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# Facial Divergence And Facial Profile in A Sample of Iraqi Adults With Normal Occlusion

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***Abstract***
***Background:*** *This study aimed to determine the facial divergence and facial profile and their relation with the facial thirds in a sample of Iraqi adults with normal dental and skeletal relations.*
***Materials and methods:*** *Fifty dental students (22 males and 28 females) agreed to participate in this study. Standardized profile photograph was taken for each student and analyzed using AutoCAD program (2016).*
***Results:*** *The mean values of facial divergence and profile angle were the same in both genders with a non-significant gender difference. Upper and lower facial thirds were significantly larger in males. No significant relations were present among variables.*
***Conclusions:*** *The sample of the present study had orthognathic faces. Facial thirds did not affect the facial divergence and facial profile angle.*
***Keywords:*** *Facial divergence, facial profile, facial thirds.*

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## I. Introduction

In diagnosing orthodontic cases, the face must be examined in three planes of space. From the profile view, facial profile angle, facial divergence and facial thirds were the most important parameters to measure because they gave clue about the malocclusion in the case [(1)]. Facial profile or convexity of the face can be determined by measuring the angle between lines extending from soft tissue nasion to subnasale and from the latter to the point soft-tissue pogonion. When the points lie in a straight line, an orthognathic face will be. Convex or concave angles indicate a problem in either jaws or in both of them [(2)]. Divergence of the face represents the inclination of the lower face relative to the forehead (anterior or posterior). This can be determined by the angle formed by the nasion-pogonion soft tissue line and the Frankfort horizontal [(3)]. In an orthognathic face, the facial angle is usually approximately 90 degrees. Posteriorly divergent face is associated with posteriorly placed mandible. On the other hand, a patient with mandibular prognathism would have a high facial angle and an "anteriorly divergent" face. Divergence of a straight profile line does not indicate facial or dental disproportions. It is a racial and ethnic characteristic and must be distinguished from the profile convexity or concavity that does indicate disproportions [(2,3)]. In this study, the facial divergence and facial profile were determined and their relations with the facial thirds were tested in a sample of Iraqi adults with normal skeletal and dental relations.

## II. Materials And Methods

**Sample**
Out of 80 examined students from the College of Dentistry, University of Baghdad, only fifty subjects (22 males and 28 females) were met the inclusion criteria.

**Inclusion criteria**
1. All of the subjects were Iraqi Arab in origin.
2. The age ranged between 19-23 years.
3. All of them had normal skeletal, molars, canines and incisors relationships [(3)].
4. All of them had complete permanent dentition regardless the third molars.
5. None of the subjects had any history of previous oro-facial surgery, orthodontic treatment or craniofacial disorder, such as cleft lip and/or palate.

## Methods

### *History and clinical examination*

Each subject was asked to seat comfortably on the dental chair and asked information about the name, age, origin, medical history, the history of facial trauma and orthodontic treatment. Then they were asked to look forward horizontally in the natural head position for clinical examination (extra-orally and intra-orally) to check their fulfillment of the required sample selection. All of them signed a consent form for participation in this study.

### *Photographic analysis*

Lateral view photograph was taken for each student in a cephalostat based head position using digital camera (Sony Cyber Shot H 50, 9.1Mega pixels, 15 X optical zoom, Sony Corporation, Nagoya, Japan).The camera was fixed in position and adjusted in height to be at the level of subject 'eyes with a height adjustable tripod. The distance from the camera to the subject was fixed at a distance of about 1.01m measured from the tripod's column to the ear rods [(4)]. The subject was asked to look at a distant mirror which is placed in front of his/her face with the ear rods fit in the external auditory meatus in order to avoid the forward, backward, and tilting of the subject head (Cephalostat based head position) [(5)]. Every profile photograph was analyzed using AutoCAD program (2016) to calculate the angular and linear measurements. The angles were measured directly as they were not affected by magnification, while the linear measurements were divided by scale for each picture to overcome the magnification.

### Photographic Landmarks, Planes, and Measurements

### Photographic Landmarks [(6-9)]

1. Point Tri (Trichion): The hairline midpoint.
2. Point G' (glabella): The most prominent anterior point in the midsagittal plane of the forehead.
3. Point N' (soft tissue nasion): The point of greatest concavity in the midline between the forehead and the nose.
4. Point Or (soft tissue orbitale): Is the soft tissue point located at the most inferior level of each infraorbital rim or the lowest point on the inferior border of bony orbit.
5. Point T (Tragion): Is the point located at the upper margin of each tragus.
6. Point Sn (subnasale): The point at which the columella merges with the upper lip in the midsagittal plane.
7. Point Pog' (soft tissue pogonion): The most prominent or anterior point on the chin in the midsagittal plane.
8. Point Me' (soft tissue menton). Lowest point on the contour of the soft tissue chin.

### Photographic Planes [(6,7,9)]

1. Frankfort plane: A plane passing through the points tragion and soft tissue orbitale.
2. Facial plane: It was drawn from soft tissue nasion to soft tissue pogonion.
3. N'-Sn plane: A plane passing through the points soft tissue nasion and subnasale.
4. Sn- Pog' plane: A plane passing through the points subnasale and soft tissue pogonion.

### Photographic Measurements [(2)]

1. Facial divergence: It can be determined by the facial angle which is the angle formed by the nasion-pogonion soft tissue line and the Frankfort horizontal plane.
2. Facial profile: Determined by the angle formed by the nasion-subnasale and subnasale and soft tissue pogonion planes.
3. Superior facial third (Tri-G'): The distance between points trichion and glabella.
4. Middle facial third (G'-Sn): The distance between points glabella and subnasale.
5. Inferior facial third (Sn-Me')**:** The distance between points subnasale and menton.

### Statistical Analyses

All the data of the sample were subjected to computerized statistical analyses using SPSS version 21 computer program. The statistical analyses included:

1. Descriptive Statistics (Means and standard deviations).
2. Inferential Statistics (Independent- samples t-test for the comparison between both genders and Pearson's correlation coefficient (r) to find out the relation among the variables).

In the statistical evaluation, the following levels of significance are used:

| | | |
|---|---|---|
| Non-significant | NS | $P > 0.05$ |
| Significant | S | $0.05 \geq P > 0.01$ |
| Highly significant | HS | $P \leq 0.01$ |

## III. Results And Discussion

Table 1 showed the descriptive statistics and genders differences of the variables measured. Both genders showed nearly orthognathic face where the facial divergence angle was around 90 degrees with a non-significant gender difference. This is the first study dealing with facial divergence in Iraqis. Proffit *et al.* [(2)] stated that the term facial divergence was invented by Milo Hellman. The subject's race and ethnic background were the factors influencing it. Facial profile was also the same for both genders with a non-significant difference. Al-Janabi [(10)] found a higher mean value in males than females in contrast to the present study because he used glabella instead of nasion used in the present study. Superior and inferior facial thirds appeared to be significantly higher in males than females. This is normal finding as males have bolder bony structure with dominance of the forehead, nose, and chin and stronger contour of the mandible [(11)]. Middle facial third showed non-significant gender difference. The relations between the parameters measured were illustrated in table 2. Generally, there were non-significant correlations among the variables.

## IV. Conclusions

Orthognathic face was prominent feature of the sample used in this study with a non-significant gender difference. Facial thirds did not affect the facial divergence and facial profile angle.

**Table 1:** Descriptive statistics and genders difference for the measured variables

| Variables | Genders | Descriptive statistics | | | Genders difference (d.f. = 48) | | |
|---|---|---|---|---|---|---|---|
| | | N | Mean | S.D. | Mean difference | t-test | p-value |
| **Facial Divergence (º)** | **Males** | 22 | 91.23 | 3.45 | -0.773 | -0.800 | 0.428 (NS) |
| | **Females** | 28 | 92 | 3.34 | | | |
| | **Total** | 50 | 91.66 | 3.38 | | | |
| **Facial Profile (º)** | **Males** | 22 | 160.18 | 4.09 | -0.711 | -0.574 | 0.569 (NS) |
| | **Females** | 28 | 160.89 | 4.54 | | | |
| | **Total** | 50 | 160.58 | 4.32 | | | |
| **Superior facial third (mm.)** | **Males** | 22 | 60.18 | 7.46 | 6.446 | 3.276 | 0.002 (HS) |
| | **Females** | 28 | 53.73 | 6.45 | | | |
| | **Total** | 50 | 56.57 | 7.56 | | | |
| **Middle facial third (mm.)** | **Males** | 22 | 70.94 | 4.15 | 1.432 | 1.350 | 0.183 (NS) |
| | **Females** | 28 | 69.51 | 3.35 | | | |
| | **Total** | 50 | 70.14 | 3.75 | | | |
| **Inferior facial third (mm.)** | **Males** | 22 | 75.64 | 5.20 | 4.840 | 3.117 | 0.003 (HS) |
| | **Females** | 28 | 70.80 | 5.64 | | | |
| | **Total** | 50 | 72.93 | 5.92 | | | |

**Table 2:** Relation among the variables

| Variables | Genders | Correlation | Facial profile | Superior facial third | Middle facial third | Inferior facial third |
|---|---|---|---|---|---|---|
| **Facial divergence** | **Males** | **r** | -0.374 | 0.176 | 0.112 | 0.027 |
| | | **p-value** | 0.086 (NS) | 0.433 (NS) | 0.619 (NS) | 0.907 (NS) |
| | **Females** | **r** | -0.249 | 0.142 | -0.098 | 0.002 |
| | | **p-value** | 0.202 (NS) | 0.470 (NS) | 0.619 (NS) | 0.992 (NS) |
| | **Total** | **r** | -0.288 | 0.093 | -0.015 | -0.036 |
| | | **p-value** | 0.142 (NS) | 0.520 (NS) | 0.916 (NS) | 0.805 (NS) |
| **Facial profile** | **Males** | **r** | | 0.121 | 0.047 | 0.131 |
| | | **p-value** | | 0.593 (NS) | 0.834 (NS) | 0.562 (NS) |
| | **Females** | **r** | | 0.191 | 0.329 | -0.151 |
| | | **p-value** | | 0.330 (NS) | 0.087 (NS) | 0.442 (NS) |
| | **Total** | **r** | | 0.107 | 0.176 | -0.071 |
| | | **p-value** | | 0.458 (NS) | 0.222 (NS) | 0.625 (NS) |

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