

A CROSS SECTIONAL STUDY TO EVALUATE DIAGNOSTIC ROLE OF USG BASED TIRADS CLASSIFICATION FOR DIAGNOSIS OF THYROID NODULES USING BETHESDA CLASSIFICATION ON FNAC AS GOLD STANDARD

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Abstract:

Thyroid gland is affected by various pathologies ranging from nodules to diffuse thyroiditis. Ultrasound is a widely accepted imaging modality for the initial assessment of thyroid nodules. TIRADS classification is a simple and reliable imaging modality to differentiate benign lesions from the malignant lesions. TIRADS can prevent unnecessary FNACs in a significant group of benign thyroid lesions. The sonographic patterns proposed by TIRADS have high sensitivity and NPV for the diagnosis of thyroid carcinoma. This classification is very much feasible for clinical application and has an excellent negative predictive value allowing the selection of patients to FNAC.

1. **Aim:** To study the ultrasonography of the thyroid gland to evaluate the diagnostic role of TIRADS in differentiating benign from malignant thyroid nodules with pathological correlation. **Results:** Present study show 94.87% specificity and 70% sensitivity in diagnosing malignant nodules with the help of TIRADS with a diagnostic accuracy of 86 %. The positive likelihood ratio > 1 with a 95% confidence interval of 8.13 to 23.09 indicate that there is a significant association between the TIRADS scoring system and the histopathological diagnosis of the thyroid nodules. Also the study shows the negative predictive value of 87.06% effectively screens the patients so as to avoid unnecessary FNAC/biopsy.
2. **Conclusion:** Our study suggests that there is a significant correlation between the TIRADS score assigned to the nodules and histopathological report. There is concordance of 87 % observed with pathological findings in the present study.

Keywords: FNAC, TIRADS, USG

Introduction:

Thyroid swelling is a common disorder and almost 13% of adult Asian Indians have been shown to have a palpable nodule. Nodules are the main cause of concern among all thyroid pathologies because of their malignant potential. High resolution ultrasound is a good, safe, cost effective, widely available, and easily reproducible imaging tool for diagnosis of clinically suspected thyroid lesions.

There are well-established ultrasound findings that differentiate benign and malignant thyroid nodules and there are many classification systems which categorizes thyroid nodules according to the risk of cancer. TIRADS classification originally proposed by Horvath et al. and subsequently modified by Kwak et al. is as follows: TIRADS 1—normal thyroid gland; TIRADS 2—benign lesions (including simple cyst, spongiform nodule, isolated macro calcification and typical sub acute thyroiditis) ; TIRADS 3—probably benign lesions (no suspicious ultrasound [US] features or nodules that are iso or hyper echogenic); TIRADS 4— suspicious lesions, TIRADS 5—probably malignant lesions (all five suspicious US features); and TIRADS 6— biopsy-proven malignancy.

Ultrasound imaging characteristics which were considered suspicious were (I) solid nodule (II) micro calcifications, (III) irregular or micro lobulated margins, (IV) marked hypo echogenicity and (V) taller than wide shape. TIRADS 4a had a 5–10% risk of malignancy, while 4b and 4c had a 10–80% risk of malignancy. TIRADS 5 category lesions have 80% risk of malignancy.

Category-based reporting system for thyroid FNAC is as follows: Bethesda Class I- inadequate or unsatisfactory, Bethesda Class II -benign thyroid nodules, Bethesda Class III -follicular lesion of undetermined significance, Bethesda Class IV -(suspicious for) follicular neoplasm, Bethesda Class V-suspicious for malignancy and Class VI-malignant.

Of the many classification systems that have been described, Thyroid Imaging Reporting and Data System (TIRADS) described by Kwak et al. is a relatively simple system which can be easily adopted, just like Breast Imaging Reporting and Data System (BIRADS) which has been successfully used for several years to assess breast lesions.

MATERIALS AND METHODS

STUDY TYPE: Qualitative study

STUDY DESIGN: Hospital based Prospective comparative study.

STUDY UNIVERSE: All patients attending OPD in SMS medical college and attached hospitals with clinically suspected thyroid lesions

SAMPLING TECHNIQUE: Every eligible case was included in our study

STUDY POPULATION: The study included all patients with clinically suspected thyroid lesions who visited Department of Radiodiagnosis, SMS Medical College and attached hospital, Jaipur and had thyroid lesion on USG.

STUDY AREA: Department of Radiodiagnosis, SMS Hospital, Jaipur, Rajasthan.

STUDY DURATION: Data collection for study was started after approval from the institutional research and review board from April 2020 to September 2022.

SAMPLE SIZE: Sample size was calculated 115 cases who met the inclusion criteria

INCLUSION CRITERIA:

- All patients referred to the Department of Radiodiagnosis with clinically suspected thyroid pathology.

EXCLUSION CRITERIA:

2. Patients with diffuse thyroid disease.
3. Patients with already diagnosed thyroid pathology who came for a follow up scan.

STUDY TOOL: Pre-tested, pre-designed proforma was used to collect data.

EQUIPMENT: CANON TOSHIBA APLIO 300 USG MACHINE

Results and discussion:

In our study, most of the patients presenting were under 30- 39 year of age and majority were female (91%). Majority of the patients presented with neck swelling (80%), followed by dysphagia (15%) and pain (5%).

- In our study, sensitivity, specificity , PPV , NPV and accuracy of USG based TIRADS for detecting benign lesions were 94.87%, 70.27%, 87.06%, 86.67% and 86.96% respectively.
- In our study, sensitivity, specificity , PPV , NPV and accuracy of USG based TIRADS for detecting malignant thyroid lesions were 70.27%, 94.87%, 86.67%, 87.06% and 86.96% respectively.
- Our study showed 94.8% specificity and 70.27% sensitivity in diagnosing malignant nodules with the help of TIRADS with a diagnostic accuracy of 86 %. The positive likelihood ratio > 1 with a 95% confidence interval of 8.1 to 23.09 indicate that there is a significant association between the TIRADS scoring system and the histopathological diagnosis of the thyroid nodules. Also the study shows the negative predictive value of 87.06% effectively screens the patients so as to avoid unnecessary FNAC/biopsy.
- In our study final results showed that there is a significant correlation between the TIRADS score assigned to the nodules and histopathological report. There is concordance of 87 % observed with pathological findings in the present study.

Table 1: TIRADS category in relation to cytopathology

TIRADS category	Malignant		Benign		Total	Malignancy risk
	N	%	N	%		
TIRADS –II/III/IVA	11	12.9	74	87.1	85	12.9
TIRADS–IVB/IVC/V	26	86.7	4	13.3	30	86.7
Total	37	32.2	78	67.8	115	32.2
Chi-square = 51.903 with 1 degree of freedom; P < 0.001 (S)						

Table 2: Diagnostic parameters of TIRADS for diagnosis of benign lesions

Parameter	Value	95% CI
Sensitivity	94.87%	(87.54, 97.99)
Specificity	70.27%	(54.22, 82.51)
Positive Predictive Value	87.06%	(78.3, 92.62)
Negative Predictive Value	86.67%	(70.32, 94.69)

Diagnostic Accuracy	86.96%	(79.59, 91.93)
Likelihood ratio of a Positive Test	3.191	(2.666 - 3.819)
Likelihood ratio of a Negative Test	0.07298	(0.04331 - 0.123)

Table 3: Diagnostic parameters of TIRADS for diagnosis of malignant lesions

Parameter	Value	95% CI
Sensitivity	70.27%	(54.22, 82.51)
Specificity	94.87%	(87.54, 97.99)
Positive Predictive Value	86.67%	(70.32, 94.69)
Negative Predictive Value	87.06%	(78.3, 92.62)
Diagnostic Accuracy	86.96%	(79.59, 91.93)
Likelihood ratio of a Positive Test	13.7	(8.131 - 23.09)
Likelihood ratio of a Negative Test	0.3134	(0.2618 - 0.375)

Figure 1: Diagnostic parameters of TIRADS for diagnosis of malignant lesions

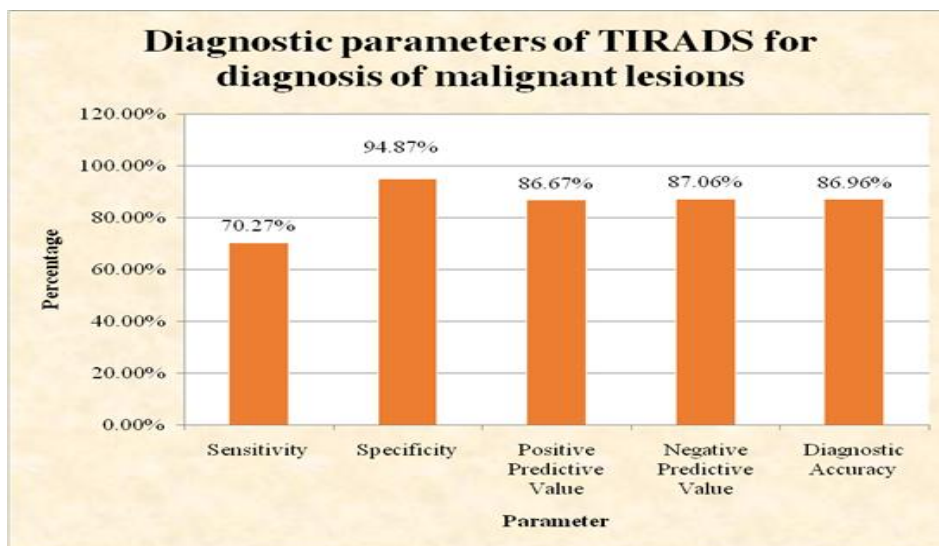
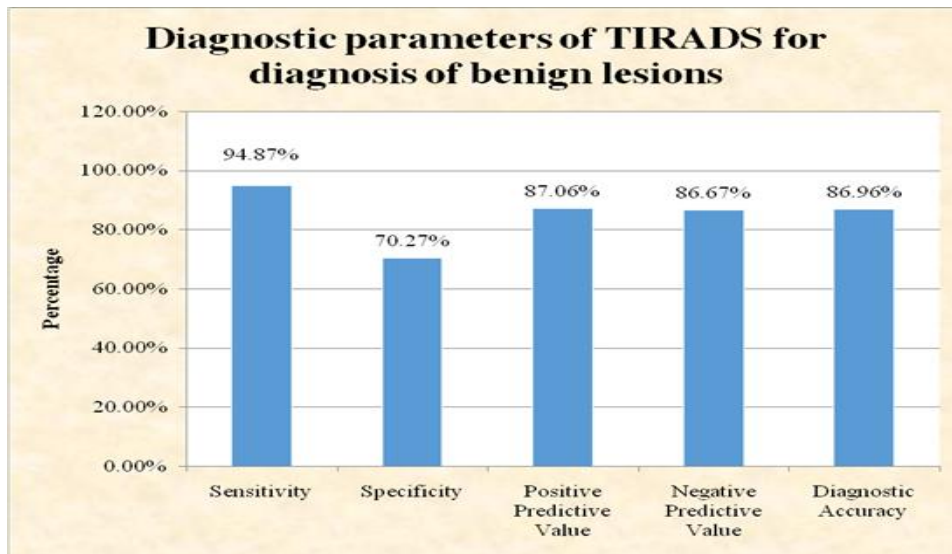


Figure 1: Diagnostic parameters of TIRADS for diagnosis of benign lesions



Conclusion: This study concludes that TIRADS classification is a simple but reliable imaging modality in differentiating benign lesions from the malignant lesions. Presence of any suspicious ultrasound features of malignancy encourages the radiologist's confidence while classifying a lesion as malignant on TIRADS. The sonographic patterns proposed by TIRADS have high sensitivity and NPV for the diagnosis of thyroid carcinoma. This classification is very much feasible for clinical application and has an excellent negative predictive value allowing the selection of patients to FNAC.

Conflict of the study

There was no conflict of interest in study.

LIMITATIONS OF THE STUDY

1. This was a smaller and single centre study, larger and multi-centre studies are required for better correlation of our findings.
2. Lack of MRI study in patients with metallic implants and cardiac pacemakers.

Case illustration:

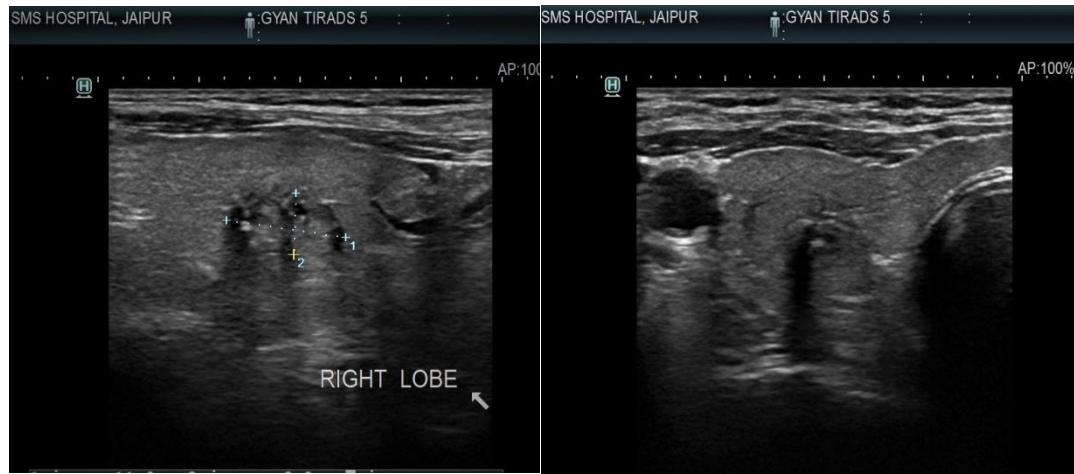


Figure 2A,B: USG images showing an ill-defined heterogeneous mass in right lobe thyroid with few punctate foci of calcifications are seen.

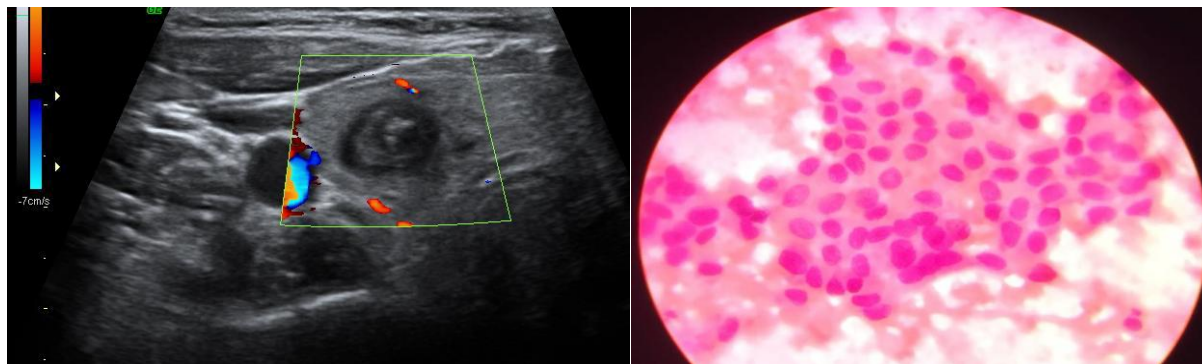


Figure 3 C, D :USG image shows no significant vascularity on colour Doppler image. Microscopy revealed suspicious papillary carcinoma.

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