

**Ministry of Higher Education
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Baghdad University
College of Dentistry**



**Validity of 3D Reconstructed Computed
Tomographic image using craniometrical
measurements of the skull for sex differentiation
(Iraqi study)**

A thesis

**Submitted To the College Of Dentistry Baghdad University In
Fulfillment Of Requirement for the Degree of Master of
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Abstract

Background: The skull offers a high resistance to adverse environmental conditions over time, resulting in the greater stability of the dimorphic features as compared to other skeletal bone pieces.

Sex determination of human or human skeletal remains is considered an initial step in its identification. Often fragmentary remains are available for forensic identification making sex determination difficult.

Aim of study: The purpose of this study is to evaluate the validity of 3D Reconstructed Computed Tomographic images in sex differentiation by using craniometrical measurements at various parts of the skull for Iraqi individuals.

Materials and Method: 3D reconstructed computed tomographic scanning of 100 Iraqi arab subject, (50 males and 50 females) were analyzed with their age range from 20-70 years old. Those patients attending Neuroscience Hospital in Baghdad city taking CT scans for different diagnostic purposes from November 2013 to April 2014.

Craniometrical linear measurements were located and marked on both side of the 3D skull images including: Porion-mastoidal length (PO-MS), Asterion-Mastoidale length (AS-MS), The Perpendicular distance from mastoidal to Frankfort plane (MS-FH), The greatest bizagomatic diameter (ZY-ZY), greatest transverse diameter of the skull (EU-EU) and the distance between the most anterior points on frontal midline to the most prominent projection of occipital bone (G-I), triangle was designed at mastoid process region by the previous 2 linear measurements (PO-MS) and (AS-MS) with a third line drawn between the 2 points PO and AS, then the area of mastoid triangle was calculated by means of the Heron's formula. All the measurements were made in centimeter unit.

Results: The present study clearly distinguished between two situations for sex identification. The first situation or context; include only one side or part of the skull which is available for examination (**unilateral craniometrical measurements**). In

the second situation both sides of the skull are intact (**bilateral craniometrical measurements**).For the all parameters measured the mean value for Male had highly significant than females with (p value < 0.001).A receiver operating characteristic curves was obtained for each variable to observe their overall performance in sex determination. The area of mastoid triangle was found to be the best variable with maximum areas under a curve and highest predictive accuracy (**ROC area =0.97 for unilateral skull measurements and 0.98 for bilateral measurements**),while the EU-EU was found to be the least one for sex determination. Age showed no statistical differences in the study.

Conclusion: 3D reconstructed Computed tomography scanning is accurate diagnostic method for analyzing the craniometrical measurements for sex determination. Sex differentiation for isolated part of the skull when only the fragmentary crania is available instead of complete cranium ,could be achieved and the highest accuracy in sex determination can be obtained whether part or complete skull available, Since the increase in ROC area when substitute the unilateral for bilateral measurements is almost negligible and not exceeding 1%.