Original Research Paper

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General Surgery

A STUDY COMPARING ULTRASONOGRAPHY, FINE NEEDLE ASPIRATION CYTOLOGY FEATURES WITH HISTOPATHOLOGY IN DIAGNOSIS OF THYROID SWELLINGS.

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ABSTRACT **Background** High resolution ultrasonography (USG) is the first-line investigation in evaluation of euthyroid nodules. Thyroid imaging reporting and data system (TIRADS) is an USG-based risk stratification system for classifying thyroid nodules. Subjects with high-risk category of TIRADS undergo fine needle aspiration cytology (FNAC) and FNAC findings are reported according to Bethesda classification. Bethesda categories are used for determining risk of malignancy. The aim of this study is to compare the accuracy in diagnosing Thyroid swellings by USG with TIRADS score ,FNAC with BETHESDA score and the Histopathological diagnosis in patients who underwent surgery. **Materials and methods** It is Retrospective Observational study done in Basaveshwara Teaching and General Hospital with 54 cases .All patients USG FNAC done data collected and compared with HPE report **Results** Study observes that, maximum number of patients 19 (35.2%) were belongs to the age group of 21—30 year, followed by 14 (25.9%) of patients were seen in the age group of 31—40 years. The sex ratio male to female was 1:8.In the study majority of patients 29 (53.7%) were seen multi nodular goiter lesions, followed by 11 (20.4%) were solitary thyroid nodule lesions .colloid goiter were 14.8%, hashimotos thyroiditis patients were 11%.Study observed; female patients were predominant 48 (88.9%) and female patients were 6 (11.1%). Out of 11 solitary thyroid nodules 9 (81.8%) were seen follicular adenoma and 2 (18.1%) were seen follicular carcinoma. In the present study out of 54 sample thyroid lesions 2 (3.7%) were seen malignant. The study prevalence of thyroid carcinoma was 3.7% .The Accuracy sensitivity Specificity of usg was91.48% ,67.92%,93.32%.The Accuracy sensitivity Specificity of FNAC was 92.22%,82.52%,94.11%. **Conclusion** USG followed by FNAC increases the accuracy to diagnose various thyroid swellings so by which unnecessary thyroid gland surgery and hence complications can be avoided. However the most accurate and confirmatory diagnosis is given by histopathology.

KEYWORDS : Histopathology, FNAC, USG, TIRADS, BETHESDA

INTRODUCTION

Thyroid enlargements (Goiter) have been recognised since 2700 BC[1] Thyroid enlargement is the most common case seen by clinicians in general practice.The prevalence of self reported goiter or Thyroid disorders in National Family Health survey 4(NFHS 4 2015 -2016) was 2.2 % and 2.9% in NFHS 5 (2019-2021). In females the self reported prevalence was 2% and in males self reported prevalence is 1%.Thyroid is superficial structure hence easily amenable to clinical examination and multiple invasive and non- invasive investigations. Evaluation of a patient with Thyroid swellings requires detailed history, clinical examination and imaging. A multitude of Imaging studies are available such as Ultrasound, FNAC,Thyroid radionuclide imaging, CT scan, MRI, PET scan in the evaluation of Thyroid swellings pre-operatively.USG is the first line of investigation in biochemically euthyroid Thyroid swellings.Thyroid imaging recording and data system is a risk stratification system for classifying Thyroid swellings into 5 categories TIRADS 5 based on Ultrasonography features. Fine needle aspiration cytology provides a rational approach towards clinical management of the Thyroid swellings and determining which patients undergo surgery by BETHESDA classification into 6 categories. The aim of this study is to compare the accuracy in diagnosing Thyroid swellings by USG with TIRADS score, FNAC with BETHESDA score and the Histopathological diagnosis in patients who underwent surgery.

AIMS AND OBJECTIVES

1. To identify age and sex distribution of Thyroid swellings in the study population.
2. To calculate the Sensitivity Specificity, Positive Predictive Value and Negative Predictive Value of USG, FNAC with Histopathological examination is considered the gold standard.

MATERIALS AND METHODS

Source of Data-

The Source of data for the present study was collected from the Department of General Surgery , Basaveshwara Teaching and General Hospital attached to Mahadevappa Rampure Medical College Kalaburagi.

Study Design-Retrospective Observational Study.

Sample size -54 cases

Sample size calculation for continuous outcome measure.

Prevalence of thyroid lesions in Karnataka, India was ranged from 4.0% to 7% the average prevalence was 5.5%[2]

$P = 5.5/100 = 0.055 \quad q = 0.945$

Sample size $(S) = (Z_{\alpha/2} + Z_{1-\beta})^2 \, p\,q / d^2$

Where $\alpha = 0.025$, $Z_{\alpha/2} = 1.96$,

$\beta = 0.20$, $Z_{1-\beta} = 0.842$, $d = 9\% = 0.09$, Power of study = 80.0%

So, Sample size $(n) = (1.96 + 0.842)^2 \, 0.055 \, X \, 0.945 / (0.9)^2$

$= (2.802)^2 \, X \, 0.055 \, X \, 0.945 / 0.0081$

$= 7.854 \, X \, 0.0519 / 0.0081$

$= 0.408 / 0.0081$

$= 50.323$

Sample size round figure (n) = 54 cases.

Sampling procedure-

The study subjects selected after applying inclusion and exclusion criteria. Study duration-October 1 2021-September 31 2023

Inclusion criteria-

Euthyroid patients who underwent Thyroidectomy procedures in the study period were included in the study

Exclusion criteria-

1. Patients in whom the final HPE report was thyroglossal cyst.
2. Patients in whom either the FNAC or USG or HPE report was not available.
3. Patients with Non - diagnostic (BETHESDA 1) FNAC reports.

Patients who satisfied the Inclusion Exclusion criteria were taken for study purposes.

Statistical data analysis:

Statistical data was analyzed by IBM SPSS 20.0 version software. Collected data were spread on excel sheets and prepared master charts. Through the master chart tables and graphs were constructed. For quantitative data analysis mean and standard deviations were calculated and t-test was applied for statistical significance, For qualitative data analysis chi-square test was applied for statistical

significance and analytical epidemiological measurements were calculated. If P-value was less than 0.05 considered as significant.

RESULTS

All the patients admitted with thyroid lesions and satisfying the inclusion and exclusion criteria were included in the study population. There were a total of 54 cases. After excluding cases of thyroglossal cyst. USG and/or FNAC and HPE done.

Table No.1: Age and gender wise distribution of patients

Age in years	Males		Females		Total	
11—20	0	0.0	3	6.3	3	5.6
21—30	3	50.0	16	33.3	19	35.2
31—40	2	33.3	12	25.0	14	25.9
41—50	0	0.0	10	20.8	10	18.5
51—60	0	0.0	4	8.3	4	7.4
61—70	1	16.7	3	6.3	4	7.4
Total	6	100.0	48	100.0	54	100.0
Mean ± SD	37.50 ± 15.08		37.00 ± 12.54		37.03 ± 12.84	
P-value	t = 0.532 P = 0.813, NS					

NS= not significant, S=significant, HS=highly significant

Study observes that, the maximum number of patients 19 (35.2%) belonged to the age group of 21—30 years, followed by 14 (25.9%) of patients were seen in the age group of 31—40 years. Minimum age of patient was 18 years and maximum age was 70 years. The mean age of male patients was 37.50 years; the mean age of female patients was 37.0 years. Mean age of all patients was 37.03 years. There was statistically no significant difference of age distribution in gender (P>0.05). Study observed; female patients were predominant 48 (88.9%) and male patients were 6 (11.1%). The sex ratio of male to female was 1:8

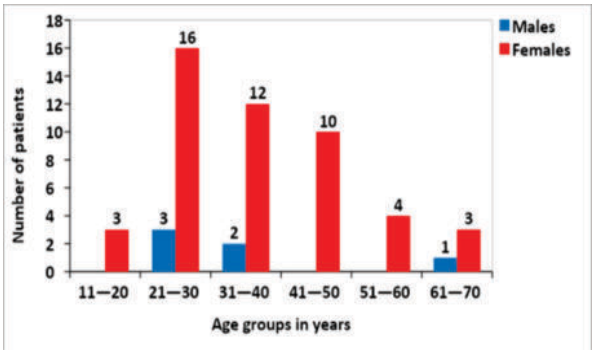

Figure 1:Multiple bar diagram represents age wise distribution of patients

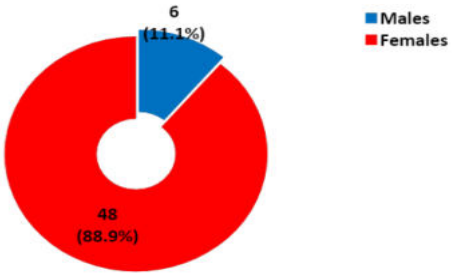

Figure 2:Pie diagram represents gender wise distribution of patients

Study observed; female patients were predominant 48 (88.9%) and male patients were 6 (11.1%). The sex ratio male to female was 1:8

Table No.2: Types of thyroid lesions wise distribution of patients

Types of thyroid lesions	Number of patients	Percentage
Multi nodular goitre	29	53.7
Colloid goitre	8	14.8
Hashimotos thyroiditis	6	11.1
Solitary Thyroid nodule	11	20.4
Total	54	100.0

In the study majority of patients 29 (53.7%) were multi nodular goiter lesions,8 (14.8%) were colloid goiter, followed by 11 (20.4%) were solitary thyroid nodule lesions

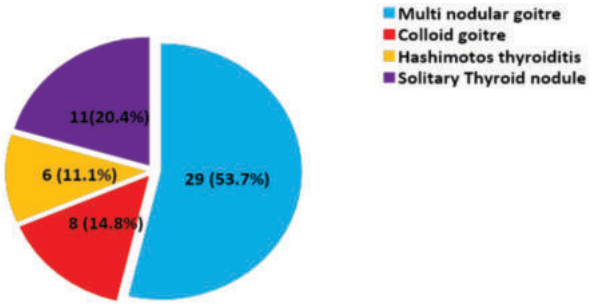

Figure 3:Pie diagram presents types of thyroid lesions wise distribution of patients

Out of 11 solitary thyroid nodules 9 (81.8%) were seen with follicular adenoma and 2 (18.1%) were seen with follicular carcinoma. Among follicular adenomas 8 (88.9%) were females and 1 (11.1%) was seen in male patients. All 2 (18.1%) of follicular carcinoma were seen in females.

Table No.3: Gender wise classification of Solitary Thyroid Nodule

Solitary Thyroid Nodule	Males		Females		Total	
	No	%	No	%	No	%
Follicular adenoma	1	11.1	8	88.9	9	81.8
Follicular carcinoma	0	0.0	2	100.0	2	18.1
Papillary carcinoma	0	0.0	0	0.0	0	0.0
Total	1	9.1	10	90.9	11	100.0

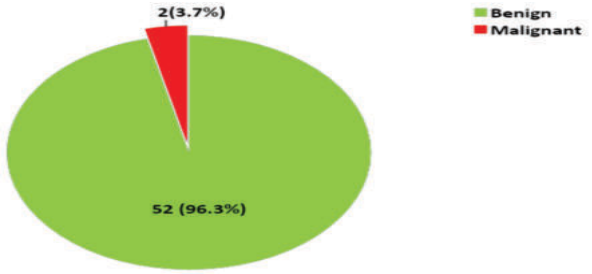

Figure 4:Pie chart represents nature of thyroid swellings distribution in patients

Table No.4: Nature of thyroid swellings wise distribution of patients

Nature of thyroid swellings	Males		Females		Total	
	No	%	No	%	No	%
Benign	6	100.0	46	95.8	52	96.3
Malignant	0	0.0	2	4.2	2	3.7
Total	6	100.0	48	100.0	54	100.0

In the present study out of 54 sample thyroid lesions 2 (3.7%) were seen to be malignant. The study prevalence of thyroid carcinoma was 3.7%. In the study all 2 (3.7%) of thyroid carcinoma cases were observed females, all 6 male patients were seen with benign nature of thyroid swellings

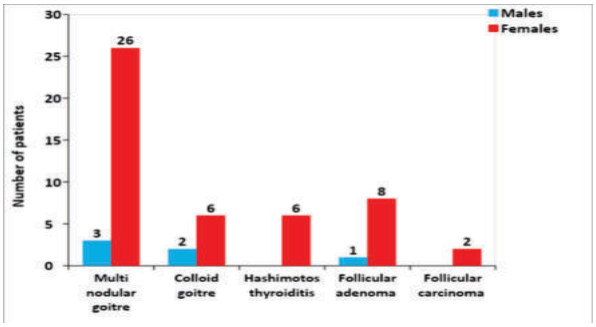

Figure 5:Multiple bars represent gender wise distribution of types of thyroid lesions

Table No.5: Gender wise distribution of types of thyroid lesions

Types of thyroid lesions	Males		Females		Total	
	No	%	No	%	No	%
Multi nodular goitre	3	10.3	26	89.7	29	53.7
Colloid goitre	2	25.5	6	75.0	8	14.8
Hashimotos thyroiditis	0	0.0	6	100.0	6	11.1
Follicular adenoma	1	11.1	8	88.9	9	16.7
Follicular carcinoma	0	0.0	2	100.0	2	3.7
Total	6	11.1	48	88.9	54	100.0

Study observed that out of 29 multi nodular goitre 26 (89.7%) were females and 6 (75.0%) of patients were observed colloid goitre in females, all 6 (100.0%) of hashimotos thyroiditis were seen in females and 2 (100.0%) follicular carcinoma patients were females.

Table No.6: Efficacy of USG in diagnosing thyroid lesions

Disease	Sensitivity	Specificity	PPV	NPV	Accuracy
Multi nodular goitre	88.24%	83.78%	71.43%	93.94%	85.19%
Colloid goitre	62.50%	84.78%	82.67%	92.86%	81.48%
Hashimotos thyroiditis	50.00%	100.0%	100.0%	94.12%	94.44%
Follicular adenoma	88.89%	100.0%	100.0%	97.83%	98.15%
Follicular carcinoma	50.0%	98.04%	100.0%	98.11%	98.15%
Overall	67.92%	93.32%	90.82	95.37%	91.48%

Table No.7: Efficacy of FNAC in diagnosing thyroid lesions

Disease	Sensitivity	Specificity	PPV	NPV	Accuracy
Multi nodular goitre	86.21%	92.00%	92.59%	85.19%	88.89%
Colloid goitre	87.50%	91.30%	63.64%	97.67%	90.74%
Hashimotos thyroiditis	50.0%	100.0%	100.0%	94.12%	94.44%
Follicular adenoma	88.89%	91.11%	66.7%	97.62%	90.74%
Overall	82.52%	94.11%	74.57%	94.92%	92.22%

DISCUSSION

In this study of thyroid swellings comprising 54 cases, 61.1% of the study population was in the age group between 21-40 years with a mean age of 37.03 years. This result is comparable to the results obtained by Kapur and co authors who found 54% of the patients in the 20-40 years [3] of age group, while Ghoshal et al found 30-50 years as the common age group[4]. There was a clear preponderance of females to males 8:1 ratio, (88.9% females) affected with thyroid pathologies. This finding is consistent with almost all studies of thyroid diseases. In all thyroid diseases female predominance was seen, being maximum in MNG and colloid goiter (1:6) and minimum in carcinoma (2.33 times) this denotes the increased incidence of carcinoma in male population which is consistent with that in the literatureUltrasound is increasingly being regarded as the "true" diagnosis in the morphological description of the thyroid gland. It has been demonstrated that thyroid imaging is subject to considerable observer variation.. Differentiation of benign from malignant masses on the basis of their sonographic appearance,provides the size and multicentricity of the lesion, invasion into adjacent structures, Guidance for FNAC, to detect cervical lymphadenopathy and sub clinical nodularity.Features suggestive of malignancy on USG are hypoechoic pattern, incomplete peripheral halo, irregular margins, internal micro-calcification, presence of cervical lymphadenopathy and peripheral degeneration in mixed nodules. Features suggestive of benign diseases on USG are-halo sign (transonic uniform rim surrounding the mass), variable echogenicity, multilocularity, large cystic lesion, diffusely nodular non homogeneous gland and peripheral calcification. Moon et al has studied the ultrasonogram in 857 patients and showed an acceptable malignancy-predicting value of USG in thyroid nodules supporting the potential role of USG for predicting malignancy in selected patients with thyroid nodules [5] .However, the high rate of indeterminate results precludes it from being a standard independent diagnostic method at the present time.Katz et al 1984 also found that USG was unable to differentiate between thyroiditis and malignant lesions[6]. In our study, we found overall the sensitivity and specificity of USG to be 67.92% and 93.32% . In consistency with our study, Watters et al found that the sensitivity and specificity of USG were 74% and 83% respectively[7] They emphasized that the USG has an added advantage of allowing the whole gland to be examined rather than the dominant nodule; but was limited by the fact that no features were pathognomonic for malignancy. So, it should be regarded as a complementary rather than an alternative investigation to FNAC in the management of solitary thyroid nodules. Jones et al found the sensitivity and specificity of USG to be 75% and 61% respectively[8]. FNAC is found to be the most useful first line of investigation than other investigations like USG, thyroid scan and serologic studies. FNAC leads to early diagnosis and aids in the treatment of thyroid lesions. FNAC has a good amount of accuracy up-to 97% in the preoperative diagnosis of various thyroid lesions. This has been claimed by Handa et al while others believe, correct preoperative diagnosis can be made only in 25%, hence there is marked discrepancy regarding this subject[9].In our study the sensitivity was maximum for carcinoma (100%) and minimum for Hashimoto's thyroiditis(50%), specificity was 92% for MNG and 96.15% for carcinoma. The PPV for MNG was 92.59% and 50% for carcinoma. Similar findings have been corroborated by numerous authors like Suen et al and Gupta et al [10,11] .The limitation of FNAC includes false-negative result and false positive results. A comparative study was done by Bloch [12] between FNAC and histopathology and found that the accuracy of FNAC was 91.6%. Handa *et al*[9] have a similar study in which FNAC revealed a sensitivity of 97%, specificity 100% a PPV of 96% and a NPV of 100%. Mundasad *et al*[13] had done similar study and identified that FNAC had a sensitivity (52.6%), specificity (86.6%) and accuracy (79.1%) for thyroid malignancy. According to histopathological diagnosis the risk of malignancy was calculated in case of indeterminate thyroid nodule (Bethesda 3 and 4) was 38.46%. In our study sensitivity of FNAC was 80%, specificity was 90%, positive and negative predictive value was 86%, and the overall diagnostic accuracy was 85%.and FNAC when assessed together had higher sensitivity and specificity in general compared to when used alone, possibly covering the shortcomings when used alone, making them integral parts of triple assessment. The results, we found, in our study are comparable to other studies on FNAC. The final diagnosis as well as any further treatment were subsequently changed depending on the final histopathology diagnosis. Hence histopathology is taken as the gold standard investigation in diagnosing thyroid disorders.

CONCLUSION

USG and FNAC are simple methods of diagnosing thyroid gland swellings. They can be performed as outpatient department procedures and are acceptable to most of the patients. In the present study, the sensitivity, specificity and diagnostic accuracy of USG and FNAC for thyroid gland swellings was reasonably good. USG followed by FNAC increases the accuracy to diagnose various thyroid swellings so by which unnecessary thyroid gland surgery and hence complications can be avoided. However the most accurate and confirmatory diagnosis is given by histopathology.

REFERENCES

1. LGeeta,CH Orlo:Thyroid,Parathyroid and Adrenal .In:Brunicardi C,Andersen D,Billiar T,Dunn D,Hunter J,Matthew's J,Pollock R editors.Schwartz's Principles of Surgery,10th edition .New York:McGrawHill Education ;2014, p.1521
2. Ahmed, Zulfikar, et al.Study of prevalence of thyroid lesions in coastal region of Karnataka:Journal of Evolution of Medical and Dental Sciences.2013; volume 2:36.
3. Kapur MM, Sarin R, Karmarkar MG, Sarda AK. Solitary thyroid nodule. Indian J Surg. 1982;44:174-6.
4. Ghoshal B, Pal NC, Majumdar P. FNAB in the diagnosis of cold thyroid nodules: correlative study with histopathology and its application in thyroid surgery. J Indian Med Asso.1984;82:127-9.
5. Moon HG, Jung EJ, Park ST, Ha WS, Choi SK, Hong SC et al. Role of ultrasonography in predicting malignancy in patients with thyroid nodules. World J Surg. 2007;31(7):1410-6.
6. Katz JF, Kane RA. Thyroid nodules: sonographic pathologic correlation. Bri J Radiol. 1984;151:741-5.
7. Watters AK, Ahiya AT. Role of USG in the management of thyroid nodules. Am J Surg. 1992;164:654-7.
8. Jones AJ, Aitman TJ. Comparison of FNAC, RNS and USG In the Management of Thyroid Nodules. Post Grad Med J. 1990;66:914-7.
9. Handa U, Mohan H, Nagarkar N. Role of fine needle aspiration cytology in diagnosis and management of thyroid lesions: a study on 434 patients. J Cytol. 2008;25:13-5.
10. Gupta M, Gupta S. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. J Thyroid Res. 2010;4:379051.
11. Suen KC. Atlas and text of aspiration biopsy cytology. Williams and Wilkins, London. 1990;33-7.
12. Bloch M. Fine needle aspiration biopsy of head & neck masses. Otolaryngol Head Neck Surg. 1997;89:62–8.