

SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY.

College of Graduate Studies.

*Measurement of the Thyroid Gland Volume and the
Different between Right & Left lobe Volume in
healthy Sudanese population.*

قياس حجم الغدة الدرقية و الفرق بين حجمي الفص الايمن واليسر لدى السودانين
الاصحاء .

*A thesis submitted for partial fulfillments of academic
requirement for MSC degree in diagnostic medical
ultrasound.*

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الاية

قال الله عزوجل:

(اقرأ باسم ربك الذى خلق(1) خلق الانسان من علق (2) اقرأ
وربك الاكرم (3) الذى علم بالقلم (4) علم الانسان ما لم
يعلم...)

Dedication

الاهداء

الى والدي الغالي...من كان لي الدافع والسند...اطال الله في عمره.
الى كل الحب والحنان...من ربنتي وتربي اولادي...متعها الله بالصحة والعافية.
الى رفيق درب وصاحب القلب والصابر معي..وعلي...زوجي العزيز.
الى من هم اعلى من الروح...ورود جنتي وشموع دربي....اولادي.
حفظهم الله لي جميعا.
الى استاذتي الجليلة ومشرفتي...من لم تبخل علي بعلمها ومعرفتها وكانت لي نورا بتوجيهاتها
استاذة اسماء جزاها الله كل خير.
والى كل من مد لي العون ولو بكلمة

لكم مني كل الشكر والتقدير.

Acknowledgement

Full regards to my supervisor Dr/ Asma Ebraheem
Who gave me perfect advices, ideas and
motivations to complete this research in success.

I would like to thank all people who have
helped me and contributed to this research.

الخلاصة

الغرض من هذا البحث هو قياس حجم الغدة الدرقية لدى عينة من المواطنين السودانيين رجال ونساء من عمر سنة الى عمر خمسين سنة.

اجريت الدراسة على مائة فرد في مستشفى الرباط الجامعي واستغرقت الدراسة ثلاثة شهور.

Siemens and Toshiba باستخدام جهاز

تم قياس حجم الفص الايمن والفص الايسر للغدة الدرقية كل على حدا عن طريق المعادلة (الطول العرض العمق 0.52) داخل الجهاز والحجم الكلي للغدة .

وكان متوسط حجم الغدة كاملة (8.61). ومتوسط حجم الفص الايمن (4.60). ومتوسط حجم الفص الايسر (3.93). اذا الفص الايمن اكبر من الفص الايسر.

يمكن اعتماد الموجات فوق الصوتية كوسيلة تشخيصية جيدة لقياس حجم الغدة الدرقية كما انها امنة ورخيصة

Abstract.

This study to measure the thyroid gland volume in normal Sudanese population male and female from one year old to fifty year old.

100 normal Sudanese male and female from 1 to 50 years old were scanned ultrasound at Ribat University Hospital over 3 month.

High resolution sonography of the thyroid gland was performed with an ultrasound machine Siemens and Toshiba. The volume of each lobe was calculated automatically in the machine by using Ellipsoid formula (the volume = length * width * depth *0.52) and the total thyroid volume obtained by add them.

The overall mean volume \pm SDml of thyroid gland was 8.61ml the mean volume of right lobe was 4.60ml the mean volume of left lobe was 3.93ml the right lobe is bigger than the left lobe.

The ultrasound has proven as a useful method for the assessment of the thyroid volume and it is safety and less expensive.

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List of appreciation.

| | |
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| U/S | Ultrasound |
| CT | Computrise Tomography |
| MRI | Magnetic resonance imaging |
| WHO | World health organization |
| ICCIDD | International Council for the Control of Iodine Deficiency Disorders |
| RT | right |
| LT | left |
| MHz | megahertz |
| | |
| | |
| | |

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Chapter One.

Chapter one.

1-1).Introduction:

The thyroid gland is a vital endocrine gland in our body; it's the most common gland imaging by ultrasound especially in tropical Africa where other modern imaging modalities' as computerized tomography (CT) and magnetic resonance imaging (MRI) are may not be available or more expensive.

And the thyroid ultrasonography has proven a useful and practical method for assessment of thyroid volume.

Various investigators over the world have measured the thyroid volume and have found different values of normal thyroid volume.

So this study was done to establish the thyroid volume in normal Sudanese (male and female) from one to fifty years old.

1-2).Problem:

To see the thyroid volume variations.

1-3).General Objectives:

This study measurement the volume of thyroid gland in healthy Sudanese male and female from one year to fifty year old by using ultrasound.

1-4).Specific Objectives:

This study to measure the thyroid volume by applying formula to bring the volume of each lobe and adding the results to obtain the total volume of thyroid gland.

And to evaluate the normal echogenecity of thyroid gland.

1-5).Over View of the Study:

This study falls in 5 chapters, in (chapter one) introduction, (chapter two) literature review, (chapter three) material and method, (chapter four) results, (chapter five) discussion, conclusion and recommendation. referance and appendix.

Chapter Tow.

Chapter two.

Literature Review.

2-1).Embryology:

The thyroid gland is the first of the body's endocrine glands to develop, on approximately the 24th day of gestation. The thyroid originates from two main structures: the primitive pharynx and the neural crest. The rudimentary lateral thyroid develops from neural crest cells, while the median thyroid, which forms the bulk of the gland, arises from the primitive pharynx.

(emedicine.medscape.com)

As an entodermal thickening in the midline of the floor of the pharynx, this thickening becomes a diverticulum that grows inferiorly into the underlying mesenchyme and is called the thyroglossal duct. The duct elongates, and its distal end becomes bilobed. The duct becomes a solid cord of cells, and as a result of epithelial proliferation, the bilobed terminal swellings expand to form the thyroid gland.

(Clinical Anatomy by systems Richard S .Snell, MD,PHD)

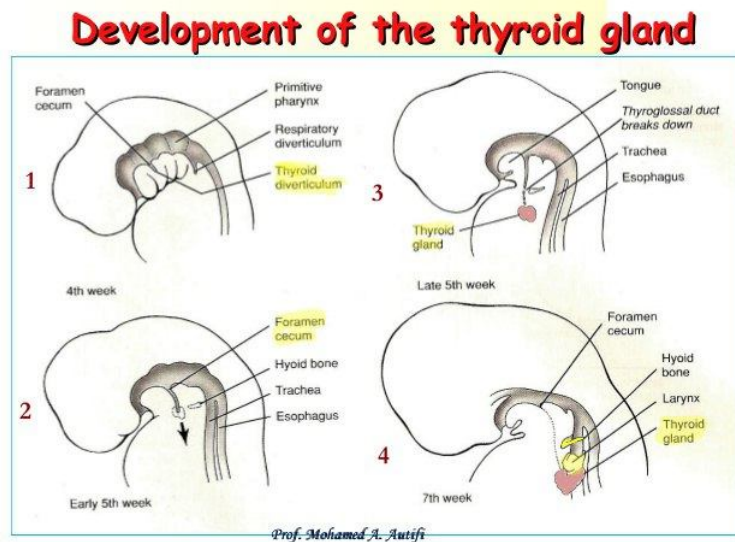


Figure 2-1 thyroid gland development

2-2). Anatomy:

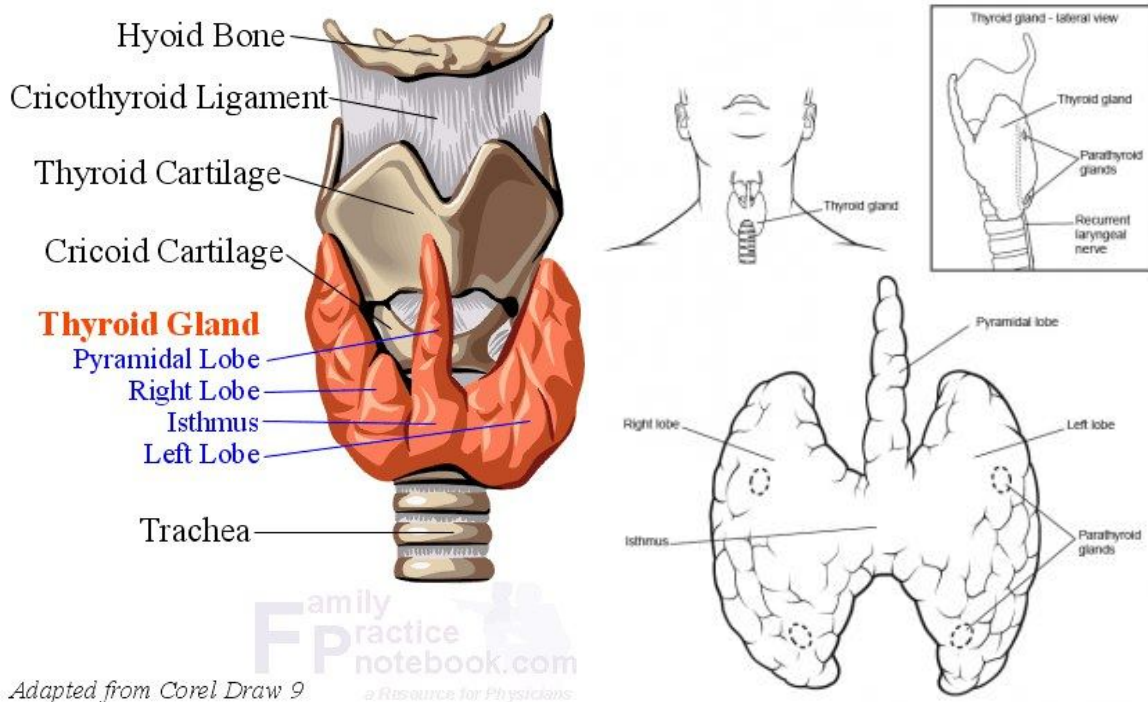


Figure 2-2 anatomy of thyroid gland

The thyroid is a highly vascular, brownish-red gland located inferiorly in the lower neck, extending from the level of the fifth cervical vertebra down to the first thoracic. The gland varies from H to a U shape and is formed by 2 elongated lateral lobes with superior and inferior poles connected by a median isthmus, with an average height of 12-15 mm, overlying the second to fourth tracheal rings.

(reference.medscape.com)

Each lobe is pear shaped, with its apex being directed upward as far as the oblique line on the lamina of the thyroid cartilage; its base lies below at the level of the fourth or fifth tracheal ring. Each lobe is 50-60 mm long.

(Clinical Anatomy by systems Richard S Snell, MD, PHD)

2-2-1). the structure of the thyroid gland:

The thyroid gland is covered by a thin capsule of connective tissue. Microscopically the gland is seen to consist of large number of spherical follicles which are lined with cuboidal epithelium and which contain colloid.

The colloid consists of glycoprotein called (thyroglobullen), which is the storage form of the thyroid hormone (Thyroxin/Triiodothyronen).

There is also a second type of cells, the parafolliculler cell which is present in smaller numbers than the follicular cells. These cells secret calcitonen.

(Clinical Anatomy by systems Richard S .Snell, MD, PHD)

2-2-2) Blood supply:

2-2-2-1) the arteries:

- _The superior thyroid artery, a branch of the external carotid artery, descends to the upper pole of each lobe, accompanied by the external laryngeal nerve.
- _ the inferior thyroid artery, a branch of the thyrocervical trunk, ascends behind the gland to the level of the cricoids cartilage. It then turns medially and downward to reach the posterior border of the gland.

_The thyroidea ima, if present, may arise from the brachiocephalic artery or the arch of the aorta. It ascends in front of the trachea to the isthmus.

(Clinical Anatomy by systems Richard S. Snell, MD, PHD)

2-2-2-2). the veins:

From the thyroid gland are the superior thyroid, which drains into the internal jugular vein; and the inferior thyroid. The inferior thyroid veins of the two sides anastomose with one another as they descend in front of the trachea. They drain into the left brachiocephalic vein in the thorax.

(Clinical Anatomy by systems Richard S. Snell, MD, PHD)

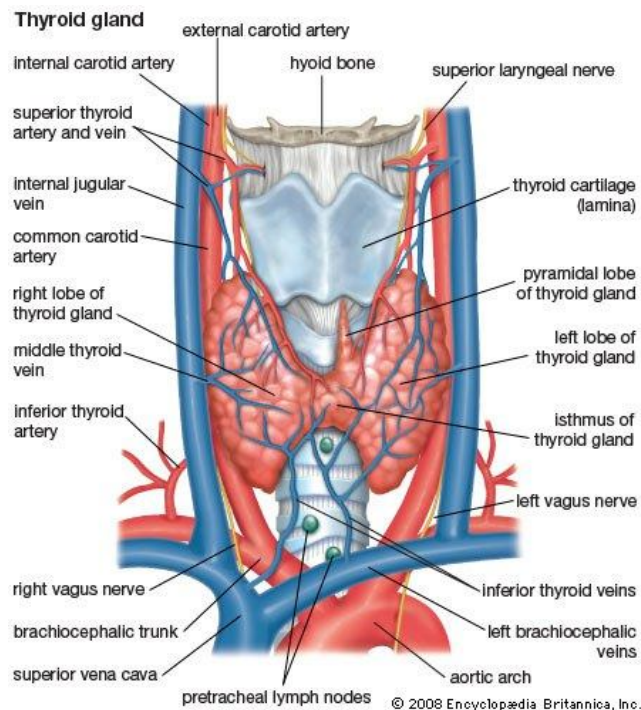


Figure 2-3 blood supply of thyroid gland

2-2-3).Lymph Drainage:

The lymph from the thyroid gland drains mainly laterally into the deep cervical lymph nodes. A few lymph vessels descend to the paratracheal nodes.

2-2-4).Nerve Supply:

Superior, middle, and inferior cervical sympathetic ganglia.

(Clinical Anatomy by systems Richard S. Snell, MD, PHD)

2-3).Physiology:

Functions of the Thyroid Gland:

In response to the thyroid-stimulating hormone produced by the pars anterior of the pituitary, the hormones thyroxine and triiodothyronine are liberated from the follicular colloid and enter the blood stream. The thyroid hormones increase the metabolic activity of most cells in the body, increasing oxygen consumption and heat production. The parafollicular cells produce the hormone thyrocalcitonin , which lowers the level of blood calcium.

The parafollicular cells are stimulated by hypercalcemia and suppressed by hypocalcemia; they are not controlled by the pituitary gland.

(Clinical Anatomy by systems Richard S. Snell, MD, PHD)

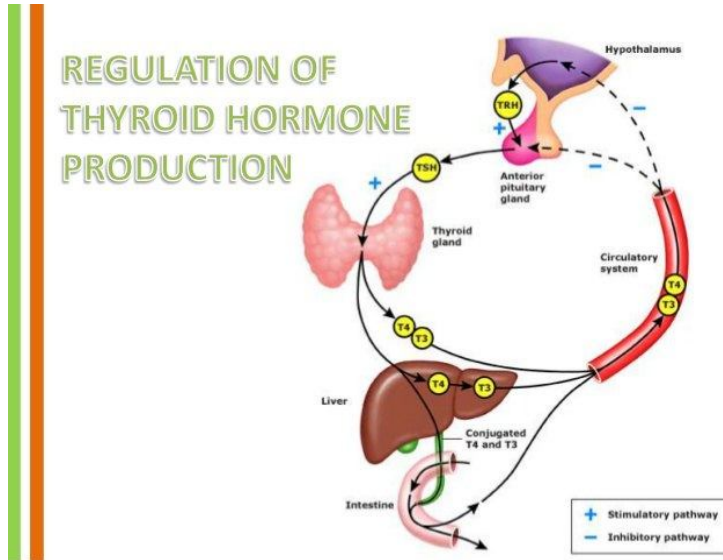


Figure 2-4 thyroid hormon

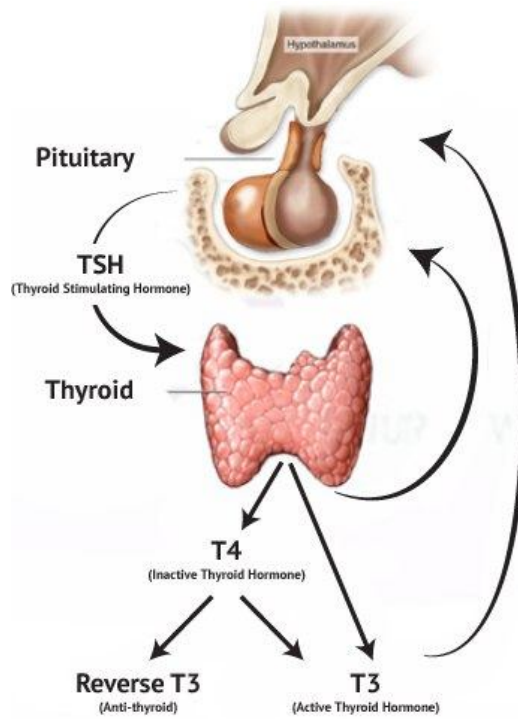


Figure 2-5 thyroid action

2-4).thyroid gland normal variation:

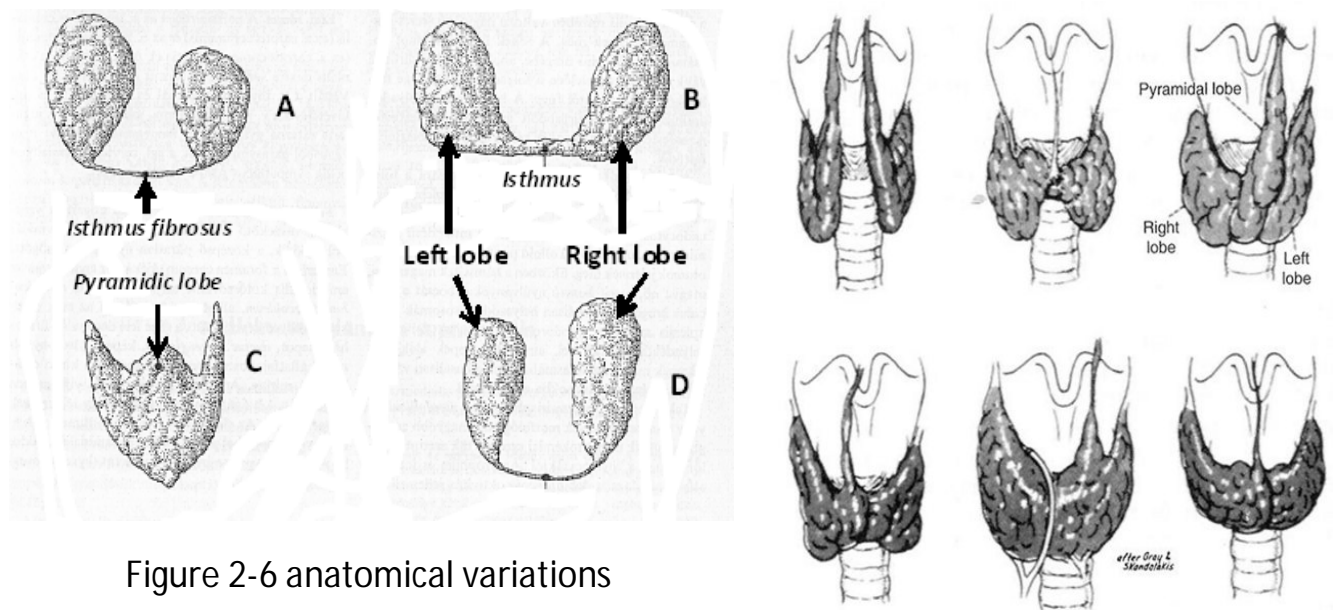


Figure 2-6 anatomical variations

Anatomical Variations

Most of the variation in the thyroid gland is the pyramidal lobe, which generally arises from the isthmus and lies in the midline, but can also arise from either lobe. It more commonly originates from the left lobe than the right lobe.

Thyroid tissue can develop in abnormal locations (Ectopic or accessory thyroid), such as the tongue (lingual thyroid). The entire gland or part of it may descend downward more, and this results in thyroid tissue being located behind the chest

bone or between the aorta and pulmonary trunk. It can also develop rarely within the trachea, and if present it may be life threatening.

The two lateral lobes are almost equal, but occasionally they are very unequal in size, and in rare cases one lobe may be absent or the total thyroid may be absent (Athyrosis). The isthmus varies greatly in size and is frequently absent.

(khalidalomari.weebly.com)

2-4-1). Thyroid Gland Variations, Accessory Thyroid and the Thyroglossal Duct



Figure 2-7 Absence of the thyroid isthmus.

Lateral lobes have pyramidal lobes.



Figure 2-8 Pyramidal lobe arising from the isthmus of the gland .

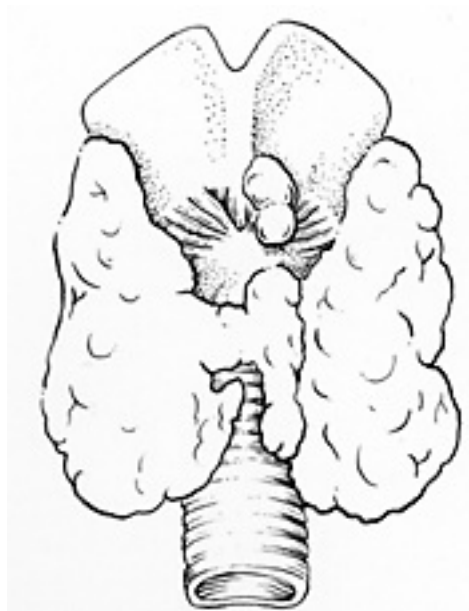


Figure 2-9 Accessory thyroid gland on the cricothyroid muscle .

Pyramidal lobe on left, inferior part of the isthmus .

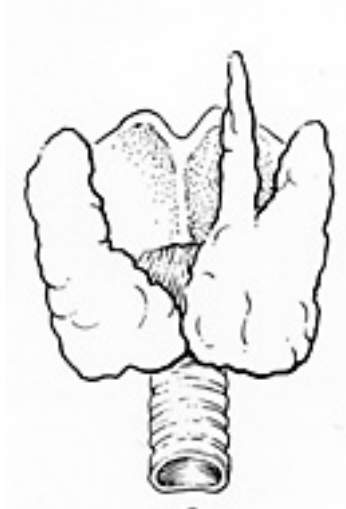


Figure 2-10 Pyramidal lobe arising from the union of the left lobe at the isthmus .



Figure 2-11 Accessory thyroid may be located under and above the hyoid bone.



Figure 2-12 Persistent thyroglossal duct in an adult, originating at the foramen caecum of the tongue.

(Images available: www.anatomyatlases.org)

2-4-2). Thyroid Glands Without an Isthmus



Figure 2-13 Thyroid gland with the pyramidal process attached to the left lobe, isthmus absent.



Figure 2-14 Thyroid gland with both pyramidal process and isthmus absent.

(Images available: www.anatomyatlases.org)

2-4-3).Lingual Thyroid

In the fetal life the thyroid gland originates in the back of the tongue and migrates to the front of the neck. If it fails to migrate properly, it can remain high in the neck or even in the back of the tongue. When migration fails and the gland remains in the base of the tongue, it is called a lingual thyroid or ectopic lingual thyroid.

Lingual thyroid are more common in females than in males. They are usually less than a centimeter in size but can reach more than 4centimetres. Large lingual thyroids can affect swallowing and breathing, but most people are unaware of it.

(khalidalomari.weebly.com)



Figure 2-15 lingual thyroid

(Images available: www.ghorayeb.com)

2-5).Ultrasound of the thyroid gland:

2-5-1).Radiographic appearance:

Ultrasound of normal thyroid gland has an homogenous appearance, the capsule may appear as a thin hyperechoic line.

Each lobe normally measures:

Length: 4-7 cm

Depth: <2 cm

Isthmus measures <0.5 cm deep

Volume (excluding isthmus, unless its thickness is > 3mm)

10-15 ml for females

12-18 ml for males

2-5-2).Ultrasound of the thyroid normal:

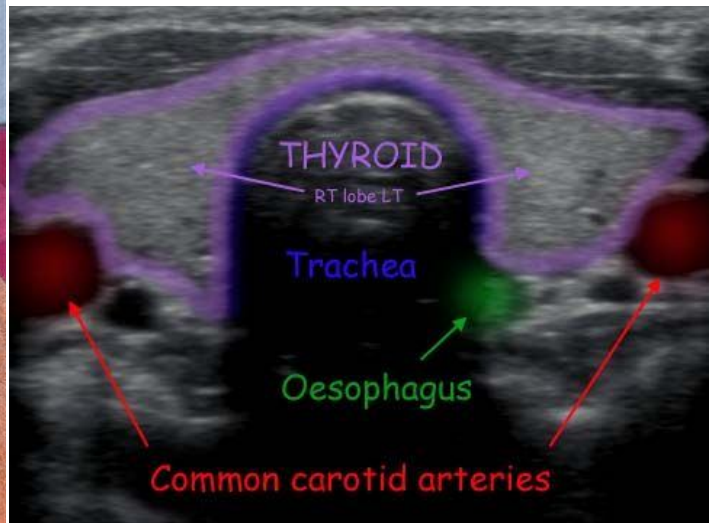


Figure 2-16 Thyroid Scan plane transverse

Transverse view of a normal thyroid

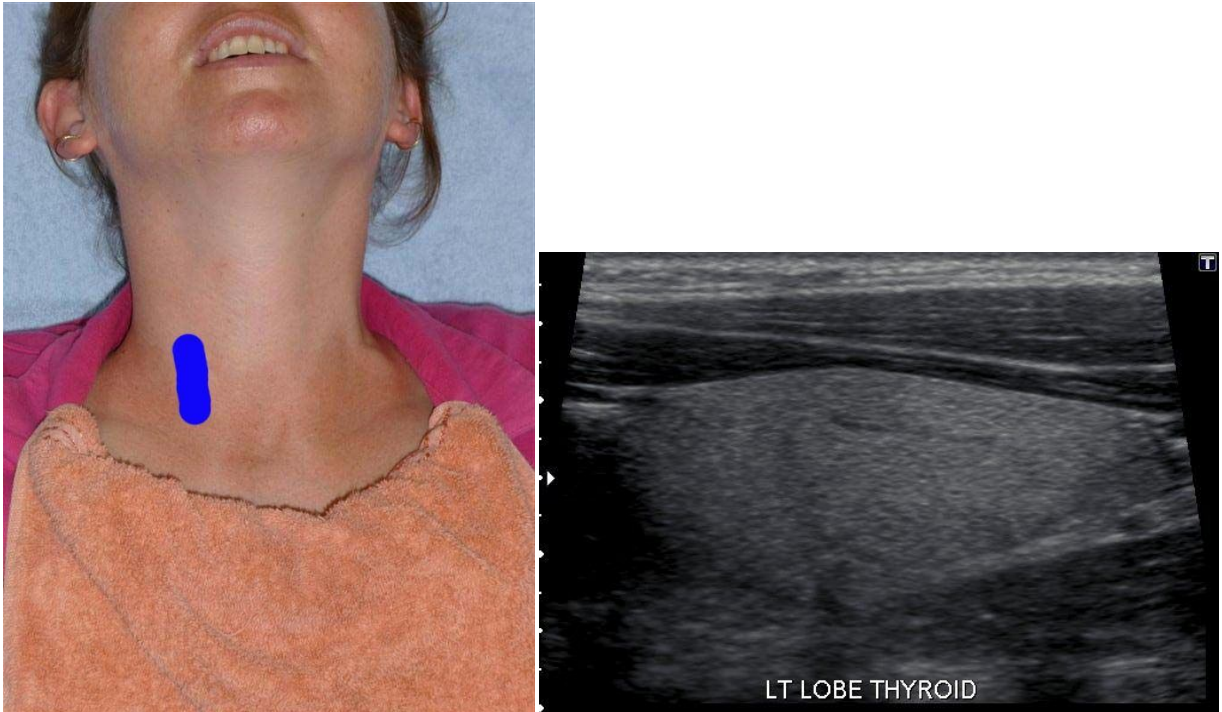


Figure 2-17 Scan plane for longitudinal view

longitudinal view of left lobe

Equipment selection and technique:

- A 7-14mHz linear transducer
- Good colour/power/Doppler capabilities when assessing vessels or vascularity of a structure.

Scanning technique:

- Begin with a survey scan in transverse down the midline to assess for tracheal deviation and obvious pathology.
- Tilt the patients head slightly to the contra lateral side and scan down in transverse.
 - Rotate into longitudinal and scan from medial to lateral.
 - Repeat this for the other side with the head tilted the other way.

- With the patients head/neck straight, scan the isthmus in longitudinal and transverse.
- Scan down each side of the neck in transverse for alternative pathology.

Thyroid Volume:

Method for determining thyroid size by ultrasonography:

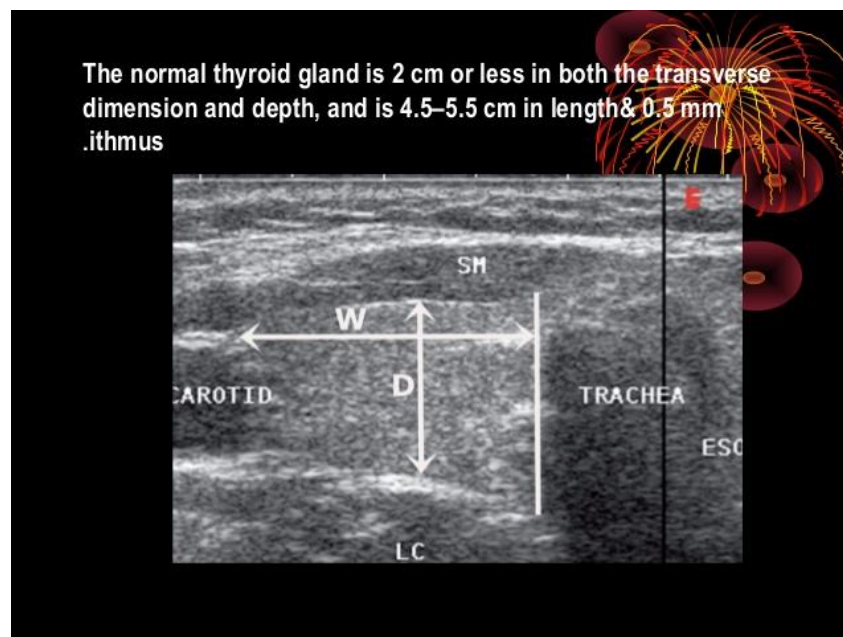


Figure 2-18 transverse image

In the longitudinal view of the thyroid, the length (L) is measured from the cranial to the caudal ends of the lobe

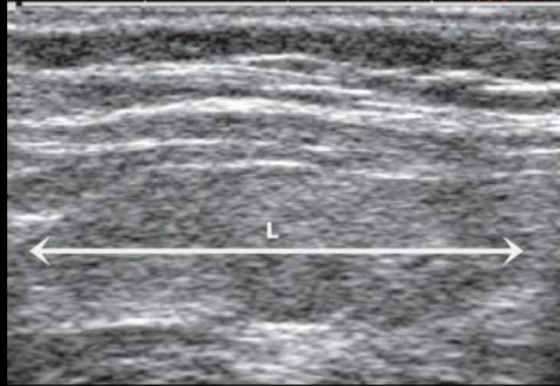


Figure 2-19 longitudinal view

2-6).Previous Study:

Mohamed yousef et al in 2010 concluded that the thyroid volume in Sudanese normal subjects using ultrasound. A total of 103 healthy subjects were studied, 28 (27.18%) females and 75 (72.82%) males. Thyroid volume was estimated using ellipsoid formula. The mean age and range of the subjects was 21.8 (19-29) years; the mean body mass index (BMI) was 22.3(16.46-26.07)kg/m². The overall mean volume \pm SD volume of the thyroid gland for both lobes in all the patients studied was 6.44 \pm 2.44ml. The mean volume for both lobes in females and males were 5.78 \pm 1.96ml and 6.69 \pm 2.56ml, respectively. The males' thyroid volume was greater than the females'. The mean volume of the right and left lobes of the thyroid gland in males and females were 3.38 \pm 1.37 ml and 3.09 \pm 1.24 ml, respectively. The right thyroid lobe volume was greater than the left.

Kyuing Kim and young sik et al 2012 concluded that the thyroid volume in schoolchildren aged 6 to 12 years living in Cagayan areas in Philippine. Were the mean weight was 9.4 \pm 29.7 kg the mean thyroid volumes was 6.44 \pm 2.2 ml

The work of Brunn et al] in 1981 was based on volume measurement of cadaver glands subsequently immersed in water. Brunn et al. concluded that a modified correction factor of 0.52 resulted in a more accurate assessment of thyroid volume

p.kayastha,s,paudel,shethaetet al in 2010 concluded that Among 485 individuals between 1 to 83 years of age, 221(45.57%) were males and 264(54.43%) were females. Maximum [354 individuals (72.99%)] were from hilly region and minimum [16 individual (3.30%)] were from Himalayan region. Mean thyroid

volume was 6.629 ± 2.5025 ml. In general, thyroid volume was found to be more in older individuals than in young age group.

There was no significant difference of thyroid volume between males and females. Thyroid volume best correlated with body surface area ($r=0.444$, $p<0.0001$). The volume had a positive correlation with weight ($r=0.443$, $p<0.0001$), body mass index ($r=0.371$, $p<0.0001$) and height ($r=0.320$, $p<0.0001$) of the individual.

Samah Maglad Abd Elohab et al in 2013 concluded that the thyroid volume in normal adult Sudanese women by using ultrasound. A total of 100 healthy subjects were studied. Thyroid volume was estimated using ellipsoid formula. The mean ages and ranges was 1.66 ± 41.87 years old the overall mean volume \pm SD ml of thyroid gland was 0.93 ± 6.40 ml the mean volume of right lobe was 0.26 ± 3.41 ml the mean volume of left lobe was 0.27 ± 2.98 ml the right lobe is greater than the left lobe.

Chapter three .

Chapter three
Material and method

3-1).material:

3-1-1).patient population:

100 healthy Sudanese male and female from one year old to fifty year old

3-1-2).machine:

Toshiba and Siemens with frequency 7.5 - 10.5 MHZ linear transducer

3-2).methods:

3-2-1).area of the study:

This study was done in Ribat University Hospital in Khartoum Sudan over four month

3-2-2).technique:

All the individuals were examined in the supine position with the neck hyper-extended. Using a linear 7.5 – 10.5 MHz probe in Toshiba and Siemens machine, transverse and longitudinal sections of both lobes of the thyroid gland were scanned. Measurements of the maximum length of the lobe from the sagittal images were recorded. The maximum transverse diameter (breadth) and the maximum depth of each lobe were recorded from the transverse images. To ensure that the probe was in the same position each time, anatomical landmarks were used. For measurement of thyroid length, the probe was placed longitudinally in the midline of the neck to obtain sagittal views of the larynx; the probe was then moved obliquely to find the maximum length of the thyroid gland, just medial to the carotid vessels. The transverse views were obtained by using the trachea and carotid vessels as landmarks

The volume of each lobe was calculated automatically by the machine using the formula for ellipsoid, where Thyroid volume= length *breadth*depth*.../6. Total thyroid volume was obtained by adding the volume of both the lobes. Volume of isthmus was not included in the total thyroid volume.

Chapter Four

Chapter Four

Results:

Table 4.1 show statistical parameters for all patients:

| | Mean | Median | SD | Min | Max |
|----------------|-------|--------|-------|-----|-----|
| Age | 29.77 | 30 | 9.18 | 6 | 49 |
| Weight | 66.96 | 70 | 15.75 | 15 | 103 |
| Rt Lobe | 4.60 | 4 | 1.93 | 1 | 11 |
| Lt Lobe | 3.93 | 3 | 1.99 | 1 | 12 |
| Thyroid Volume | 8.61 | 8 | 3.64 | 3 | 22 |

Table 4.2 show frequency of Gender for all patients:

| | Frequency | Percent |
|--------|-----------|---------|
| Female | 50 | 50 |
| Male | 49 | 49 |
| Total | 100 | 100.0 |

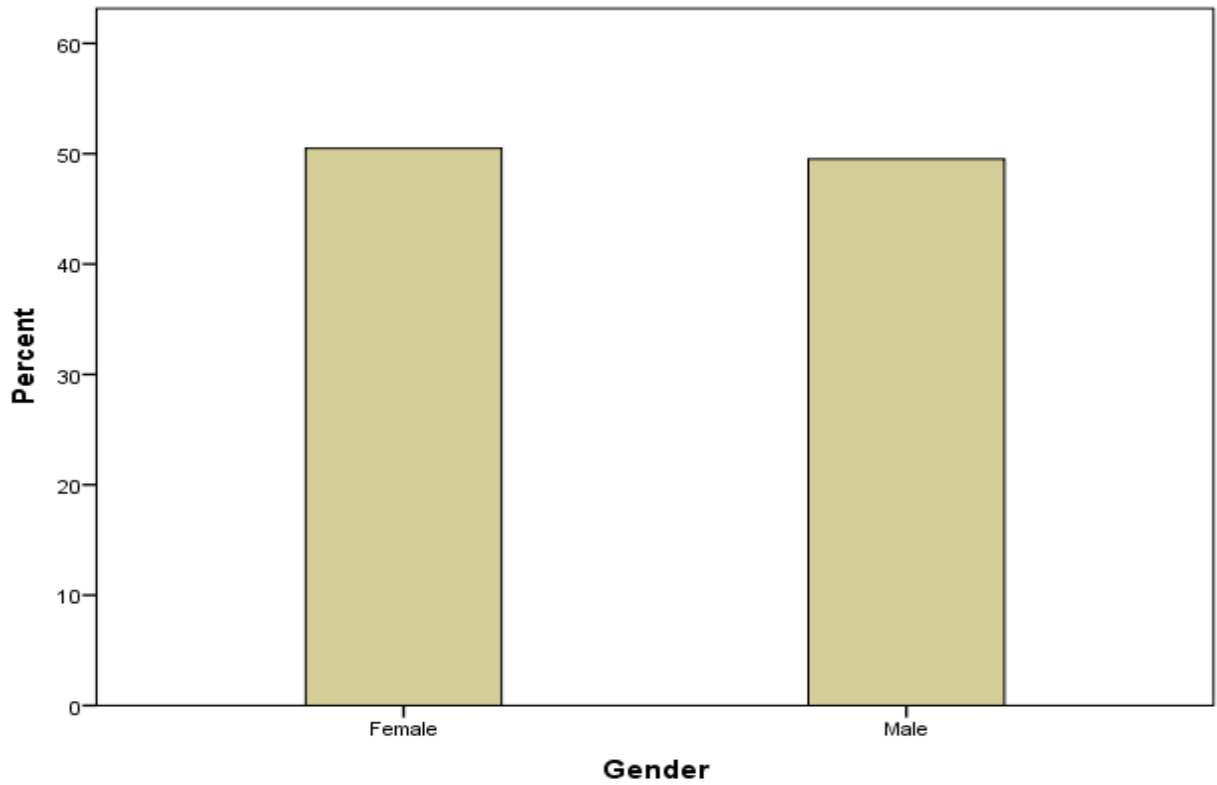


Table 4.1 show frequency of Gender for all patients

Table 4.3 show frequency for all patients according to smoking:

| | Frequency | Percent |
|-------|-----------|---------|
| Yes | 13 | 13 |
| No | 87 | 87 |
| Total | 100 | 100.0 |

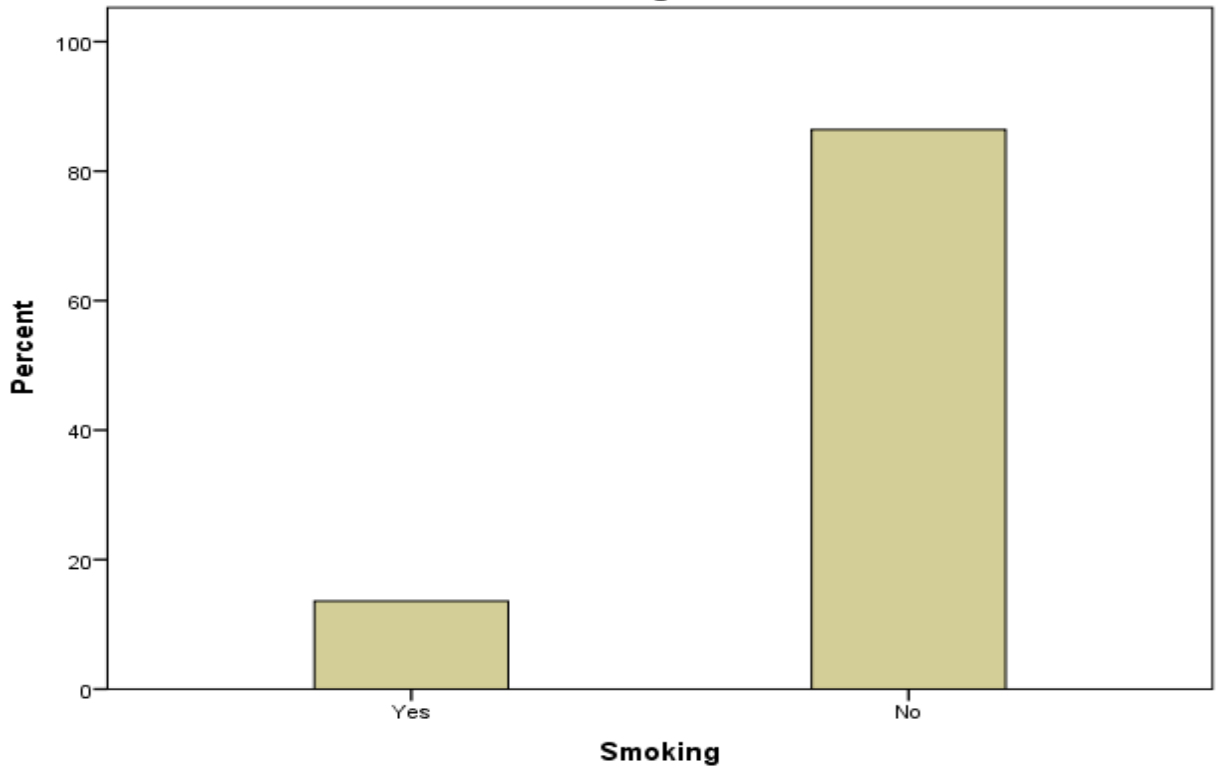


Figure 4.2 show frequency for all patients according to smoking

Table 4.4 show frequency of Right lobe volume for all patients:

| | Frequency | Percent |
|-----|-----------|---------|
| 1.0 | 1 | 1.0 |
| 1.9 | 1 | 1.0 |
| 2.0 | 7 | 7 |
| 3.0 | 22 | 22 |
| 4.0 | 27 | 27 |
| 5.0 | 19 | 19 |
| 6.0 | 13 | 13 |
| 7.0 | 5 | 5 |

| | | |
|-------|-----|-------|
| 8.0 | 2 | 2 |
| 9.0 | 2 | 2 |
| 10.0 | 3 | 3 |
| 11.0 | 1 | 1.0 |
| Total | 100 | 100.0 |

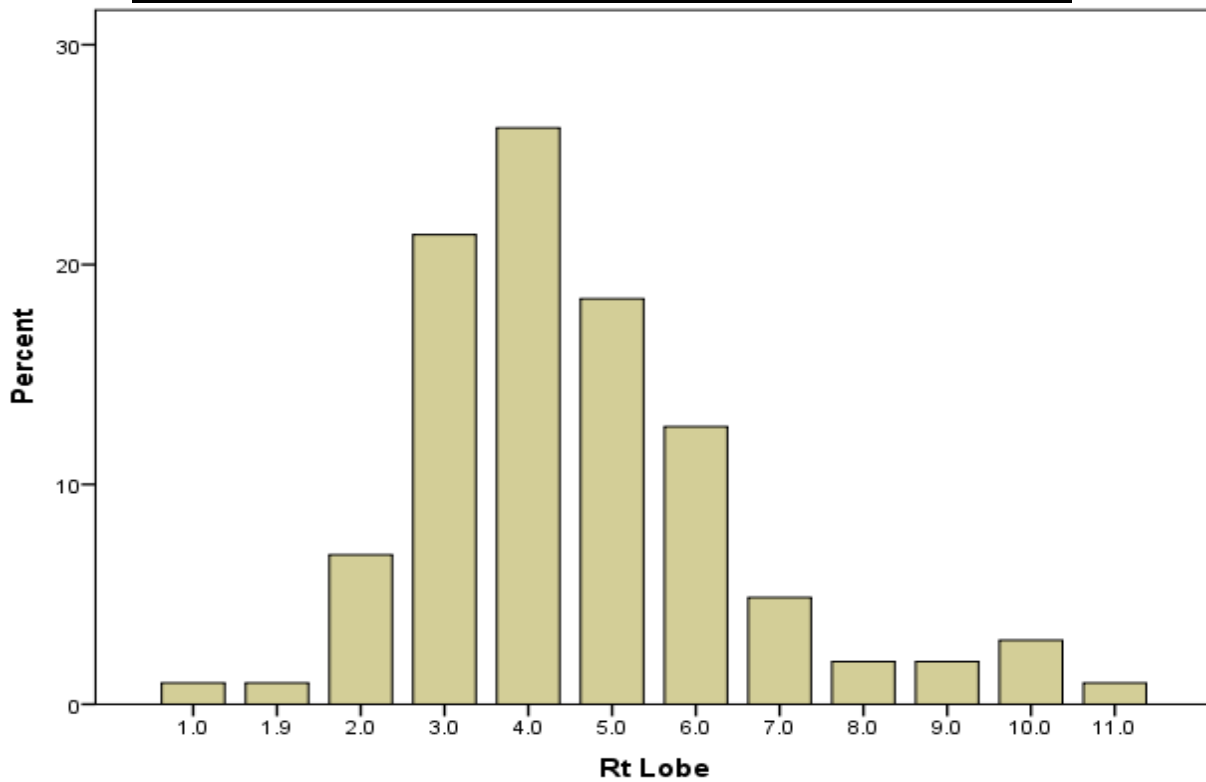


figure 4.3 show frequency of Right lobe volume for all patients

Table 4.5 show frequency of Lift lobe volume for all patients:

| | Frequency | Percent |
|-----|-----------|---------|
| 1.0 | 3 | 3 |
| 1.5 | 1 | 1.0 |
| 2.0 | 15 | 14.6 |
| 3.0 | 33 | 33.0 |
| 4.0 | 20 | 20 |

| | | |
|-------|-----|-------|
| 5.0 | 16 | 16 |
| 6.0 | 5 | 5 |
| 7.0 | 1 | 1.0 |
| 8.0 | 2 | 2 |
| 10.0 | 1 | 1.0 |
| 11.0 | 2 | 2 |
| 12.0 | 1 | 1.0 |
| Total | 100 | 100.0 |

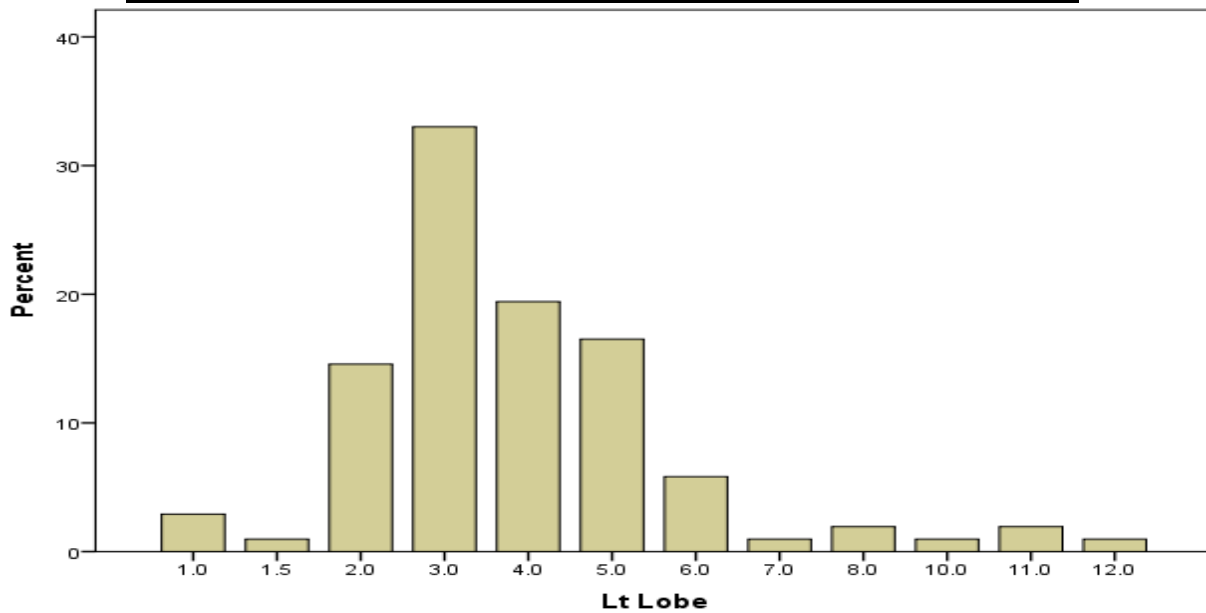


Figure 4.4 show frequency of Lift lobe volume for all patients

Table 4.6 show frequency of Thyroid Volume for all patients:

| | Frequency | Percent |
|-----|-----------|---------|
| 3.0 | 3 | 3 |
| 3.3 | 1 | 1 |
| 4.0 | 2 | 2 |
| 5.0 | 6 | 6 |
| 6.0 | 19 | 19 |

| | | |
|-------|-----|-------|
| 7.0 | 14 | 14 |
| 8.0 | 17 | 17 |
| 9.0 | 9 | 9 |
| 10.0 | 7 | 7 |
| 11.0 | 8 | 8 |
| 12.0 | 2 | 2 |
| 13.0 | 2 | 2 |
| 14.0 | 2 | 2 |
| 15.0 | 1 | 1 |
| 17.0 | 5 | 5 |
| 22.0 | 2 | 2 |
| Total | 100 | 100.0 |

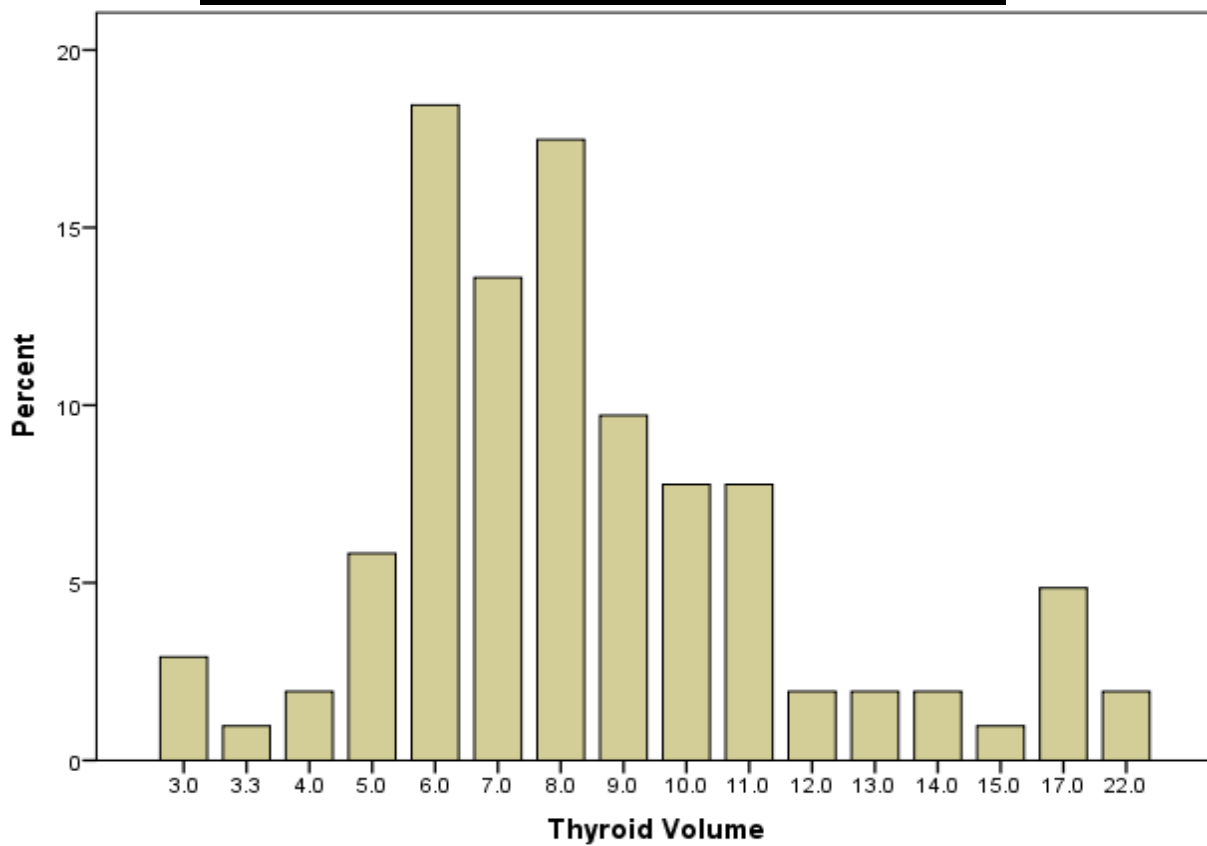


Table 4.5 show frequency of Thyroid Volume for all patients:

Table 4.7 show correlation between the thyroid volume and Gender

Thyroid Volume * Gender Crosstabulation

Count

| Thyroid Volume | Gender | | Total |
|----------------|--------|------|-------|
| | Female | Male | |
| 3.0 | 2 | 1 | 3 |
| 3.3 | 0 | 1 | 1 |
| 4.0 | 2 | 0 | 2 |
| 5.0 | 4 | 2 | 6 |
| 6.0 | 14 | 5 | 19 |
| 7.0 | 6 | 8 | 14 |
| 8.0 | 11 | 7 | 18 |
| 9.0 | 5 | 5 | 10 |
| 10.0 | 3 | 5 | 8 |
| 11.0 | 2 | 6 | 8 |
| 12.0 | 0 | 2 | 2 |
| 13.0 | 1 | 1 | 2 |
| 14.0 | 1 | 1 | 2 |
| 15.0 | 0 | 1 | 1 |
| 17.0 | 1 | 4 | 5 |
| 22.0 | 0 | 2 | 2 |
| Total | 51 | 49 | 100 |

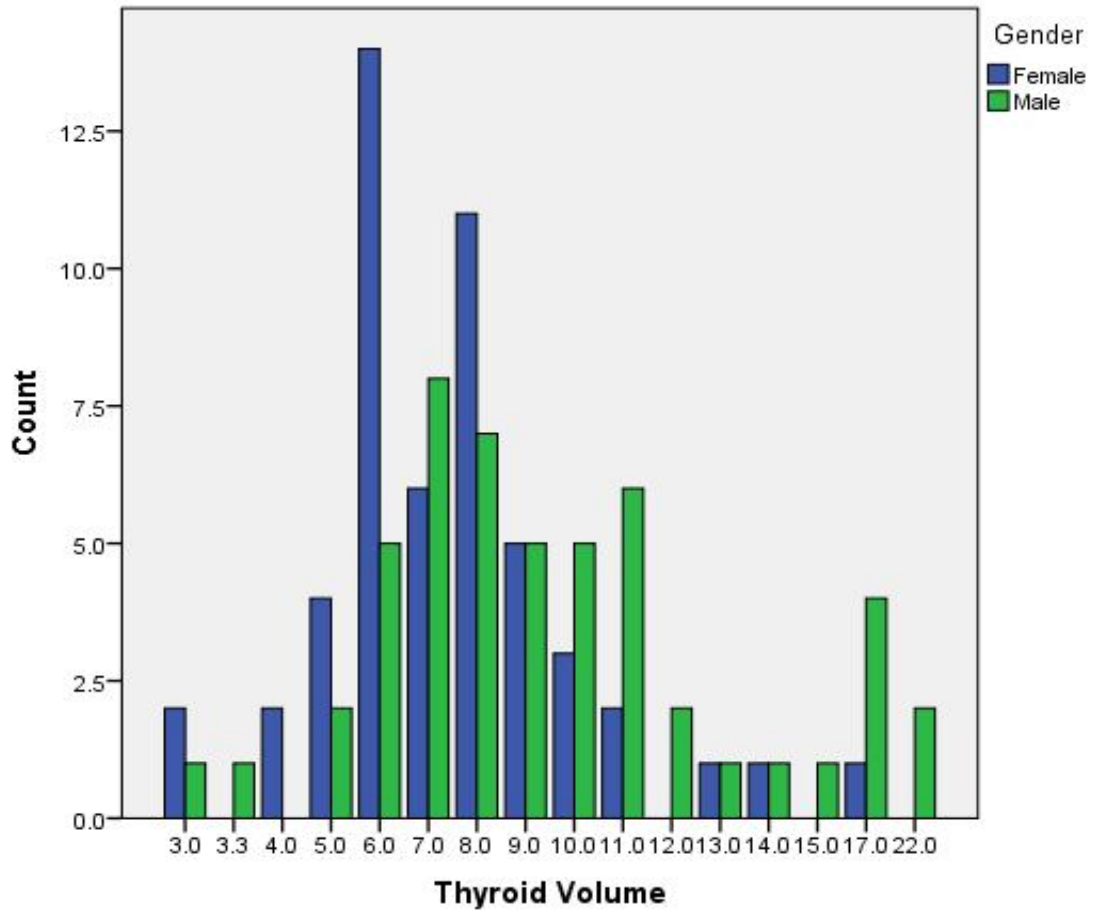


Figure 4.6 show correlation between the thyroid volume and Gender

Table 4.8 show correlation between the thyroid volume and Smoking

Thyroid Volume * Smoking Crosstabulation

Count

| Thyroid Volume | Smoking | | Total |
|----------------|---------|----|-------|
| | Yes | No | |
| 3.0 | 0 | 3 | 3 |
| 3.3 | 0 | 1 | 1 |

| | | | |
|------|----|----|-----|
| 4.0 | 0 | 2 | 2 |
| 5.0 | 1 | 5 | 6 |
| 6.0 | 2 | 17 | 19 |
| 7.0 | 3 | 11 | 14 |
| 8.0 | 1 | 17 | 17 |
| 9.0 | 1 | 9 | 10 |
| 10.0 | 0 | 8 | 7 |
| 11.0 | 2 | 6 | 7 |
| 12.0 | 0 | 2 | 2 |
| 13.0 | 1 | 1 | 2 |
| 14.0 | 0 | 2 | 2 |
| 15.0 | 0 | 1 | 1 |
| 17.0 | 3 | 2 | 5 |
| 22.0 | 0 | 2 | 2 |
| | 12 | 88 | 100 |

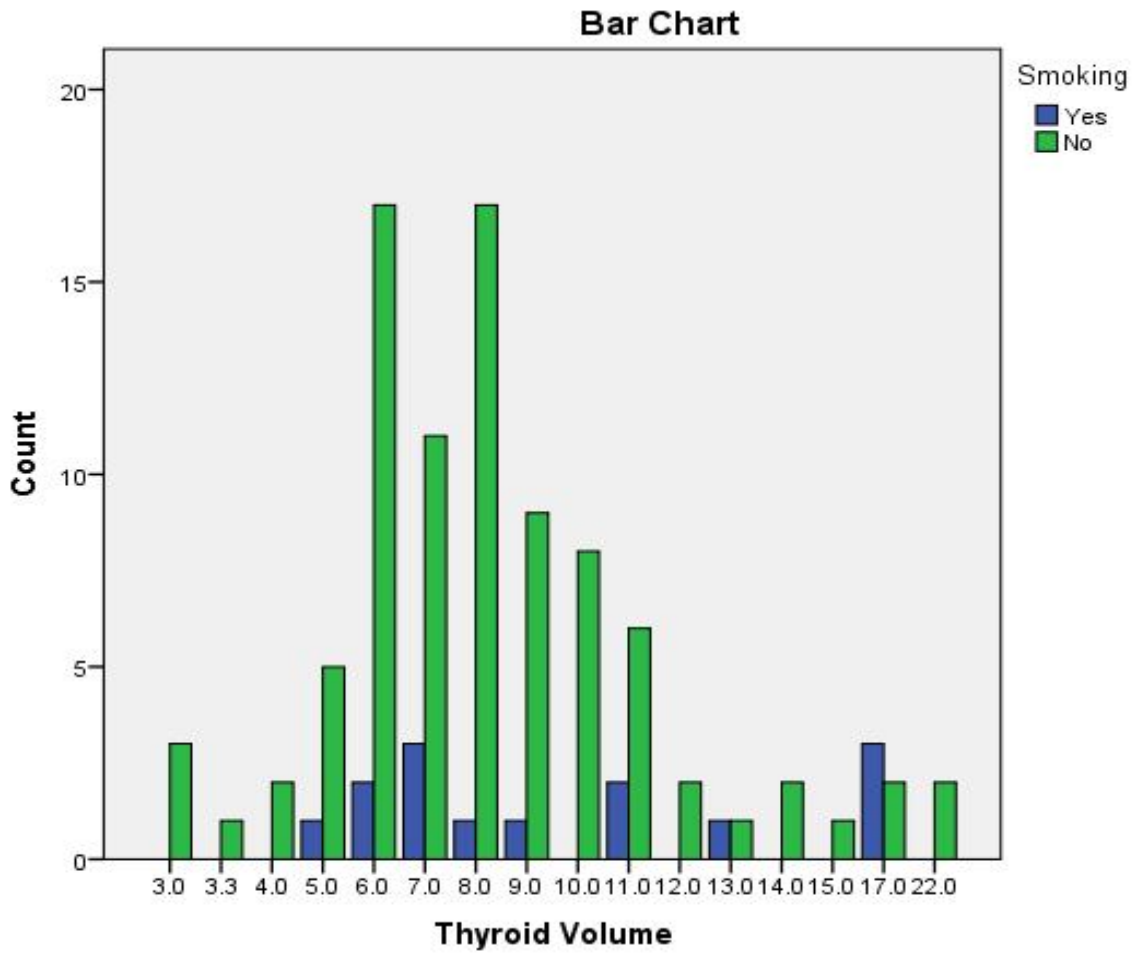


Figure 4.7 show correlation between the thyroid volume and Smoking

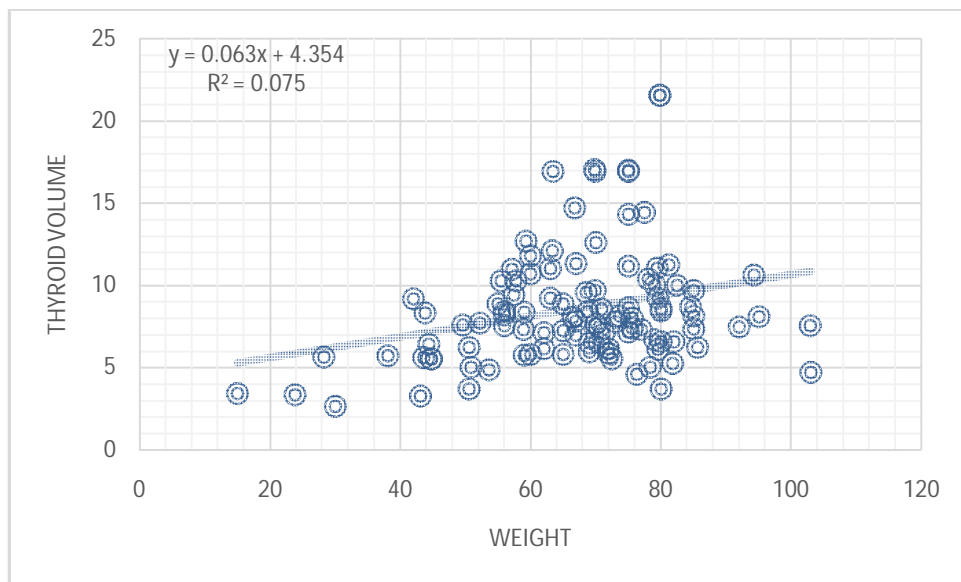


Figure 4.8 show correlation between the thyroid volume and patients weight

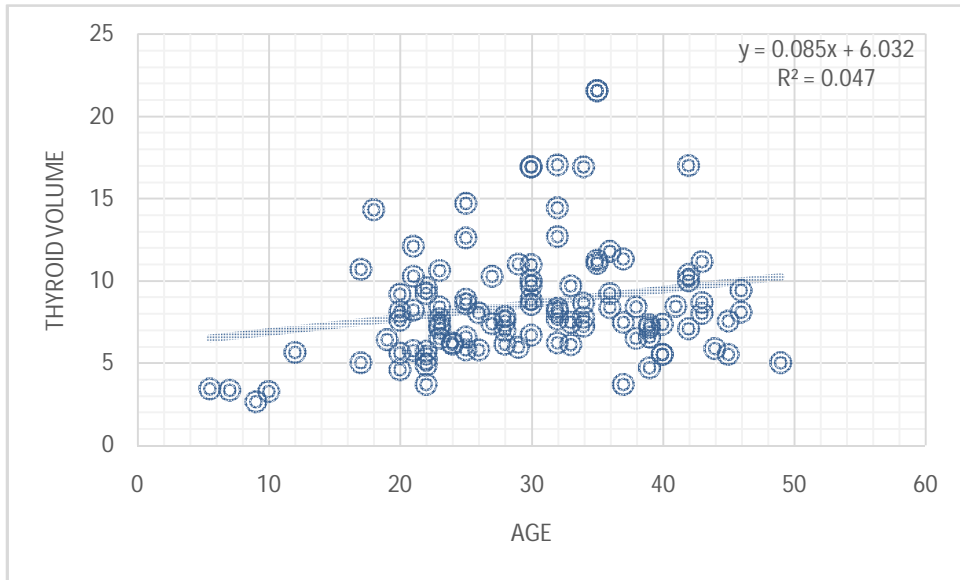


Figure 4.9 show correlation between the thyroid volume and patients Age

Chapter Five

Chapter Five.

Discussion conclusion recommendation

5-1).Discussion:-

The following chapter will deals with the high lighting of the results relived to patient ultrasonography:

I estimated the reference values of total thyroid volume based on ultrasonographic measurements of thyroid gland for Sudanese males and females based on the observations in total 100 individuals. Relation of total thyroid volume with age were studied

Table 4.1 show statistical parameters for all patients.

Table 4.2 show frequency of gender for all patients

Figure 4.1 show frequency of gender for all patients.

Table 4.3 show frequency for all patients according to smoking, the percent of smokers was 13% when non-smokers percent was 87%; so the effect of smoking unclear.

Figure 4.2 show frequency for all patients according to smoking, the percent of smokers was less than 20% and the percent of non-smokers was more than 80%.

Table 4.4 show frequency of right lobe volume for all patients

Figure 4.3 show frequency of right lobe volume for all patients, the maximum volume of RT lobe was between 3.5 cm³ -4.5 cm³ and it has percent more than 20%

Table 4.5 show frequency of left lobe volume for all patients

Figure 4.4 show frequency of left lobe volume for all patients, the maximum volume of LT lobe was between 2.5 cm³ -3.5 cm³ and it has percent more than 30%.

Table 4.6 show frequency of thyroid volume for all patients

Figure 4.5 show frequency of thyroid volume for all patients, the volume of thyroid gland ranged from 5.5 cm³ -6.5 cm³ was the highest frequency was close to 20%.

Table 4.7 show correlation between the thyroid volume and gender

Figure 4.6 show correlations between the thyroid volume and gender, by increasing the volume of thyroid gland; males dominate females.

Table 4.8 show correlation between the thyroid volume and smoking

Figure 4.7 show correlations between the thyroid volume and smoking, due to the small number of smokers; there was no significant increase in the volume of the gland. But less than 5% the smoking was associated with volume between 16 cm³ -20 cm³ (big volume).

Figure 4.8 show correlation between the thyroid volume and patients weight, an increase in the volume of the gland is shown in weights between 60K -80K.

Figure 4.9 show correlation between the thyroid volume and patients age, there is an increase in the volume of the gland in the ages between 20 years to 40 years.

The study showed that the maximum volume of thyroid was 22cm³ and the minimum volume was 3 cm³ when the volume 6 cm³ was had the highest percent. The mean thyroid volume was 8.61 +-3.64 SD this volume was greter than that obtained by Samah Maglad et al in 2013 mean thyroid volume was 0.93+-6.40 ml and Mohamed Yousef et al in 2010 mean thyroid volume was 6.44+-2.44 ml.

In the study, the highest frequency ratio was for volume 4 cm³ for the right lobe while volume 3 cm³ was for the left lobe. Right lobe of the thyroid gland had significantly higher volume than the left lobe (RT lobe 4.60+-1.93) (LT lobe 3.93+-1.99).

5-2).Conclusion:-

This study aim to establish a local reference of thyroid volume in normal Sudanese male and female which will be useful in the clinical practice especially for the diagnosis of goiter

100 healthy Sudanese male and female were scanned in supine position with full extended neck by using Toshiba and Siemens with 7.5_10.5 MHz linear transducer there is no special patient preparation for thyroid scan sonograms were analyzed by SPSS.

The estimated mean thyroid volume in our population is seen to be significantly ... compared to the thyroid volume in the other previous study and WHO and ICCIDD thyroid volumes.

5-3).Recommendation:-

This study would like to highlight some points in a form of recommendations as follows:-

- 1) Ultrasound must be used as a first tool in thyroid examination
- 2) Care must be taken in bringing of ultrasound machine about capability of volume measurement

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Appendix

Data Sheet

DATA SHEAT.

بيانات المريض:

اسم المريض:

عمر المريض:

وزن المريض:

السكن:

الوظيفة:

هل يدخن؟ نعم لا

اذا يدخن كم عدد مرات التدخين في اليوم؟

هل في العائلة من لديه غدة؟ نعم لا

هل اجريت فحص لهرمونات الغدة سابقا؟ نعم لا

اذا فحصت ماهي النتيجة؟

The Image:

Type of machine:

The Frequency use:

Echogency: hemogenis hetrogins

Reslution: high good poor

The Mesurments:

Right lobe:

Length.....

Width.....

depth.....

The volume.....

Lift lobe:

Length.....

width.....

depth.....

The volume.....

Ismath:

Length.....

Depth.....

The volume of the thyroid gland:

.....

If there is normal varetion.....

Data Collection Sheet

| Tybe | Age | Weight | Smoking | RT Lobe volume | LT Lobe volume | Thyroid gland (whole volume) |
|-------|-----------|--------|---------|----------------|----------------|------------------------------|
| 1) M | 7 years | 23.8 k | No | 1.871 cm3 | 1.471 cm3 | 3.343 cm3 |
| 2) M | 5.5 years | 15 k | No | 2.081 cm3 | 1.327 cm3 | 3.409 cm3 |
| 3) F | 9 years | 36 k | No | 1.284 cm3 | 1.356 cm3 | 2.640 cm3 |
| 4) F | 10 | 43.1 k | No | 1.666 cm3 | 1.599 cm3 | 3.265 cm3 |
| 5) F | 17 | 60 k | No | 6.227 cm3 | 4.456 cm3 | 10.684 cm3 |
| 6) M | 18 | 75 k | No | 8.410 cm3 | 5.894 cm3 | 14.305 cm3 |
| 7) F | 20 | 49.6 k | No | 4.099 cm3 | 3.502 cm3 | 7.602 cm3 |
| 8) F | 19 | 44.4 k | No | 3.316 cm3 | 3.100 cm3 | 6.417 cm3 |
| 9) F | 20 | 76.3 k | No | 2.835 cm3 | 1.767 cm3 | 4.602 cm3 |
| 10) F | 12 | 28.3 k | No | 2.830 cm3 | 2.820 cm3 | 5.650 cm3 |

| | | | | | | | |
|-----|---|----|--------|-----|---------------------------|---------------------------|------------------------|
| 11) | F | 17 | 50.8 k | No | 3.109 cm ³ | 1.912 cm ³ | 5.022 cm ³ |
| 12) | F | 20 | 73.6 k | No | 4.915 cm ³ | 3.204 cm ³ | 8.119 cm ³ |
| 13) | F | 20 | 43.6 k | No | 3.209 cm ³ | 2.383 cm ³ | 5.594 cm ³ |
| 14) | F | 20 | 42 k | No | 4.445 cm ³ | 4.732 cm ³ | 9.177 cm ³ |
| 15) | F | 23 | 56 k | No | 4.604 cm ³ | 3.812 cm ³ | 8.416 cm ³ |
| 16) | M | 28 | 72 k | No | 3.794 cm ³ | 2.336 cm ³ | 6.130 cm ³ |
| 17) | F | 30 | 79 k | No | 2.792 cm ³ | 3.888 cm ³ | 6.681 cm ³ |
| 18) | F | 25 | 80 k | No | 5.267 cm ³ | 3.335 cm ³ | 8.603 cm ³ |
| 19) | M | 26 | 65 k | Yes | 3.881 cm ³ | 1.928 cm ³ | 5.810 cm ³ |
| 20) | F | 24 | 62 k | No | 3.852 cm ³ | 2.293 cm ³ | 6.145 cm ³ |
| 21) | M | 30 | 65 k | No | 5.232 cm ³ | 3.643 cm ³ | 8.876 cm ³ |
| 22) | M | 22 | 63 k | No | 5.193 cm ³ | 4.024 cm ³ | 9.218 cm ³ |
| 23) | M | 28 | 67 k | Yes | 3.994 cm ³ | 2.968 cm ³ | 6.962 cm ³ |
| 24) | F | 25 | 70 k | No | 7.798 cm ³ | 4.819 cm ³ | 12.617 cm ³ |
| 25) | M | 30 | 75 k | Yes | 10.519 cm ³ | 6.409 cm ³ | 16.928 cm ³ |
| 26) | F | 30 | 79k | No | 6.025 cm ³ | 3.979 cm ³ | 10.005 cm ³ |
| 27) | F | 25 | 55k | No | 6.268 cm ³ | 2.854 cm ³ | 8.852 cm ³ |
| 28) | F | 21 | 56k | No | 4.676 cm ³ | 3.531 cm ³ | 8.208 cm ³ |
| 29) | F | 25 | 80k | No | 2.478 cm ³ | 4.081 cm ³ | 6.559 cm ³ |
| 30) | F | 28 | 56k | No | 4.358 cm ³ | 3.197 cm ³ | 7.555 cm ³ |
| 31) | F | 25 | 60k | No | 2.673 cm ³ | 3.139 cm ³ | 5.812 cm ³ |
| 32) | F | 22 | 53.6k | No | 2.355 cm ³ | 2.517 cm ³ | 4.872 cm ³ |
| 33) | F | 22 | 50.6k | No | 1.981 cm ³ | 1.708 cm ³ | 3.689 cm ³ |
| 34) | M | 21 | 63.3k | No | 6.297 cm ³ | 5.799 cm ³ | 12.096 cm ³ |
| 35) | F | 21 | 57.7k | No | 4.909 cm ³ | 5.368 cm ³ | 10.277 cm ³ |
| 36) | M | 30 | 57.1k | Yes | 6.580 cm ³ | 4.410 cm ³ | 10.991 cm ³ |
| 37) | M | 25 | 66.8k | No | 9.245 cm ³ | 5.467 cm ³ | 14.712 cm ³ |
| 38) | F | 24 | 50.6k | No | 3.668 cm ³ | 2.548 cm ³ | 6.216 cm ³ |
| 39) | M | 27 | 75.6k | No | 4.163 cm ³ | 3.216 cm ³ | 7.379 cm ³ |
| 40) | M | 27 | 55.5k | No | 5.665 cm ³ | 4.593 cm ³ | 10.258 cm ³ |
| 41) | F | 30 | 63.4k | No | 5,317 cm ³ | 11.609 cm ³ | 16.926 cm ³ |

| | | | | | | | |
|-----|---|----|-------|-----|------------------------|------------------------|------------------------|
| 42) | F | 22 | 81.8k | No | 2.657 cm ³ | 2.609 cm ³ | 5.266 cm ³ |
| 43) | M | 23 | 94.3k | No | 5.300 cm ³ | 5.316 cm ³ | 10.617 cm ³ |
| 44) | M | 22 | 68.5k | No | 4.830 cm ³ | 4.735 cm ³ | 9.566 cm ³ |
| 45) | F | 23 | 52.2k | No | 4.241 cm ³ | 3.469 cm ³ | 7.710 cm ³ |
| 46) | F | 23 | 58.9k | No | 3.898 cm ³ | 3.401 cm ³ | 7.299 cm ³ |
| 47) | F | 22 | 38.1k | No | 4.083 cm ³ | 1.666 cm ³ | 5.705 cm ³ |
| 48) | F | 21 | 59k | No | 2.762 cm ³ | 3.004 cm ³ | 5.767 cm ³ |
| 49) | M | 29 | 63k | Yes | 5.777 cm ³ | 5.233 cm ³ | 11.011 cm ³ |
| 50) | M | 30 | 70.9k | No | 5.653 cm ³ | 2.888 cm ³ | 8.541 cm ³ |
| 51) | M | 38 | 69k | Yes | 3.659 cm ³ | 2.840 cm ³ | 6.500 cm ³ |
| 52) | M | 32 | 59.3k | Yes | 6.866 cm ³ | 5.815 cm ³ | 12.682 cm ³ |
| 53) | F | 32 | 77.5k | No | 6.499 cm ³ | 7.939 cm ³ | 14.439 cm ³ |
| 54) | M | 32 | 69.8k | Yes | 8.926 cm ³ | 8.126 cm ³ | 17.053 cm ³ |
| 55) | M | 36 | 59k | No | 3.727 cm ³ | 4.639 cm ³ | 8.367 cm ³ |
| 56) | M | 34 | 103k | Yes | 2.979 cm ³ | 1.726 cm ³ | 4.705 cm ³ |
| 57) | M | 35 | 81.2k | No | 5.087 cm ³ | 6.146 cm ³ | 11.233 cm ³ |
| 58) | F | 40 | 44.8k | No | 3.232 cm ³ | 2.301 cm ³ | 5.534 cm ³ |
| 59) | M | 35 | 79.8k | No | 10.463 cm ³ | 11.099 cm ³ | 21.562 cm ³ |
| 60) | M | 34 | 69.9k | Yes | 10.233 cm ³ | 6.679 cm ³ | 16.912 cm ³ |
| 61) | M | 38 | 68.7k | No | 5.156 cm ³ | 3.229 cm ³ | 8.386 cm ³ |
| 62) | M | 32 | 43.8k | Yes | 4.793 cm ³ | 3.542 cm ³ | 8.335 cm ³ |
| 63) | M | 33 | 70.5k | No | 4.104 cm ³ | 3.382 cm ³ | 7.487 cm ³ |
| 64) | F | 37 | 80k | No | 2.246 cm ³ | 1.436 cm ³ | 3.682 cm ³ |
| 65) | M | 34 | 75k | Yes | 4.374 cm ³ | 4.264 cm ³ | 8.638 cm ³ |
| 66) | M | 34 | 65k | Yes | 4.151 cm ³ | 3.090 cm ³ | 7.242 cm ³ |
| 67) | M | 37 | 67k | No | 5.829 cm ³ | 5.496 cm ³ | 11.326 cm ³ |
| 68) | M | 33 | 85k | No | 6.163 cm ³ | 3.534 cm ³ | 9.697 cm ³ |
| 69) | F | 32 | 70k | No | 3.447 cm ³ | 4.225 cm ³ | 7.672 cm ³ |
| 70) | F | 32 | 85.6k | No | 3.169 cm ³ | 3.034 cm ³ | 6.204 cm ³ |
| 71) | M | 36 | 60k | No | 6.752 cm ³ | 5.027 cm ³ | 11.780 cm ³ |

| | | | | | | | |
|------|---|----|--------|-----|-----------|-----------|------------|
| 72) | M | 35 | 79.4k | No | 6.196 cm3 | 4.845 cm3 | 11.041 cm3 |
| 73) | M | 42 | 78.1k | No | 5.372 cm3 | 5.016 cm3 | 10.388 cm3 |
| 74) | F | 45 | 102.9k | No | 4.088 cm3 | 3.443 cm3 | 7.531 cm3 |
| 75) | F | 44 | 72k | No | 3.426 cm3 | 2.434 cm3 | 5.860 cm3 |
| 76) | F | 43 | 75.6k | No | 5.312 cm3 | 2.697 cm3 | 8.010 cm3 |
| 77) | F | 43 | 75k | No | 7.107 cm3 | 4.072 cm3 | 11.179 cm3 |
| 78) | M | 42 | 75k | No | 7.388 cm3 | 9.613 cm3 | 17.001 cm3 |
| 79) | M | 46 | 57.4k | No | 5.843 cm3 | 3.582 cm3 | 9.425 cm3 |
| 80) | F | 43 | 84.5k | No | 3.460 cm3 | 5.225 cm3 | 8.686 cm3 |
| 81) | F | 46 | 95k | No | 3.366 cm3 | 4.738 cm3 | 8.104 cm3 |
| 82) | F | 42 | 71.3k | No | 3.964 cm3 | 3.116 cm3 | 7.081 cm3 |
| 83) | F | 36 | 79.5 | No | 5.312 cm3 | 3.979 cm3 | 9.291 cm3 |
| 84) | M | 41 | 80k | No | 5.843 cm3 | 2.584 cm3 | 8.427 cm3 |
| 85) | M | 39 | 75k | Yes | 3.964 cm3 | 3.197 cm3 | 7.161 cm3 |
| 86) | M | 39 | 82k | No | 4.072 cm3 | 2.517 cm3 | 6.589 cm3 |
| 87) | M | 29 | 69k | No | 3.582 cm3 | 2.355 cm3 | 5.937 cm3 |
| 88) | F | 37 | 92k | No | 3.116 cm3 | 4.358 cm3 | 7.474 cm3 |
| 89) | F | 32 | 85k | No | 3.460 cm3 | 4.676 cm3 | 8.136 cm3 |
| 90) | F | 42 | 82.5k | N0 | 5.087 cm3 | 4.909 cm3 | 9.996 cm3 |
| 91) | M | 39 | 77k | No | 3.659 cm3 | 3.668 cm3 | 7.327 cm3 |
| 92) | M | 34 | 73k | No | 3.727 cm3 | 4.038 cm3 | 7.765 cm3 |
| 93) | M | 28 | 67k | No | 5.156 cm3 | 2.657 cm3 | 7.813 cm3 |
| 94) | M | 23 | 62k | N0 | 4.104 cm3 | 3.004 cm3 | 7.108 cm3 |
| 95) | M | 49 | 78.3k | N0 | 2.246 cm3 | 2.777 cm3 | 5.023 cm3 |
| 96) | F | 40 | 85k | No | 4.151 cm3 | 3.216 cm3 | 7.367 cm3 |
| 97) | F | 33 | 79.5k | No | 3.447 cm3 | 2.640 cm3 | 6.087 cm3 |
| 98) | M | 26 | 66.5k | No | 4.793 cm3 | 3.265 cm3 | 8.058 cm3 |
| 99) | M | 30 | 69.9k | N0 | 4.088 cm3 | 5.593 cm3 | 9.681 cm3 |
| 100) | M | 45 | 75.5k | No | 3.426 cm3 | 2.081 cm3 | 5.507 cm3 |

