Ultrasound Assessment for Thyroid Examination in Patients with Hypothyroidism

Yours Abdel Hassan[1], Safwan Saeed[2] , Maha Taha Idrees[3]

[1]Research Scholar, Radiology Department, Technical Medical Institute of, Middle Technical University, Baghdad, Iraq, [2]Research Scholar, Department of Radiology Technologies, College of Health and Medical Technology, Middle Technical University, [3]Research Scholar, Radiology Departments, Radiotherapy Branch, Technical Medical Institute of, Middle Technical University, Baghdad, Iraq

Abstract

Patients with overt hypothyroidism show decreased echogenicity of the thyroid at ultrasonography **.** The purpose of the present study was to evaluate the effectiveness of ultrasonography for diagnosing the most common hypothyroidism and to guide patients to appropriate treatment show decreased echogenicity of the thyroid by ultrasonography. This study have been conducted on 80Patients, the age group between 20-70 years, in the period of January 2020 to October 2021. Thyroid ultrasonography was carried out by the type of ultrasound (US) machine used in the study is a sameness -X300 ultrasound device with 7.5MHz probe. The volume of the thyroid lobe noticed calculations according to the formula of the: width x length x thickness. The assessment of the 80 patients with hypothyroidism who were included in our study, (57) patients with decreased echogenicity, 23 patients had been with normal echogenicity, the lowest was found in patients homogenous enhancement 42.5%, non- homogenous 57.5%, thyroid the gland has a medium gray scale homogeneous echo pattern and the level of echogenicity is higher than Size of thyroid, The higher percentage of nodules (51.3%) of the size of the thyroid was normal. But the higher percentage of nodules type (40.0%) for the study group was solid compared to the lower percentage (2.5%) was solid and cystic. Ultrasound had high specificity and more accuracy to assess patients with hypothyroidism. An association between hypo echogenicity at thyroid US and high level of thyroid stimulation hormone (TSH suggesting decreased echogenicity at the ultrasonography diagnostic**.**

Keywords: *Hypothyroidism, Ultrasound thyroid, TSH, Central hypothyroidism*

Introduction

Hypothyroidism is the most widely recognized thyroid problem, influences ladies often as more as possible, and the frequency increments with age [(1)] brings about low degrees of thyroid chemical [(2)] Hypothyroidism is described by an inadequacy in the T4 and T3 chemicals [(3-4)]. There are essentially two kinds of hypothyroidism, essential hypothyroidism, which is brought about by thyroid organ infection itself [(5)] Primary hypothyroidism is characterized as high serum TSH levels with typical or decreased free thyroxin (FT4) levels [(6)] . The most predominant etiology of essential hypothyroidism is iodine insufficiency [(7)] Hypothyroidism is named essential when there is low thyroid organ movement; it

Corresponding author :
Yours Abdel Hassan
e-mail: yusraabd1981@gmail.com

represents over 90% of the cases. Focal hypothyroidism addresses under 1% of the cases [8] and is brought about by either low degrees of TSH emission by the front pituitary (optional hypothyroidism) or low degrees of thyrotropin-delivering chemical (TRH) discharge by the hypothalamus [9]. become ultrasound the main imaging strategy utilized for thyroid infections [10] . The thyroid organ is unmistakably appropriate for high-recurrence sonography (utilizing 7-15 MHz transducer) which works with the recognition of clinically non-obvious knobs of 2-3 mm size and permits a more precise portrayal of the. It is likewise used to decide the size and numbers of thyroid knobs evaluate the volume of tissue in thyromegaly cases, and separate thyroid masses from adjoining [11]. the diminished echogenicity of the thyroid organ is related to plain hypothyroidism. Echogenicity has been shown hypothyroidism. Diminished echogenicity or inconsistency in the reverberation design during a thyroid in patients with raised thyroid-invigorating chemical (TSH) could be taken as early indications of thyroid disappointment [12]. US Characteristics of the Thyroid Gland [13] . Examination of the accuracy of ultrasonography to evaluate ultrasound discoveries of patients with hypothyroidism.

Patients and Methods

The present study had been executed between October 2020 and February 2021, eighty patients, with age group (20–70) years; diagnosed with hypothyroidism by ultrasound the radiology department in Baghdad medical city/ institute of radiology, patients, present with a variety of symptoms include (Swelling of the thyroid gland, swelling, difficulty swallowing Hoarseness presence .patient has a thyroid-stimulating hormone (TSH) test which was high more than (0.4-4.2 ulU/ml), which indicated the patient has hypothyroidism. A thyroid ultrasound is performed to determine the size and shape detect abnormalities of the thyroid such as enlargement, hypothyroidism. Ultrasound examination in supine position: The patient lies down with his or her neck on a pillow or other soft support. His or her neck is stretched slightly. The ultrasound technician applies a water-based gel on your neck to help transmit the sound waves. Next, the technician moves a wand, called a transducer, back and forth on the skin of his or her neck. The system was used sameness -X300 ultrasound device with 7.5MHz that is found in the Institute of X-Ray in medical city/ Baghdad. The device had a thyroid probe of about 5–7 MHz Axial scans of the whole gal of each lobe, to compare echogenicity and ND at the upper AP diameters is measured. The size of both lobes as normal amassment is (50 mm Length, 30mm width, 20mm depth). Texture, either homogenous or non-homogenous contacting nodules or not if nodules Echogenicity either normal slightly echogenic or hypo echoic which mean decrease in echogenicity. Identify focal lesions, measure the main lesions and identify the dominant one (according to size). –sizes and texture (solid, cystic, or complex) found at right or left lobes and their number either few <4 nodules, multiple>4 nodules. After y ultrasound, you can resume your normal activities.

Results

The results of the present study that were explained in the table (1) showed the distribution study group according to, gender, which showed that the patient with hypothyroidism was male 10(12.5) which less than70 females (87.5%)

Table (1) : The distribution of study group according to gender

		No.(n=80)	%(100%)
Gender	Male	10	12.5
	Female	70	87.5

Table (2) represents the distribution of study group according to Size of thyroid, Nodules (Type, lobe and Number) .The higher percentage (51.3%) of size of thyroid was normal. But the higher percentage of nodules type (40.0%) for study group was solid compared to lower percentage (2.5%) was solid and cystic. The higher percentage (38.8%) non nodules lope that followed by 26.3% was right lobe compared to lower percentage was (10.0%) for Left lobe. The higher percentage of cement mantle was (90.0%) was compared to lower percentage was (10.0%) was 2-3m. The higher percentage of number nodules was (45.0%) have a few nodules compared to lower percentage was (15.0%) with multiple nodules.

In table (3) show the distribution of nodules for study group by echogenicity. The higher percentage (28.8%) was solid for decrease echogenicity cases compared with 11.3% of echogenicity cases, while lower percentage of nodules was solid and cystic among decrease echogenicity cases and echogenicity cases. The association between size of thyroid and echogenicity was significantly (P=0.040).

Table (4) represented the distribution of number nodules for study group by echogenicity. The higher percentage (31.3%) of cases was few nodules for decrease echogenicity cases compared with 13.8% of normal cases. The lower percentage (11.3%) with multiple nodules was decrease echogenicity cases compared with 3.8% of normal cases. The association between number nodules and echogenicity was significantly (P=0.047).

Table (2): Distribution of study group according to Size of thyroid, Nodules (Type, lope and Number)

		No.(n=80)	%(100%)
Size of thyroid	Normal	41	51.3
	Large	28	35.0
	Small	11	13.8
Nodules Type	Non	31	38.8
	Solid	32	40.0
	Cystic	9	11.3
	Solid &Cystic	2	2.5
	Cystic &Complex	6	7.5
Nodules lobe	Non	31	38.8
	Right lope	21	26.3
	Left lope	8	10.0
	Right lope& Left lope	20	25.0
Number of nodules	Non	32	40.0
	Few nodules	36	45.0
	Multiple nodules	12	15.0

Table (3) : The distribution of nodules for study group by echogenicity.

Nodules		Texture and homogenous		Total
		Echogenicity	Decrease Echogenicity	
Non	No.	9	22	31
	%	11.3%	27.5%	38.8%
Solid	No.	9	23	32
	%	11.3%	28.8%	40.0%
Cystic	No.	2	7	9
	%	2.5%	8.8%	11.3%
Solid &Cystic	No.	0	2	2
	%	0.0%	2.5%	2.5%
Cystic &Complex	No.	3	3	6
	%	3.8%	3.8%	7.5%
Total	No.	23	57	80
	%	28.8%	71.3%	100.0%

(Kappa P=0.040 (P≤0.05) S)

Table (4): Distribution of Number nodules for study group by Echogenicity

Number nodules		Echogenicity		Total
		Normal	Decrease Echogenicity	
Non	No.	9	23	32
	%	11.3%	28.8%	40.0%
Few nodules	No.	11	25	36
	%	13.8%	31.3%	45.0%
Multiple nodules	No.	3	9	12
	%	3.8%	11.3%	15.0%
Total	No.	23	57	80
	%	28.8%	71.3%	100.0%

(Kappa P=0.047 (P<0.05) S)

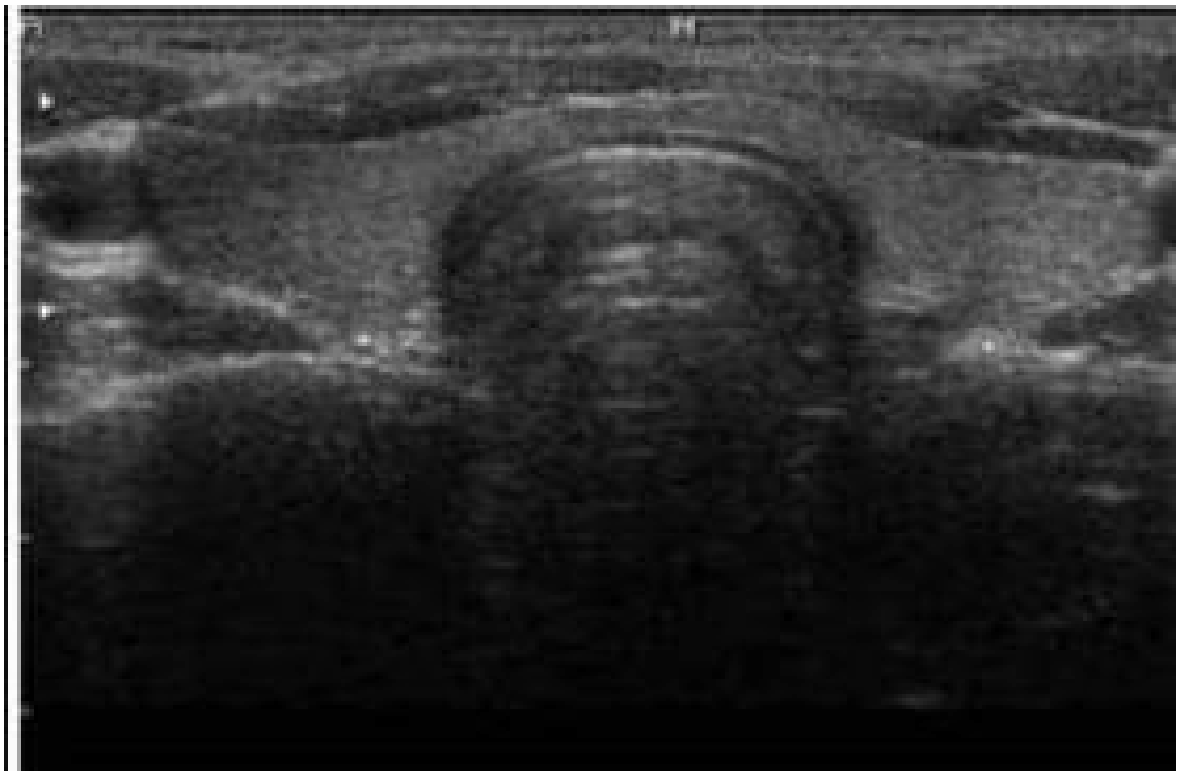

Figure (2) Ultrasound examination of the Hypothyroidism a 29-year-old woman showing homogeneous in texture.

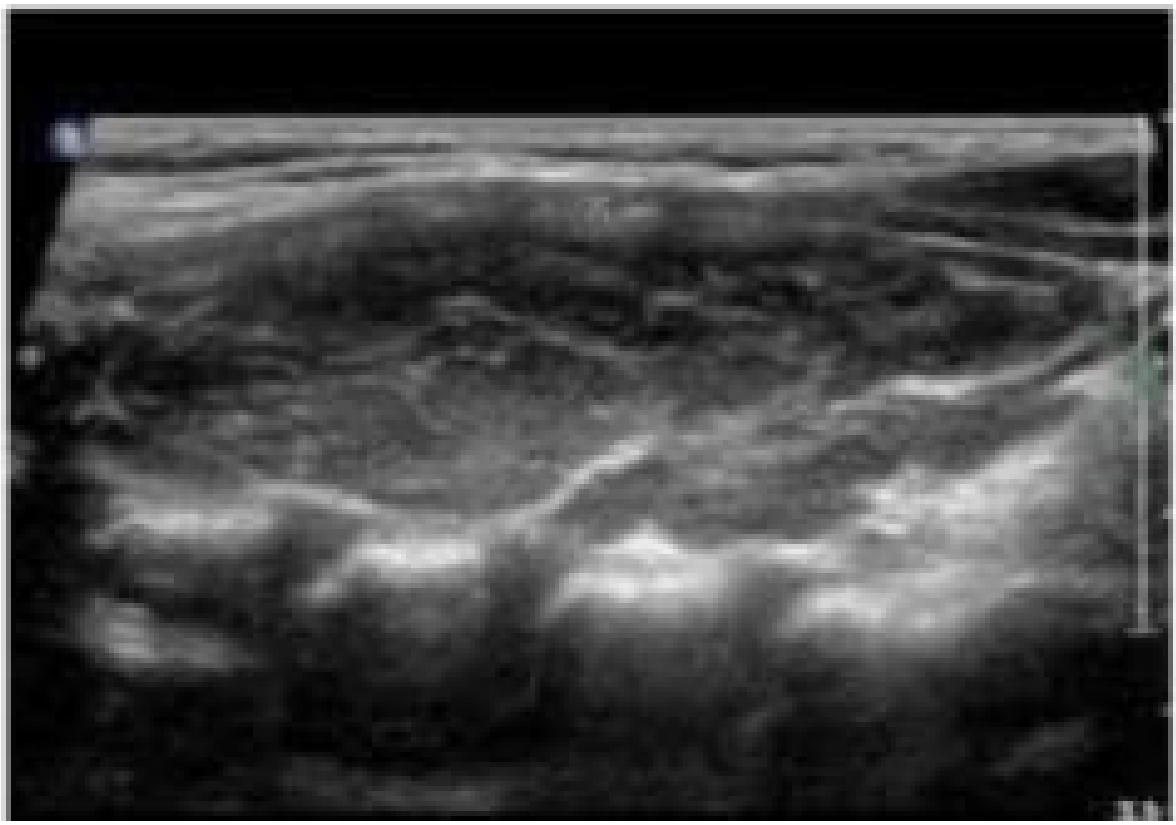

Figure (3) Ultrasound examination of the of Hypothyroidism a 45-year-old woman showing non homogeneous in texture

Figure (4) benign hypo echoic, well-circumscribed solid thyroid nodule with peripheral "halo" in the right lobe show typical benign patterns in ultrasound-mode

Discussion

The study was achieved on 80 patients who had clinically hypothyroidism who were primarily investigated with U/S. Age patients ranged from 20 to 70 years; In the investigation, we surveyed the capacity of thyroid ultrasound to distinguish hypothyroidism the best larger part of patients; were female which exhibited that a huge level of patients were ladies 70 (87.5%) in examination with male 10(12.5%). the predominance of hypothyroidism was more normal among ladies than men. These outcomes were likewise in concurrence with an investigation acted in the United Kingdom [(14)], which showed that the female: male proportion was 6:1. Another examination [(15)], shown in table 1 our study found

an association between the decreased echogenicity of the thyroid and overt hypothyroidism. Were included in (57) patients with decreased echogenicity, 23 been with normal echogenicity and all of the patients had a high TSH, and results were correlated with homogeneity. Normal echogenicity the lowest was found in patients Thyroid Texture homogenous 42.5%, Non- homogenous 57.5%, our study found an association between the decreased echogenicity of the thyroid and overt hypothyroidism. Were included in (57) patients with decreased echogenicity, 23 been with normal echogenicity and all of the patients had a high TSH, and results were correlated with homogeneity. been with normal echogenicity the lowest was found in patients Homogenous enhancement 42.5%, Non- homogenous 57.5%, the thyroid gland has a medium grayscale homogeneous echo pattern and the level of the echogenicity thyroid gland has a medium grayscale homogeneous echo pattern and the level of echogenicity is higher than Size of thyroid, showed an association study between low echo the thyroid gland and hypothyroidism In the current study y group according to Echogenicity. The higher percentage was (71.25 %) of Decrease Echogenicity compared to a lower percentage (28.75%) was echogenicity Ultrasound assessed thyroid nodules, types, and sizes, and the results were that the highest percentage of nodules (51.3%) were normal and (40.0%)were solid compared with the lowest ratio of (2.5%)whose composition was cystic solid and the percentage of nodules increased with age . The study included the type of thyroid nodules with echo the higher percentage (28.8%) was solid for decrease echogenicity cases compared with 11.3% of echogenicity cases, while a lower percentage of nodules were solid and cystic among decrease echogenicity cases and echogenicity cases. The association between the size of the thyroid and echogenicity was significant (P=0.040). of number nodules for the study group by echogenicity. The higher percentage (31.3%) of cases was few nodules for decrease echogenicity cases compared with 13.8% of normal cases. The lower percentage (11.3%) with multiple nodules was decreased echogenicity cases compared with 3.8% of normal cases. The association between number nodules and echogenicity was significant (P=0.047).

Conclusion

In the US, (71.25 %) of decrease echogenicity (28.75%) was echogenicity there 35.0% were of large thyroid and of Small thyroid. US reports showed that 40.0 % cases solid nodules, 11.3% of cases cystic, but 7.5% cystic and complex. The thyroid gland hypo-echogenicity and heterogeneity constitute findings of great importance in the diagnosis when correlated with hypothyroidism. And thyroid ultrasonography is useful to detect hypothyroidism there was an association between decreased echogenicity and thyroid dysfunction and high TSH levels, even in subjects with normal thyroid function, or subclinical or overt hypothyroidism.

Ethical Clearance: Taken from Middle Technical University ethical committee

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Conflict of Interest : Nil

References

(1) Rizzo LFL, Mana DL, Bruno OD, Wartofsky L. Coma mixedematoso. Medicina (B Aires) 2017; 77: 321-8.

(2) Alam, M. A., Quamri, M. A., Sofi, G., and Ansari, S. Update of hypothyroidism and its management in Unani medicine. Journal of basic, clinical physiology and Pharmacology. 2020; 1.

3)) Guglielmi, R., Grimaldi, F., Negro, R., Frasoldati, A., Misischi, I., Graziano, F., and Papini, E. Shift from levothyroxine tablets to liquid formulation at breakfast improves quality of life

of hypothyroid patients. Endocrine, Metabolic and Immune Disorders-Drug Targets (Formerly Current Drug Targets-Immune, Endocrine and Metabolic Disorders). 2018; 18(3): 235-240.

(4) Chiovato, L., Magri, F., and Carlé, A. Hypothyroidism in context: where we've been and where we're going. Advances in therapy. 2019; 36(2): 47-58.

(5) Stagnaro-Green, A., Abalovich, M., Alexander, E., Azizi, F., Mestman, J., Negro, R., and Wiersinga, W. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum thyroid. 2011; 21(10): 1081-1125.

(6) Waguespack SG. Thyroid sequelae of pediatric cancer therapy. Horm Res Paediatr. 2019; 91(2): 104–117.

(7) Nemeth, N. N., Walker, A., Baker, E. H., Murthy, P. L., and Bratton, R. L. Large-Scale Weibull Analysis of H-451 Nuclear-Grade Graphite Specimen Rupture Data. 2012.

(8) Hofstetter, L., and Messerli, F. H. Hypothyroidism and hypertension: fact or myth?. The Lancet. 2018; 391(10115): 29-30.

9)) Biondi, B., and Cooper, D. S. Thyroid hormone therapy for hypothyroidism. Endocrine. 2019; 66(1): 18-26.

(10) Jan Kratky, Jan Jiskra and Eliska Potlukova. The Role of Ultrasound in the Differential Diagnosis of Hypothyroidism. 2013; 10:5772-54678.

(11) Diagnostic Radiology Neuroradiology Including Head and Neck Imaging. Typeset at JPBMP typesetting unit Printed at chapter 24 Thyroid Imaging Alpana Manchanda. 2010; ISBN 978-93-80704-25-8.

(12) Jeong, Sun Hye MD, PhDa; Hong, Hyun Sook MD, PhDa, Lee, Ji Ye MDa,b. The association between thyroid echogenicity and thyroid function in pediatric and adolescent Hashimoto's thyroiditis. 2019; 98 (14): e15055.

(13) Kim DW, Eun CK, In HS, Kim MH, Jung SJ, Bae SK. Sonographic differentiation of asymptomatic diffuse thyroid disease from normal thyroid: a prospective study. AJNR Am J Neuroradiol. 2010;31(10).

(14) Nygaard, B. Clinical evidence hypothyroidism (primary). B. M. J. (2010); 01: 605.

(15) Baha, M. Estrogen replacement therapy may exacerbate hypothyroidism . Natio. Engla. J. Medic. 2001; 344 : 1743-1749.