

Chapter one

Introduction

1.1 Introduction:

The mandible from Latin mandibula, "jawbone or inferior maxillary bone is the largest, strongest and lowest bone in the face.¹ It forms the lower jaw and holds the lower teeth in place. In the midline on the anterior surface of the mandible is a faint ridge, an indication of the mandibular symphysis, where the bone is formed by the fusion of right and left processes during mandibular development. Like other symphysis in the body, this is a midline articulation where the bones are joined by fibrocartilage, but this articulation fuses together in early childhood. (wikipedia.org/wiki/mandible).

The mandible consists of: a curved, horizontal portion, the body or base. Two perpendicular parts, the rami, or ramus for each one, unite with the ends of the body nearly at right angles. The angle formed at this junction is called gonial angle. body of the mandible. Condyle, superior (upper) and posterior projection from the ramus, which makes the temporomandibular joint with the temporal bone.

Coronoid process, superior and anterior projection from the ramus. This provides attachment to the temporalis muscle.

(wikipedia.org/wiki/mandible)

The mandible articulates with the two temporal bones at the temporomandibular joints. Computed tomography (CT or CAT scan) is a noninvasive diagnostic imaging procedure that uses a combination of X-rays and computer technology to produce horizontal, or axial, images (often called slices) of the body. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat, organs, and blood

vessels. CT scans are more detailed than standard X-rays.
(wikipedia.org/wiki/mandible)

1.2 Problem of the study:

It is important to know the age throughout the measurement of mandible rami. However, there are no previous studies on the measurement of the mandible ramus in the general Sudanese people.

1.3 Objectives of the Study:

1.3.1 General objective:

The general purpose of this study is measurement of mandible ramus in the Sudanese people using 3D computed tomography.

1.3.2 Specific Objectives:

- ❖ To measure rami length and width.
- ❖ To compare the measurements between right and left.
- ❖ To correlate finding with age.

1.4 Significance of the study:-

This study will improve the knowledge of age by measurement of mandible ramus.

1.5 Overview of the study:-

This study consisted of five chapters, chapter one an introduction which, includes; problem of study also contain general, specific objectives and significant of the study. Chapter two includes back ground and literature review about role of CT images to measurement mandible ramus and other modalities might be use. Chapter three describe the methodology will be using this study. Chapter four include result of presentation of finding of study; finally chapter five include discussion, conclusion and recommendation.

Chapter two

Literature review

2.1 Facial Bone Anatomy:

The facial skeleton serves to protect the brain; house and protect the sense organs of smell, sight, and taste; and provide a frame on which the soft tissues of the face can act to facilitate eating, facial expression, breathing, and speech. The primary bones of the face are the mandible, maxilla, frontal bone, nasal bones, and zygoma. Facial bone anatomy is complex, yet elegant, in its suitability to serve a multitude of functions. (wikipedia.org/wiki/mandible)

2.1.1 Maxilla:

The maxilla has several roles. It houses the teeth, forms the roof of the oral cavity, forms the floor of and contributes to the lateral wall and roof of the nasal cavity, houses the maxillary sinus, and contributes to the inferior rim and floor of the orbit. Two maxillary bones are joined in the midline to form the middle third of the face. (wikipedia.org/wiki/mandible)

2.1.2 Zygoma:

The zygoma forms the lateral portion of the inferior orbital rim, as well as the lateral rim and lateral wall of the orbit. Additionally, it forms the anterior zygomatic arch, from which the masseter muscle is suspended. (wikipedia.org/wiki/mandible)

2.1.3 Frontal Bone

The frontal bone forms the anterior portion of the cranium, houses the frontal sinuses, and forms the roof of the ethmoid sinuses, nose, and orbit.

Anteriorly, the external surface is convex superiorly, and it articulates with the parietal bones posteriorly and the greater wing of the sphenoid posteroinferiorly. The anterior convex surface thickens inferiorly to form the supraorbital rims. Just above the supraorbital rims are thickened arches termed the superciliary arches. Their midline union forms a depression called the glabella. At the junction of the lateral third and the medial third of each supraorbital rim is either a notch or foramen through which the supraorbital vessels and nerves run. Bilateral notches are found in 49% of skulls, bilateral foramina in 26%, and 1 notch and 1 foramen in 24%.[.\(wikipedia.org/wiki/mandible\)](http://wikipedia.org/wiki/mandible)

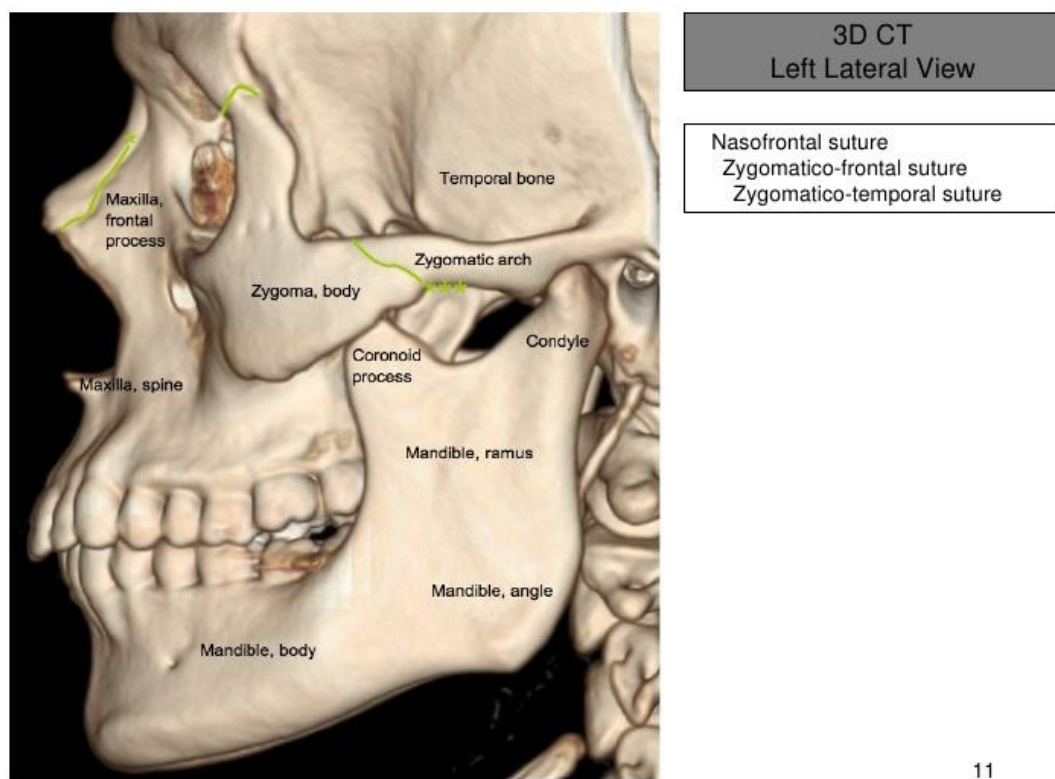
Inferolaterally, the supraorbital ridge forms the zygomatic process that articulates with the frontal process of the zygomatic bone. The inferior surface of the frontal bone forms the concave surface of the orbital roof and the anterior nasal roof.

The internal surface of the frontal bone is concave anteriorly, with grooves laterally for the middle meningeal vessels. The floor of the internal surface forms the floor of the anterior cranial fossa. It has a midline dehiscence termed the ethmoid notch that articulates with the ethmoid bone. (See the image below.) Anterior to the ethmoid notch is an upward sloping ridge termed the frontal crest, which forms a groove for the superior sagittal sinus. At the anterior articulation between the frontal crest and the cribriform plate of the ethmoid bone is a small foramen called the foramen caecum, which usually transmits an emissary vein from the roof of the nasal cavity to the superior sagittal sinus.
[.\(wikipedia.org/wiki/mandible\)](http://wikipedia.org/wiki/mandible)

2.1.4 Nasal Bones:

The paired nasal bones form the anterosuperior bony roof of the nasal cavity. They are approximately quadrangular. They articulate with the nasal process of the frontal bone superiorly, the frontal process of the maxillary bone laterally, and with one another medially. Their inferior border is free and forms the superior margin of the piriform aperture. The external surface is convex except for the superior-most portion, where a concavity forms as the margin turns superiorly to articulate with the frontal bone. On the internal surface is a vertical groove for the external nasal artery.

(wikipedia.org/wiki/mandible)



Emergency Radiology: Imaging of Facial Trauma

Rathachai Kaewlai, MD

Figure 2.1 3D CT facial bone lateral view
(wikipedia.org/wiki/imaging_of_facial_bone)

2.1.5 Mandible:

The mandible is a U-shaped bone. It is the only mobile bone of the facial skeleton, and, since it houses the lower teeth, its motion is essential for mastication. It is formed by intramembranous ossification. The mandible is composed of 2 hemimandibles joined at the midline by a vertical symphysis. The hemimandibles fuse to form a single bone by age 2 years. Each hemimandible is composed of a horizontal body with a posterior vertical extension termed the ramus.

(wikipedia.org/wiki/mandible)

2.1.6 Body - lateral surface:

On the anterior inferior midline region of the hemimandible body is a triangular thickening of bone termed the mental protuberance. The thickened inferior rim of the mental protuberance extends laterally from the midline and forms 2 rounded protrusions termed the mental tubercles. Located lateral to the midline on the external surface are the mental foramina that transmit the mental nerves and vessels. They usually are located below the apex of the second bicuspid and have 6-10 mm of variation in the anteroposterior dimension.

The rim of bone lateral to the mental tubercles extends posteriorly and ascends obliquely as the oblique line to join the anterior edge of the coronoid process. The inferior rim of the posterior body thickens and flares laterally where it attaches to the masseter muscle.

(wikipedia.org/wiki/mandible)

2.1.7 Body - medial surface:

Just lateral to the symphysis on the inner surface of the mandible are 2 paired protuberances termed the superior and inferior mental spines. The genioglossus muscle attaches to the superior mental spines, and the

geniohyoid muscle attaches to the inferior mental spines. Just lateral to the inferior mental spines on the inferior border of the mandible are 2 concavities called the digastric fossae, where the anterior digastric muscles attach.

Extending obliquely in a posterosuperior direction from the midline is a ridge of bone called the mylohyoid line, which serves as the attachment site for the mylohyoid muscle. Above and below the mylohyoid line on the inner mandibular body are 2 shallow convexities against which the sublingual and submandibular glands abut, respectively. Medial to the ascending edge of the anterior ramus is the retromolar trigone, located immediately behind the third molar.

(wikipedia.org/wiki/mandible)

2.1.8 Rami - lateral surface:

The ramus extends vertically in a posterosuperior direction posterior to the body on each hemimandible. The mandibular angle is formed by the intersection of the inferior rim of the body and the posterior rim of the ascending ramus. The superior ramus bifurcates into an anterior coronoid process and a posterior condylar process. The concavity between the 2 processes is called the mandibular notch. The coronoid is thin and triangular. With the teeth in occlusion, its superior extent is medial to the zygomatic arch. The coronoid is the site of attachment of the temporalis muscle. Inferiorly, the condylar process has a narrow neck that widens to a globular head that articulates with the glenoid fossa of the temporal bone.

(wikipedia.org/wiki/mandible)

2.1.9 Rami - medial surface:

On the medial surface of the ramus, just below the mandibular notch, is an aperture termed the mandibular foramen; the inferior alveolar nerve and blood vessels run through this aperture. Just medial to the mandibular foramen is the lingula, a triangular bony protuberance with its apex pointing posterosuperiorly toward the condylar head. Extending anteriorly and inferiorly from the mandibular notch toward the inferior rim of the body is the mylohyoid groove, through which the mylohyoid nerve runs.

(wikipedia.org/wiki/mandible)

2.1.10 internal anatomy:

The mandible has a large medullary core with a cortical rim 2-4 mm thick. The inferior alveolar canal begins at the mandibular foramen and courses inferiorly, anteriorly, and toward the lingual surface in the ramus. In adults, the canal comes in close proximity to the roots of the third molar. In the mandibular body, the canal courses along the inferior border close to the lingual surface. Anteriorly, the canal runs typically inferior to the level of the mental foramen, to which it ascends at its terminal end. The mandible houses the lower dentition, which in adults consists of 2 central and 2 lateral incisors, 2 canines, 2 first and 2 second premolars, and 3 sets of molars. Interdental septi run between the buccal and lingual cortices of the mandible, and interraderic septi run between the mesial and distal roots of the molars.

(wikipedia.org/wiki/mandible)

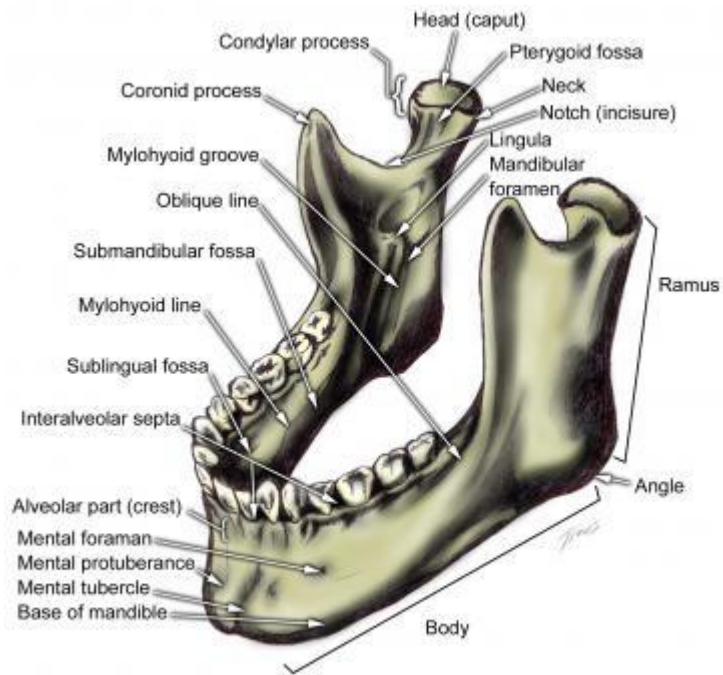


Figure 2.2 anatomy of mandibule
([wikipedia.org/wiki/imaging_of_facial_bone](https://www.wikipedia.org/wiki/imaging_of_facial_bone))

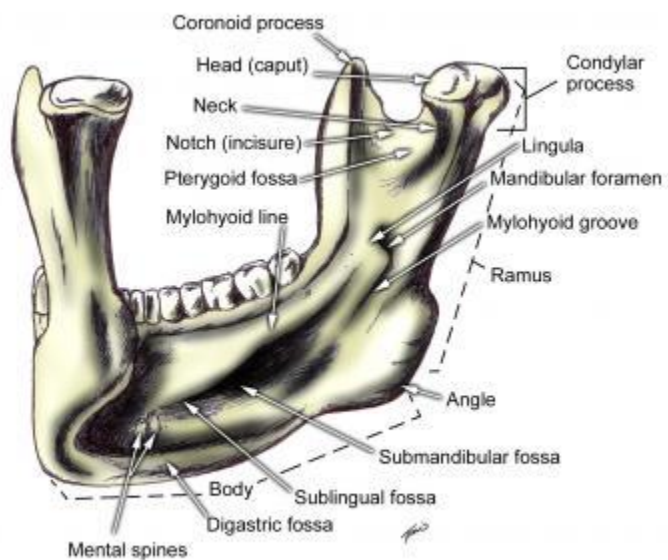


Figure 2.3 anatomy of the mandible (internal view)
([wikipedia.org/wiki/imaging_of_facial_bone](https://www.wikipedia.org/wiki/imaging_of_facial_bone))



Figure 2.4 CT 3D facial bone
(wikipedia.org/wiki/imaging_of_facial_bone)

2.2Physiology:

The mandible, or lower jaw, is the bone that forms the lower part of the skull, and along with the maxilla (upper jaw), forms the mouth structure. Movement of the lower jaw opens and closes the mouth and also allows for the chewing of food. The lower set of teeth in the mouth is rooted in the lower jaw.

(wikipedia.org/wiki/mandible_anatomy_and_physiology)

2.3 Pathology:

Mandibular fracture, also known as fractures of the jaw, are breaks through the mandibular bone. They usually occur due to trauma and are often associated with other facial trauma. The types of mandibular fractures include fractures at the symphyseal area, horizontal ramus, mandibular angle and condylar.

(Andrew E.2000)

2.4 Classification:

This is the most useful classification, because both the signs and symptoms, and also the treatment are dependent upon the location of the fracture. The mandible is usually divided into the following zones for the purpose of describing the location of a fracture : condylar, coronoid process, ramus, angle of mandible, body (molar and premolar areas), parasymphysis and symphysis.

(wikipedia.org/wiki/mandible pathology)

2.4.1 Alveolar:

This type of fracture involves the alveolus, also termed the alveolar process of the mandible.

(wikipedia.org/wiki/mandible pathology)

2.4.2 Condylar:

Condylar fractures are classified by location compared to the capsule of ligaments that hold the temporomandibular joint (intracapsular or extracapsular), dislocation (whether or not the condylar head has come out of the socket (glenoid fossa) as the muscles (lateral pterygoid) tend to pull the condyle anterior and medial) and neck of the condyle fractures.

E.g. extracapsular, non-displaced, neck fracture. Pediatric condylar fractures have special protocols for management.

(Abdel -Galil,et al 2010)

2.4.3 Coronoid:

the coronoid process of the mandible lies deep to many structures, including the zygomatic complex (ZMC), it is rare to be broken in isolation. It usually occurs with other mandibular fractures or with fracture of the zygomatic complex or arch. Isolated fractures of the coronoid process should be viewed with suspicion and fracture of the ZMC should be ruled out.

([wikipedia.org/wiki/mandible pathology](http://wikipedia.org/wiki/mandible_pathology))

2.4.4 Ramus:

Ramus fractures are said to involve a region inferiorly bounded by an oblique line extending from the lower third molar (wisdom tooth) region to the posteroinferior attachment of the masseter muscle, and which could not be better classified as either condylar or coronoid fractures.

([wikipedia.org/wiki/mandible pathology](http://wikipedia.org/wiki/mandible_pathology))

2.4.5 Angle:

The angle of the mandible refers to the angle created by the arrangement of the body of the mandible and the ramus. Angle fractures are defined as those that involve a triangular region bounded by the anterior border of masseter muscle and an oblique line extending from the lower third molar (wisdom tooth) region to the posteroinferior attachment of the masseter muscle.

([wikipedia.org/wiki/mandible pathology](http://wikipedia.org/wiki/mandible_pathology))

2.4.6 Body:

Fractures of the mandibular body are defined as those that involve a region bounded anteriorly by the parasymphysis (defined as a vertical line just distal to the canine tooth) and posteriorly by the anterior border of the masseter muscle.

([wikipedia.org/wiki/mandible pathology](https://en.wikipedia.org/wiki/Mandible_pathology))

2.4.7 Parasymphysis:

Parasymphyseal fractures are defined as mandibular fractures that involve a region bounded bilaterally by vertical lines just distal to the canine tooth.

([wikipedia.org/wiki/mandible pathology](https://en.wikipedia.org/wiki/Mandible_pathology))

2.4.8 Symphysis:

Symphyseal fractures are linear fractures that run in the midline of the mandible (the symphysis).

([wikipedia.org/wiki/mandible pathology](https://en.wikipedia.org/wiki/Mandible_pathology))

2. 5 Fracture type:

Mandibular fractures are also classified according to categories that describe the condition of the bone fragments at the fracture site and also the presence of communication with the external environment.

([wikipedia.org/wiki/mandible fracture](https://en.wikipedia.org/wiki/Mandible_fracture))

2.5.1 Greenstick:

Greenstick fractures are incomplete fractures of flexible bone, and for this reason typically occur only in children. This type of fracture generally has limited mobility.

([wikipedia.org/wiki/mandible fracture](https://en.wikipedia.org/wiki/Mandible_fracture))

2.5.2 Simple:

A simple fracture describes a complete transection of the bone with minimal fragmentation at the fracture site.

([wikipedia.org/wiki/mandible fracture](https://wikipedia.org/wiki/mandible_fracture))

2.5.3 Comminuted:

The opposite of a simple fracture is a comminuted fracture, where the bone has been shattered into fragments, or there are secondary fractures along the main fracture lines. High velocity injuries (e.g. those caused by bullets, improvised explosive devices, etc...) will frequently cause comminuted fractures.

([wikipedia.org/wiki/mandible fracture](https://wikipedia.org/wiki/mandible_fracture))

2.5.4 Compound:

A compound fracture is one that communicates with the external environment. In the case of mandibular fractures, communication may occur through the skin of the face or with the oral cavity. Mandibular fractures that involve the tooth-bearing portion of the jaw are by definition compound fractures, because there is at least a communication via the periodontal ligament with the oral cavity and with more displaced fractures there may be frank tearing of the gingival and alveolar mucosa.

([wikipedia.org/wiki/mandible fracture](https://wikipedia.org/wiki/mandible_fracture))

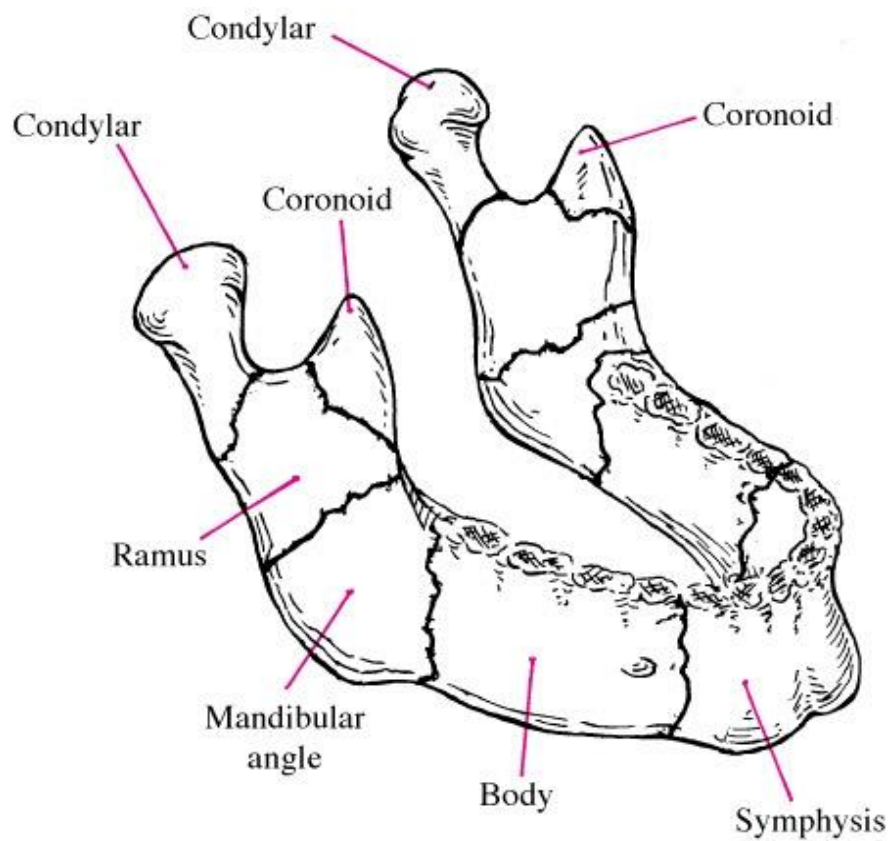


Figure 2.5 fractures of mandibule
 (wikipedia.org/wiki/imaging of facial bone)

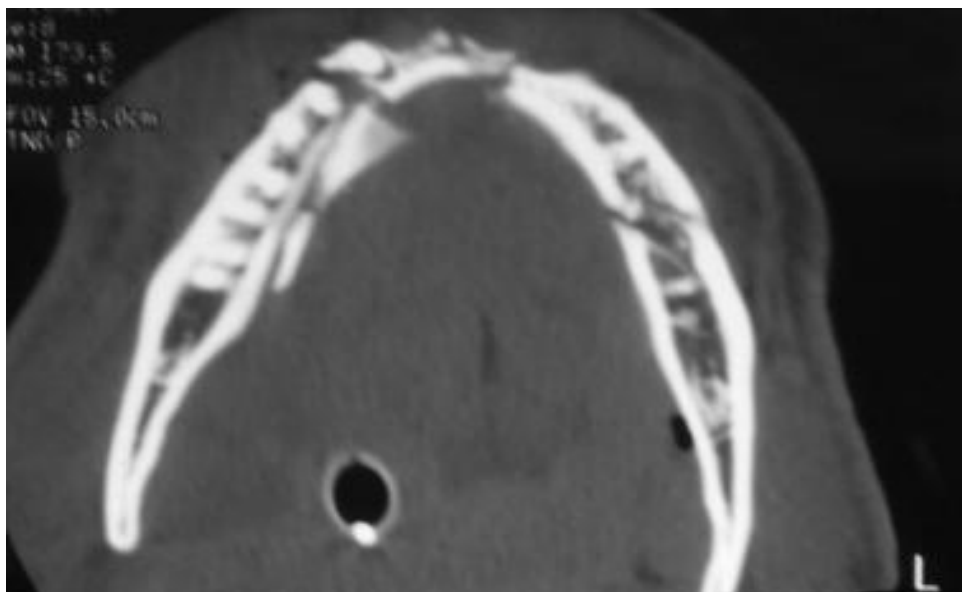


Figure 2.6 axial CT mandible fracture
 (wikipedia.org/wiki/imaging of facial bone)



Figure 2.7 3D CT mandible fracture
(wikipedia.org/wiki/imaging_of_facial_bone)

2.6 Previous studies:

Indira AP¹ et al 2012 had studied the Mandibular ramus to differentiate between sexes and it also expresses strong univariate sexual dimorphism. Mandibular ramus measurements were carried out in Bangalore population by using CT scan. This study on mandibular ramus measurements using orthopantomograph shows strong evidence suggesting that the ramus can be used for gender determination for forensic analysis and 76% of the cases were classified correctly (Indira, 2012).

Noha Saleh Abu-Taleb^{*} and et al 2015 had studied Mandibular ramus to differentiate between sexes and Age in an Egyptian Population by using CT scan by Comparisons between right and left sides were performed and no statistically significant difference was found between the two sides; consequently, the mean of the two sides was used in further statistical analysis(Noha Saleh Abu-Taleb 2015).

de Oliveira FT¹, and et al 2015. Had studied Mandibular ramus to differentiate between sexes and Age in a Brazilian population on lateral cephalometric radiographs, In conclusion, the mandibular ramus length was not effective in discriminating sex. Mandibular length is strongly related to chronological age and can be used to predict whether an individual is 18 years or older with high degree of expected accuracy. (de Oliveira FT¹2015).

Chapter three

Materials and methods

The methodology section of this thesis described the design of the study, the setting where it took place, the sampling design that was used, and the instruments that were involved in data collection, and also the procedures that were followed for data collection. The statistics that were used for data analysis and a description of the way in which data were analyzed are also discussed.

3.1 Materials

3.1.1 Study sample:

Total samples of 40 patients in the study, their ages were between (20 - 75) years old. Both genders were include 21 were males and 19 were females.

3.1.2 Area and duration of the study:

The study had been carried out during the period from September 2015 up to January 2016 in Almodares Hospital in Khartoum.

3.1.3 Machines used:

CT scanner used GE high speed dual sensation with KVP 120.

3.2 Methods of scanning:

CT scan done from mandible to frontal sinuses technical factors that were used in this study were 120 Kv 100mAs 5_10 slice thickness.

3.2. 1 Methods of measurements:

All images of study are measurement two length and two width diameters in axial CT

- ❖ *Maximum ramus breadth*: The distance between the most anterior point on the mandibular ramus and a line connecting the most posterior point on the condyle and the angle of jaw.
- ❖ *Minimum ramus breadth*: Smallest anterior–posterior diameter of the ramus.
- ❖ *Condylar height/maximum ramus height*: Height of the ramus of the mandible from the most superior point on the mandibular condyle to the tubercle, or most protruding portion of the inferior border of the ramus.
- ❖ *Projective height of ramus*: Projective height of ramus between the highest point of the mandibular condyle and lower margin of the bone.

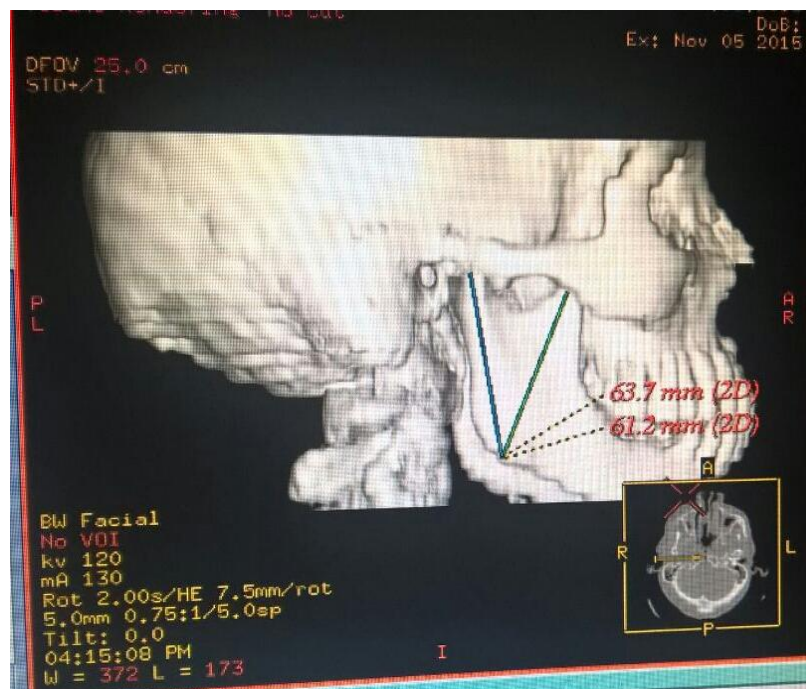


figure 3.1 Diagram showing mandibular ramus measurements

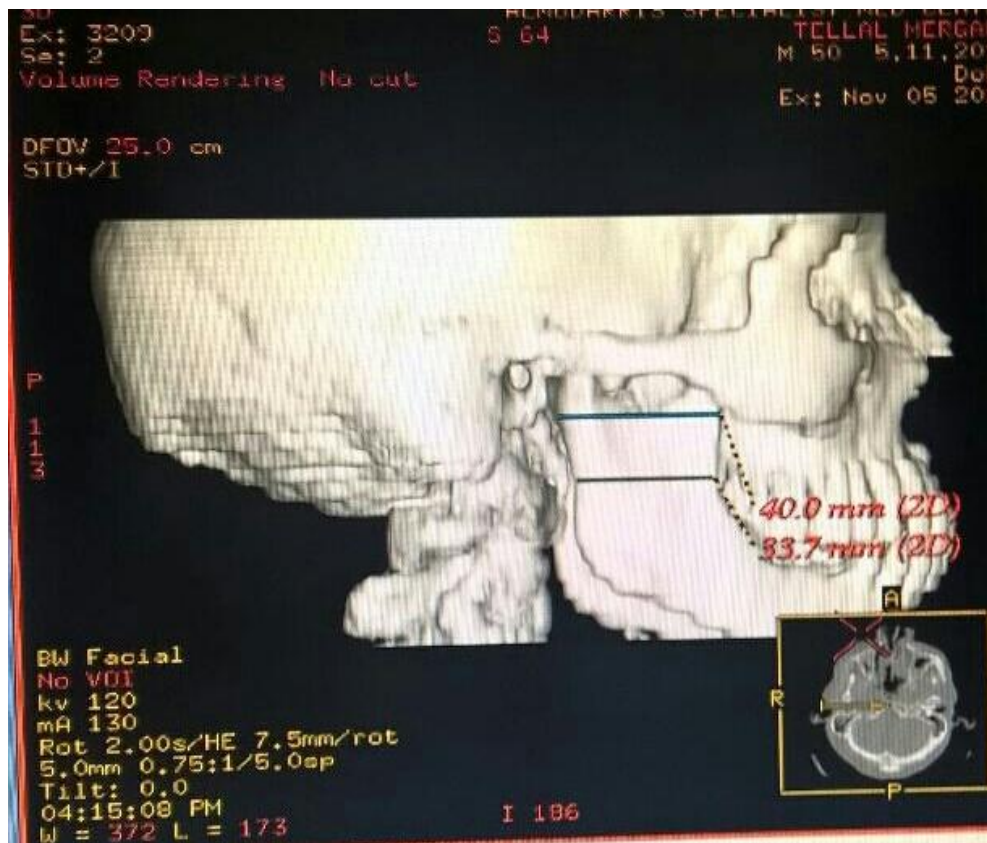


figure 3.2 Diagram showing mandibular ramus measurements

3.3Data analyzes:

The data were analyzed using Excel programmer for significances of tests were used. Frequency tables mean and standard deviations were presented.

Chapter Four

Results

Computerized Tomography scanning was performed in the Radiology Unit of the Almodares international Hospital in Khartoum. _

The data was collected from 40 normal CT scans for facial bones. 21 were males and 19 were females. Age, Mandible variables were recorded including Maximum length RT medial condyle, Maximum length RT lateral condyle, Maximum width RT mandible, minimum width RT mandible, Maximum length LT medial condyle, Maximum length LT lateral condyle, Maximum width LT lateral condyle, Minimum width LT lateral condyle. Measurement of the variables were made and classified according to age.

The mean and SD were presented after applying analyses using Excel program me. Detailed results are shown in the tables and figures below.

Table 4.1 Gender Distribution

Gender	
Male	Female
21	19

Table 4-2 Frequency of ages

AGE	FREQUENCY
20-29	5
30-39	8
40-49	8
50-59	9
60-69	8
70-79	2

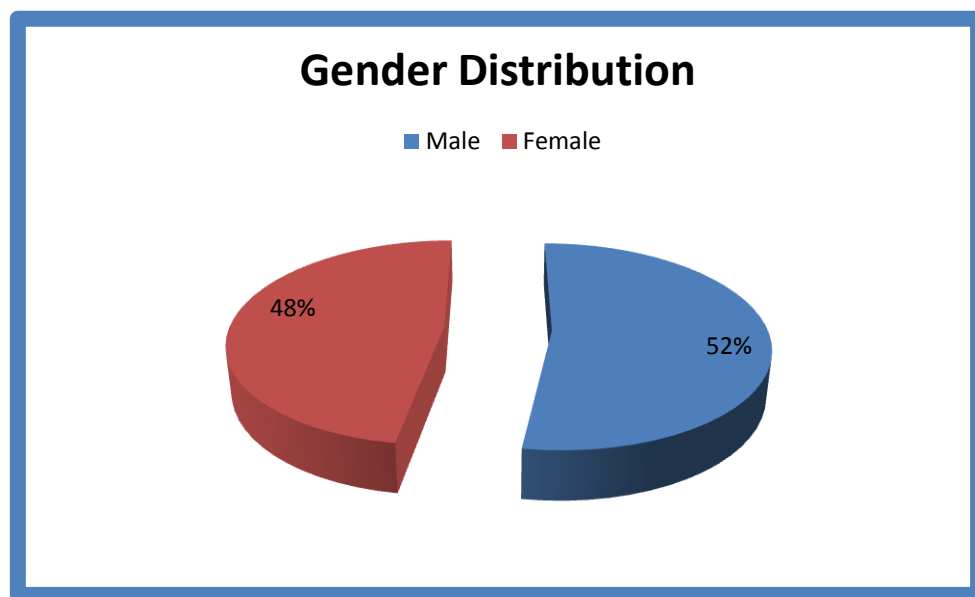


Figure 4.1 gender distributions

Table 4.3 *Mean and standard deviations of the variables Maximum length RT medial condyle, Maximum length RT lateral condyle, Maximum width RT mandible, minimum width RT mandible, Maximum length LT medial condyle, Maximum length LT lateral condyle, Maximum width LT lateral condyle, Maximum width LT lateral condyle.*

Minimum width LT lateral condyle	Maximum width LT medial condyle	Maximum length LT lateral condyle	Maximum length LT medial condyle	Minimum Width RT lateral condyle	Maximum width RT medial condyle	Maximum length RT lateral condyle	Maximum length RT medial condyle
31.75	38.0875	65.455	56.9775	31.75	38.0875	65.455	57.0025
mean							
±3.29	±3.11	±4.72	±4.79	±3.29	±3.11	±4.72	±4.80
Stander diviation							

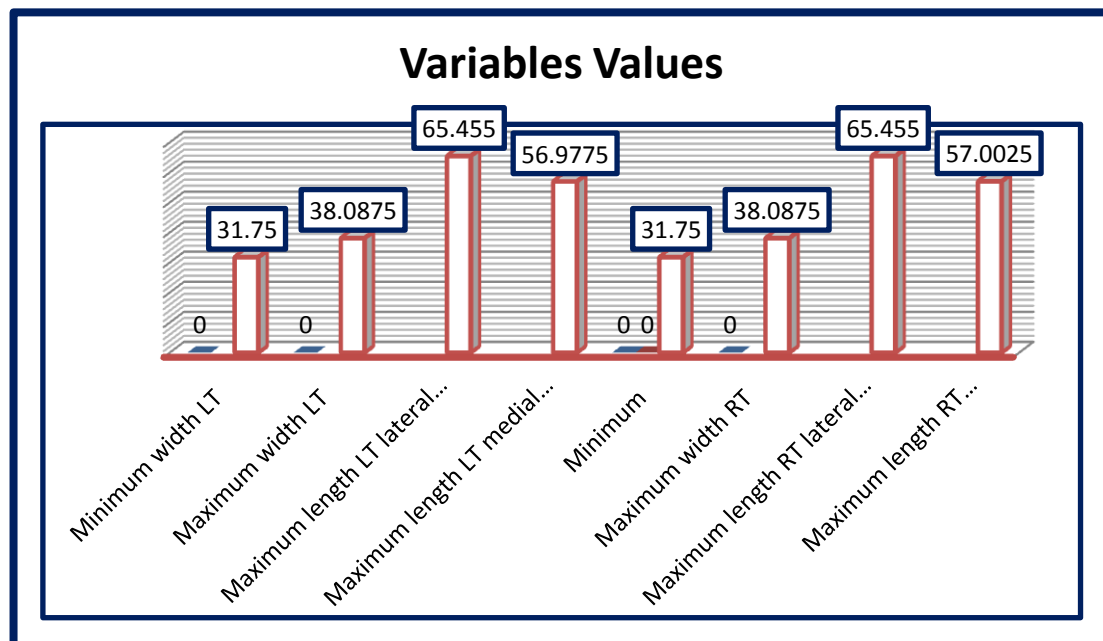


Figure 4.2 variables values

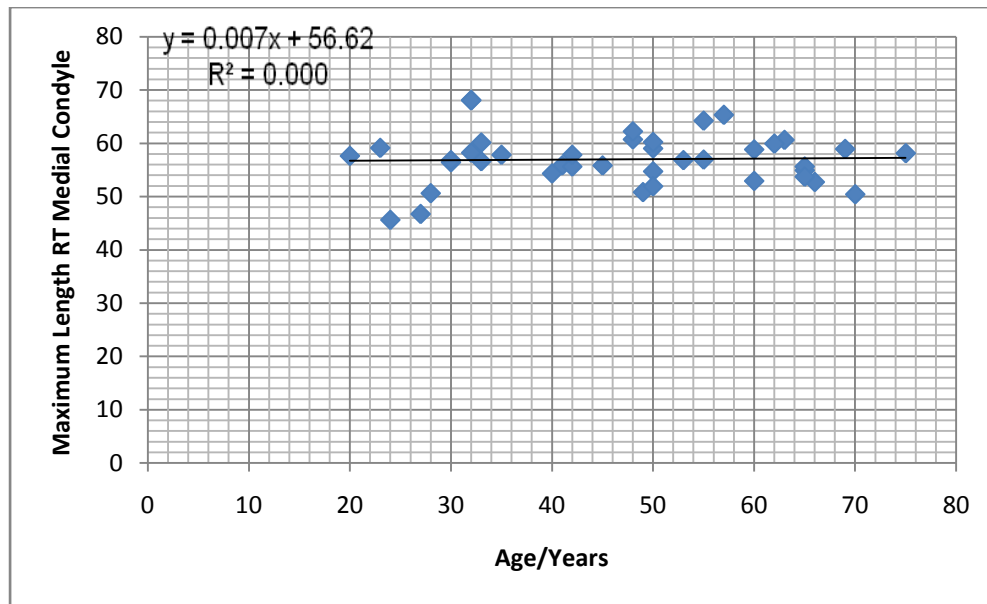


Figure 4.3A scattered plot diagram shows the linear relationship between the age and maximum length RT medial condyle as the age increase the length increase by 0.007 starting from 56.6 mm for each decade (10 years)

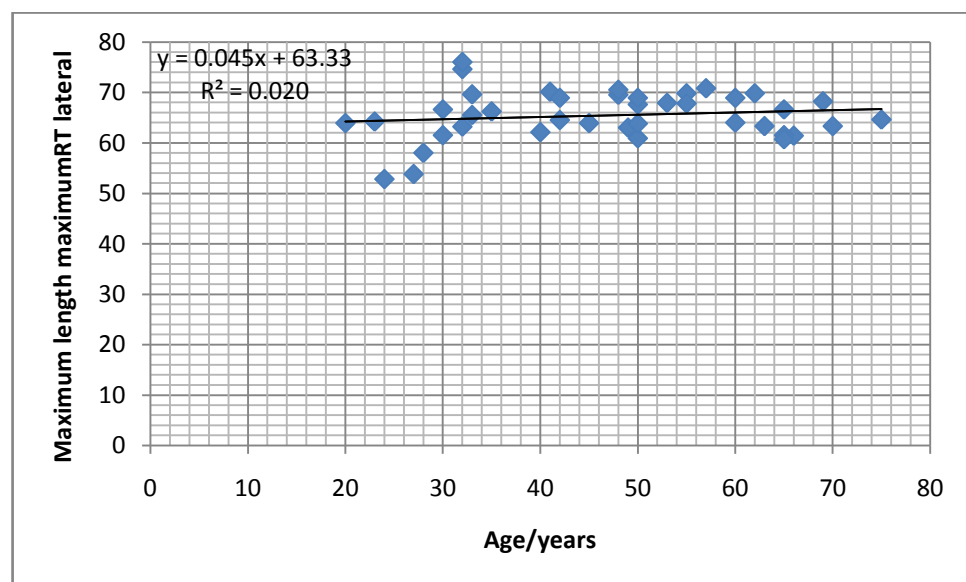


Figure 4.4 A scattered plot diagram shows the linear relationship between the age and the maximum length maximum RT lateral as the age increase the length increase by 0.045 starting from 63.33mm for each decade (10 years)

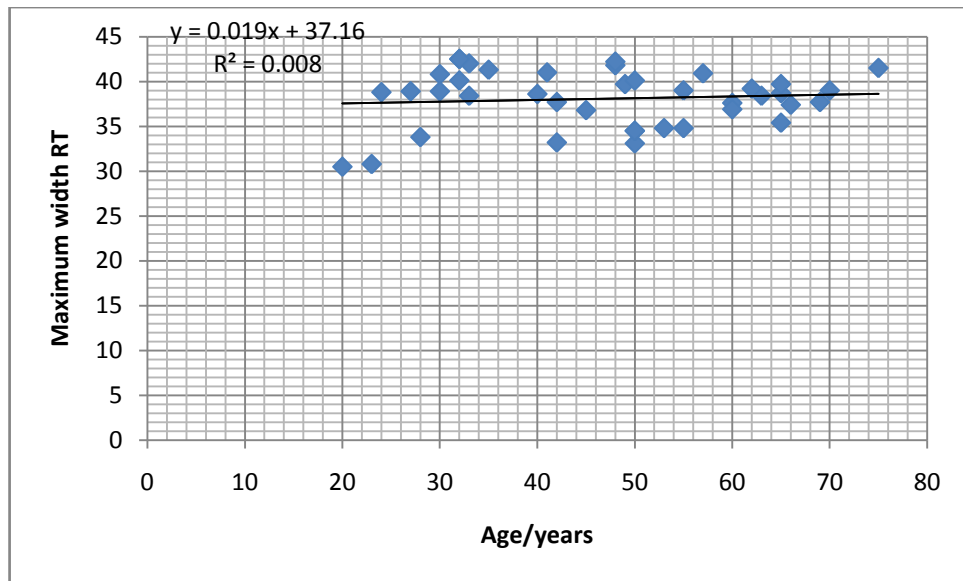


Figure 4.5 A scattered plot diagram shows the linear relationship between the age and the maximum width RT as the age increase the length increase by 0.019 starting from 37.1 mm for each decade (10 years)

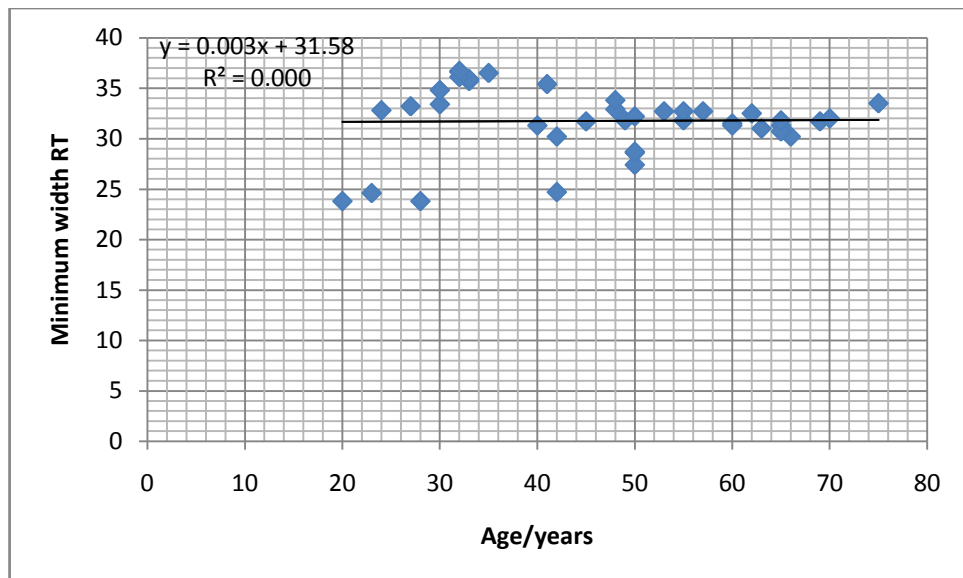


Figure 4.6 A scattered plot diagram shows the linear relationship between the age and the minimum width RT as the age increase the length increase by 0.003 starting from 31.5 mm for each decade (10 years)

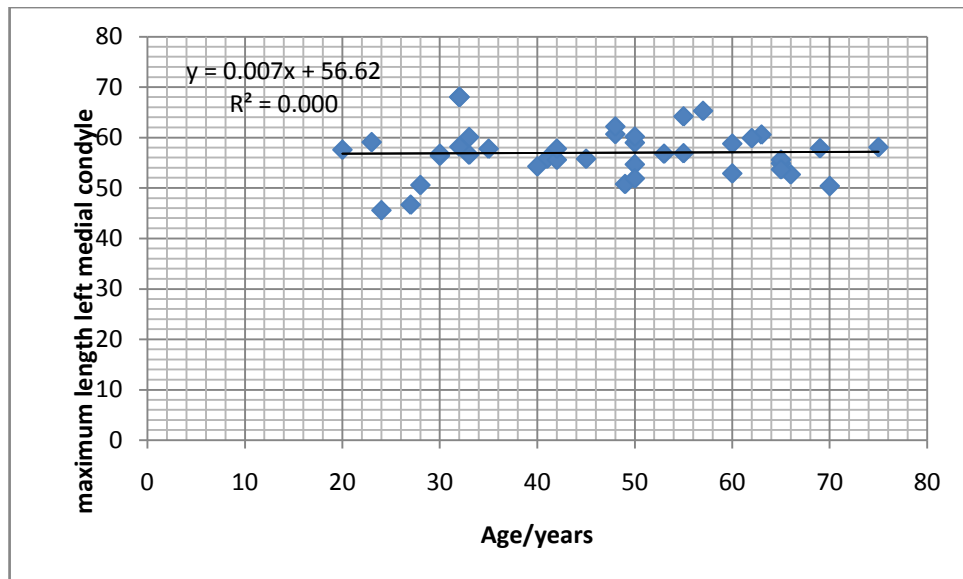


Figure 4.7 A scattered plot diagram shows the linear relationship between the age and the maximum length LT medial condyle as the age increase the length increase by 0.007 starting from 56.6 mm for each decade (10 years)

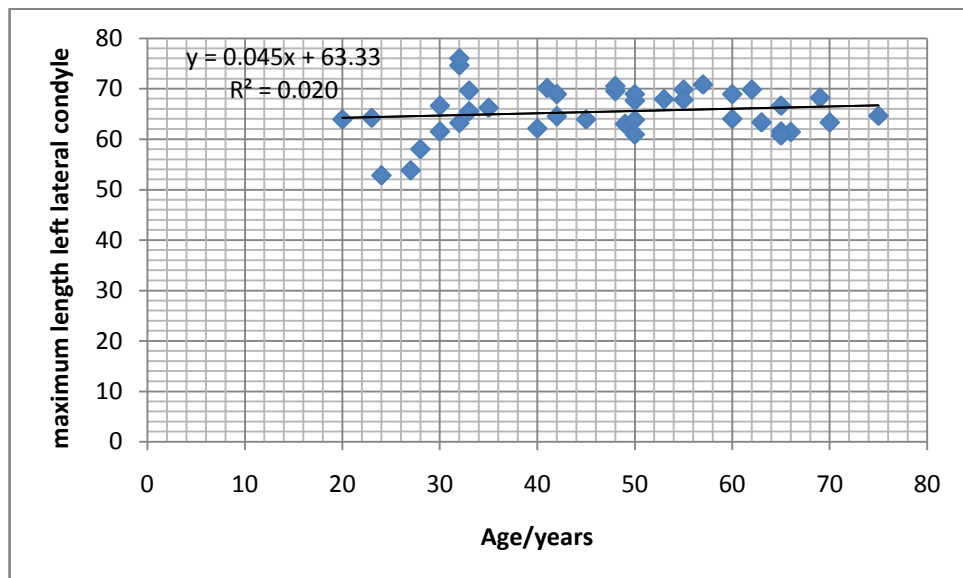


Figure 4.8 A scattered plot diagram shows the linear relationship between the age and the maximum length LT lateral condyle as the age increase the length increase by 0.045 starting from 63.3 mm for each decade (10 years).

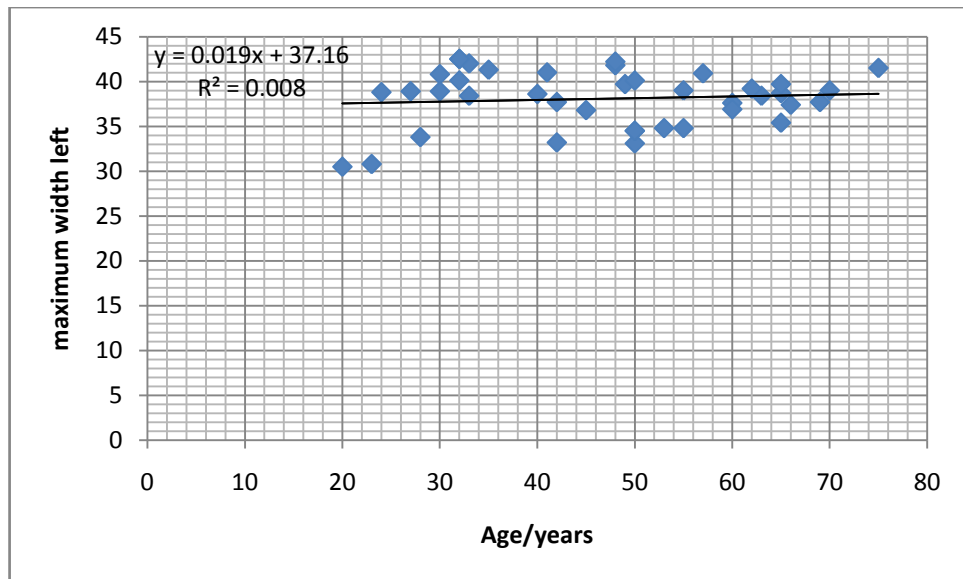


Figure 4.9A scattered plot diagram shows the linear relationship between the age and the maximum width LT as the age increase the length increase by 0.019 starting from 37.1 mm for each decade (10 years).

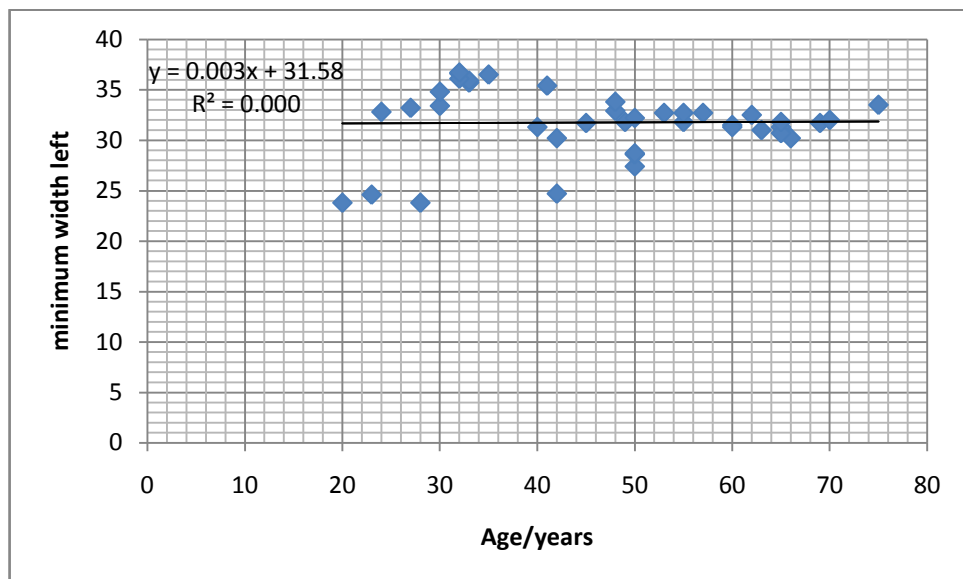


Figure 4.10A scattered plot diagram shows the linear relationship between the age and the minimum width LT as the age increase the length increase by 0.003 starting from 31.5 mm for each decade (10 years)

Chapter five

(Discussion, conclusions and recommendation)

5.1 Discussion:

This study is attempting to measurement the mandible ramus in the Sudanese patient to determined age according to measurements.

This study was performed on 40 patients. Data collected for patients age (20-75) years old. The results showed that the mean and stander deviation minimum width LT lateral condyle (31.75 ± 3.29)-maximum width LT medial condyle (38.0875 ± 3.11)- maximum length LT lateral condyle (65.455 ± 4.72)-maximum length LT medial condyle (56.9775 ± 4.79)- minimum width RT lateral condyle (31.75 ± 3.29)-maximum width RT medial condyle (38.0875 ± 3.11)-maximum length RT lateral condyle (65.455 ± 4.72)-maximum length RT medial condyle (57.0025 ± 4.80). the linear relationship between the age and maximum length RT medial condyle as the age increase the length increase by 0.007 starting from 56.6 mm for each decade (10 years) and the linear relationship between the age and the maximum length maximum RT lateral as the age increase the length increase by 0.045 starting from 63.33mm for each decade (10 years) and the linear relationship between the age and the maximum width RT as the age increase the length increase by 0.019 starting from 37.1 mm for each decade (10 years) and the linear relationship between the age and the minimum width RT as the age increase the length increase by 0.003 starting from 31.5 mm for each decade (10 years) and the linear relationship between the age and the maximum length LT medial condyle as the age increase the length increase by 0.007 starting from 56.6 mm for each decade (10 years) and the linear relationship between the age and the maximum length LT lateral condyle as the age increase the length increase by 0.045 starting from 63.3 mm for

each decade (10 years) and the linear relationship between the age and the maximum width LT as the age increase the length increase by 0.019 starting from 37.1 mm for each decade (10 years) and shows the linear relationship between the age and the minimum width LT as the age increase the length increase by 0.003 starting from 31.5 mm for each decade (10 years).

These measurement compared to study done by Indira AP¹, and et al 2012 in Bangalore population by using CT scan had studied can be used to differentiate between sexes strong evidence suggesting that the ramus can be used for gender determination in ours study we used the mandible ramus measurement to differentiate between ages and two studied explained the relationship between the mandible ramus with sex and age.

These measurement compared to study done by Noha Saleh Abu-Taleb and et al 2015 had studied Mandibular ramus to differentiate between sexes and Age in an Egyptian Population by using CT scan by Comparisons between right and left sides no statistically significant difference was found between the two sides according to her measurement mandible ramus can used to determined age and sex in ours studied no statistically significant difference was found between the two sides according to ours measurement although the different method of the mandible ramus measurement between two studies but finally same rustle the mandible ramus measurement can be used to determined age and sex. These measurement compared to study done by Oliveira FT¹ and et al 2015 had studied Mandibular ramus to differentiate between sexes and Age in a Brazilian population on lateral cephalometric radiographs, , the mandibular ramus length was not effective in discriminating sex. Mandibular length is strongly related to chronological age. In ours

studied the mandible ramus can used to determined the age according to ours measurement.

5.2Conclusion:

The study conclude that the normal mandible ramus measurement in Sudanese patient by CT scan was found the minimum width LT lateral condyle (31.75 ± 3.29)-maximum width LT medial condyle (38.0875 ± 3.11)- maximum length LT lateral condyle (65.455 ± 4.72)- maximum length LT medial condyle (56.9775 ± 4.79)-minimum width RT lateral condyle (31.75 ± 3.29)-maximum width RT medial condyle (38.0875 ± 3.11)-maximum length RT lateral condyle (65.455 ± 4.72)- maximum length RT medial condyle (57.0025 ± 4.80).

Sudanese mandible ramus measurement was different from the previous study.

5.3Recommendation:

Further study in evaluation of mandible ramus with larger sample of Sudanese population to determine the sex.

Using of other imaging technique and different method of measurement to confirm the result.

References:

- Abdel -Galil, K.; Loukota, R.2010. Fractures of the mandibular condyle. British Journal of Oral and Maxillofacial
- Banks P, Brown A; Brown, Andrew E 2000. Fractures of the facial skeleton.
- de Oliveira FT, 2015. Mandibular ramus to differentiate between sexes and Age in a Brazilian population.
- Indira AP, Markande A, David MP 2012 Mandibular ramus An indicator for sex determination - A digital radiographic study. J Forensic Dent Sci(4): 58-62.
- Giles E 1964 Sex d etermination by discriminant function analysis of the mandible. Am J PhysAnthropol(22): 129-135.
- Kharoshah MA, Almadani O, Ghaleb SS, Zaki MK, Fattah YA 2010 Sexual dimorphism of the mandible in a modern Egyptian population. J Forensic Leg Med (17): 213-215.
- Laster WS, Ludlow JB, Bailey LJ, Hershey HG 2005 Accuracy of measurements of mandibular anatomy and prediction of asymmetry in panoramic radiographic images.
- Rösing FW, Graw M, Marré B, Ritz-Timme S, Rothschild MA, 2007 Recommendations for the forensic diagnosis of sex and age from skeletons.
- Raj JD, Ramesh S 2013 Sexual dimorphism in mandibular ramus of south Indian population. Antrocom Online Journal of Anthropology 9: 253-258.

- Taleb NSA, Beshlawy ME 2015 Mandibular Ramus and Gonial Angle Measurements as Predictors of Sex and Age in an Egyptian Population. Forensic Res(6): 308.
- www.wikipedia.org/wiki/mandible

