

Thyroid Gland Volume Measured by Ultrasound in Different Age Groups in Sulaimani Population.



Faruk Hasan Faraj , * Kamal Ahmad Saeed

College of Medicine, Department of General Sergion, Sulaimani University

**Dler Abdulruhman Muhammad

Medical and Dental College, Sulaimani University.

Kurdistan Region / Iraq

Abstract

The main objective of this study is to describe thyroid volume measured by ultrasonography in different gender and age groups in the Sulaimani population. In this cross-sectional study, two hundred subjects aged three to seventy five years with healthy thyroids were studied. The sample consisted of five age groups with twenty females and twenty males in each group. Information was collected on age, sex, body height, neck length, neck circumference, and thyroid volume measured by sonography. The results of this study show strong correlations between chronological age, neck circumference, and body length. Sex does not significantly affect the thyroid volume.

Key words: thyroid gland volume, ultrasound, different age groups.

Introduction

The establishment of reference range for the normal thyroid gland is essential both for the examination of the patient referred for evaluation of the thyroid gland and determination of goiter prevalence in a given area.

The main factor that is involved in the regulation of the gland volume is the effect of iodine. It is important to know the reference values of thyroid volume and its determinants in free iodine deficient subjects [1].

Many factors might account for the discrepancy between data obtained from investigations of thyroid volume by ultrasonography in various parts of the world, although different ultrasound equipment and the possible role of genetic factors have been suggested [2]. The most important factors of disparity appear to be the interobserver variation and the status of iodine consumption in different regions of the world [2].

Many studies have been done showing that ultrasound is very accurate in the diagnosis of goiter and is the best way to determine the thyroid volume [3-6].

This study is conducted to investigate thyroid volume measured by real time ultrasonography to obtain the normal thyroid volume values for different age groups and gender differences in Sulaimani governorate, and to correlate it with other variables like body height, length of the neck, and neck circumference. Another objective of this study is to have a standard base line of thyroid volume in our population.

Subjects and methods

This study was conducted in three different localities in Sulaimani governorate in the Consultant clinic center, Shorsh hospital and Sulaimani teaching hospital.

*E-mail : kamalsaeed62@yahoo.com

**Cited from his M.sc. Thesis

Two hundred subjects from patients with different conditions who consulted the clinic were included.

Subjects having historical, clinical, and / or sonographical abnormalities of the thyroid gland were excluded initially. The two hundred subjects consisted of twenty subjects in each age & gender stratum (Table 1).

For each subject the following parameters were measured:

- a - Body height (cm).
- b- Length of the neck (cm).
- c- Neck circumference (cm).
- d- Ultrasonographic examination of thyroid gland.

Thyroid volume was estimated using real-time ultrasonography. The ultrasound was conducted by three experienced sonographis. Longitudinal and transverse scans were performed allowing the measurements of depth (d), width (w), and the length (l) of each lobe. The volume of each lobe was calculated according to Brunn J et al. [7] by the formula:

$$\text{Volume (ml)} = \text{Depth (mm)} \times \text{Width (mm)} \times \text{Length (mm)} \times 0.000479$$

The thyroid volume was the sum of the volumes of both lobes and expressed as (ml). Isthmus was not included, because of the difficulty of recording its volume with a two dimensional ultrasound imaging system. An F test was used to test the significance of factors included in the study.

A Duncan new multiple range test was used for comparison of means. Simple correlation coefficients were obtained between thyroid dimensions and volume.

Results

The study population (n=200) is shown in (table1). The mean volume of thyroid gland among males was (12.2 ml) and among females was (11.5ml) and the difference is statistically not significant (P >0.05).as shown in table (2).

Means with a similar letter are not significantly different.

The youngest age group had naturally had the smallest volume (4.79) and this was the only figure which was significantly different from all other age groups.

Table (3) shows the ANOVA analysis adjusted for sex, age, and the discrepancies between age & sex. The only significant variable was age.

Table (1): Numbers of subjects according to sex and age.

Age groups (years)	Number of observations	Male	Female
1-10	40	20	20
11-20	40	20	20
21-30	40	20	20
31-40	40	20	20
41-75	40	20	20

Table (2) The mean volume of thyroid in (ml) in different age groups according to age.

Age groups	1-10	11-20	21-30	31-40	41-75
Means	4.79	12.37	13.36	15.01	13.75
	a*	b	bc	d	c

Table (3) Analysis of Variance (ANOVA) for the thyroid volume.

SOV (Source of Variation)	Df (degree of freedom)	SS (Sum of squares)	MS (Mean of squares)	F (Fischer ratio)
Sex	1	26.31	26.31	3.40
Age	4	2638.52	659.63	85.2**
Sex X age	4	16.90	4.23	0.55
Error	190	1470.32	7.74	
Total	199	4152.05		

Table (4) Correlation coefficients between traits studied (body height, neck circumference and neck length).

	Body height	Neck circumference	Neck length	Thyroid volume
Body height		0.67 **	0.70 **	0.82**
Neck circumference			0.47**	0.75**
Neck length				0.51**

** Significant at (p<0.01)

All the studied parameters were significantly correlated to the thyroid volume. The body height has the strongest correlation with the thyroid volume.

Discussion

The changes in the thyroid volume mainly occurred below the age of twenty years, and remain nearly unchanged in adults and declines slightly in older age groups. The other main finding in this study is the strong correlation between the thyroid volume and body length, neck circumference and neck length. The onset of puberty occurs with the maturation of the hypothalamo-pituitary-gonadal axis, resulting in the development of the secondary sexual characteristics, changes in skeletal size, and body composition with adaptation of the hypothalamo-pituitary thyroid gland axis in response to the increased energy expenditure.

A prepubertal surge of thyroid stimulating hormone (TSH) between 8-12 years old, followed by a transient increase in circulating thyroid hormones (T4 and T3), in addition to enhanced peripheral conversion of T4 to T3 may account for this adaptation [8]. With ongoing puberty, however, decreasing or constant TSH levels have been reported, as well as a progressive decrease in circulating thyroid hormones [9]. It is concluded that the increase in the mean thyroid volume is concurrent mainly with the onset of puberty.

This result is similar to some studies done in Europe and USA [10-13] while it disagrees with some other studies [14-16].

The mean thyroid volumes in the total groups were (12.2 ml) and (11.5 ml), for males and females respectively. The difference between them was not significant. This finding agrees with other results [17-19], but they are different from other studies [2,11-14,16,17]. In our study we found that after puberty girls had larger thyroids than boys, and this was in concurrence with another study [20].

The earlier onset of puberty in females renders their thyroid volume larger than males before 14 years of age, while after 16 years old, the thyroid volume becomes larger in males. This may be due to the fact that the body organs are larger in males than in females generally. Female steroids might have additional positive influence on the difference in the body weight between the genders [11, 16]. Another cause of increasing the size of the thyroid is the goitrogenic effect of smoking that is habitual mainly in the males [19, 21].

This study provides an important insight into the correlation of thyroid volume with other studied variables. However, this study has some limitations like selection bias. In addition to that we had different sonographers who measured the thyroid volume. In future studies we recommend an adjustment for age when studying the impact of those factors related to thyroid volume.

Conclusion

Assessment of thyroid gland volume based on chronological age, neck circumference, neck length and body length were the most reliable methods in the event of normal somatic development. It is concluded that the sex does not

significantly influence the thyroid volume when considered as a possible addition to this base line model. It is also concluded that the main changes in the thyroid volume occurred between 3-19 years old and remained nearly a plateau in adults and slightly declined in the older ages. The larger thyroid volumes in our population as compared to those reported in other countries indicated that the state of iodine consumption was still insufficient in our population therefore it is recommended to establish volumetric standards for the population to prevent overestimation of goiter prevalence. The mean thyroid volume in our population was larger or smaller than those obtained in other countries, indicating the racial differences. Differences in daily iodine intake, genetic background and environmental factors can contribute to variation in the mean thyroid volume in different areas.

Acknowledgements

We express our sincere thanks and appreciation to all radiologists in all the hospitals who helped us a lot in performing the ultrasonographic examinations. We are very thankful to the volunteers who participated freely in this study as without their full help and support this study would never have been achieved. We appreciate greatly all the help and contributions to Professor Dr, Nazhad Noori Maarof and Dr, Ahmed Ismail Al-Winde. Finally we appreciate greatly all the help and contributions to from the biostatistics department, especially senior lecturer Rezan Hama Rashid for her great help and efforts in biostatistics.

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تویژینه وهیهك له سههر قهبارهی بژینهی دهرهقی بیوانه گراو بههوی نامیری سۆنارموه له ته مه نه جیاجیاکاندا له ناو دانیشتوانی شاری سلیمانی.

فاروق حسن هرج ، کمال احمد سعید ، کۆلیجی پزشکی ، بهشی نهشته رگه ری گشتی ، زانکۆی سلیمانی

دئیر عبد الرحمن محمد ، کۆلیجی پزشکی ددان ، زانکۆی سلیمانی

ههریمی کوردستان / عیراق

پوخته

په یوه نهدی له بیوان قهبارهی بژینهی دهرهقی و پیوه رهکانی له ش تا نیستا جیکای کومانه وه به ته واوی ساغ نه کراوه ته وه . له سه ره ده می بساق بوون دا گۆرانکاری گرنک روو نه دات له قهبارهی بژینهی دهرهقی و هه ره مانه کانی دا وه ک دیاره ده یه کی سروشتی یو سازکردن و ناماده بوون بو نه و گۆرانکاریانه ی نه گه شه کردنی له ش به گشتی و لایه نی سیکسی به تاییه تی . ناما نه جی سه ره کی نه م تویژینه وه یه نه وه یه که قهبارهی بژینهی دهرهقی بزانی نه ته مه نه جیاجیاکان و له هه ردوو ره گه زه که دا له نیو دانیشتوانی شاری سلیمانی له ری ی سه رنج دان و پیوانه کردنی یه وه به هوی نامیری سوناره وه . پشکنینی وورده نه نجام درا بو دووسه که س (که بهاری ته ندروستی بژینهی دهرهقی بیان باش بو یه ته مه نیان له نیوان (۳ - ۷۵) سالاندا دا بوو . که سه کان دابه ش کران بو بیینج کۆمه له (گروپ بجه پی ی ته مه ن و ره گه ز ، هه رگروپیک بیست که سی تیدابوو له هه ردوو ره گه زه که دا . داتا (زانیاری) کۆکرایه وه ده رباره ی ته مه ن ، ره گه ز ، دریزی له ش ، دریزی مل (گه ردن) ، پیوه ری چوارچیه ی مل و قهباره ی بژینهی دهرهقی به هوی نامیری سوناره وه . زانیاری ده رباره ی قهباره ی بژینهی دهرهقی و نه و گۆرانکاریانه ی به سه ره نه و قهباره یه دا دیت و هۆکاره کانی نه و گۆرانکاریانه ، زۆر گرنک و سوو به خشه بو ده ستنیشان کردنی وورده کاریه کان و هۆکاره کانی گۆرانکاری نه و که سه نه ی که توشی نه خوشی په ریزاده بوون له نه نجامی که می ماده ی یۆد دا . ته مه نی مروه ، چوارچیه ی مل و دریزی له ش له وه هۆکاره کرتانه ن که له کاتی نه خوشی په ریزاده دا په چاوه کراین وه کاریگه ری گرنکیان هه یه له زۆر له و گۆرانکاریانه ی که به سه ره قهباره ی بژینهی دهرهقی دا دین . به نام جیاوازی ره گه ز کاریگه ری نه و توی نی یه له و گۆرنکاریانه ی به سه ره قهباره ی بژینهی دهرهقی دا دین .

قیاس حجم الغدة الدرقيّة باستخدام جهاز السونار في اعمار مختلفة في السليمانية.

فاروق حسن هرج ، کمال احمد سعید ، کلیة الطب ، قسم الجراحة العامة ، جامعة السليمانية

دئیر عبد الرحمن ، کلیة طب الاسنان ، جامعة السليمانية

اقلیم کوردستان / العراق

الخلاصة

ان العلاقة بين حجم الغدة الدرقيّة و المقاييس الجسميّة أمر فيه اختلاف وعدم الاتفاق. أثناء البلوغ تحدث تغييرات في حجم و وظيفة الغدة الدرقيّة وذلك للتكيف لتطورات الجسميّة و الجنسيّة. أن الهدف من هذه الدراسة هو وصف حجم الغدة الدرقيّة عن طريق قياسه بواسطة جهاز السونار في مختلف الاعمار لكلا الجنسين من سكان السليمانية. تم فحص دقيق لثانتي شخص من ذوى الغدة الدرقيّة السليمة تتراوح اعمارهم بين (۳ - ۷۵) سنة ، قسمت الحالات إلى خمسة مجاميع حسب الجنس و العمر و شملت كل مجموعة (۲۰) شخصا لكلا الجنسين . تم جمع المعلومات عن العمر و الجنس و طول الجسم و الرقبة و قياس محيط الرقبة و حجم الغدة الدرقيّة بواسطة جهاز السونار. إن معرفة حجم الغدة الدرقيّة و التغيرات التي تحصل له و مسببات هذه التغيرات مهم و ذو فائدة قصوى كخلفية للحالات المرضيّة عند الأشخاص المصابين بنقص مادة ألا يودين. من العناصر المهمة في هذه الحالات هي العمر ، محيط الرقبة و طول الجسم ، وهي التي نحسب لها الحساب في كثير من التغيرات التي تحصل لحجم الغدة الدرقيّة. الاختلافات الجنسيّة أو العامل الجنسي لا يؤثر كثيرا على حجم الغدة الدرقيّة.