

**Original Research Article**

## To Study the Clinical Profile among Different Bethesda Categories of Thyroid Lesions: A Study of 917 Cases

Authors

**Usha Joshi<sup>1\*</sup>, Harsh Khetan<sup>2</sup>, Binay Kumar<sup>3</sup>**

<sup>1</sup>Associate Professor, Department of Pathology, Government Medical College & Hospital Haldwani, Distt: Nainital (Uttarakhand) India

<sup>2</sup>PG -3<sup>rd</sup> Year Resident, Department of Pathology, Government Medical College & Hospital Haldwani, Distt: Nainital (Uttarakhand) India.

<sup>3</sup>Professor, Department of Pathology, Government Medical College & Hospital Haldwani, Distt: Nainital (Uttarakhand) India

Correspondence Author

**Usha Joshi**

Associate Professor, Department of Pathology, Government Medical College & Hospital Haldwani, Distt: Nainital (Uttarakhand) India

**Abstract**

**Background:** Fine needle aspiration (FNA) is the primary diagnostic tool in initial evaluation of the thyroid lesions. The New Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) is considered a standard reporting system for categorization of the thyroid lesions in cytology.

**Aims/Objectives:** To correlate the clinical profile of patients of thyroid lesions with different Bethesda categories.

**Materials and Methods:** The study was conducted at department of pathology Government Medical College, Haldwani. It comprised of 917 cases of thyroid lesions, spanning over a period of five years. The clinical findings, history and lab investigations were correlated with the Bethesda categories of thyroid lesions.

**Results:** The age of the patients ranged from 5 to 90 years. Female to male ratio was 6.51:1. Bethesda category II lesions had less specificity with duration of thyroid swelling and presented with any duration, while malignant lesions presented mostly with short duration of swelling (1-6 month). Eye signs were mostly seen in patients with hyperplastic thyroid (Bethesda category II) lesions. Thyroid nodules were mostly seen to involve right lobe (15.59%) of thyroid, while isthmus (3.48%) involvement was least common. Tenderness (4.15%) was mostly associated with thyroiditis (Bethesda category II) cases and was rarely associated with malignant cases. While Bethesda category II, showed all 3 patterns of thyroid profile, Bethesda category III, IV, V & VI were either euthyroid or hyperthyroid and none hypothyroid.

**Conclusion:** Our study concluded that FNAC, if interpreted in conjunction with clinical profile of the patients, could prove useful for the diagnosis and categorization of thyroid lesions.

**Keywords:** Fine needle aspiration (FNA), Thyroid lesions, The New Bethesda System for Reporting Thyroid Cytopathology (TBSRTC).

**Introduction**

Thyroid lesions are common clinical findings with a high prevalence in general population. Thyroid lesions are common in women. The vast majority

of these lesions are non neoplastic. Clinical parameters that raise suspicion of malignancy include: male gender; young patients aged less than 20 years; old people more than 70 years and

larger lesions (> 4 cms size). However, clinical presentation alone cannot distinguish benign from malignant lesions. Several diagnostic tools such as thyroid scan, ultrasonography and fine needle aspiration (FNA) are used to distinguish malignant from benign lesions.

Recent studies have demonstrated that FNA is most accurate, reliable, cost effective and simplest screening test for rapid diagnosis of thyroid lesions that obviate the need of subjecting the patients to open biopsy.<sup>[1]</sup> Aspiration cytology done with care and the smears interpreted carefully has quite high accuracy rates.<sup>[2]</sup>

To address terminology and other issues related to thyroid fine-needle aspiration (FNA), The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) was introduced in 2010.<sup>[3]</sup> This system classifies FNA results into six general diagnostic categories, namely; nondiagnostic or unsatisfactory (Bethesda I), benign (Bethesda II), atypia of undetermined significance or follicular lesion of undetermined significance (Bethesda III), follicular neoplasm or suspicious for a follicular neoplasm (Bethesda IV), suspicious for malignancy (Bethesda V) and malignant (Bethesda VI).<sup>[3]</sup>

The aim of this study is to correlate the clinical profile of patients of thyroid lesions with different Bethesda categories.

### Material and Method

The present study is based on the analysis of 917 patients presenting with thyroid swelling in the department of surgery, ENT and pathology of Government Medical College and Sushila Tiwari Hospital (STH), Haldwani over a period of 5 year from August 2011-July 2016. The clinical findings, history and lab investigations were correlated with the Bethesda categories of thyroid lesions. The thyroid lesions were aspirated with 23/24 gauze disposable needles, fitted with 10/20 ml disposable syringes, using standard procedure. The smears thus prepared, were stained with May Grunwald, Hematoxylin & eosin and Papanicolaou stains.

### Results

This study was conducted for five years in STH, Haldwani and total 917 patients underwent fine needle aspiration of thyroid lesions which comprised 7.93 % of total FNACs conducted at our institution [Table 1].

The age of the patients ranged from 5 to 90 years in our study, with a mean age of  $38.59 \pm 15.27$  years [Table 2]. Out of 917 cases, maximum number of cases was found to be in the age group 21-50 years (612 cases). Out of which maximum number of cases were found to be in Bethesda Category II Benign (524 cases).

Of the 917 cases, thyroid swellings were seen in 795 (86.69%) female patients and 122 (13.31%) male patients with a ratio of 6.51:1. *Bethesda category II Benign (BN) was the most common diagnosis in both sexes* [Table 3].

Our study also showed that while benign lesions had less specificity with duration of thyroid swelling and presented with any duration; malignant lesions presented mostly with short duration of swelling between 1-6 month, thereby indicating rapid increase in swelling in malignant lesions [Table 4].

In most patients with benign and malignant thyroid swellings, clinical presentation was either euthyroid or hypothyroid while presentation with hyperthyroid features were least in both benign and malignant lesions. None of the patient in Bethesda category IV presented with hyperthyroid features [Table 5].

Most patients (880 cases) with thyroid swelling did not have any relevant history. 16 patients presented with eye signs, out of which 15 were diagnosed under Bethesda category II Benign (6 under subcategory of hyperplastic thyroid). Out of 21 patients who presented with pressure symptoms, 1 was non diagnostic, 18 were diagnosed under Bethesda category II Benign, 1 patient was diagnosed suspicious for papillary carcinoma and 1 Anaplastic carcinoma [Table 6].

Out of 917 cases, 832 (90.73%) cases were  $\leq 4$  cms., 693 cases diagnosed under Bethesda

category II Benign had swelling  $\leq 4$  cms., and 24 cases diagnosed under Bethesda category V & VI had swelling  $\leq 4$  cms. 2 cases were seen with size ranging from 10 – 15 cms., both diagnosed under Bethesda category II Benign [Table 7].

Of the 917 cases, 635 (69.24%) cases were diffuse or bilateral. Out of which, 562 cases diagnosed under Bethesda category II were diffuse/bilateral while out of 44 cases diagnosed under Bethesda Category III, IV, V & VI, 39 (88.63%) cases were nodular, involving either isthmus, left or right lobe of thyroid. Most cases 143 (15.59%) with thyroid nodule were seen to involve right lobe of thyroid while isthmic (3.48%) involvement was least common [Table 8].

We also observed that out of 917 cases, 879 (95.85%) cases were non tender and 38 (4.15%) cases were tender. Out of 37 cases in benign category, 30 (3.27 %) cases were of thyroiditis. Out of 44 cases diagnosed under Bethesda category III, IV, V & VI, only 1 was tender which

came under Bethesda category VI malignant [Table 9].

Of the 917 cases, 679 patients did not undergo thyroid profile test or reports were awaited. Of the rest, those diagnosed under Bethesda category II, showed all 3 patterns of thyroid profile while out of 44 cases diagnosed under Bethesda category III, IV, V & VI, 10 were euthyroid while only 1 was hyperthyroid and none hypothyroid [Table 10].

Based on Bethesda category, Bethesda category I included 102 cases of which maximum 54 cases were blood only, Bethesda category II Benign included 771 cases of which maximum 457 cases were Colloid goiter/ Colloid goiter with cystic degeneration, followed by 184 cases of autoimmune thyroiditis. Bethesda category III included 3 cases, Bethesda category IV included 12 cases, Bethesda category V included 9 cases and Bethesda category VI included 20 cases [Table 11].

**Table 1:** Year-wise distribution of thyroid cases

Year	Total no. of FNACs (n=11467)	Total no. of Thyroid FNACs (n=917)	% of thyroid FNACs (Avg-7.93%)
Aug 2011-Dec 2011	980	91	9.28
2012	2014	161	7.99
2013	2340	182	7.77
2014	2459	242	9.84
2015	2189	160	7.30
Jan 2016-July 2016	1485	81	5.45

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT - Malignant

**Table 2:** Age-wise distribution of cases according to TBSRTC category

	Bethesda category						Total
	ND/UNS	BN	AUS	SFN/FN	SM	MGT	
0- 10	2	8	0	0	0	0	10
11-20	9	95	0	0	2	2	108
21-30	17	169	1	3	0	5	195
31-40	16	215	0	1	4	2	238
Age (yrs.) 41-50	28	140	1	4	1	5	179
51-60	22	94	1	3	1	0	121
61-70	7	35	0	1	1	2	46
71-80	1	12	0	0	0	3	16
81-90	0	3	0	0	0	1	4
Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 3:** Sex-wise distribution of cases according to TBSRTC category

		Bethesda category					Total	
		ND/UNS	BN	AUS	SFN/FN	SM		MGT
Sex	Female	80	682	2	10	7	14	795
	Male	22	89	1	2	2	6	122
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT - Malignant

**Table 4:** Duration-wise distribution of cases according to TBSRTC category

		Bethesda category					Total	
		ND/UNS	BN	AUS	SFN/FN	SM		MGT
Duration	O/E	24	98	0	2	0	0	124
	<1 month	15	113	1	1	2	2	134
	1-6 month	27	190	2	3	2	8	232
	6-12 month	15	116	0	1	1	3	136
	1-5 year	16	178	0	2	3	3	202
	>5 year	5	76	0	3	1	4	89
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 5:** Distribution of cases based on C/F according to TBSRTC category

		Bethesda category					Total	
		ND/UNS	BN	AUS	SFN/FN	SM		MGT
C/F	Euthyroid	60	304	2	6	5	11	388
	Hyperthyroid	13	114	0	0	2	1	130
	Hypothyroid	29	353	1	6	2	8	399
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 6:** Distribution of cases based on relevant history

		Bethesda category					Total	
		ND/UNS	BN	AUS	SFN/FN	SM		MGT
<i>No relevant history</i>		100	738	3	12	8	19	880
Relevant History:-	-Eye signs +	1	15	0	0	0	0	16
	-Pressure symptoms +	1	18	0	0	1	1	21
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 7:** Distribution of cases based on size of thyroid swelling

	Bethesda category						Total
	ND/UNS	BN	AUS	SFN/FN	SM	MGT	
<=1	44	60	1	2	1	4	112
1-2	36	282	2	4	4	3	331
2-3	18	251	0	4	3	7	283
3-4	2	100	0	2	0	2	106
4-5	1	44	0	0	0	2	47
5-6	0	18	0	0	0	1	19
6-7	1	4	0	0	1	0	6
7-8	0	5	0	0	0	1	6
8-10	0	5	0	0	0	0	5
10-12	0	1	0	0	0	0	1
12-15	0	1	0	0	0	0	1
Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 8:** Distribution of cases based on diffuse/nodular

		Bethesda category						Total
		ND/UNS	BN	AUS	SFN/FN	SM	MGT	
<i>Diffuse/Nodular</i>	Diffuse	69	562	0	0	3	1	635
	Isthmus	4	23	1	2	1	1	32
	MN	2	32	0	0	1	0	35
	Left lobe	11	47	1	4	1	8	72
	Right lobe	16	107	1	6	3	10	143
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 9:** Distribution of cases based on tenderness

		Bethesda category						Total
		ND/UNS	BN	AUS	SFN/FN	SM	MGT	
<i>Tenderness</i>	Absent	102	734	3	12	9	19	879
	Present	0	37	0	0	0	1	38
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 10:** Distribution of cases based on thyroid profile

		Bethesda category						Total
		ND/UNS	BN	AUS	SFN/FN	SM	MGT	
<i>Thyroid profile:-</i>	NA	80	566	3	11	2	17	679
	-Euthyroid	15	86	0	1	6	3	111
	-Hyperthyroid	3	48	0	0	1	0	52
	-Hypothyroid	4	71	0	0	0	0	75
	Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant

**Table 11:** Spectrum of distribution of cases according to TBSRTC category

	Bethesda category						Total
	ND/UNS	BN	AUS	SFN/FN	SM	MGT	
Adequacy criteria not fulfilled	37	0	0	0	0	0	37
Blood only	54	0	0	0	0	0	54
Cyst fluid only	11	0	0	0	0	0	11
Acute thyroiditis	0	2	0	0	0	0	2
Adenomatoid goiter	0	25	0	0	0	0	25
Autoimmune thyroiditis	0	184	0	0	0	0	184
Colloid goiter	0	305	0	0	0	0	305
Colloid goiter with cystic degeneration	0	152	0	0	0	0	152
Colloid goiter with Hurthle cell changes	0	1	0	0	0	0	1
Colloid goiter with thyroiditis	0	37	0	0	0	0	37
DeQuirvain thyroiditis	0	1	0	0	0	0	1
Florid Lymphocytic thyroiditis	0	25	0	0	0	0	25
Hyperplastic thyroid	0	38	0	0	0	0	38
Subacute Granulomatous thyroiditis	0	1	0	0	0	0	1
AFLUS	0	0	3	0	0	0	3
F.N.	0	0	0	9	0	0	9
Hurthle cell neoplasm	0	0	0	3	0	0	3
Susp. for Medullary Ca.	0	0	0	0	2	0	2
Suspicious for medullary/papillary Ca.	0	0	0	0	1	0	1
Suspicious for Papillary Ca	0	0	0	0	6	0	6
Anaplastic Ca.	0	0	0	0	0	5	5
Medullary Ca.	0	0	0	0	0	2	2
Papillary Ca	0	0	0	0	0	12	12
Poorly diff. Ca. with metastasis	0	0	0	0	0	1	1
Total	102	771	3	12	9	20	917

ND/UNS - Non diagnostic/unsatisfactory; BN – Benign; AUS - Atypia of undetermined significance; FN/SFN - Follicular neoplasm/Suspicious for follicular neoplasm; SM - Suspicious for malignancy; MGT – Malignant.

### Discussion

The present study titled as ‘To study the clinical profile among different Bethesda categories of thyroid lesions: a study of 917 cases’ was carried out in the pathology department of Sushila Tiwari Hospital and GMC Haldwani. The study sample consisted of all those patients having thyroid lesions, irrespective of their age and sex, referred for cytological study from ENT OPD, Surgery OPD and admitted to ward.

Thyroid cytology comprised 7.93 % of total FNACs conducted at our institution over the five years period. In present study the youngest patient was five years with cytological diagnosis of nodular colloid goiter. The oldest patient was of 90 years with cytological diagnosis of nodular colloid goiter.

In benign category, age ranges from 5 – 90 years while in malignant category, age ranges from 20 - 84 years. In our study, mean age was  $38.59 \pm$



15.27 years and was comparable to studies by Handa U et al<sup>[4]</sup> and Rangaswamy M et al.<sup>[5]</sup>

In our study Female: Male ratio was 6.51:1 which was comparable to study by Handa U et al<sup>[4]</sup> in which it was 6.35:1. It is a known fact that thyroid diseases affect females more commonly than males.<sup>[6,7]</sup>

The duration varies from study to study. Our study correlates largely with study by Bhansali SK.<sup>[8]</sup> In the present study, 232 (25.29%) patients were having thyroid lesions with symptoms for 1-6 months.

In present study, pressure symptoms were present in 21 (2.29%) cases and pain in 38 (4.14%) cases which is comparable with study by Godinho-Matos L et al.<sup>[9]</sup>

The smaller size of the thyroid swelling mostly favors benign pathology. In our study, the majority of the patients 614 (66.95%) had the size of the thyroid swelling between 1 to 3 cms as seen from (Table 6). Gharib H et al<sup>[10]</sup> stated that malignant involvement is not less frequent in nodules smaller than 10 mm in diameter and such lesions should be assessed with FNA biopsy unless they have strong clinically suspicious history or suspicious US finding. Thus, they stressed that an arbitrary diameter cut-off for cancer risk is not justified.

The present study like Kapilla K et al<sup>[11]</sup> shows that bilateral/diffuse involvement of thyroid lesions were observed maximum in 73.06% cases, closely followed by the right lobe involvement (15.59% cases) and left lobe involvement (7.85% cases). The involvement of isthmus was observed in least number of cases in the present study i.e. 3.48%.

The high prevalence of diffuse involvement in our study could be due to the fact that study involved many patients from kumaon (hilly) region and iodine deficiency is very common in the region, leading to diffuse involvement of thyroid gland.

In our study, the majority of the swellings, 879 (95.85%) cases were not associated with tenderness on clinical palpation of the thyroid lesions (Table 8). This finding is in accordance to

the study by Ananthakrishnan N et al<sup>[12]</sup> which had 10% of their cases with associated pain and tenderness and non-tender thyroid lesions comprised 90% of the cases.

Thyroid function tests (TFTs) are non-invasive investigations and help to rule out certain conditions like Grave's disease, Hashimoto's thyroiditis, and toxic adenoma, toxic multinodular goitre which are associated with deranged TFTs. Thus helping the clinicians decide on medical line of management or undertake surgical intervention. In our study Bethesda category II showed all three patterns of thyroid profile.

### Conclusion

The study was conducted in Government medical college, Haldwani and STH over a period of five years. The common age of patients affected by thyroid lesions ranged from 5 to 90 years with a mean age of  $38.59 \pm 15.27$  years. The thyroid lesions were more common in females than males. Bethesda II category was the most common category and colloid goiter was the most common lesion. The high prevalence of diffuse involvement could be attributed to the fact that study involved many patients from kumaon (hilly) region.

Hence, we conclude that FNAC, if interpreted in conjunction with clinical profile of the patients, could prove useful for the diagnosis and categorization of thyroid lesions.

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