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Correlation between Tirads Ultrasound Criteria and Bethesda 2017 System for Reporting Thyroid Cytopathology: A Three Year Retrospective Study at a Tertiary Care Centre in Haryana, India

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ABSTRACT

Aims: *Currently it is common in our country to advise ultrasound of the thyroid gland and fine needle aspiration cytology (FNAC) together for in case of nodular thyroid disease. Some recent studies on correlation of the ultrasound findings and the cytological findings seem to suggest that in many of such cases, FNAC can be avoided. The current study was undertaken to provide clarification in the matter.* ***Material and Methods:*** *This is a retrospective cross-sectional study carried out in Departments of Radiology and Pathology of a tertiary care hospital in Haryana, India between January 2018 and December 2020. The study included those patients diagnosed to be having thyroid nodules on ultrasound of the thyroid gland. These patients subsequently underwent ultrasound guided FNAC. On ultrasonography the thyroid nodules were categorised in to various TIRADS categories using the American College of Radiology TIRADS system. The cytopathological findings were categorised on the Bethesda 2017 system. The data from the ultrasonological and cytopathological systems was tabulated together and various statistical analysis values were obtained.* ***Results:*** *492 patients were included in this study. After tabulating the data from the TIRADS and the Bethesda systems together, we obtained a sensitivity of 85.7%, specificity of 97.7%, positive predictive value of 52.2%, negative predictive value of 99.6%, and accuracy of 97.4%. Pearson Chi-square value was 212.4 and p-value <0.001 indicating significant association between the two systems. Area under ROC curve was 0.99 indicating that the results are very good. We calculated that 95% of our patients (belonging to TIRADS categories 2 & 3) had only 1.7% overall risk of malignancy.* ***Conclusions:*** *There is significant correlation between TIRADS and Bethesda systems for thyroid nodules. Vast majority of patients with thyroid nodules can be kept under follow-up following ultrasound examination and need not undergo the invasive FNAC procedure.*

Keywords: Bethesda, Fine needle aspiration cytology, Malignancy risk, Thyroid image reporting and data system, Thyroid nodule

INTRODUCTION

The Nodular thyroid disease is detected in 3-7% of the adult population worldwide [1]. Though most of the thyroid nodules are benign, some of them are known to harbor malignancy [2]. Thyroid cancers carry good long-term prognosis after surgical excision [3]. Selecting those patients whose thyroid nodules harbor malignancy accurately would prevent unnecessary thyroidectomies in those persons carrying benign thyroid lesions [4]. Thyroid

Figure 2 Ultrasound image of TI-RADS grade-TR5 nodule

NPV and accuracy values. These values are also shown graphically in Figure 3 We obtained Pearson Chi-square value of 212.4 and p-value < 0.001 indicating significant correlation between TIRADS and Bethesda systems of classification of thyroid nodules. Area under ROC curve of 0.99 (Figure 4) indicates that the results are very good. Risk of malignancy calculated for TIRADS-2 grade was 0% and as low as 1.7% for TIRADS-3 grade in our study. On the other hand, it was as high as 37.5% and 85.7% respectively for TIRADS grades 4 & 5. Hence, based on these results, we recommend followup for thyroid nodules falling in TIRADS grades 2 and 3 and FNAC for higher TIRADS grades. Thus, approximately 95% of patients with thyroid nodules referred for ultrasound study can avoid undergoing FNAC and can be kept on follow-up.

Table 2 Cross tabulation of TIRADS and Bethesda Grades

	Bethesda 4-6	**Bethesda 1-3**	**Total**	**Sensitivity**	**Specificity**	**PPV**	**NPV**	**Accuracy**
TIRADS 4-5	12	11	23	85.70%	97.70%	52.20%	99.60%	97.40%
TIRADS 2-3	2	467	469					
Total	14	478	492					

Figure 3 Graphical representation of Sensitivity, Specificity, PPV, NPV & Accuracy