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Categorization of thyroid lesions FNAC in Bethesda system: An institutional study in southern Rajasthan

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Abstract
Background: Fine needle aspiration cytology (FNAC) is an important screening test for thyroid lesions. The Bethesda system for reporting thyroid cytopathology 2016 (TBSRTC) was revised by International Congress of cytology in Yokohama, Japan which is a standardized category-based reporting system of FNA specimens. There are six categories each of which predicts malignancy risk and recommends clinical management. Aim of this study was to analyze the diagnostic utility of Bethesda system in reporting of thyroid FNAC.
Method: In an institution based cross sectional study of FNAC done on 410 patients from 2017 to 2019 presenting with thyroid lesion were examined and categorized as per TBSRTC.
Results: The distribution of patients in the six categories was 4.63% were Category I (nondiagnostic), 90.0% Category II (benign), 0.73% were Category III (atypia of undetermined significance), 2.44% were Category IV (suspicious for follicular neoplasm), 0.49% were Category V (suspicious for malignancy), and 1.71% were Category VI (malignant).
Conclusion: The Bethesda system is standardized system of reporting thyroid cytopathology; therefore, prompts the recommended clinical management of that category. These data extend the utility of TBS classification by fostering an improved understanding of the risk posed by any confirmed malignancy.

Keywords: Fine needle aspiration cytology; Bethesda; cytopathology; thyroid lesions

Introduction
Approximately 42 million people in India suffer from thyroid diseases [1]. Prevalence of a palpable thyroid nodule is nearly 12.2% As per GLOBOCON 2018 the incidence of thyroid cancer is 1.78% and it accounts for 0.71% mortality [2]. It is important to distinguish between benign and malignant nodules for appropriate management. Fine needle aspiration cytology (FNAC) has surfaced as an indispensable first-line diagnostic tool. Traditionally, use of diverse nomenclature and diagnostic criteria had limited the understanding of thyroid cytopathology reports by clinicians, thus hindering the definitive management [3].
The Bethesda System for Reporting Thyroid Cytopathology 2007 (TBSRTC) was laid down in Bethesda, Maryland and was revised in 2016 by International Congress of cytology in Yokohama, Japan. It includes report layout, sample adequacy, diagnostic category, risk of malignancy, and proposes clinical management. TBSRTC standardizes the cytology reporting for thyroid lesions, providing a uniform and clinically pertinent reporting nomenclature [4, 5]. Aim of this study was to analyze the diagnostic utility of Bethesda system in reporting of thyroid FNAC.

Table 1: TBSRTC: recommended diagnostic categories, implied risk of malignancy and recommended clinical management

Diagnostic category	Risk of Malignancy (%)	Usual management
Nondiagnostic or unsatisfactory	1-4	Repeat FNA with ultrasound guidance
Benign	0-3	Clinical follow up
Atypia of undetermined significance or follicular lesion of undetermined significance	5-15	Repeat FNA
Follicular neoplasm or suspicious for follicular neoplasm	15-30	Surgical lobectomy
Suspicious for malignancy	60-75	Near-total thyroidectomy or surgical lobectomy
Malignant	97-99	Near total thyroidectomy

Material and Methods

In an institutional prospective 2-year study from 2017 to 2019. FNAC was done on 410 patients presenting with thyroid lesion using 22G needle, smears were fixed with 95% methanol and stained with May Grunwald Giemsa (MGG), examined and categorized as per TBSRTC along with relevant clinical and radiological details.

Results

Out of 410 patients, 345 (84.15%) were females and 65 (15.85%) were males, with a male: female ratio of 1: 5.3. The age range of patients was from 21 to 70 years, with a mean age of 34 years. The commonest cytological diagnostic category was benign follicular nodule followed by Benign-Hashimoto's thyroiditis. Figure 1/ Table 2 shows distribution of cases in each TBSRTC category. Table 3 shows details of Benign (TBSRTC primary category II) of which benign follicular nodule made maximum 71.44% of cases (Figure 2) and lymphocytic thyroiditis being second most common 19.75% of cases (Figure 3). Figure 4 shows Atypia of undetermined significance (TBSRTC primary category III) comprising 0.73% cases. Table 4 shows details of lesions categorized as Suspicious of Malignancy (TBSRTC primary category V). Table 5 shows details of lesions categorized as Malignant TBSRTC primary category VI (Figure 5, 6)

Table 2: Number of cases in each TBSRTC category

S.No	Category	Number of cases	Percentage (%)	F:M	Common age group (years)
1.	Non-diagnostic/unsatisfactory	19	4.63	13:6	20-30
2.	Benign	369	90.0	10.2:1	25-35
3.	AUS/FLUS	03	0.73	2:1	30-40
4.	FN/SFN	10	2.44	4:1	50-70
5.	Suspicious of malignancy	02	0.49	F	30-40
6.	Malignancy	07	1.71	2.5:1	60-70

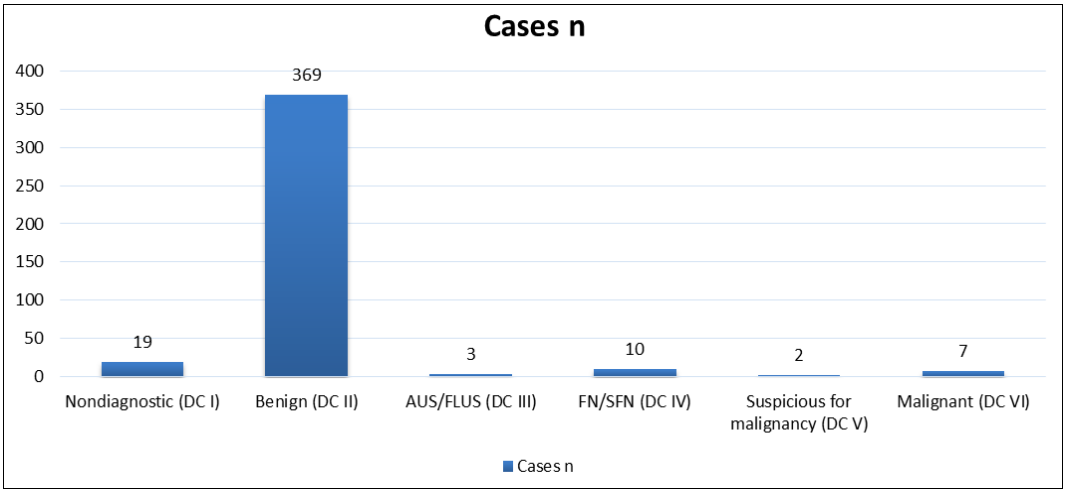


Fig 1: Distribution of cases in each TBSRTC category

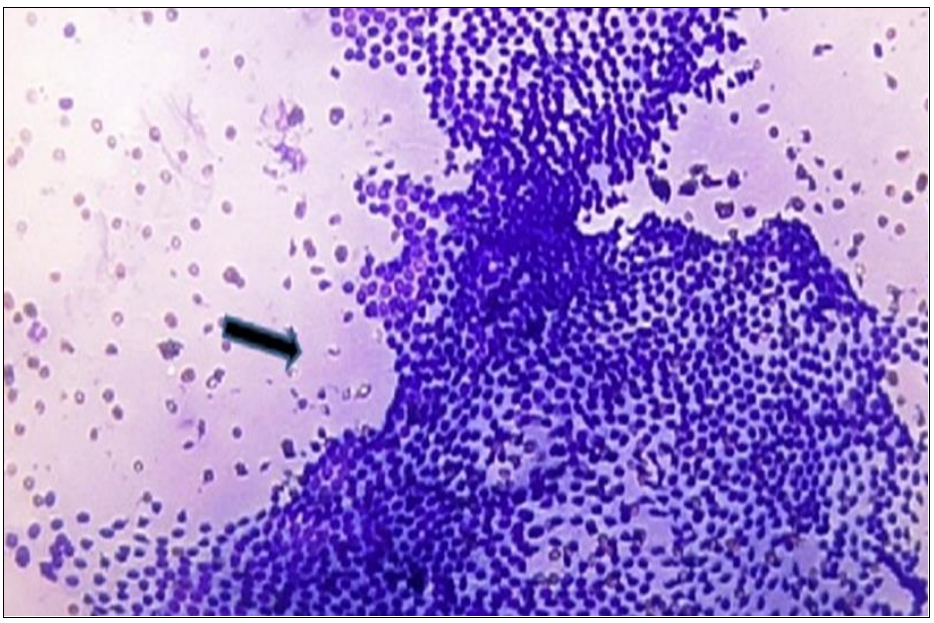


Fig 2: Benign follicular nodule: Photomicrograph showing monolayer sheets of evenly spaced follicular cells having a honeycomb-like arrangement. (400x; MGG stain)

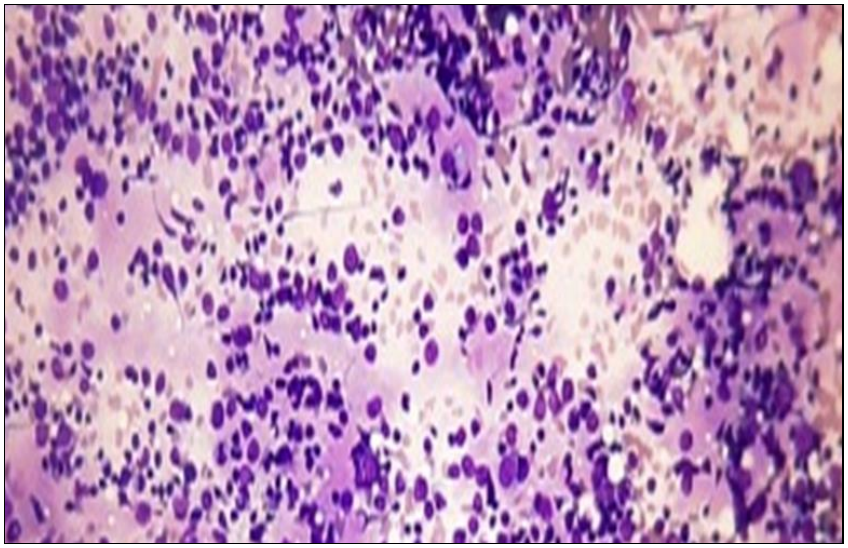


Fig 3: Lymphocytic thyroiditis: Photomicrograph showing polymorphous lymphoid population. (400X; MGG stain)

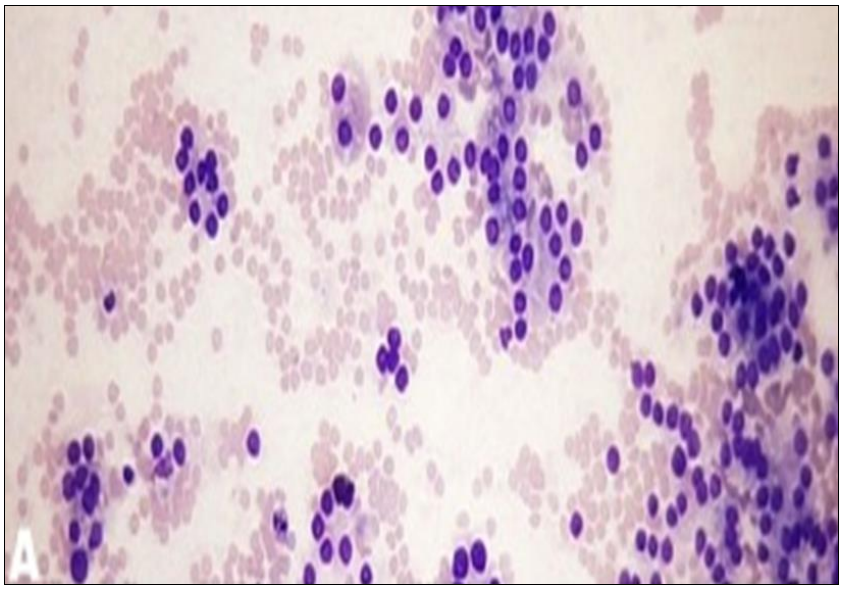


Fig 4: Atypia of undetermined significance: Photomicrograph shows prominent micro follicles in a moderately cellular specimen (400X, MGG stain)

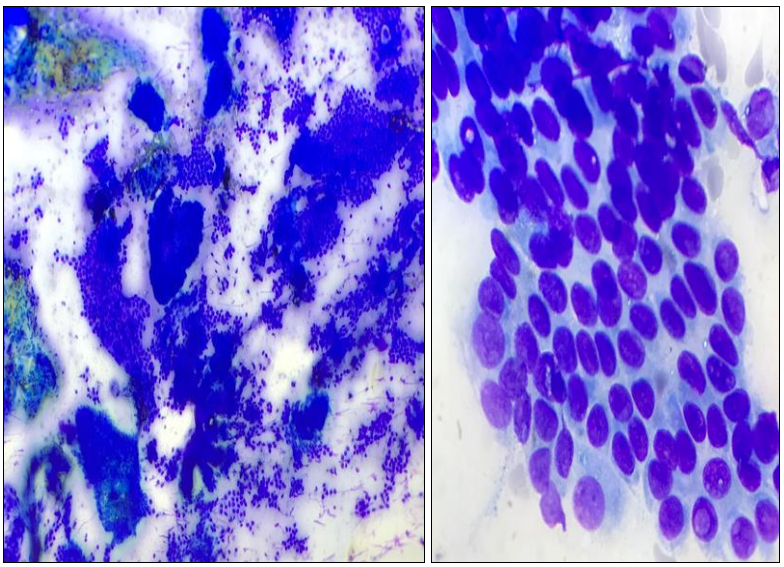
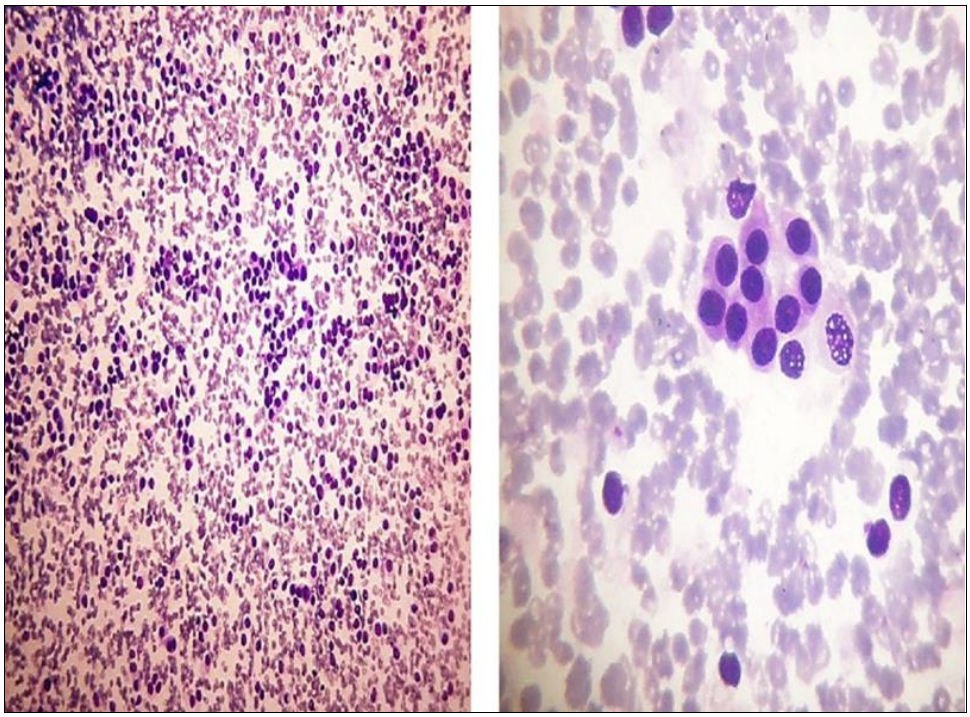


Fig 5: Papillary carcinoma thyroid: Well defined architectural pattern, chewing gum colloid and nuclear molding (100X and 400X view; MGG stain)



(a) **(b)**

Fig 6: Medullary carcinoma thyroid: predominantly cohesive, syncytial-like clusters with few isolated plasmacytoid cells (100X and 400X view; MGG stain)

(AUS/FLUS-Atypia/follicular lesion of undetermined significance; DC-Diagnostic category; FN/SFN-Follicular neoplasm/suspicious for follicular neoplasm)

Table 3: Details of benign (TBSRTC primary category ii)

S. No	Subcategory	Number of cases	Percentage (%)	F:M	Common age group (years)
1.	Consistent with benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.)	263	71.44	8:1	30-50
2.	Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context	72	19.75	35:1	25-35
3.	Consistent with granulomatous (subacute) thyroiditis	02	0.01	F	20-30
4.	Other	32	8.8	2:1	30-40

Table 4: Details of lesions categorized as suspicious of malignancy (TBSRTC primary category V)

S.No	Subcategory	Number of cases	Percentage (%)	F:M	Common age group (years)
1.	Suspicious for papillary carcinoma	01	50	F	67
2.	Suspicious for medullary carcinoma	01	50	F	50
3.	Suspicious for metastatic carcinoma	0	0		
4.	Suspicious for lymphoma	0	0		
5.	Other	0	0		

Table 5: Details Of lesions categorized as malignant (TBSRTC primary category VI)

S.No	Subcategory	Number of cases	Percentage (%)	F:M	Common age group (years)
1.	Papillary thyroid carcinoma	1	14.29	F	55
2.	Poorly differentiated carcinoma	0	0		
3.	Medullary thyroid carcinoma	4	57.13	3:1	25-55
4.	Undifferentiated (anaplastic) carcinoma	1	14.29	M	60
5.	Squamous cell carcinoma	0	0		
6.	Carcinoma with mixed features	0	0		
7.	Metastatic carcinoma	0	0		
8.	Non-Hodgkin lymphoma	1	14.29	F	62
9.	Other	0	0		

Discussion

FNAC is a valuable and popular adjunct in the diagnosis and management of thyroid diseases. Male: Female ratio was 1:5.3 and majority of the cases were in the age group 21–50 years with a mean age of presentation 34 years. The findings are comparable to the studies of Nandekar *et al* [6] Mandal *et*

al [7]. and Bamanikar *et al* [8] It is a well-known fact that thyroid lesions are most commonly seen in middle-aged females [9]. The present study reported 4.63% aspirates were nondiagnostic which is similar to study of Yassa *et al* [10]. and Nayar and Ivanovic (5%) unsatisfactory smears in their studies, respectively. There was good correlation of incidence of benign thyroid lesions with Mondal *et al*.[11] Number of benign cases are higher because patients usually come directly to the tertiary care center without any reference. Hence, the present study group is a representative of general population. Only 0.73% cases were under category AUS/AFLUS which is due to strict adherence to diagnostic criteria and keeping the use of AUS/AFLUS to a minimum. Mondal *et al*.[11] also reported AUS/AFLUS to be 1%. Thyroid lesions categorized as Suspicious of malignancy cases were 0.49% which is in concordance with Nandekar *et al* [6]. and Nayar and Ivanovic [10]. The present study had 1.71% cases in the malignant category which is like Nandekar *et al* [6]. 1.98% and Mehra and verma 2.2% [12].

Conclusion

1. The Bethesda system is standardized, reduces inter-observer variability and improving communication between cytopathologists and clinicians, and inter-laboratory agreement.
2. It predicts cancer prevalence and is causally related to the risk of malignancy, therefore, avoids unnecessary surgery, thus truly embodying the clinico-pathological correlation in its true spirit.
3. It imparts important prognostic information about cancer type, variant, and risk of recurrence. Therefore, helps in better understanding the risk posed by any confirmed malignancy.

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