Correlation of gonial angle size, angular cortical thickness and mandibular bone height with age, gender and dental status in Iraqi sample

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ABSTRACT

Background: Mandibular angle plays an important role in ensuring a harmonious facial profile from esthetic point of view so it is a representative of mandible morphology. The aim of the study was to measure the size of gonial angle, angular cortical thickness and height of mandibular bone using digital panoramic radiography and correlate these 3 measurements with age, gender and dental status

Materials and methods: This study was conducted on 90 Iraqi subjects (40 female and 50 male) aged from (20-85) years divided into 3 study groups: Complete dentated, partially dentated and edentulous. The collected data were possessed and analyzed using Storage Package of Statistical Science SPSS package program (version 13).

Results: The angle size showed a statistically significant moderately strong positive linear correlation with age in both complete and partial dentition. The angular cortical thickness was significantly different in the mean between complete and partial dentition. The thickness showed a statistically significant highly strong negative linear correlation with age. The mandibular bone height in edentulous study group showed a statistically significant strong negative linear correlation with age.

Conclusion: Age associated with increase in gonial angle. Angular cortical thickness and mandibular bone height decreased with age.

Key words: Gonial angle, angular cortical thickness, mandibular bone height. (J Bagh Coll Dentistry 2010;22(4):47-49).

INTRODUCTION

Throughout one’s lifetime, the mandible undergoes remodeling and morphological alterations occur in various areas of the mandible, including the gonial region, antegonial region, condyle and ramus. The word “gonion” is derived from the Greek word “ywvtx” meaning angle. The gonial angle, also called mandibular angle or angle of jaw, is the angle at which the lower border of the mandibular body meets the posterior border of the ramus (1). Gonial angle plays an important role in ensuring a harmonious facial profile from an esthetic point of view so it is a representative of mandible morphology and its increase may cause the face to appear older (2,3). Bairam and Miller (4) stated that Height of mandible (indicative of mandibular bone loss) decreased both with age of subject and with time after extraction. Several authors reported that panoramic radiography is a radiographic procedure that produces a single image of the facial structures including both maxillary and mandibular arches and their supporting structures. This additional information is possible because its coverage exceeds that of the conventional full-mouth survey. Studies indicate that panoramic radiographs, because of their increased coverage, reveal conditions that may otherwise remain undetected (5,6). Lin and Hung (7) investigated the change of gonial angle with age and gender of 1009 adult subjects using lateral cephalometric radiographs. Uthman (8) used a new indices of radiomorphometric to assess bone mass by a study of mandibular cortical thickness of 80 subjects. Sağlam (9) using panoramic radiographs to examine the variation in maxillary and mandibular vertical measurements of 192 subjects dentate and edentulous.

MATERIALS AND METHODS

Ninety panoramic radiographs of digital origin were collected from one specialized Iraqi dental centers in Baghdad. The images were from 90 individuals with an age ranging from 20-85 years. Those patients divided into 3 study groups. Number of females: 40 ;number of males :50 (table 1). The exclusion criteria were used : no orthodontic and periodontal problems and last tooth in mandible shoud be extracted at least 6 months before the study. In complete and partial study group the following measurements were carried out on panoramic radiographs: The gonial angle and angular cortical thickness while in
edentulous study group mandibular bone height measured. Statistical analysis: The quantitative variables (gonial angle, angular cortical thickness and mandibular bone height) were normally distributed and conveniently described by mean, standard deviation SD, standard error SE and the parametric statistical tests of significance were used. The independent samples t-test was used to test the statistical significance of difference in mean between gender (males and females).

**Table 1: The gender distribution in 3 study groups**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Complete dentition</th>
<th>Partial dentition</th>
<th>Edentulous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>46.7</td>
<td>34</td>
</tr>
<tr>
<td>Male</td>
<td>32</td>
<td>53.3</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>

**RESULTS**

Intra-observer observation were obtained through taking 10 randomly images and re-evaluated by the researcher after one month passing, also inter-observer observation were obtained through taking randomly another 10 images and examined once again by an expert radiologist who calculate the measurements.

The complete and partial study groups were subdivided into 2 age groups: - younger age group (20-34) years and older age group (35-49) years old and the edentulous study group was subdivided into 2 age groups: - younger age group (50-64) years and older age group (65+) years old.

The P (paired t-test) showed statistically non-significant for the mean difference between right and left side measurements for selected parameters (gonial angle, angular cortical thickness and mandibular bone height) so dealt with side not subject. In complete and partial dentition groups there were no important or statistically significant differences in mean GA between these 2 study groups and this finding holds true in each of the two age groups. Generally, in each of the 2 study groups the mean gonial angle was significantly higher in the older age group. There was statistically significant difference in mean ACT between complete and partial dentition in older age group. In each complete and partial dentition study group there was a statistically significant difference in mean ACT between 2 age groups. Linear correlation coefficient of 3 parameters with each other and age (table 2).

Bar chart in figure 1 showed the mean mandibular bone height in 2 age groups that there was a significantly higher in younger age group.

**Table 2: Linear correlation coefficient**

<table>
<thead>
<tr>
<th></th>
<th>GA</th>
<th>ACT</th>
<th>Age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete dentition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>$r = -0.788$ P&lt;0.001</td>
<td>$r = 0.754$ P&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>$r = -0.788$ P&lt;0.001</td>
<td>$r = -0.973$ P&lt;0.001</td>
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<tr>
<td>Partial dentition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA</td>
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<td>$r = -0.707$ P&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>$r = -0.701$ P&lt;0.001</td>
<td>$r = 1$ P&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Edentulous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBH</td>
<td>$r = -0.462$ P&lt;0.001</td>
<td>$r = 0.693$ P&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

Means (error bars: 95% CI for mean)

**Figure 1: Dot diagram with error bars showing the mean (with its 95% confidence interval) MBH in 2 age groups**
DISCUSSION
In the present study there is a statistically non significant difference in mean between right and left sides measurements for the selected parameters.
Shahabi et al. (10) found no significant differences in mean between right and left gonial angles. In the present study older age group increase gonial angle compared to younger age group. Yanikoglu and Yilmaz (11) showed that the size of the angle was different between continuous measurements and values tend to increase after tooth extraction. Ohm and Silness (12) mentioned that the number of teeth had a decisive influence on the size of the gonial angle Polat et al. (13) stated that the cortical thickness of mandible was the most important index affected by tooth extraction. Karaagaçlioglu and Ozkan (14) reported that the amount of mandibular height reduction increased in the older age group.
Albanese (15) who stated that bone loss is a closely age-related phenomenon. The thickness of the mandibular cortical bone is highly influence by age.

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