

## ESTIMATION OF CYTOMORPHOLOGICAL SPECTRUM OF THYROID LESIONS BY FINE-NEEDLE ASPIRATION CYTOLOGY BASED ON BETHESDA SYSTEM FOR REPORTING IN TERTIARY CARE HOSPITAL

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### ABSTRACT

**Objectives:** The objectives of this study were as follows: (1) To estimate the cytomorphological spectrum of thyroid lesions. (2) To categorize the thyroid lesions based on Bethesda system reporting. (3) To correlate the spectrum of thyroid lesions with demographic parameters.

**Methods:** A retrospective record-based study was conducted at the Department of Pathology in Tertiary Care Institute, from January 2017 to January 2021. A total of 346 case files were retrieved consisting of all the patients having thyroid lesions who underwent the procedure of fine-needle aspiration cytology. Statistical analysis was done using the software Statistical Package for the Social Sciences (SPSS) 22.0 version. Continuous variables were presented by mean $\pm$ SD and categorical variables by frequency or percentages.

**Results:** Majority of the cases are falling between the age group of 26–35 years, followed by 36–45 years of age. The majority of cases in the study population were presented with Bethesda Category II lesion (88.7%) which was found to be statistically significant ( $p < 0.05$ ), the most common spectrum was seen, which was Colloid nodule in 40.46% of cases categorized to Bethesda Class II. This was found to be statistically significant ( $p < 0.05$ ), followed by adenomatoid nodule in 30.92% of cases also Category II.

**Conclusion:** Fine-needle aspiration cytology is a cost effective procedure that provides specific diagnosis rapidly with minimum complications.

**Keywords:** Thyroid lesion, Bethesda system, Cytomorphology, Fine-needle aspiration cytology, Thyroid cancer, Adenomatoid module.

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### INTRODUCTION

The primary objective of fine-needle aspiration cytology (FNAC) of the thyroid is to select those patients who require surgery for a neoplastic disorder from those who have a functional or inflammatory abnormality and who can be followed clinically or treated medically [1]. Children and adolescents should not be excluded, because they may also harbor malignant tumors [1]. Statistical evidence strongly suggests that the use of aspiration biopsy has markedly reduced the number of thyroidectomies, whereas the proportion of carcinomas in the surgically treated population has increased significantly. Thyroid cancer occurs in a small proportion of patients with thyroid nodules, ranging from 5% to 20% in this group for the general population and from 18% to 30% for the population exposed to ionizing radiation [2,3]. Clinical thyroid cancer has a prevalence of approximately 2.5 cases/1000 persons [4], but occult thyroid cancer is found at autopsy with a prevalence of 36 cases/1000 persons [5], indicating that only one of 15 thyroid cancers is clinically manifested. However, rapid assessment and accurate diagnosis of needle aspiration smears have become increasingly popular due to the global trend in reducing health-care costs [6]. This study is undertaken to identify the cytomorphological spectrum of thyroid lesions and to correlate with histomorphological features wherever necessary.

### METHODS

It was a retrospective record-based study conducted at the Department of Pathology of Lt. Shri Lakhiram Agrawal Memorial Medical College Raigarh (CG) from January 2017 to January 2021. A total of 346 case files were retrieved consisting of all the patients having thyroid lesions who underwent the procedure of fine-needle aspiration cytology.

### Inclusion criteria

All the cases which have undergone fine-needle aspiration cytology in the Department of Pathology, Lt. Shri Lakhiram Agrawal Memorial Medical College Raigarh (CG) were included in the study.

### Exclusion criteria

The following criteria were excluded from the study:

1. Already diagnosed cases in FNAC or histopathology.
2. Post-operative cases.

Thyroid swellings were aspirated using 24-gauge needle fitted with 10 mL syringe using standard protocol. Aspiration was done after detailed clinical history and physical examination. Aspirated material was smeared into glass slides and air dried, stained with Giemsa/Leishman stain. Cytological evaluation was done by two pathologists and categorized on the basis of Bethesda reporting system. The cytological results were correlated with clinical features, thyroid function tests, and histopathological examination.

### Statistical analysis

Statistical analysis was done using the software Statistical Package for the Social Sciences (SPSS) 22.0 version. Continuous variables were presented by mean $\pm$ SD and categorical variables by frequency or percentages. To find the association between categorical variables, we have used Chi-square or Fisher's exact test. Independent t-test was used to find the significant difference in means of the variables.  $p < 0.05$  indicated a statistically significant difference between groups.

### RESULTS AND OBSERVATIONS

The study included 346 with the minimum presenting age 9 years to maximum presenting age 80 years. Majority of the cases are falling between the age group of 26–35 years, followed by 36–45 years of age which was not significant ( $p > 0.05$ ) (Table 1).

As per Table 2, the majority of cases in the study population were presented with Bethesda Category II lesion (88.7%) which was found to be statistically significant ( $p < 0.05$ ), (colloid goiter followed by adenomatoid nodule, Hashimoto thyroiditis), followed by Category IV thyroid lesions.

As per Table 3, spectrum of thyroid lesions is seen that the most common spectrum was seen, which was Colloid nodule in 40.46% of cases categorized to Bethesda Class II. This was found to be statistically significant ( $p < 0.05$ ), followed by adenomatoid nodule in 30.92% of cases also Category II.

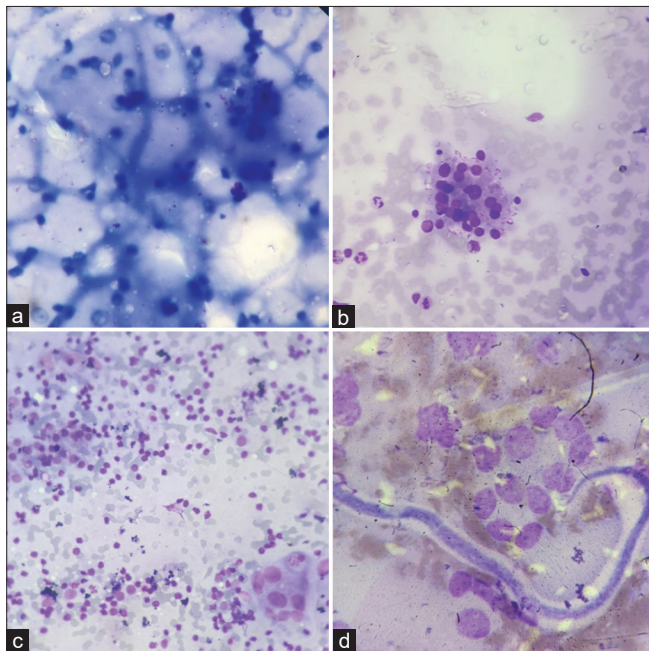
In Bethesda Category II lesion, majority of cases with were seen between 26 and 35 years followed by 36–45 year age group. In Category IV lesion, maximum number of cases were seen with age group between 15 and 25 and 36–45 year of age group. In Category

VI lesion, maximum number of cases were presented by age group of >55 year of age group.

As per Table 5, the study was female preponderance with the age groups 15–25 years, 26–35 were found to be statistically significant ( $p < 0.05$ ). Overall there was no differentiation in thyroid lesions in age and sex and there was significant difference; despite, the study was female preponderance.

**DISCUSSION**

Today FNAC is practiced worldwide [7]. The scope of FNAC in selecting cases that require surgery and in providing a pre-operative morphological diagnosis has gone a long way in obviating unnecessary surgeries as well as in planning proper surgical and other treatment protocols [8]. The sensitivity and diagnostic accuracy of thyroid surgery have been shown to be as high as 85–95% in experienced hands [9,10]. Positive predictive value of 89–98%, negative predictive value of 94–99%, [11,12] and false negative rates as low as 5–10% [13] have established FNA as an invaluable diagnostic modality. Although there is



**Fig. 1: (a) Colloid goiter with cystic degeneration (Giemsa, ×40). (b) Primary hyperplasia with fire flakes (Giemsa, ×40). (c) Hashimoto's thyroiditis (Giemsa, ×40). (d) Microfilaria in thyroid lesion (Giemsa, ×40)**

**Table 1: Age-wise distribution of the study population (n=346)**

Age of patient	Number of cases	Percentage
<15 years	9	2.60
15–25 years	75	21.68
26–35 years	102	29.48
36–45 years	78	22.54
46–55 years	50	14.45
>55 years	32	09.25
Total	346	100

**Table 2: Grading of thyroid lesions according to Bethesda category (n=346)**

S. No.	Bethesda category	n (%)
1	I	7 (2.02)
2	II	307 (88.72)
3	III	3 (0.86)
4	IV	19 (5.49)
5	V	5 (1.44)
6	VI	5 (1.44)

**Table 3: FNAC spectrum of thyroid lesion in the study population**

S. No.	FNAC diagnosis	Number of cases	Percentage	Bethesda category
1	Inadequate	7	2.02	I
2	Adenomatoid nodule	107	30.92	II
3	Colloid nodule	140	40.46	
4	Lymphocytic/ Hashimoto thyroiditis	56	16.18	
5	Microfilaria	1	0.29	
6	Granulomatous thyroiditis	3	0.87	
7	Atypia of undetermined significance	3	0.86	III
8	Follicular neoplasm	12	3.46	IV
9	Hurthle cell neoplasm	7	2.02	
10	Suspicious for malignancy	5	1.44	V
11	Papillary carcinoma	4	1.15	VI
12	Medullary carcinoma	1	0.29	
	Total	346	100	

FNAC: Fine-needle aspiration cytology

**Table 4: Spectrum of thyroid lesions in the study population in various age group**

Age of patient	I	II	III	IV	V	VI	Total
<15	1	8	0	0	0	0	9
15–25	3	66	0	6	0	0	75
26–35	1	96	2	2	1	0	102
36–45	0	71	0	6	1	0	78
46–55	1	44	1	2	1	1	50
>55	1	22	0	3	2	4	32
Total	7	307	3	19	5	5	346

**Table 5: Age and sex distribution of cases with thyroid lesions**

Age group (years)	Male, n (%)	Female, n (%)	Total	p-value
<15	4 (44.44)	5 (55.56)	9	0.11
15–25	4 (5.33)	71 (94.67)	75	0.01*
26–35	9 (8.82)	93 (91.18)	102	0.001*
36–45	12 (15.38)	66 (84.62)	78	0.21
46–55	5 (10)	45 (90)	50	0.32
>55	10 (31.25)	22 (68.75)	32	0.43
Total	44 (12.72)	302 (87.28)	346	0.09

a large body of world literature claiming the accuracy and usefulness of thyroid cytology, there is also evidence showing possible limitations and pitfalls of this procedure [13]. Seven (0.63%) cases were inconclusive and were included in a separate group. Comparable experiences have been reported by others [12,13]. In all the above studies, the ratio between non-neoplastic and neoplastic lesion was in between 2.41:1 and 12.29: 1. In our study, this ratio was found to be in 8.08:1 which is well within this range and is similar to the study by Sathiyamurthy *et al.* [6]. In all the above studies, the mean age ranged from 36.5 to 48.98 and our study is most comparable with the study by Arvinthan *et al.* [14]. The most common lesion found in this study is colloid goiter (71.55%) with or without secondary changes. This is comparable to most other studies by Gupta *et al.* [15] and Sathiyamurthy *et al.* [6]. The positive influence of FNAC on the management of thyroid disease is perhaps best highlighted in the low rate of surgical intervention (15.2%) in the study by Uma *et al.*, where surgery was avoided mainly in colloid goiter and thyroiditis [16]. In our study too, only 18.96% of cases came for surgical intervention and remaining cases were lost to follow-up.

### CONCLUSION

Fine-needle aspiration cytology is a cost effective procedure that provides specific diagnosis rapidly with minimum complications. Based on the cytology findings, patients can be followed in cases of benign diagnosis and subjected to surgery in cases of malignant diagnosis, thereby decreasing the rate of unnecessary surgery. Different imaging techniques are now used for pre-operative diagnosis of thyroid nodules such as radionuclide scanning and high-resolution ultrasonography.

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### AUTHORS' CONTRIBUTIONS

Dr. Reena Naik has finalized the draft and guarantor, Dr. Gajendra Megha and Chawda Hanish has prepared the conceptual framework, designing of draft, and data analysis, Dr. Chaudhary Jyoti was involved in data collection and analysis, and Dr. Minj Manoj K Yadav has done manuscript writing and data collection.

### CONFLICTS OF INTEREST

None declared.

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