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Morphological relationship of face form in lateral and frontal planes of young Iraqi adults (18-25) years in mosul city

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Abstract

To determine the face type of young Iraqi adults in Mosul city and to find out the possible relationship of the face form in frontal and lateral planes.

The sample subjects were normal class I molar and canine relationship, all subjects were following special criteria. The sample included: 60 Iraqi young adults (30 males and 30 females), aged (18-25) years. All subjects were radiographic with lateral and frontal cephalometric and the films were traced. The tracing is done including the external and internal contour of cranium, pituitary fossa, nasomaxillary complex and the mandible and it's out lie. The result was subjected to the descriptive statistics, to T-student test and to chi-square test to investigate the sex difference of facial type and means between the two sexes.

All the linear measurements are significantly differ with the males having the large value. From the lateral view, the majority of the sample (60,9%) having mesofacial type with no significant difference between the two sexes, followed by dolichofacial type (34,4%) with the females having significantly large value than males, and the least brachyfacial type (4,7%) with the females having significantly large value.

From the frontal view, the majority of the sample (84, 4%) having leptoprosopic type with no significant difference, followed by mesoprosopic type (15, 6%) with the females having significantly large value than males.

The most frequent facial pattern, of this present sample in lateral view is mesofacial followed by dolichofacial and the least is brachyfacial, while in frontal view is leptoprosopic followed by mesoprosopic type. There is good correlation between facial type in frontal and lateral planes.

Keywords: Cephalometery, frontal, lateral, face form, facial index

Introduction

The improvement of a patient's facial appearance is an objective common to a variety of clinicians including, of course, orthodontists[1].

Orthodontist's are generally the first professionals who are asked to make judgments & decisions that ultimately result in the final cosmetic facial outcome for our patients[2]. Esthetic reference values can be a useful tool for clinicians, but should always consider the characteristics of

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individual faces[3].

Facial patterns are of utmost important in orthodontic diagnosis and treatment. There would appear to be little doubt that facial pattern are determined by heredity, in large part, or by other deep – seated factors not susceptible to modification . There may be a great deviation in the individual pattern from the so-called " normal" or ideal type or pattern. It is generally accepted that the shape of face is determined by both genetic influence and local environmental factors [4].

Angle, as early as 1907, emphasized the importance of facial esthetics in Orthodontic treatment [5].

Brodie, 1942[6], introduced the method of studying the pattern and the growth of the component areas of craniofacial skeleton. He then correlated different areas as a pattern of the whole head, Downs[7] , in 1956 , had proved that Frankfort plane is adequate for facial typing , and that the patient's profile is morphologically affected by his pattern of growth .

Facial types and forms have been assessed either from the frontal or lateral view.

From Frontal view:

Kollman in 1882 related facial width to facial height to describe the face as euryprosopic , mesoprosopic or leptoptosopic . Thus the square or euryprosopic face is one which has the ratio of length to width 80.0 or smaller. Along and narrow or leptoprosopic face has a facial index of 90.0 or greater , where as the mesoprosopic face has a facial index of 85.0 to 89.9 [8].

Williams in 1990 grouped the general outline form of the faces from a frontal view into 3 major forms (square, tapering & ovoid)[9].

Graber[10] described 3 facial types: the dolicho cephalic is most likely to have long and narrow face and relatively narrow dental arches. The brachy cephalic is likely to have very broad and relatively short faces and broad round dental arches .Mesocephalic face characterized by normal proportional sizes is associated with oval shape of dental arches.

Arnett and Bergman[11] described the face as being wide or narrow , short or long , round or oval, square or rectangular.

Rauf [12] in his cross sectional study on .young Iraqi adults in Mosul city, classified the face as being square or oval or tapered

Ramadan [13] in his cross sectional study on adult Jordanian males described the face as leptoprosopic, euryprosopic and mesoprosopic types.

From lateral view:

Downs [14] and sassouni [15] also observed three categories: convex, straight and concave profile. There are two major considerations which are responsible for the convex, straight or concave profile, the position of the maxilla anteroposteriorly in the face (with reference to cranium) and the relation of mandible to maxilla [10].

Vertical Facial assessment had been introduced by sassouni [15] and he described two facial types (skeletal deep bite face) and (skeletal open bite face)

Bimler [16] , depending on the interaction between vertical and sagittal relationships , introduced a lateral suborbital facial index that relates the suborbital facial height (the distance between Frankfort horizontal and menton) to facial depth (the distance between the anterior vertical through "A" point and the posterior vertical through "C" point (Capitulare is the center of the head of the condyle

) . The index can be established by measuring suborbital facial height with a caliper and transferring the measurement to Frankfort horizontal. If the intersection is infront of the C vertical, the face is dolichoprosopic (deep), if the intersection is behind the clivus, the face is leptoprosopic (long). If the intersection is between C and the clivus, the face is mesoprosopic (medium).

Christie [17] divided the individual's face into 5 groups: severe dolichofacial, dolichofacial, mild vertical, normal or standard and brachyfacial using cephalometric analysis of Ricketts.

Bishara and Jacobsonn[18] in their longitudinal study described dental and skeletal morphologies three normal facial types (long , average and short face)

Yousif[19] ,Al-Katifi[20] and Al-Sayagh[21] described the faces as dolichfacial ,mesofacial and brachyfacial depending on rickets cephalometric analysis. Several attempts have been made to investigated the difference in the face of various ethnic groups including Caucasians [22], Chinese[23],Japanese[24],Korean[25] and Turkish [26;27].

Aims of the Study:

1. To determine the face type of young Iraqi adults in Mosul city with class I normal occlusion from lateral and frontal views.
2. To investigate the possible relationship of the face form in frontal and lateral planes.

Materials and methods

The sample: consists of 60 Iraqi young adults, (30 males and 30 females), aged (18-25) years. All are students in Mosul University. They fulfill the following criteria:

1. Complete set of permanent teeth in both jaws excluding third molar teeth.
2. Bilateral class I molar and canine relationship.
3. Over jet and overbite ranging (2-4) mm.
4. No dental arch discrepancy.
5. No apparent facial asymmetry.
6. No previous history of orthopedic, orthodontic treatment, maxillofacial surgery or extensive dentistry.
7. All subjects are Iraqi in origin, born in Mosul city.

The supplies: The S.S. white Cephalometer, with a Wehmer Cephalostate (model – W – IOSA) set at 90 Kv and 15 am power with 40-50 impulses together with 8-10 inch cassette of non-grid whemer type with a pair of highly sensitive intensifying screen is used for taking lateral and frontal cephalometric radiographs

The methods: For each subject lateral and frontal cephalometric radiograph is taken in the position of maximum intercuspation and the lips relaxed keeping Frankfort horizontal plane parallel to floor [28]. The distance between the source of radiation, the mid sagittal plane of patient (or ear-rods plane) and the film cassette is kept fixed.

Tracing procedure is carried out manually in a dark room. Tracing is done including the external and internal contour of cranium, pituitary fassa, nasomaxillary complex and the mandible and its outline.

The Cephalometric landmarks: as described by Bimler[16], yen [29]) and Ricketts [30].

Cephalometric landmarks (lateral view): as shown in Figure (1)

Point S (Sella), point N (Nasion), point Ba (Basion), point A (Subspinale),point B (supramentale), point C (capitulare), point Go (Gonion), point Me (menton), point Or (Orbitale), point Po(Porion).

_Cephalometric landmarks (frontal view): Figure (2)

Point Zy (zygomatric) and Point AG(Antegonion) .

_The Cephalometric planes: Figure (1)

- SN plane: is formed by a line joining point S and point N [14].
- FH plane (Frankfort horizontal plane): is formed by aline joining point or and point Po [14].
- MP (Mandibular plane): is formed by a line joining point Go and point Me [14].

The Cephalometric measurements in lateral view: Figure (1)

— **Angular measurement:** are measured to nearest half degree.

1. Anterior profile angle (APA): is defined as the angle NAB and is measured as its supplementary angle to 180° [16].
2. Posterior profile angle (basic angle of face) (PPA): is a Cephalometric counterpart of the APA and is formed by tangents to the clivus and the lower border of the mandible [16].

— **Linear measurements:** are measured to nearest half millimeter.

1. Facial depth (A-C): the distance between the anterior vertical through "A" point and the posterior vertical through "C" point [16].

— Sub-orbital facial height: the distance between Frankfort horizontal and point Me [16].

— **Ratio:**

- Sub-orbital facial index: it relates sub-orbital height to facial depth [16].

The Cephalometric measurement in frontal view: Figure (2)

— **Angular measurements:** are measured to nearest half degree.

- Frontal facial taper angle (Zy AG – Zy AG): is the angle between Zy-AG, Zy-AG and representing the angular taper of the face from the frontal view. It is useful indicator for quantifying changes in facial width with growth and treatment [31].

— **Linear measurements:** are measured to nearest half millimeter.

1. Zy - Zy : width of the maxilla measured at Zygomatic arches [32].
2. AG-AG: mandibular width measured between the antegonial notches [32] .
3. N – Me: the anterior facial height, a vertical distance between point N and Me point [8].

— **Ratio:**

1. Facial index: $\frac{NMe}{Zy-Zy}\times 100$: it relates facial length(8) .
2. Fronto-facial taper $\left(\frac{Zy-Zy}{AG-AG}\right)$: is the relative width between Zygomatic arches and the mandibular rami [31] .

Assessment of Facial types:

- **In Lateral view :**

Using Bimler Cephalometric analysis (1957) , lateral sub-orbital Facial index that relates sub-orbital facial height to facial depth , the face is classified into dolichofacial , brachyfacial or mesofacial face[16].

- **In frontal view:**

Using kollman's method, depending on the value of facial index, the face is classified into euryprosopic , mesoprosopic or leptoprosopic [8].

The results were analyzed by applying the descriptive analysis (means and standard deviation) for all

variable, T-Student tests to investigate the sex difference of means between males and females at 0.05 level of significance and Chi-square test to investigate the sex difference of facial types between the two sexes.

Results

The means and standard deviation for angular and linear measurement for total sample with comparison between the two sexes in lateral and frontal view are shown in table (1) and (2) respectively.

One of the angular measurements which PPA is significantly differs with the males having the height value than females. While the rest of angular measurements APA and frontal facial taper angle are non-significantly differ between the two sexes.

All the linear measurements are significantly differ with the males having the larger value. The ratios measurements (the front facial taper and the facial index) are non-significantly differ.

Table (3) represents the percentage and chi-square test of facial types in lateral and frontal views for males, females and total sample. From the lateral views , the majority of the sample (60.9%) having mesofacial type with no significant difference between the two sexes , following by dolichofacial type (34.4%) with the females having significantly larger value than males and the least brachyfacial type (4.7%) with the females having significantly larger value .

From the frontal view, the majority of the sample (84.4%) is having leptoprosopic type with no significant difference, following by mesoprosopic type (15.6%) with the females having significantly larger value than males.

Discussion

As found in table (1) , the comparison between males and females for different angular and linear measurements in lateral view reveals that females possess high value for APA than males which means that females having more tendency to convex profile than males , however , the difference is non significant at $P \leq 0.05$.

A Cephalometric counterpart to APA is the PPA and the results showing that the males having higher value than females meaning that males having higher tendency for long face than females and this difference is significant at $P \leq 0.05$.

The facial depth (A-C) and sub-orbital facial height are significantly higher in males than females reflecting a sex influence on these linear measurements.

Table (2) reveals the comparison between the two sexes for different measurements in frontal view. The results indicate that non-significant difference for front facial taper and frontal facial taper angle between the two sexes , however , the females having slightly higher value for frontofacial taper angle indicating that males having more tendency toward narrow long (leptoprosipic) facial pattern than females.

All the linear measurements are significantly differed with males having the higher value, indicating that these difference fall under sex influence.

Table (3) showing percentage and Chi-square test of facial types in lateral and frontal view with comparison between tow sexes.

Distribution of facial types in lateral view:

The majority of the sample having mesofacial pattern with the males having slightly higher percentage than

females, however this difference is non-significant at P≤0.05 this is in agreement with AL-Katifi[20] and AL-Sayagh [21] and Bozic [33].

Then followed by dolichofacial pattern with the females having the higher value than males and this difference is significant at P≤0.05 This is in agreement with AL-Katifi[20] and AL-Sayagh [21].

The least type is brachyfacial pattern with the males having the higher value than females and this difference is significant at p≤0.05.this is in agreement with AL-Sayagh [21].

The dolichofacial patterns are higher in females than males where as the males having higher percentage of branchy facial pattern. This comes in agreement to profit [34] who stated that females had a tendency toward backward rotation of mandible where as the males showed forward rotation.

So the general pattern of the face of the present Iraqi young adult, in Mosul city is mesofacial followed by dolichofacial & the least is brachyfacial. Christie [17] showed that Caucasians tend to have more brachyfacial than dolichofacial pattern, while Northern European group tends to have a dolichocephalic & Eastern European have brachycephalic face [10].

Distribution of facial types in frontal view:

As found in table (3) the majority of the sample having leptoprosopic facial pattern with the males having slightly higher value than females , followed by mesoprosopic facial pattern with the females having significantly higher value than males at 0.05 level of significance .

This means that the males have more tendencies to have long narrow face than females & that females tend to have more well balanced facial pattern than males.

Distribution of facial types in lateral & frontal views:

It is found that (48.44%) of total sample that have mesofacial pattern in lateral view having leptoprosopic pattern in frontal view (31.25% males and 17.19% females). And (12.5%) of total sample that have mesofacial pattern in lateral view having mesoprosopic facial pattern in frontal view (9.37% females and 3.13% males).

While (32.81%) of total sample that have dolichofacial pattern in lateral view having mesoprosopic facial type in frontal view (20.31% females and 12.5% males).

And (1.56%) of total sample that have dolichofacial pattern in lateral view having leptoprosopic facial type in frontal view (1.56 males and zero% females) .

Conclusions

1. The most Frequent facial pattern, of the present young Iraqi adult sample in Mosul city, in lateral view is mesofacial followed by dolichofacial and the least is brachyfacial .
2. The most frequent facial pattern of the present sample in frontal view is leptoprosopic facial type following by mesoprosopic type.
3. There is good correlation between facial type in frontal and lateral planes.

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Table (1) Means and standard deviations of angular and linear measurements for total sample with comparison between males and females lateral view:

Variable	Mean	SD	Sex*	Mean	SD	T-value	Significance**
Angular:							
Anterior profile angle (PPA)	185.41	5.273	M F	184.17 186.64	5.534 4.769	-1.912	N.S
posterior profile angle (PPA)	90.12	7.255	M F	92.14 88.09	5.637 8.167	2.306	S
Linear:							
Facial depth A-C	85.5	5.853	M F	88.56 82.438	6.294 3.262	4.888	S
Sub-orbital Facial height	87.66	5.253	M F	89.662 85.758	4.852 5.321	2.412	S

M = males (ni=30), F = females (n. = 30), ** S = Significance, N.S =non- Significance at P≤0.05, angular Variable were measured in degrees, linear Variable were measured in millimeter

Table (2) Means and standard deviations of angular and linear and ratio measurements for total sample with comparison between males and females frontal view:

Variable	**Mean**	**SD**	**Sex***	**Mean**	**SD**	**T-value**	**Significance**
Angular							
Zy-AG Zy-AG	35.429	4.047	M F	34.843 36.016	4.775 3.128	-1.161	N.S
Linear							
N-Me	128.703	7.154	M F	132.141 125.266	7.008 5.521	4.359	S
Zy-Zy	136.758	6.143	M F	140.859 132.656	5.241 3.807	7.163	S
AG-AG	88.71	4.643	M F	90.484 86.937	5.288 3.058	3.285	S
Ratio							
Zy-Zy/AG-AG	1.544	7.184	M F	1.559 1.528	8.679 4.952	1.769	N.S
N.Me/Zy-Zy	94.27	4.814	M F	93.881 94.659	5.051 4.612	-0.644	N.S

M = males (ni=30), F = females (n. = 30), ** S = Significance, N.S =non- Significance at P≤0.05, angular Variable were measured in degrees,linear Variable were measured in millimeter

Table (3) percentage and Chi-square test of Facial types in lateral and frontal view for total sample with comparison between males and females

Variable	Percent T	Sex *	Percent	Chi-square test	Significance
Lateral facial	Types				
Dolichofacial	34.4	M F	28.1 40.6	8.605	S
Mesofacial	60.9	M F	68.8 53.1	15.239	N.S
Brachyfacial	4.7	M F	3.1 6.3	1.117	S
Frontalfacial	Types				
Leptoprosope	84.4	M F	90.6 78.1	54.232	N.S
Mesoprosopic	15.6	M F	9.4 21.9	4.095	S
Euryprosopic	Zero	M F	—	—	—

M = males (ni=30), F = females (n. = 30),** S = Significance , N.S =non- Significance at P≤0.05, d.f = 4

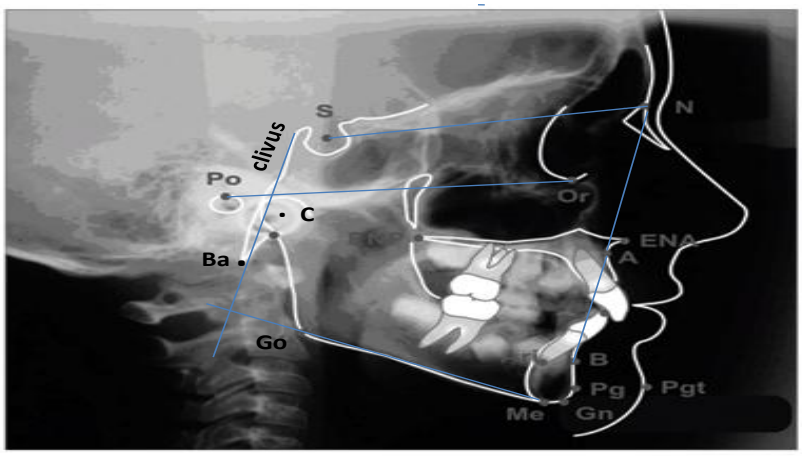

Figure 1: Cephalometric land marks (lateral view)

Figure 2: cephalometric land marks (frontal view)