



## Assessment of facial proportions in a sample of Iraqi adults with normal occlusion

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### Abstract

This study aimed to evaluate the facial proportion in a sample of Iraqi adults using Peck and Peck analysis and to verify the presence of genders differences.

60 Arab adult subjects (30 males and 30 females) having normal skeletal and dental relation and acceptable facial profile were chosen for this study. Each individual was subjected to clinical examination and digital true lateral cephalometric radiograph in the natural head position. The radiographs were analyzed using AutoCAD 2007. Descriptive statistics was obtained for the variables for both genders; independent samples t-test was performed to evaluate the genders difference.

The mean values of the facial, maxillo-facial, naso-maxillary, maxillary and total vertical angles are nearly similar in both genders with a non-significant difference. There is slight increase in the nasal angle in females and mandibular angle in males with a significant and highly significant genders difference respectively.

Both genders showed proportional faces, although there is slight increase in the nasal angle in females and mandibular angle in males.

**Key words: Facial proportions, normal occlusion.**

### Introduction

Facial proportion was defined as the comparative relation of facial elements in profile <sup>(1)</sup>.

There are many methods to assess the facial proportion. Wylie and Johnson <sup>(2)</sup> were the first to describe the linear measurements in assessing the vertical dysplasia. They measured the total anterior facial height from Nasion to Menton and divided it into two parts as they projected a perpendicular from the anterior nasal spine so the upper anterior facial height was 45% and the lower anterior facial height was 55%.

Peck and Peck <sup>(1)</sup> measured seven angles between different facial parts namely the nose, upper lip, maxilla and mandible.

Proffit *et al.* <sup>(3)</sup> stated that the vertical facial proportions in the frontal and lateral views are best evaluated in the context of the facial thirds which the Renaissance artists noted were equal in height in well-proportioned faces. In modern Caucasians, the lower facial third often is slightly longer than the central third. The lower third has thirds: the mouth should be one-third of the way between the base of the nose and the chin. Another method to

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determine the facial proportion and symmetry in the frontal plane was dividing the face into central, medial, and lateral equal fifths. The separation of the eyes and the width of the eyes, which should be equal, determine the central and medial fifths. The nose and chin should be centered within the central fifth, with the width of the nose the same as or slightly wider than the central fifth. The inter-pupillary distance should equal the width of the mouth.

The aims of this study are; to evaluate the facial proportion in a sample of Iraqi adults using Peck and Peck analysis and to verify the presence of genders differences.

## Materials and Method

### Sample

The sample included dental students from the College of Dentistry/ University of Baghdad and students from the Nursing School in Baghdad with an age ranged between 18-25 years. 60 Arab subjects (30 males and 30 females) were selected having full permanent dentition regardless the third molars, Class I skeletal and dental relationship, acceptable facial profile, with no history of orthodontic/ oro-facial surgery, facial trauma or deformity.

### The Instruments

1. Kidney dish.
2. Dental mirrors.
3. Sterilizer (Mommert, Germany).
4. A blue cloth covering a 20 × 100 cm. mirror holds on a stand<sup>(4)</sup>.
5. Freely-suspended chain<sup>(3)</sup>.
6. Measuring tape.
7. Pencil.
8. Vernier.

### The Equipment

1. X-Ray Unit (The Planmeca ProMax X-ray unit).

### 2. Analyzing Equipment:

- a) Pentium IV portable computer.
- b) Analyzing software (AutoCAD 2007).

## Method

### History and clinical examination

Each individual was seated on a dental chair and asked information about name, age, origin, history of facial trauma, surgery and previous orthodontic treatment. Then skeletal relation was assessed using the two finger method of Foster<sup>(5)</sup> and the dental relation according to Angle<sup>(6)</sup>, while the overjet and overbite were measured according to Draker<sup>(7)</sup>, Baume *et al.*<sup>(8)</sup> and Little and Riedel<sup>(9)</sup>.

### Lateral cephalometric exposure

For the cephalometric profile recording, the subject stand relaxed in the natural head position after performing a series of neck-bending exercises. He/she should look straight into his eyes on a blue cloth covering a 20 × 100 cm. mirror mounted on the stand, 137 cm. in front of the plane of the ear rods<sup>(4)</sup>. A freely suspended chain was mounted near the nasal rod and in front of the sensor of the cephalostat unit to represent the true vertical line which is the extra-cranial reference line of the cephalometric radiographs<sup>(3)</sup>.

The body posture was controlled and the subject was asked to assume a convenient head position while looking straight into his eyes in the mirror. After adjustment of the cephalometer, the ear and nasal rods were inserted. Each subject was then instructed to keep their teeth lightly closed together<sup>(4)</sup>.

### Cephalometric analysis

Every digital true lateral cephalometric radiograph was analyzed by using AutoCAD program to calculate the angular measurements. After importing the picture to the AutoCAD program, the points were localized, the planes were determined, and the angles were measured. The angles were measured directly as they were not affected by magnification. Firstly the ANB angle <sup>(10)</sup> was measured to confirm that the entire sample had Class I skeletal relation ( $2^{\circ} \pm 2^{\circ}$ ).

### Cephalometric Landmarks, Planes, and Measurements

According to Peck and Peck <sup>(1)</sup>, the following landmarks, planes and measurements were used in this study:

1. Point soft tissue nasion (n): The most posterior point at the root of the nose in the median sagittal plane.
2. Point pronasale (prn): The most anterior point of the nose in the median sagittal plane.
3. Point labrale superius (ls): The point at the superior margin of the upper membranous lip in the median sagittal plane.
4. Point soft tissue pogonion (pog): The most anterior prominent point on the chin in the median sagittal plane.
5. Point P: The midpoint of the facial line.
6. Point Porion (Po): The most superiorly positioned point of the external auditory meatus.

### Cephalometric planes

1. Facial line: It extends from point soft tissue nasion to soft tissue pogonion.
2. Soft tissue orientation plane: It extends from point P to Porion.
3. Soft tissue Nasion- Labrale superius line: It extends from point

soft tissue nasion to labrale superius.

4. Pronasale - labrale superius line: It extends from point pronasale to labrale superius.
5. Porion - soft tissue nasion line: It extends from point Porion to soft tissue nasion.
6. Porion - Pronasale line: It extends from point Porion to Pronasale.
7. Porion - labrale superius line: It extends from point Porion to labrale superius.
8. Porion - soft tissue pogonion line: It extends from point Porion to soft tissue pogonion.

### Cephalometric measurements (Fig.1)

1. The facial angle (F): It is formed by the intersection of the orientation plane with the facial line at point P. It is read as the inside inferior angle and serves as an index of profile orientation.
2. The maxillo-facial angle (Mf): It is formed between the facial line and Nasion- Labrale superius line. It relates the upper lip to the chin horizontally. It may be considered a soft tissue analog to cephalometric ANB introduced by Riedel <sup>(10)</sup>.
3. The naso-maxillary angle (Nm): The inside superior angle formed by the intersection of pronasale - labrale superius line with the orientation plane. It relates the upper lip to the nasal apex.
4. The nasal angle (Na): It is formed by the intersection of the Porion - soft tissue nasion line with Porion - pronasale line. It measures nasal height from soft tissue nasion to pronasale.
5. The maxillary angle (Mx): It is formed by the intersection of the Porion - labrale superius line with Porion - pronasale line. It measures

- maxillary height from pronasale to labrale superius.
6. The mandibular angle (Mn): It is formed by the intersection of the Porion – labrale superius line with Porion – soft tissue pogonion line. It records mandibular height from labrale superius to soft tissue pogonion. The vertex of all these angles is at Porion.
  7. The total vertical angle (TV): A composite angle representing dimension from soft tissue nasion to soft tissue pogonion. It is formed between the Porion – soft tissue nasion and Porion – soft tissue pogonion lines.

### Statistical Analyses

All the data of the sample were subjected to computerized statistical analysis using SPSS version 15 (2006) computer program. The statistical analyses included:

1. Descriptive statistics; means, standard deviations (SD), range, and the statistical table.
2. Inferential statistics; independent samples t-test for the comparison between both genders.

### Results and Discussion

The sample of Peck and Peck <sup>(1)</sup> study consisted of fifty-two young adult subjects. Each participant had been acclaimed previously in some manner by a segment of the general population as possessing those qualities of facial esthetics which are the most pleasing. The sample included professional models, beauty contest winners, and performing stars noted for their facial attractiveness. Forty-nine of the subjects were female, while three subjects were male. Racially, the sample was all white. Thirteen European backgrounds were represented in the maternal and paternal ancestries of the subjects. To

the question, "Have you ever had orthodontic treatment?" twenty-five per cent of the sample (13 subjects) answered "yes." From a cursory examination of occlusion, Class I (Angle) molar relationships of varying degrees were observed in all fifty-two participants.

Peck and Peck <sup>(1)</sup> depended on point tragion and used the profile photograph and stated that this analysis can be done on lateral cephalometric radiograph and point Porion can be used as a substitute for point tragion and this is the basis of the present study. On the other hand, Peck and Peck <sup>(1)</sup> selected models and stars who had attractive faces with unequal sample number. In the present study, the sample includes subjects with normal occlusion, skeletal class I and had acceptable facial profile with a statistically adequate and equal numbers.

Table 1 showed the descriptive statistics and genders difference for the measured variables. The results indicated that the mean values of the measured variables are nearly similar in both genders with a non-significant difference except for the nasal angle which showed higher mean value in females with a significant genders difference and mandibular angle which showed higher mean value in males with a highly significant genders difference.

When the mean values of this study compared with that of Peck and Peck <sup>(1)</sup>, the facial angle in Iraqis was slightly larger, this may be attributed to the difference in the location of points tragion and Porion or it may be the backward position of point soft tissue pogonion and this comes in agreement with Kadhom <sup>(11)</sup> who found a backward position of point soft tissue pogonion in Iraqis. This confirmed the value of maxillo-facial angle which is larger than that of Peck and Peck <sup>(1)</sup>.

The mean value of naso-maxillary angle is larger in the present study; this is due to inclination of the orientation plane downward because of the backward position of point soft tissue pogonion.

The mean value of maxillary angle is lower than Peck and Peck<sup>(1)</sup> indicated some reduction in the maxillary height, on the other hand, the mean value of mandibular angle is higher in the present study indicating the backward position of point soft tissue pogonion.

The total angle is similar in both studies; this is due to the compensation between the maxillary and mandibular heights that equalized the total angle in Iraqis with that of Peck and Peck<sup>(1)</sup>.

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Table 1. Descriptive statistics and genders difference for the measured variables.

Variables	Peck and Peck <sup>(1)</sup> (N=52)		Present study									Gender difference d.f.=58	
			Total sample (N=60)			Male (N=30)			Female (N=30)				
	Mean	Range	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.	Range	t-test	p-value
Facial angle	102.5	96-106.5	105.55	2.52	100-111	105.27	2.52	100-110	105.83	2.53	102-111	-0.87	0.39 (NS)
Maxillo-facial angle	5.9	2.5-9.5	8.13	1.66	5-12	8.23	1.91	5-12	8.03	1.40	6-10	0.46	0.65 (NS)
Naso-maxillary angle	106.1	97-114.5	109.68	4.68	99-118	109.80	5.18	99-118	109.57	4.21	101-116	0.19	0.85 (NS)
Nasal angle	23.3	20-27	22.98	1.84	19-27	22.50	1.76	19-27	23.47	1.81	21-27	-2.10	0.04 *
Maxillary angle	14.1	12-17	13.05	1.19	9-16	13.20	1.37	9-16	12.90	0.96	11-14	0.98	0.33 (NS)
Mandibular angle	17.1	14-20	18.42	1.31	16-22	18.87	1.28	16-22	17.97	1.19	16-20	2.82	0.01 **
Total vertical angle	54.5	47-62	54.45	2.53	50-60	54.50	2.42	50-59	54.30	2.67	50-60	0.30	0.76 (NS)

Table 2. In the statistical evaluation, the following levels of significance are used:

$P > 0.05$	NS	Non-significant
$0.05 \geq P > 0.01$	*	Significant
$0.01 \geq P > 0.001$	**	Highly significant
$P \leq 0.001$	***	Very highly significant

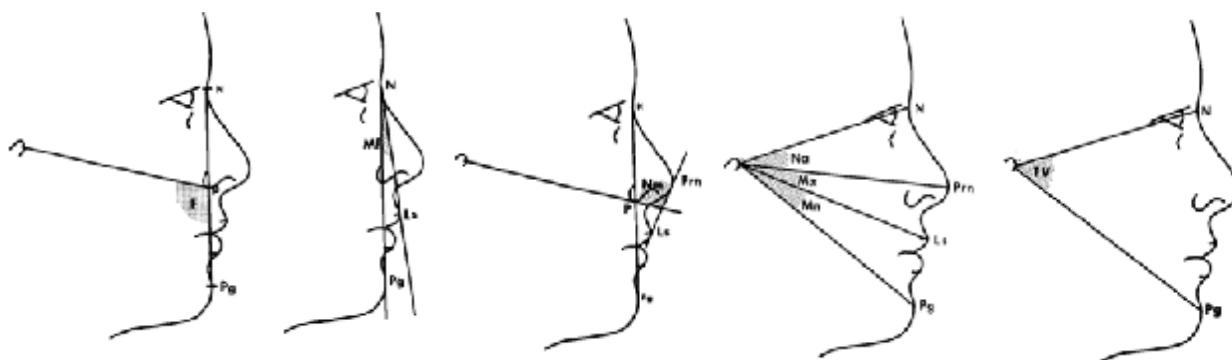


Figure 1. Landmarks, planes and measurements