

## Bimaxillary Protrusion in the Palestinian Population

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### ABSTRACT

**Objective:** To study the prevalence of bimaxillary protrusion among Palestinians.

**Materials and Methods:** Cephalometric radiographs for 79 normal occlusion adult Palestinian university students were traced.

**Results:** The interincisal angle was decreased in the Palestinian women compared to the Caucasian means, but this had no impact on lip protrusion.

**Conclusion:** Relative to Caucasian cephalometric norms, Palestinians show no extraoral bimaxillary protrusion features, and therefore, these norms can be applied to Palestinian faces.

**KEY WORDS:** Bimaxillary protrusion; Cephalometric norms

### INTRODUCTION

Bimaxillary protrusion or full-mouth appearance is an esthetic condition resulting from protruded and proclined upper and lower incisors with resultant protrusion of the lips and convexity of the face.<sup>1</sup> Many articles in the orthodontic literature described bimaxillary protrusion in African Americans, Asians, and other communities.<sup>1-12</sup>

In a study of the Thai population, Lamberton et al<sup>13</sup> found that the dentition is more procumbent and the interincisal angle more acute. Hassan<sup>14</sup> studied the cephalometric norms for Saudi adults living in the western region of Saudi Arabia and found that the Saudis had distinct cephalometric features and tended to have bimaxillary protrusion.

Behbehani et al<sup>15</sup> studied the racial variations in cephalometric analyses between whites and Kuwaitis and reported that the Kuwaitis show more protrusive upper and lower lips and more facial convexity. All the measurements relating the upper and lower incisors to the maxilla and the mandible, respectively, showed a significant bimaxillary protrusion.

On the other hand, Bishara et al<sup>16</sup> established cephalometric standards for Egyptian adolescent boys and

girls and compared them with a matched Iowa adolescent sample. There was a great similarity in the overall facial morphology between the Egyptian and Iowa populations.

In Palestine, there is a marked increase in the number of orthodontic patients attending the Department of Orthodontics at the Arab American University demanding a reduction in the excessive forward projection of both the maxillary and the mandibular anterior teeth in relation to the face. However, there is a shortage of literature describing Palestinian norms and averages, unlike the full data available for the European American, Afro-American, Japanese, Korean, Chinese, and Arab populations. Therefore, we decided to carry out this study in Palestinians. The aim of the study was the following:

to determine the occurrence and severity of bimaxillary protrusion in the Palestinian population for clinical and research purposes,

to compare our results with some classical standards in other studies of bimaxillary protrusion in other nations,

to study the difference between Palestinian men and women in their facial features, and

to determine if the cephalometric averages and norms for Caucasians can be applied to the Palestinian population.

### MATERIALS AND METHODS

This study was composed of 79 students (54 women and 25 men) of the Arab American University of Jenin, Palestine, distributed uniformly from all the regions of Palestine. The average age of the patients was 20 years. Our inclusion criteria included a Class

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**Table 1.** Measurements of the Female and Male Groups Together and the Comparison Between Both Groups Using *t*-Test

|                      | Minimum | Maximum | Mean     | Standard Deviation | T Value | Significance |
|----------------------|---------|---------|----------|--------------------|---------|--------------|
| UI/palatal plane     | 95.40   | 131.00  | 113.9165 | ±6.15964           | 1.44    | .15          |
| UI/SN                | 88.00   | 118.00  | 105.8481 | ±5.91410           | 0.57    | .56          |
| LI mandibular plane  | 80.40   | 111.00  | 94.9468  | ±7.43738           | 1.65    | .10          |
| UI/LI                | 106.00  | 152.00  | 126.6076 | ±9.31420           | -3.05   | .003*        |
| UI/APOG              | 3.00    | 13.00   | 7.0823   | ±2.20813           | 0.82    | .441         |
| LI/APOG              | 0.00    | 35.00   | 4.1139   | ±4.20222           | 1.44    | .154         |
| Nasolabial angle     | 81.00   | 138.00  | 110.3418 | ±11.18594          | 1.11    | .269         |
| Upper lip/E plane    | -12.00  | 2.00    | -5.8481  | ±2.57248           | 0.44    | .655         |
| Lower lip/E plane    | -8.00   | 6.00    | -2.2532  | ±2.77104           | 0.84    | .402         |
| FFH/mandibular plane | 11.00   | 39.00   | 24.0646  | ±5.21340           | 1.03    | .304         |

\* Significance level at  $\alpha = .05$ .

I molar and canine relationship, with minimum crowding or spacing that did not exceed 2 mm, normal overjet and overbite, and no previous orthodontic treatment. To avoid a biased sample, facial profile was not a criterion for selection.

Cephalometric radiographs were obtained from these patients, traced, and analyzed during a cephalometric course taught at the university using the Nemotec analysis software system. The position of the upper incisors was studied by measuring them relative to the palatal plane, to the sella-nasion plane, and the A-pogonion line. The lower incisors were measured by referring them to the mandibular plane and to the A-pogonion line, while the interincisal angle was measured as an indicator of the presence of anterior tooth flaring and proclination.

The nasolabial angle was measured to study the soft tissue procumbency and the position of the upper and lower lips relative to the esthetic plane of Ricketts. The mandibular plane to the Frankfort horizontal was measured to study the relationship between bimaxillary protrusion and the vertical dimension.

### Statistical Analysis

Each measurement of the Palestinian sample was compared to its mean in its original analysis. As measurements vary from men and women, we divided the sample into two groups: group 1 for women and group 2 for men. An independent sample *t*-test was used to study the difference between men and women (Tables 1 and 2).

## RESULTS

### Position of the Upper Incisors

The results of this sample showed a slight increase in proclination of the upper incisors both to the palatal plane, A-pogonion plane, and to sella nasion. The women showed more upper incisor proclination com-

**Table 2A.** Measurements of Female Subjects

|          | Minimum | Maximum | Mean     | Standard Deviation |
|----------|---------|---------|----------|--------------------|
| UIPALTAL | 100.00  | 131.00  | 114.5926 | 5.95112            |
| UINCISN  | 90.00   | 118.00  | 106.1111 | 5.76805            |
| LWIMP    | 80.40   | 111.00  | 95.8778  | 7.01292            |
| UI/LI    | 106.00  | 145.00  | 124.5370 | 8.75605            |
| UIAPOG   | 3.00    | 13.00   | 7.2222   | 2.17444            |
| LOWIAPOG | .00     | 35.00   | 4.5741   | 4.74183            |
| NSLBANGL | 87.00   | 134.00  | 109.3889 | 10.73245           |
| UPLPEPLN | -12.00  | 2.00    | -5.7593  | 2.61299            |
| LWLIPEPL | -7.00   | 6.00    | -2.0741  | 2.85401            |
| FFHMPLNE | 11.00   | 39.00   | 24.4778  | 5.15663            |

**Table 2B.** Measurements of Male Subjects

|          | Minimum | Maximum | Mean     | Standard Deviation |
|----------|---------|---------|----------|--------------------|
| UIPALTAL | 95.40   | 125.00  | 112.4560 | 6.46903            |
| UINCISN  | 88.00   | 117.00  | 105.2800 | 6.30159            |
| LWIMP    | 81.00   | 111.00  | 92.9360  | 8.06241            |
| UI/LI    | 114.00  | 152.00  | 131.0800 | 9.06422            |
| UIAPOG   | 3.00    | 11.60   | 6.7800   | 2.29474            |
| LOWIAPOG | .00     | 8.00    | 3.1200   | 2.49616            |
| NSLBANGL | 81.00   | 138.00  | 112.4000 | 12.07615           |
| UPLPEPLN | -12.00  | -2.00   | -6.0400  | 2.52455            |
| LWLIPEPL | -8.00   | 3.00    | -2.6400  | 2.59615            |
| FFHMPLNE | 12.00   | 32.00   | 23.1720  | 5.32897            |

pared to the men, but the difference was not statistically significant ( $P < .05$ ).

### Position of the Lower Incisors

The lower incisors in the Palestinian sample showed a greater lower incisor proclination when referred to the A-pogonion line, and as it appears with the lower incisor to mandibular plane, both men and women shared the tendency toward a greater lower incisor proclination. Women showed a higher tendency, although the difference was not statistically significant ( $P < .05$ ). The readings of the lower incisor to man-

dibular plane for the male sample showed a tendency for less lower incisor proclination compared to the women, but the difference was not statistically significant ( $P < .05$ ).

### Interincisal Angle

The interincisal angle presented a lesser mean than used in the Nemotec analysis software system. Thirty-nine percent of the sample presented with an interincisal angle less than 124 degrees, which indicated a tendency toward more incisor proclination among the Palestinians. However, when the means for the men and women were divided, the mean for the interincisal angle for the male group showed a more normal range compared to the mean of the female group, who presented with a decreased interincisal angle. The difference between the male and female means was statistically highly significant ( $P < .05$ ). This indicates that the women in the Palestinian population tend to have more incisal proclination than the men, who tend to have a more normal proclination.

### Relationship of Lips to Facial Profile

The relationship of the lips to the Rickett's esthetic line indicated a normal relationship compared to the Rickett's mean, which means an absence of mouth fullness in this Palestinian sample. The incisor proclination that was seen in the interincisal angle did not result in lip procumbency and bimaxillary proclination features in individuals with Class I occlusion. The nasolabial angle was slightly increased in the male group but showed a value consistent with the average value.

### Vertical Dimension

The results of this study indicate that the Palestinian faces were within average measurements, and the slight increase in incisor proclination was not associated with any significant change in the vertical height or accompanied by mandibular rotation ( $P < .05$ ).

### DISCUSSION

This study could be considered the first cephalometric study to determine the prevalence of bimaxillary protrusion using a sample of Palestinians. The results of this study differ from other studies of the Arab population, as this study showed less features of bimaxillary protrusion.

The results of this study conflict with the results of Hassan<sup>14</sup> in which Saudi adults living in the western region of Saudi Arabia were found to have cephalometric features of bimaxillary protrusion. Unlike the results of that study, our Palestinian cephalometric mea-

surements did not have those distinct features of bimaxillary protrusion.

The Palestinian measurements showed less bimaxillary protrusion compared to the results of Behbehani et al,<sup>15</sup> who studied the racial variations in cephalometric analysis between whites and Kuwaitis. Their results showed more protrusive upper and lower lips and more facial convexity for the Kuwaiti sample. All the measurements relating the upper and lower incisors to the maxilla and the mandible showed a significant bimaxillary protrusion; however, while the Palestinian interincisal angle was reduced, the features of bimaxillary protrusion were not prevalent.

On the other hand, Bishara et al<sup>16</sup> established cephalometric standards for Egyptian adolescent boys and girls and compared them with a matched Iowa adolescent sample. There was a great similarity in the overall facial morphology between the Egyptian and Iowa populations.

The results of this study were very close to the results of Hamdan and Rock<sup>17</sup> for the Jordanians in the parameters of upper incisor to palatal plane, interincisal angle, lower incisor to mandibular plane, and lower incisor to the A-pogonion line. Compared to British norms in the Hamdan and Rock study, Palestinians and Jordanians have proclined upper and lower incisors in relation to their corresponding dental bases and a reduction in interincisal angle. The lower incisors are in front of the A-pogonion line compared to the incisors of European populations.

The soft tissue measurements of our study aimed to evaluate the impact of dental proclination on the soft tissue profile. The soft tissue measurements did not show mouth fullness; in other words, the soft tissue did not follow completely the hard tissue and teeth, and this explains the balanced soft tissue profile for the Palestinians.

### CONCLUSIONS

- Palestinian faces show the absence of extraoral bimaxillary protrusion features, and the cephalometric norms taken for the Caucasians can be applied to Palestinian faces.
- Palestinian women have a tendency for a slightly decreased interincisal angle and incisor proclination, but this proclination did not have an impact on facial profile.

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