

# Dental Panoramic Imaging Efficiency in Measurement of Gonial Angle Degree in Relation to Gender and Age

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**Abstract:** ***Background:** Gonial angle is an important landmark which is influenced by the age and gender, **Aims of the study:** the objective of this study was to measure the gonial angle degree and evaluate the changes in relation to sex and age by using digital panoramic radiograph. **Material and method:** Sixty digital panoramic radiographs was evaluated (30 male and 30 female). The patients classified into 6 groups according to age. The gonial angle was measured on digital panoramic radiographs by using Planmeca Romix software program. **Results and discussion:** Correlation of age on gonial angle is significant, the gonial angle decrease with age While insignificant differences was found between the size of gonial angle between males and females but females had larger gonial angle. **Conclusion:** gonial angle is one of the most important and widely used radiographic landmark in orthodontic tracing for evaluation of growth pattern and treatment planning. It's also used as a basic reference for forensic dentistry and for comparison with other nationalities and races.*

**Keywords:** gonial angle, age, gender

## 1. Introduction

The gonial angle is important landmark in the mandible which is influenced by age and gender. The sex-related differences in the skeleton have been analysed in various studies. A number of studies have demonstrated that the pelvis is the most reliable area for sex determination, closely followed by the craniofacial skeleton. However, in the craniofacial skeleton, nothing provides a more reliable indicator of sexual dimorphism than the mandible <sup>[1]</sup>.

The mandible is one of the most durable and dimorphic bones of the skull, and plays an important role in sex identification. Many studies note that the assessment of mandibular features is more accurate than the metric assessment of size and proportions of other aspects of the skull for determination of gender. A number of morphological features of the mandible, such as the mandibular ramus flexure, chin shape, and shape of the lower border, among the various methods used for gender assessment in the mandible, gonial angle and ramus height have gained popularity for their simplicity, reliability, and ease of measurement. This is of special interest in forensic medicine, especially due to an increase in the incidents of violence, mass disaster, and increased number of unidentified and mutilated bodies being referred to the forensic expert where only fragmentary bone is available <sup>[2]</sup>.

Any change in the gonial angle is largely produced by ramus remodelling and is determined by the remodelling direction of the ramus with its condyle. Very few studies have been carried out to correlate the changes in the mandibular angle with age, sex and dental status. Previous reports on widening of the gonial angle in edentulous patients are conflicting.

A side from age and loss of teeth, other factors may influence change in gonial angle. Panoramic radiograph is the most obvious choice for determination of the gonial angle <sup>[3]</sup>.

## 2. Material and methods

Sixty digital panoramic radiographic were selected from the archive of radiology clinic in diagnosis department/ College of Dentistry/ Baghdad University. Thirty radiographs for males and 30 for females, with age ranged from 6 years to 70s and the sample classified into six age groups with ten year interval, each group had 10 patients (5 males and 5 females).

The panoramic x-ray machine was used in this study is Dimax 3 digital X-ray machine manufactured by Planmeca, Helsinki, Finland. The panoramic machine was supplied with sensor which is responsible for transferring digital image to the computer unit (DELL) to be able to manipulate with the software program.

## 3. Results

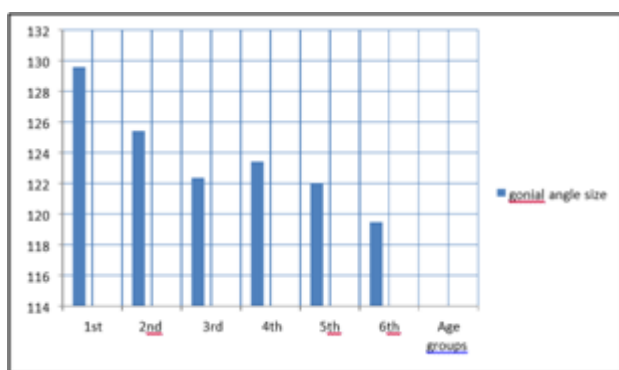
Gonial angle degree in each age group in both males and females were demonstrated in details in table [1], which shows the size of the right gonial angle, the left gonial angle and the P-value. The gonial angle size in all age groups is shown in figure [1].

The results show that gonial angle decreased in size in older age compared with younger age with  $P < 0.005$  S and there was a significant difference between younger and older age group.

The sample classified into two groups according to gender (30 males and 30 females). The size of the gonial angle in females and males for both right and left sides is shown in table [2]. The results show that females have larger gonial angle than males in all age groups with  $p > 0.005$  NS. A Comparison of gonial angle degree between males and females is shown in figure [2].

**Table 1:** Distribution of sample according to age with gonial angle measurements

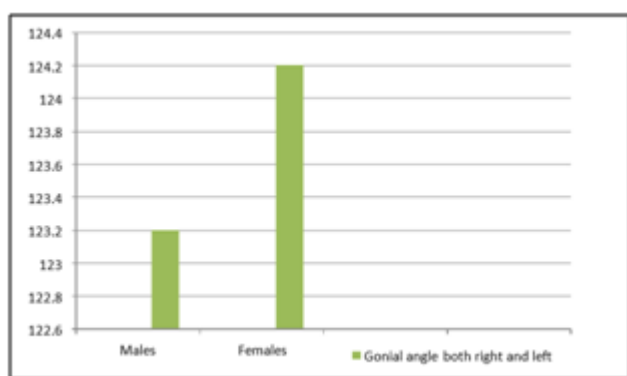
Age group	N	Gonial angle		P-value
		R	L	
6-15 years	10	130.5°	128.7°	P<0.005 S
16-25 years	10	125°	125.87°	
26-35 years	10	122.2°	122.5°	
36-45 years	10	122.8°	124°	
46-55 years	10	121.4°	122.7°	
56 years- above	10	118.4°	120.5°	



**Figure 1:** comparison of gonial angle degree between age groups.

**Table 2:** Sample distribution according to gender with gonial angle measurements

Gender	N	Gonial angle		P-value
		R	L	
Male	30	122.7°	123.69°	p> 0.005 NS
Female	30	124.06°	124.4°	



**Figure 2:** Comparison of gonial angle degree between genders

#### 4. Discussion

This study was carried out to know the differences in the gonial angle degree according to age and gender in Iraqi population, trying to be a starting for basic data information in future studies.

Age, gender, and dental status affect gonial angle size, measurements of the gonial angle is important for growth evaluation in orthodontic researches, the gonial angle shows change during growth process [4].

This study does not take the dental status in consideration and the most of the sample was dentate (except two patients were edentulous). The study shows that gonial angle decreased in size in older age compared with younger age and there was a statistical significant difference between younger and older age groups, which agree with Upadhyay et al [5] while it disagree with Xie and ainamo [6] and Huuonen et al [7], they found that older age groups have larger gonial angle this may be due to differences in sample size selection, distribution, ethnicity or the method of measuring the gonial angle. The samples in these studies were mostly edentulous.

Increasing in the size of the gonial angle may due to increased muscle tonicity of mastication especially that attached to the lower border of the mandible and the angle of the mandible and due to physiological changes lead to flare of the ramus of the mandible [8].

This study shows that females have larger gonial angle than male in all age groups, but the difference was statistically not significant. This result was inconformity with Chol et al [3].

Most of the studies have indicated a wider angle in female subjects but the finding has not been confirmed in some other studies have shown that dentate subjects with strong masseter and antero temporal muscles have small gonial angle [9].

#### 5. Conclusion

Gonial angle is one of the most important and widely used radiographic landmark in orthodontic tracing for evaluation of growth pattern and treatment planing. Measurements of right and left gonial angle on panoramic radiograph are better than cephalometric because of superimposing on anatomical structures with cephalometric. Evaluation of gonial angle is of great importance as a basic reference for forensic dentistry and also for comparison with other nationalities and race.

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