Corruccini et al [15], Farah [16] and Hassanali [17] ,all demarkate the normal value between (2-4mm).

Overbite:- Salzmann [8] defined the anterior open bite as the vertical inter arch dental separation between upper and lower incisors, accordingly edge-edge occlusion not considered as an open bite.

Many descriptions for the overbite have been widely used including: complete, incomplete, edge-edge and open bite. The complete type present when the overlapped reveals contact between the lower incisors to the palatal surfaces of the

upper incisors or palate [18] ,while the incomplete referred to cases with no such contact [19].

Another definition for overbite was given by Bishara in [20] who mentioned that overbite is "amount of vertical overlap between the maxillary and mandibular central incisors''.

Kinaan [9] and Hassanali [17] ,both considered normal range value of overbite to be (2-4mm) while Farah [16] carried out a study on (9-10) year old school children referred the normal range to be within (1-3mm).

Anterior Cross Bite:- Salzmann [8] defined this situation as the lingual placement of the maxillary incisors to their opposing lower, when both arches are in centric occlusion. This condition may be termed as instanding incisors or inversion of the incisors, Foster & Day [12] confined the condition to one or two incisors while Bjork [22] and Kinaan [9] referred it to involve one, two or three incisors.

Crowding:- Nance [23] described dental crowding as the, difference between the space needed in dental arch and the available space in that arch, that is the space discrepancy.

Vander Linden [24] stated that "Before eruption of the teeth, crowding is a normal physiologic phenomenon for both the deciduous and permanent anterior teeth. As indicated by others in the deciduous dentition, the early postnatal increase in the jaw size is usually large enough to permit normal alignment of the teeth from the moment of emergence".

Radnzic [25] reported that crowding or spacing can be described as an expression of an altered tooth / tissue ratio, or as dento- alveolar disproportion.

There is a general thought surround the crowding, which is the failure of the small jaw to accommodate large size teeth, this will result in discrepancy. This produce usually a more general crowding than local one or single area crowding, the latter exhibits more local factors effect [10].

Spacing:- Spaced dentition with one or more inter proximal spaces in an otherwise normal dental arch, is often view as a kind of malocclusion which ought to be treated orthodontically, mainly for esthetic considerations, Spaces existed between teeth discontinue arch continuity which expressed by the proximal contact between all the teeth of that arch [26]. One should keep in mind that the scarce relevant information in the literature is based partly on clinical observations and partly on studies dealt with tooth size and arch size, more crowding prevalence than spacing) this was in conformity with Lavellae and Foster [27,12] opinion.

Materials And Methods

The Sample

The sample was selected from university of Al muthanna students lies 280km to the south of Baghdad (College of medicine, College of Engineering and College of Science). A total of (1771). Age was considered according to the last birthday giving an age range from 18 years 0 months to 25 years 11 months [28].

The total number of students attending in Al muthanna university were (10689) (Ministry of Higher education and Scientific research, Al-muthanna University 2014). while the number of population were (700000). The minimum number of the sample to be representing is taken according to the following equation [29].-

(The number of sample= Number of student / Number of population × 100000) =10689 / 700000 × 100000=1527

The sample consist of (1771) students in three colleges were College of medicine (255), College of Engineering (437) and College of Science (1079) (Ministry of Higher education and Scientific research , Al-muthanna University 2014).

The sample was taken in terms of the following criteria:-

The criteria for sample specifications were:

1- Class one buccal segments "Molars - Angle & Canine" [3].

2- Normal buccolingual occlusion "Molars, Premolars & Canines" [10].

3- Full complements of permanent dentition (excluding third molars).

4- No massive proximal caries or poor restorations.

5- No peg shape laterals or congenitally missing teeth.

6- No traumatized or fractured anterior teeth.

7- No previous orthodontic treatment.

8- No supernumerary teeth.

Permission was obtained from the Almuthanna University.

Methods of Examination

The examinations were carried out initially all the students were examined clinically under day light using dental mirrors, those how had the specific criteria were isolated, reexamined, then the required measurements were carried out. Each selected students "was asked to close in centric occlusion which was checked in the posterior segment (well aligned arches with proper class one occlusion). As the molar relationship may be misleading, it is wise to assess the general features of occlusion and to take into accounts canine relation. The subject's head supported in an upright position and the examiner standing in front of the chair [30].

The following instruments were used: Plane mouth mirrors (No.4) Dentaurum (042-751), more sensitive vernier (0.0l mm sensitivity) with a digital read out (more easy to be read) was used. In addition it's zero value can be adjusted "when needed, so that a negative value can be measured directly e.g. crowding", The vernier was modified by addition of two rods, each of them consisted of two pieces (for ease of adjustment & replacement when, needed). The bases were fixed by super glue to the peaks for extra oral measurements. The pointed ends were fixed previously through use of screws. The digital vernier was used for the following purposes:

a- Space analysis "width of the incisors and space available to them".

b- Inter canine width.

c- Open bite.

d- Overjet was measured by its second end "depth gauge", Tweezers ,Kidney dish, Indelible pencil, concentrated sterilization solution (Ethyl Alcohol 95%) and Portable light.

Orthodontic Methods

Direct intra-oral measurements were conducted without technical difficulties, as it was employed and confined to the anterior segments only.

Overjet (O.J)

The overjet was measured using the modified digital vernier with its depth gauge. The instrument body was held parallel to the occlusal plane while the subject head was standardized so that the Frankfort horizontal plane was parallel to the floor [31].

The measurement of overjet is recorded to the nearest millimeter. Increased overjet was considered as > 4mm and decreased overjet was considered as <1 mm. An increased, decreased, or reversed overjet value was considered as a single occlusal anomaly [30].

Overbite (O.B)

The overbite was measured according to Draker [31] while the subject is in centric occlusion with his occlusal plane horizontal. The amount of vertical overlap of the upper incisor on the lower incisor is marked with the pencil on the labial surface of the lower incisor using the incisal edge of the upper incisor to guide the pencil with the conical plane of the sharpened point of the pencil itself parallel to the subject's occlusal plane . If there is lack of vertical overlap between any of the opposing pairs of incisors (openbite), the amount of openbite is measured directly and recorded to the nearest whole millimeter. Increased overbite was considered as >4mm and decreased overbite as < 1mm.

Anterior crossbite (A.C.B)

In this condition one, two or three of the upper incisors occlude lingual to the lowers[32]. Mandibular closure was checked, mandibular displacement and attrition was recorded.

Crowding

The space for each mal-aligned tooth was measured by use of the modified digital vernier holding the instrument body horizontally and the ends (used for internal measurements) vertically at the maximum contact points. The width of the tooth was subtracted from the space available, a negative result indicate the space insufficiency in that area. When more than one tooth was in crowding the same procedure was applied. The available space was measured" at the level of the contact point within the general curve. If two adjacent incisors were mal-aligned the contact point of one of them (which was more convenient i.e. closer to the center of the arch) was selected as a land mark for the measurements. A rotated tooth with insufficient space was involved in the crowding category [31].

Upper and lower anterior segments were divided into three areas on which measurements were carried out, these areas are:

Area -1 : The area of the right lateral incisor which extend from the mesial aspect of the right canine to the distal aspect of the right central incisor.

Area -2 : The area of the central incisors that extend from distal aspect of the right central incisor to the distal aspect of the left central incisor.

Area -3 : The area of the left lateral incisor that extend from the distal aspect of the left central incisor to the mesial aspect of the left canine .

The diagnosis of crowding was registered if the difference between   the space available and the space required is $\leq$ -2 mm in a segment [32].

Spacing

Spacing was measured with the modified digital vernier either directly (space between two teeth) or indirectly (rotated tooth with an extra space), [31] by subtraction of the tooth width from the available space. The diagnosis of spacing was registered if the difference between the space available and the space required is > 2mm in a segment [32].

This was applied to three areas for both arches and their results were added to indicate the extra space in the arch.

The same areas used in crowding evaluation were used for spacing.

Statistical Analysis

The data were processed and analyzed by using the statistics package for social sciences (SPSS Inc., version 17 for windows 7and excel 2010).The usual statistical methods were used in order to analyze and assess results include:- Descriptive Statistics, Inferential Statistics, Z-test for comparison significant difference between two proportions. The following levels of significance are used: P $\leq$ 0.05 significant.

Results

1-   Distribution of overjet and gender differences as shown in (Table ,1): The normal overjet were presented in 196 (65.3%) students (97 (64.6%) males and 99 (66%) females). Increased overjet were presented in 73 (24.3%) students (36 (24%) males and 37 (24.6%) females). Decreased overjet were presented in 31 (10.4%) students (17(11.4%) males and 14(9.4%) females), there was no significant differences between both gender for all types of overjet (P>0.05).

2-   Distribution of overbite and gender differences as shown in (Table ,2): The normal overbite were presented in 159 (53%) students (78 (52%) males and 81 (54%) females). Increased overbite were presented in 50 (16.7%) students (24 (16%) males and 26 (17.4%) females). Decreased overbite were presented in 91 (30.3%) students (48(32%) males and 43(28.6%) females), there was no significant differences between both gender for all types of overbite (P>0.05).

Table 1. Distribution (%) of overjet and gender differences, o.j= overjet, No= normal, In.=increased, De.= decreased

O. J	Total		Male		Female		P sig
	No	%	No	%	No	%	
No	196	65.3	97	64.6	99	66	0.211 NS
In.	73	24.3	36	24	37	24.6	0.451 NS
De.	31	10.4	17	11.4	14	9.4	0.284 NS
T	300	100	150	100	150	100	---

Table 2. Distribution (%) of overbite and gender differences, O.B= overbite, No= normal, In.=increased, De.= decreased.

O. B	Total		Male		Female		P sig
	No	%	No	%	No	%	
No	159	53	78	52	81	54	0.363 NS
In.	50	16.7	24	16	26	17.4	0.371 NS
De.	91	30.3	48	32	43	28.6	0.259 NS
T	300	100	150	100	150	100	---

3- Distribution of anterior crossbite and gender differences as shown in (Table ,3) :The anterior crossbite were presented in 26 (8.6%) students (12(8%) males and 14 (9.3%) females) while there was no anterior crossbite in 274 (91.4%) students (138(92%) males and 136 (90.7%) females),there was no significant differences between both gender (P>0.05).

Table 3. Distribution (%) of anterior crossbite and gender differences, A.C.B= anterior crossbite P= present,A=absent.

A. C. B	Total		Male		Female		P sig
	No	%	No	%	No	%	
P	26	8.6	12	8	14	9.3	0.344 NS
A	274	91.4	138	92	136	90.7	0.35 NS
T	300	100	150	100	150	100	--

4- Distribution of crowding and gender differences as shown in (Table ,4): There was no crowding in 192 (64%) students (94 (62.6%) males and 98 (65.4%) females). Upper segment crowding were presented in 51 (17%) students (27 (18%) males and 24 (16%) females). Lower segment crowding were presented in 57 (19%) students (29 (19.4%) males and 28 (18.6%) females),there was no significant differences between both gender for all types of crowding (P>0.05).

Table 4. Distribution (%) of crowding and gender difference
C= crowding , A = absent, US= upper segment, LS= lower segment.

C	Total		Male		Female		P sig
	No	%	No	%	No	%	
A	192	64	94	62.6	98	65.4	0.3 NS
US	51	17	27	18	24	16	0.32 NS
LS	57	19	29	19.4	28	18.6	0.429 NS
T	300	100	150	100	150	100	---

3-   Distribution of spacing and gender differences as shown in (Table ,5): There was no spacing in 218 (72.6%) students (106 (70.6%) males and 112 (74.6%) females). Upper segment spacing were presented in 49 (16.4%) students (26 (17.4%) males and 23 (15.4%) females). Lower segment spacing were presented in 33 (11%) students (18(12%) males and 15(10%) females),there was no significant differences between both gender for all types of spacing (P>0.05).

Discussion

Visual assessment of some occlusal features e.g. mild, moderate and sever crowding or spacing. These methods are usually subjective and allow wide range of interpretation (Salzmann [2,8] , Foster [12] and Mills [33]).
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Table 5. Distribution (%) of spacing and gender difference
S= spacing , A = absent, US= upper segment, LS= lower segment.

S	Total		Male		Female		P sig
	No	%	No	%	No	%	
A	218	72.6	106	70.6	112	74.6	0.216 NS
US	49	16.4	26	17.4	23	15.4	0.319 NS
LS	33	11	18	12	15	10	0.288 NS
T	300	100	150	100	150	100	---

Occlusal features are difficult to be assessed, as well as method for assessment used for public health services and epidemiological purposes differed from those needed for clinical applications Foster [12]. The main difficulties for both, depended basically on the accurate definition of the criteria and the standardization of the procedure (Bjork [32] and Helm [34]). These difficulties can be overcome through well training on the procedure and multiple Feasibility studies Lewis et al [35].

Overjet:- The three types of overbite showed no significant relation with gender: normal overjet were presented in (65.3%) students (64.4%) males and (66%) females. Increased overjet were presented (24.3%) students (24%) males and (24.6%) females. Decreased overjet were presented in (10.4%) students (11.4%) males and (9.4%) females) which is similar with previous studies Farah [16] ,Hassanali [17], Kinaan [36] and Burgersdijik [37], the tendency for the overjet to be less with increase in age during adolescence provided that teeth are not interfered with, by the lips or tongue (Salzmann [2] , Foster [18], Bjork [32] and Sillness [38]) .The overjet may serve as an indicator for the variation in the sagittal plain occlusion (antero-posterior) that can be determined easily metrically. Functionally and aesthetically, the discrepancy in the anterior segments is of more importance than in the posterior occlusion Bjork [32].

Overbite:-The three types of overbite showed no significant relation with gender: normal overbite were presented in (53%) students (52%) males and (54%) females. Increased overbite were presented (16.7%) students (16%) males and (17.4%) females. Decreased overbite were presented in (30.3%) students (32%) males and (28.6%) females), which is similar with previous studies Hassanali [17], Kinaan [36] and Sillness [38].

Generally females showed more tendency for complete overbite while males expressed more edge-edge and open bite. Similar to Isiekwe [13] and close to Foster [12] findings.

Anterior crossbite:- The anterior crossbite showed no significant relation with gender: The anterior crossbite were presented in (8.6%) students (8%) males and (9.3%) females) while there was no anterior crossbite in (91.4%) students (92%) males and (90.7%) females) which is similar with previous studies Helm [34] and Kinaan [39]. Others as Foster [12] showed less anterior cross bite percentage. This difference may be due to high class one percentage in Iraq (75%), (Kinaan, [36,39]) relative to the others e.g. (44%) in England Foster [18].

Crowding:- The three types of crowding showed no significant relation with gender: There was no crowding in (64%) students (62.6%) males and (65.4%) females). Upper segment crowding were presented in (17%) students (18%) males and 24 (16%) females). Lower segment crowding were presented in (19%) students (19.4%) males and (18.6%) females), this study displays more crowding percentage in the lower segment for total (male and female students) which is similar with previous studies Isiekwe [13], Lain and Hausen [40] and Kinaan [41], while other studies showed less lower segment crowding Barrow & White [42], Cryer [43]. This difference may be due to difference in the methodology and adult

age subjects were analyzed in this study. This was in conformity with the opinion of the increased crowding incidence of the lower incisors with age (Salzmann [2], Barrow & White [42], and Cryer [43].

Lundstrom [44], Moorrees [45] and Rossow et al [46], all suggested that this trend for increase in crowding with age till (18-22) years, may be considered as a part of maturation process" normal process".

No significant gender difference was observed similar to Helm [34] and Kinaan [41], while others as Foster [12] ,Lavellae [27,] and Sampson & Richards [47],all suggested more crowding in female. This difference may be due to race and variation in environmental factors in addition to age group.

Spacing:- The three types of spacing showed no significant relation with gender: There was no spacing in (72.6%) students (70.6%) males and (74.6%) females). Upper segment spacing were presented in (16.4%) students (17.4%) males and (15.4% females). Lower segment spacing were presented in (11%) students (12%) males and (10%) females),this study was display more upper segment spacing than the lower one was similar to other investigators findings e.g. Kinaan [9] , Steigman [26] and Lavellae [27], may be due to age up righting of the incisors specially of the lowers will reduce spaces and sometimes may cause crowding (Tully [19], Sillmen [48] and Sitakowski [49].

Many investigators as Steigman [26] and Latta [50] findings, spacing of the upper labial segment is mostly concentrated in the mid line as median diastema. Upper segment showed more spacing for both genders, although no significant gender difference was existed. This was similar to Hassanali [17] and Steigman [26] findings.

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