

# Determination of Angle of Mandible from Mandibular Bones and Orthopantomograph

Srineraja.P,  
Fourth Year BDS Student,  
Saveetha dental college and hospitals, Chennai, India

## Abstract:

The aim of this study was to determine the gonial angle in mandibular bones and orthopantomograph. A total of 50 mandibles and 50 OPGs were used in this study. The data were obtained and the mean value was calculated. The gonial angles differed in each mandibular bones and orthopantomograph. The morphology of the mandible changed as a consequence of age which can be expressed as a widening of the gonial angle.

**Key Words:** Mandible, Gonial angle, OPG, Ramus

## INTRODUCTION:

The mandible is a paired bone that develops within the mandibular arch, embedding teeth and forming an articulation of the jaw with the cranium. Morphological changes are brought about by aging. The gonial angle, or the angle of mandible, is formed by the line tangent to the lower border of the mandible and the line tangent to the distal border of the ascending ramus and condyle ie the lower jaw angle is formed by the ramus line (RL) and the mandibular line (ML), where RL is the tangent to the posterior border of the mandible and ML is the lower border of the mandible through the gnathion (gn).<sup>[1][2]</sup> With age the masticatory muscles change in function and structure with decreased contractile activity and lower muscle density. The gonial angle can be used as a tool in forensic odontology, but has received less attention. The aim of this study was to evaluate the angle of mandible comparing mandibular bones and OPGs. The study further intends to evaluate the variation in age using the gonial angle as a parameter.

## MATERIALS AND METHODS:

A total of 50 mandibles and 50 OPGs were included in the study. The study materials were obtained from the Department of Anatomy and the Department of Radiology of Saveetha Dental College and Hospitals, Chennai. Simple methodology was employed for obtaining data. The gonial angle in mandibular bones was measured as the angle formed by the base of the mandible and the posterior border of the ramus by the scale of protractor, which is placed over the angle of mandible in such a way that the base of the protractor coincides with the base of the mandible. The angle was recorded in degrees.[fig.1] [fig.2] The gonial angle in OPG was measured by a line drawn tangential to the lower border of the mandible and the line drawn tangential to the posterior border of the ramus and the condyle. The intersection of these two lines formed the gonial angle which was measured using a protractor in the same way. The angle was recorded in degrees.[fig.3] All the readings were recorded and the mean value was calculated.

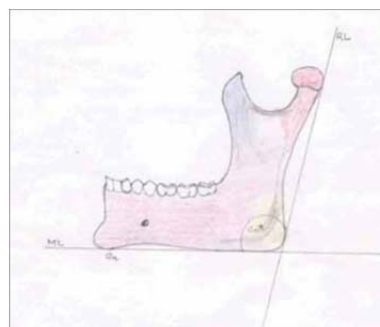


Fig 1(a)



Fig 1(b)

Fig 1(a) and Fig 1(b): measuring angle of mandible in mandibular bone

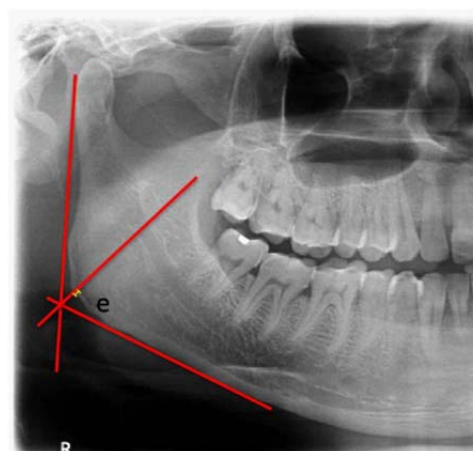


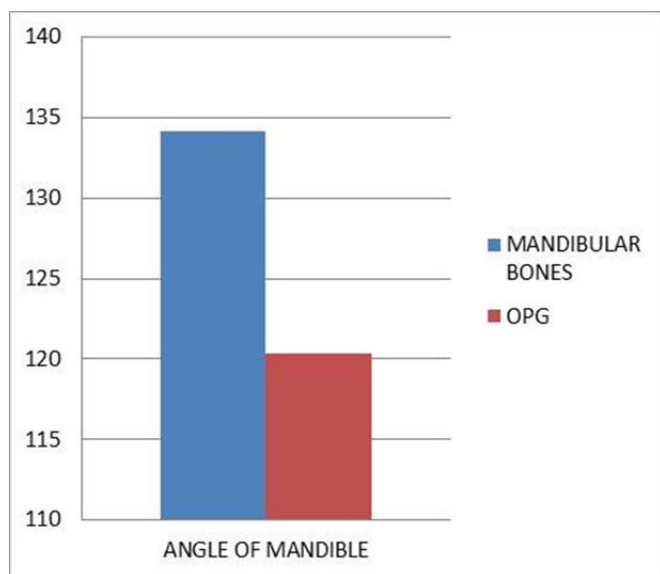
Fig 2 : measuring angle of mandible in OPG

**RESULT:**

The muscle functioning should preserve the bony structure of the gonial angle and symphyseal regions irrespective of the dental status and age, the gonial angle has been found to vary with the type of dentition and also with age.<sup>[4-6]</sup>

The present study shows various values of gonial angle in OPG and mandibular bones. No significant difference was observed between these two. On comparison of gonial angle the mandibular bone showed slightly greater value than OPG.[graph.1]

Mean angle of mandible in mandibular bone and OPG



**Graph 1**

**DISCUSSION:**

Cross-sectional studies have promoted the concept that the gonial angle (GoA) could be used as an indicator of age and gender. However, such views hold little significance as increasing literature shows contrary and variable results.

In our study, we came across the variability in the gonial angle. We could not find any significant difference between the OPGs and mandibular bones. Other studies showed increase in gonial angle with increasing age.<sup>[3] [2]</sup> However, the results of the present study were not statistically significant enough to be reliable and lead to any conclusive results. Difference in the gonial angle of the two sexes has been found in the previous studies, and the general trend was that the gonial angles in males are greater than those measured in females.<sup>[2] [10]</sup> Findings concerning gender differences may also be explained by the fact that, on average, men have greater masticatory force than women.<sup>[11]</sup>

However, the present study did not focus on the correlation between genders with gonial angle it just compared the gonial angles in bones and OPGs.<sup>[14]</sup>

The morphological change in the gonial region in the edentulous individual compared to a young individual has received little attention in the literature. Literature holds diverse studies, where a few observed no significant change in gonial angle, with others concluding gonial angle to be greater in edentulous individuals than in dentate ones.<sup>[8][9][16-18]</sup> The antegonial region will have resorption in the edentulous individuals, perhaps due to the reduced

muscle function in this region in comparison with that of the gonial angle. Muscle function tends to preserve bone at its point of insertion; therefore, the structure of the gonial region will be maintained by the insertion of the medial pterygoid and masseter muscles.<sup>[12-15][19-22]</sup>

When teeth are present, the muscular activity associated with mastication preserved the angle from any change in size. With loss of teeth, the bone undergoes remodeling and causes an increase in size occurs. There have been studies carried out on other factors that could affect the gonial angle, the postural and functional interrelationships of the cheek, lips and tongue in edentulous individuals can alter the gonial angle.<sup>[23] [24]</sup> Resorption of the bone at the posterior or inferior border of this region, the area of the masseter muscle insertion, leads to increasing obtuseness of the mandibular angle.

The considerable transformative changes in gonial angle may be attributed to several factors, and it is known that the mandible does not follow one characteristic pattern throughout life. As most of the data available is based on cross-sectional studies, there is a need for a large longitudinal study to ascertain a definitive conclusion and the reliability of gonial angle as sole indicator of age, gender, and dentition status.

**CONCLUSION:**

The mean value of the gonial angles were found to be slightly more in mandibular bones and were lesser in OPG. There seems to be difference in the gonial angle with different age groups but not significant. Both mandibular bones and OPGs showed almost similar readings. Thus gonial angle serves as an adjuvant and additional forensic parameter which guides for age group assessment, subject to odontological status.

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