Original Article

Ultrasound Findings of Neck in Paediatric Patients with Hypothyroidism in Tertiary Care Hospital

Tanzeela Awan and Nighat Haider

ABSTRACT

Objective: To evaluate ultrasonographic features of hypothyroidism in children at tertiary care hospital.
Study Design: Prospective cross sectional study
Place and Duration of Study: This study was conducted at the Department of Paediatrics, Children Hospital, Pakistan Institute of Medical Sciences, Islamabad from 1st January 2022 to 30th June 2022.
Materials and Methods: Fifty children who were less than 12 years with hypothyroidism were enrolled. The children with comorbid conditions and not willing to participate were excluded. The medical reports of children presenting with hypothyroidism and swelling in front of neck were evaluated after their consent by ultrasonography.
Results: The mean age of patients was 5.91±2.24. There were 27 (54%) were males and 23 (46%) were females. Fourteen (28%) had hypogenous type of echotexture, 2 (4%) had normal type of echotexture and 34 (68%) had heterogeneous echotexture. Majority of the participants had cyst i.e. 31 (62%) and 33 (66%) had lymphadenopathy. There was insignificant association of lobe size with age ($p>0.05$).
Conclusion: Ultrasound scanning is a non-invasive, widely accessible, and less expensive technique for diagnosis of thyroid disorder. In the investigation and treatment of thyroid problems, thyroid ultrasonography has become a well-known and effective tool.

Key Words: Thyroid disorder, Children, Ultrasonography, Diagnosis

Citation of article: Awan T, Haider N. Ultrasound Findings of Neck in Paediatric Patients with Hypothyroidism In Tertiary Care Hospital. Med Forum 2022;33(12):109-112.

INTRODUCTION

Globally, the second most prevalent endocrine disorder in children, after diabetes, is thyroid disease, which has a significant share of pediatric endocrine disorders.[1] The clinical effects of thyroid disease depend on the age of the infant or child because of the developmental and organ- or tissue-specific effects of thyroid hormone on tissue maturation. Thyroid disorder in infants and children causes metabolic disturbances and also impairs growth and development.[2]

Tri-iodothyronine (T3), thyroxine (T4), and thyroid-stimulating hormone (TSH) circulating levels are unbalanced as a result of a variety of disorders defined by hypothyroidism or hyperthyroidism.[3] A central abnormality of hypothalamic-pituitary function can directly or indirectly cause thyroid dysfunction.

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Received: April, 2022
Accepted: September, 2022
Printed: December, 2022

Hypothyroidism can permanently impair a child's intellectual abilities if it is not diagnosed and treated in the early stages of childhood. Over time, it can also affect skeletal maturation and growth.[4] The spectrum of iodine deficiency disorders in children and adolescents includes goiter, subclinical hypothyroidism, poor mental function, delayed physical development, and increased thyroid gland susceptibility to radiation.[5] Children seem to suffer more frequently from thyroid diseases.[6] Compared to adults, there are significant differences in the etiology, prevalence, clinical presentation, and clinical outcomes of thyroid problems in children and adolescents.[7] Early diagnosis of thyroid disease is very important for a child's growth and development. Currently, ultrasonography in addition to clinical examination and thyroid function testing is the preferred approach for thyroid diagnosis.[8]

Thyroid imaging is recommended as part of newborn screening or when there is a palpable thyroid mass in children and adolescents to detect congenital hypothyroidism.[9] However; imaging plays an important role in the diagnosis of thyroid disease in pediatric patients. Radionuclide scintigraphy and ultrasound are the two main imaging modalities used to diagnose thyroid disease. The aspiration of nodules found can also be guided by ultrasound. Because scintigraphy provides functional information and ultrasound provides anatomic information, they complement each other. Ultrasonography is a first-line diagnostic tool for

lymphadenopathy and thyroid abnormalities in pediatric patients.[10]

In children, the size of the thyroid gland varies with age and is related to body surface area, height, weight, and age. Visual indicators of thyroid gland enlargement include anterior convexity rather than the normal isthmus's concavity, narrowing of the trachea, and greater isthmus thickness.[11-13] According to Chang et al, 14% of pediatric patients who showed no uptake on scintigraphy had a thyroid gland they were found in the correct location on ultrasound. If the thyroid is found in normal position, greater diagnostic power is available to determine aetiology, decision of discontinuation of treatment, and prognosis.[14] Ultrasound can also be used to ensure a newborn with congenital hypothyroidism has a normal thyroid in the correct location. Ultrasound has been increasingly utilized for evaluation of the thyroid structure. It is a useful adjunct to clinical exam to evaluate thyroid size and anatomy and to detect nodules. Therefore, this study was designed to evaluate ultrasonographic features of hypothyroidism in children at tertiary care hospital. It will help us to correlate possible underlying cause of hypothyroidism with ultrasonographic findings so that early evaluation and intervention can be done for better outcome of this condition.

MATERIALS AND METHODS

This prospective cross-sectional study was conducted at the Children Hospital, Pakistan Institute of Medical Sciences, Islamabad. After the approval of Ethics Committee, 50 children who were less than 12 years with hypothyroidism were enrolled. The Children with comorbid conditions and not willing to participate were excluded. The medical reports of children presenting with hypothyroidism and swelling in front of neck were evaluated after their consent by ultrasonography and findings were collected. Data was entered and analyzed by SPSS 25.0. Chi-square test was applied to find out significant association between categorical variables.

RESULTS

The mean age of patients was 5.91±2.24. There were 27 (54%) were males and 23 (46%) were females. As far as size of right lobe was concerned, there were 1 (2%) patients whose lobe size was below average, 10 (20%) were had normal and 39 (78%) patients were had above average. Whereas, 4 (8%) patients had left lobe size below average, 5 (10%) patients had normal lobe size and 41 (82%) had left lobe size as above average. Fourteen (28%) had hypogenous type of echotexture, 2 (4%) had normal type of echotexture and 34 (68%) had heterogeneous echotexture. Majority of the participants had cyst i.e. 31 (62%) and 19 (38%) were not having cyst. Almost 56% patients had focal lesions and 66% patients had lymphadenopathy (Table 1). Both left and right lobes are insignificantly associated with age (p>0.05) [Tables 2-3).

Table 1: Demographic and clinical features of pediatric patients (n=50)

Variable	No.	%
Age (Years)	5.91±2.24	
Gender		
Male	27	54.0
Female	23	46.0
Lobe size (right)		
Below average	1	2.0
Normal	10	20.0
Above average	39	78.0
Lobe size (left)		
Below average	4	8.0
Normal	5	10.0
Above average	41	82.0
Echotexture		
Hypogenous	14	28.0
Normal	2	4.0
Heterogeneous	34	68.0
Cyst		
Yes	31	62.0
No	19	38.0
Focal Lesion		
Yes	28	56.0
No	22	44.0
Lymphadenopathy		
Yes	33	66.0
No	17	34.0

Table 2: Association of age and lobe size (right) of pediatric patients

Age	Right Lobe			Chi square	P value
	Normal	Above average	Below average		
< 7 years	4	25	-	3.307	0.191
≥ 7 years	6	14	1		

Table 3: Association of age and lobe size (left) of pediatric patients

Age	Left Lobe			Chi square	P value
	Normal	Above average	Below average		
< 7 years	2	25	2	0.919	0.632
≥ 7 years	3	16	2		

DISCUSSION

Since ultrasound was first utilized as a new diagnostic tool for thyroid diseases in the 1960s, however it was evolved into a significant component to the examination.[15] It is common practice to employ thyroid

ultrasonography as a first-line diagnostic method for identifying and classifying nodular thyroid disease. Ultrasound scanning is a non-invasive, widely accessible, and less expensive technique for diagnosis of thyroid disorder. Furthermore, in cases of thyroid disease, real-time ultrasound imaging helps in planning diagnostic and therapeutic interventional procedures. A blood test or a radioactive isotope uptake test is typically necessary to evaluate thyroid function, which includes whether the thyroid gland is underactive, hyperactive, or functioning normally. This is the main limitation of ultrasonography in thyroid scanning.[16]

The results of current study showed the demographic and clinical features of pediatric patients. The mean age of patients was 5.91±2.24. There were 27 (54.0%) were males and 23 (46.0%) were females. These findings were compared with literature.[15,16]

The findings of an observational study reported that the majority of individuals with abnormal thyroid hormone levels belonged to the 0-1 year age group, followed by 9–12 years, according to demographic data on these patients. The total male to female ratio was 1:1.2, but as patients got older, the female majority of cases increased gradually, reaching 1:2.5 in the age group of 9-12 years.[17] However, a study revealed that thyroid issues are well recognized to be more prevalent in women of all ages.[18] Previous research in Indian children have shown that there are more females than males in these populations.[19]

In the present study it was reported that out of 50 patients, 14 (28%) had hypogenous type of echotexture, 2 (4%) had normal type of echotexture and 34 (68%) had heterogeneous echotexture. Majority of the participants had cyst i.e. 31 (62%) and 19 (38%) were not having cyst. Almost 56% patients had focal lesions and 66% patients had lymphadenopathy. In a study conducted in Japan conducted a study on 3 centers which includes children range from 3-18 years. The results of the study revealed that 56.88% have thyroid cysts and 1.65% have thyroid nodules.[20] Another study conducted in Nagasaki also reported that thyroid cysts was present in 42.51% and thyroid nodules in 0.73% of the children.[21] The use of US to assess thyroid structure has increased. To assess thyroid size and structure and find nodules, it is a helpful alternative to clinical examination. In autoimmune thyroiditis (AIT), diffuse echogenicity or the presence of micro nodules are commonly reported findings and are considered reliable indicators of AIT. US has also been useful in identifying patients at risk for developing hypothyroidism in patients with AIT.[22]

CONCLUSION

The important function that thyroid hormones play in fetal and early neonatal brain development and their effects on growth and development in the first two decades of life. In the investigation and treatment of thyroid problems, thyroid ultrasonography has become a well-known and effective tool. Not only radiologists, but also endocrinologists and surgeons who use advanced ultrasound techniques in their routine clinical and surgical practice are fond of these techniques.

Author's Contribution:

Concept & Design of Study:	Tanzeela Awan
Drafting:	Nighat Haider
Data Analysis:	Nighat Haider
Revisiting Critically:	Tanzeela Awan, Nighat Haider
Final Approval of version:	Tanzeela Awan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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