

Prevalence of thyroid nodules in patients undergoing thyroid ultrasonography at a tertiary care centre

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Abstract

Background: Thyroid nodules are common diseases, and have been detected up to 50% of the general population. Imaging plays a key role in the diagnosis and characterisation of thyroid diseases, and the information provided by imaging studies is essential for management planning.

Objectives: To assess the prevalence of thyroid nodules in patients undergoing Thyroid ultrasonography in a tertiary care centre.

Methods: A descriptive cross-sectional study was done among 86 patients. Data were collected from October 2021 to March 2022 after ethical clearance. Thyroid Imaging, Reporting and Data System were used to access the thyroid nodules. Descriptive statistics were applied using SPSS v.20.

Results: The prevalence of thyroid nodules was seen in 98 (88%) individuals in total distributed in 15 (15.3%) males, and 83 (84.7%) females. Among total 98 patients, 66 (67.3%) patients had right thyroid nodules: benign 50 (51%), malignant 16 (16.3%) and 52 (53.7%) had left thyroid nodules: benign 36 (36.7%), malignant 16 (16.3%). The composition of thyroid nodules among majority participants was cystic type, anechoic type of echogenicity. Significant relationship was seen among female gender and malignancy, solid composition of thyroid nodules, and ill-defined margin.

Conclusion: The prevalence of thyroid nodules was higher in comparison to other studies. Sonographic features like consistency, margin, and echotexture could differentiate benign and malignant thyroid nodules by using Thyroid Imaging Reporting and Data System.

Key words: Cross sectional study; Prevalence; Thyroid nodule; Ultrasonography.

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INTRODUCTION

Thyroid nodules are common diseases, detected in up to 50% of general population.¹ Ultrasonography (USG) is generally the first choice for evaluation of thyroid morphology because of its high sensitivity for small nodule detection. The spatial resolution achieved by ultrasound is of 0.7 to 1 mm order, not achieved by any other imaging methods.² Thus, ultrasound is preferred for screening thyroid nodules and for carrying out preoperative assessment compared with more expensive and invasive fine-needle aspiration.^{2,3} Furthermore it is a very accurate and highly sensitive method for detecting thyroid gland lesions. However, its usefulness in differentiating benign and malignant thyroid gland tumours is relatively low.⁴

Thyroid Imaging Reporting Data System (TIRADS) is a risk stratification system for classifying thyroid lesions on ultrasound.⁵ In evaluation of thyroid nodule, clinical challenge lies in identifying subjects at high risk of developing thyroid cancer.⁶

American College of Radiology (ACR) released TIRADS in 2009 to standardise ultrasound results. This specification makes assessment of benign and malignant thyroid nodules clearer. Application of TIRADS classification helps to regulate domestic ultrasound diagnosis; the standard was revised in 2015.^{7,8} This study aimed to assess the prevalence of thyroid nodules in patients undergoing thyroid ultrasonography at a tertiary care centre.

METHODOLOGY

A descriptive cross-sectional study was conducted in adult population who came to the Department of Radiology, Kathmandu Medical College (KMC) Teaching Hospital for thyroid USG with suspected thyroid nodules from October 2021 to March 2022. Ethical approval was obtained from the Institutional Review Committee of KMC (Ref. 0609202106). Patient who has undergone thyroid fine-needle aspiration or biopsy prior to USG and those with diffuse thyroid disease like thyroiditis, thyroid enlargement were excluded from the study.

A convenient sampling method was used and the sample size was calculated using the formula, Sample size (n) = Z^2pq/e^2 ; Where $Z = 1.96$ at 95% confidence interval; $p = 0.17$ (17.7%);⁹ $q = 0.83$; $e = 0.07$ (7% margin of error). The total sample size calculated was $110.62 \approx 111$.

All the participants were informed about the study in detail. Written informed consent was taken from each participant. Detailed patient information and proper clinical history were documented. The USG was performed using USG-LOGIQ P3 by Wipro GE Ultrasound equipment using a high frequency 5–12 MHz probe. Patients were kept in reclining position with neck hyperextended. Thyroid nodules were assessed according to the guidelines of TIRADS. Scoring was done based on composition, echogenicity, shape, margin, and echogenic foci of thyroid nodules. Adding all points from above categories TIRADS level was determined (0 points = TR1 benign, 2 points = TR2 not suspicious, 3 points = TR3 mildly suspicious, 4 to 6 points = TR4 moderately suspicious, 7 points or more = TR5 highly suspicious).

ACR TI-RADS does not include subcategories and TR0 category to indicate a normal thyroid gland so both categories were excluded in this study.

Data regarding demographic variable and radiological diagnosis of thyroid nodules were collected and documented on a structured proforma and data entry

and analysis was done in IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis was done. All categorical data were expressed in frequency and percent. All numerical continuous data were expressed in mean \pm SD. Figure 1 shows Hypoechoic, irregular margin, wider than taller lesion noted in right thyroid gland.

RESULTS

A total of 111 cases underwent evaluation by USG among which only 98 (88.3%) cases were thyroid related and rest 13 (11.7%) were non-thyroid cases. The mean age of participants was 44.8 ± 16.74 years. Majority of the cases 22 (22.4%) were in the age group of 51-60 years of age followed by 20 (20.4%) cases in age group of 31-40 years of age. The number of female cases 83 (84.7%) outnumbered the male cases 15 (51.3%) in this study. The ethnic distribution of the case participants observed were 35 (35.8%) Dalit, and 31 (31.6%) Brahmin forming the majority (Table 1).

The prevalence of thyroid nodules was seen in 98 (88%) individuals in total distributed in 15 (15.3%) males, and 83 (84.7%) females. Among total 98 patients, 66 (67.3%) patients had right thyroid nodules: benign 50 (51%), malignant 16 (16.3%) and 52 (53.7%) had left thyroid nodules: benign 36 (36.7%), malignant 16 (16.3%).

Regarding morphological characteristics of thyroid nodules by ultrasonography, the composition of thyroid nodules among majority participants were cystic type: 49 (56.9%) in right lobe and 34 (39.5%) in left lobe for benign cases (Table 2). Twelve (37.5%) malignant cases in right lobe had spongiform composition. Anechoic type 18 (20.93%) of echogenicity was found followed by hypoechoic type 15 (17.4%) among benign cases in right lobe. Similarly in left lobe 11 (12.79%) benign cases were noted an echoic type and equal number of hyper and hypoechoic type 10 (11.62%) each. Similar type of finding was noted about shape in right and left nodules in benign cases each 19 (22%) and 20 (23.2%) respectively in left lobe. Smooth margin was noted in benign cases in right 44 (51.1%) and left lobe 33 (38.3%). Increased vascularity was seen in six (18.7%) malignant cases, however majority of the cases showed absence of increased vascularity in both lobes (Table 2).

There was no significant relationship between age, ethnicity, family history, and malignancy. However, Female gender was associated with presence of nodules and malignancy ($p < 0.005$).

There was a significant relationship between internal consistency and malignancy (p-value <0.001). Most benign cases had cystic type of consistency while malignancies had solid composition. Furthermore, smooth margin of thyroid was more likely to be benign than ill defined (p <0.008). There was no significant relationship between malignancy and echogenicity, shape and vascularity (Table 3).

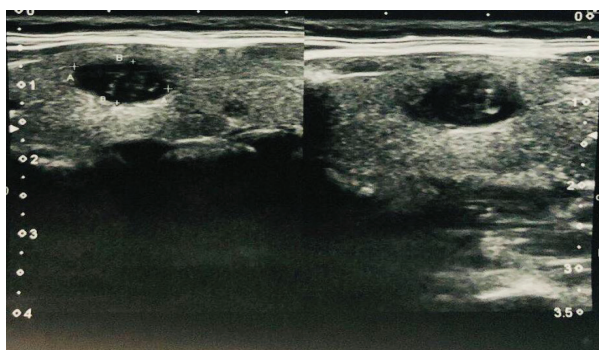


Figure 1: Ultrasonographic picture of right thyroid gland

Table 1: Distribution of socio-demographic variables of the participants (N=111)

Variables	n (%)
Age	
<20	9 (9.2)
21-30	13 (13.3)
31-40	20 (20.4)
41-50	16 (16.3)
51-60	22 (22.4)
61-70	12 (12.2)
71-80	4 (4.1)
81-90	2 (2.0)
Sex	
Male	15 (15.3)
Female	83 (84.7)
Ethnicity	
Brahmin	31 (31.6)
Chhetri	19 (19.4)
Janajati	6 (6.1)
Dalit	35 (35.8)
Madhesi	7 (7.1)
Family History	
Yes	16 (16.3)
No	82 (83.7)

Table 2: Morphological characteristics of thyroid nodules, n (%)

USG characteristics	Right lobe		Left lobe	
	Benign (n=50)	Malignant (n=16)	Benign (n=36)	Malignant (n=16)
Composition				
Cystic	49 (56.9)	1 (3.1)	34 (39.5)	5 (15.6)
Spongiform	1 (1.2)	12 (37.5)	2 (5.6)	4 (12.5)
Mixed cystic and solid	-	2 (6.3)	-	1 (3.1)
Solid and almost completely solid	-	1 (3.1)	-	6 (18.8)
Echogenicity				
Anechoic	18 (20.9)	-	11 (12.79)	1 (3.12)
Hyperechoic	10 (11.6)	6 (18.8)	10 (11.6)	6 (18.8)
Hypoechoic	15 (17.4)	8 (25.0)	10 (11.6)	5 (15.6)
Isoechoic	7 (8.1)	2 (6.3)	5 (5.8)	4 (12.5)
Shape				
Wider than tall	19 (22.1)	10 (31.3)	20 (23.3)	8 (25.0)
Taller than wide	2 (2.3)	1 (3.1)	1 (1.2)	2 (6.3)
Margin				
Smooth	44 (51.2)	5 (15.6)	33 (38.4)	4 (12.5)
Ill-defined	6 (6.9)	7 (21.9)	2 (2.3)	8 (25.0)
Lobulated or irregular	-	4 (12.5)	1 (1.2)	3 (9.4)
Extra thyroidal extension	-	-	-	1 (3.1)

Vascularity				
Central	1 (1.2)	1 (3.1)	-	1 (3.1)
Peripheral	1 (1.2)	3 (9.4)	1 (1.2)	1 (3.1)
Both	7 (8.1)	3 (9.4)	6 (6.9)	6 (18.8)
Absent	41 (47.7)	9 (28.1)	29 (33.7)	8 (25.0)

Table 3: Association of malignant and benign thyroid nodules with demographic and sonographic features, n (%)

Variables	Benign	Malignant	p-value
Age (in years)			
<40	21 (30.0)	11 (39.3)	0.25
>40	49 (70.0)	17 (60.7)	
Gender			
Male	15 (21.4)	-	0.005
Female	55 (78.6)	28 (100)	
Ethnicity			
Brahmin	20 (28.6)	11 (39.3)	0.52
Chhetri	15 (21.4)	4 (14.3)	
Janajati	26 (37.1)	9 (32.1)	
Dalit	3 (4.3)	3 (10.7)	
Madhesi	6 (8.6)	1 (3.6)	
Family history			
Yes	25 (35.7)	8 (28.6)	0.63
No	45 (64.3)	20 (71.4)	
Composition			
Cystic	42 (82.3)	9 (37.5)	<0.001
Spongiform	6 (11.8)	1 (4.2)	
Mixed	2 (3.9)	5 (20.8)	
Solid	1 (2.0)	9 (37.5)	
Echogenicity			
Anechoic	19 (34.5)	2 (8.0)	0.42
Hyper or isoechoic	19 (34.5)	13 (52.0)	
Hypoechoic	17 (31.0)	10 (40.0)	
Shape			
Wider than tall	15 (100)	14 (82.4)	0.22
Taller than wide	-	3 (17.6)	
Margin			
Smooth	26 (78.8)	8 (34.8)	0.008
Ill-defined	6 (18.2)	10 (43.5)	
Lobulated or irregular	1 (3.0)	4 (17.4)	
Extrathyroidal extension	-	1 (4.3)	
Vascularity			
Any form of vascularity	11 (15.7)	8 (28.6)	0.05
Perinodular	2 (2.9)	4 (14.3)	
Intranodular	2 (2.9)	1 (3.6)	
No change	55 (78.6)	15 (53.6)	
Fisher exact test was used			

DISCUSSION

In this study the prevalence of thyroid nodules was 88% out of 111 cases. Higher prevalence was seen in the study done by Khadka et al.¹⁰ In the study done by Ahmed et al.¹¹ the prevalence was only 25.1%. The total benign cases in this study were 86 (87.7%) and malignant cases were 32 (32.65%). Among 66 patients in Khadka et al.'s study,¹⁰ there were 56 benign nodules and only six malignant nodules were noted. The malignant cases were seen among females than males in this study and female gender was associated with presence of nodule. This finding was similar with the study of Ahmed et al.¹¹

This study showed solid lesions to be associated with malignancy and cystic with benign, which is consistent with most studies done previously.^{10,12,13} Ill-defined margins were seen more frequently in malignant lesion in this study and was statistically significant which was consistent with study done by Arpana et al.¹³ Many studies^{10,13} showed that increased vascularity was associated with malignant nodules however this study

has shown no change of vascularity among malignant nodules.

There were some limitations to the study. The small sample size in this study is the main limitation; only 111 participants. It is recommended to conduct a similar study with larger sample size in order to identify the malignancy markers more accurately. Secondly the authors of this study could not differentiate benign and malignant thyroid nodule based on fine-needle which is a Gold standard method.

CONCLUSION

The prevalence of thyroid nodules is higher. Gender wise, female patients with thyroid nodules come to health centre more in comparison to male. Malignant nodules are solid or predominantly solid whereas cystic nodules are likely to be benign. Ill defined margins characterised malignancy of thyroid nodules.

Conflict of interest: None

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