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Original Research Paper

Pathology

A COMPARATIVE STUDY BETWEEN CONVENTIONAL METHOD AND THE BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY

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ABSTRACT

Background- Thyroid swellings are commonly investigated in cytology section and its uniform reporting to convey a decision making diagnosis to clinician is important, hence this study is done to compare conventional and Bathesda system for thyroid cytology reporting. **Methodology –**A Prospective study on 100 patients done who came for thyroid fine needle aspiration cytology. Aspiration done and smears prepared and reporting is done by Bathesda system as well as by conventional system and compared for its accuracy and uniformity. Results: The mean age of presentation of patients in present study is 38.06years. Out of 100 cases, 78 were females and 22 males. The ratio of Non neoplastic and Neoplastic lesion was 2.7:1 by Bethesda system and 3.0:1 by Conventional system. It was observed that, introduction of the new simplified Bethesda thyroid reporting system into six categories logically relates to the prognosis of thyroid diseases and may increase the reproducibility of diagnosis. Each diagnostic category conveys specific risks of malignancy, which offers guidance for patient management. **Conclusion:** Bethesda system of reporting can effectively determine which patient needed surgery/ follow-up. Bethesda system may be used as national standardized terminology for thyroid FNAC reporting.

KEYWORDS : Bethesda, FNAC, Thyroid

INTRODUCTION:

Disorders of thyroid gland are common. Thyroid cancer comprises 1% of all malignancies [1]. It is the most common cancer of the endocrine system [2]. The initial investigation for the diagnosis of thyroid swelling is fine needle aspiration cytology. Thyroid FNA has no known contraindications. The majority of the time, FNAC aids in preventing unnecessary surgeries by identifying a substantial fraction of thyroid nodules as benign.

The American thyroid association has endorsed the Bethesda system for reporting thyroid cytopathology (TBSRTC), which has gained widespread acceptance in the United States and numerous other countries worldwide.

The Bethesda system for reporting thyroid cytopathology (TBSRTC), classifies cytology smears into 6 categories:
1) Non diagnostic or unsatisfactory (ND, Bethesda I);
2) Benign (B, Bethesda II);
3) Atypia of undetermined significance or follicular lesion of Undetermined significance (AUS/FLUS, Bethesda III);
4) Follicular neoplasm or suspicious for a follicular neoplasm (FN/SFN, Bethesda IV);
5) Suspicious for malignancy (SM, Bethesda V);
6) Malignant (M, Bethesda VI) [3-5]

Each of these categories has its malignancy risk and management guideline [6, 7]

By Conventional method of reporting-The cases were diagnosed and placed under the following categories: Non diagnostic/ Unsatisfactory Colloid cyst Colloid goitre Thyroiditis Follicular lesion/Neoplasm Indeterminate smear Suspicious for malignancy malignant lesion.

AIMS AND OBJECTIVE:

1. To study the spectrum of various thyroid lesions.
2. To evaluate the cases according to Bethesda system.
3. To evaluate the cases according to Conventional system.
4. To compare the result of Bethesda system with Conventional system.

MATERIAL AND METHODS:

STUDY SETTING: All the patient with thyroid lesion coming to cytology section of department of Pathology G.R. Medical college & J.A. Group of Hospitals, Gwalior for FNAC between January 2021 to June 2022.

Study Design: Prospective study

Period Of Study: One and half year.

Sample Size: 100 cases.

Inclusion Criteria:
All patients who were advised thyroid FNAC & willing to participate in the study were included (All age group).

Exclusion Criteria:
1. Non cooperative patients
2. Anterior midline swelling which is palpable, subcutaneous and not moving with deglutition.
3. Neck masses which are not originating from thyroid, like Branchial cyst, Thyroglossal cyst and Parathyroid cyst.

The study was initiated after obtaining clearance from the institutional research and ethics committee.
Each cytology slide was reported by using two methods of reporting - a. The conventional method, b. The Bethesda system.

Statistical Analysis: Data were analyzed and interpretated by statistical software IBM SPSS statistics 20.

OBSERVATION AND RESULTS:

In the study period from January 2021 to June 2022 of 18 months, 100 cases of thyroid fine needle aspirations were collected and categorized according to "The 2017 Bethesda system and Conventional system for reporting thyroid cytopathology.

AGE: Patients with thyroid lesions in this study ranged from 10 years to 78 years.

Table 1: Distribution of patients according to age (n=100)

Age	Number	Percent
<20 Years	8	8 (8.0%)
21-40 Years	57	57(57.0%)
41-60 Years	25	25 (25.0%)
>60 Years	10	10 (10.0%)
Total	100	100 (100.0%)

Graph 1: Percentage distribution of the patients according to age

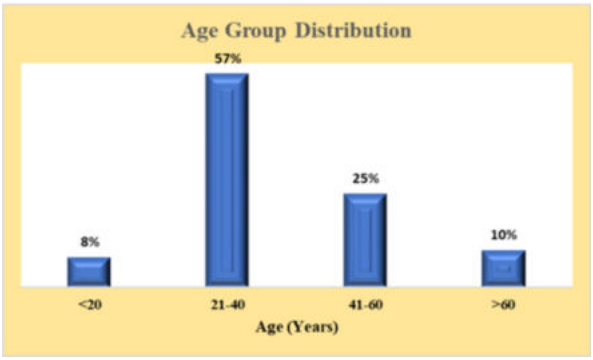


Table 2: Distribution of patients in terms of age (Years) (n=100)

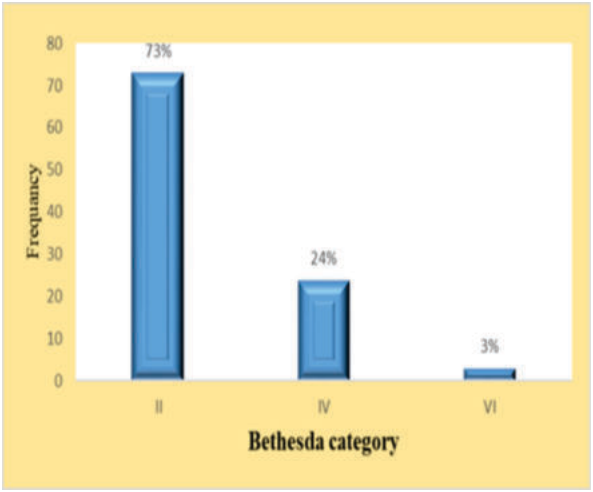
Age (Years)	
Mean (SD)	38.06(15.01)
Median	35
Range	10-78

Table 3: Distribution of patients in terms of gender (n= 100)

Gender	Number	Percentage
Female	78	78.0%
Male	22	22.0%
Total	100	100%

Table 4 Distribution Of Patients According To Bethesda Category

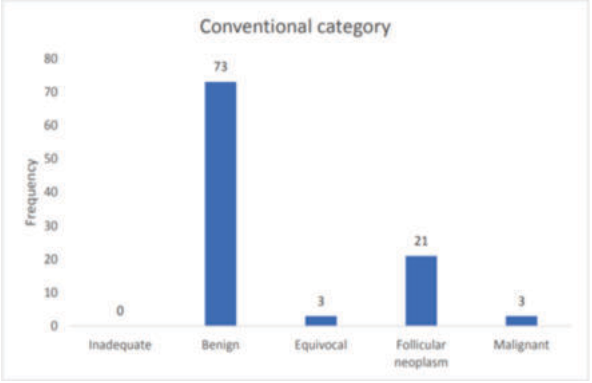
Bethesda Category	Number	Percentage
I	0	0.0%
II	73	73.0%
III	0	0.0%
IV	24	24.0%
V	0	0.0%
VI	3	3.0%



Graph- 2 Distribution of patients according to Bethesda category

Table 5 Distribution Of Patients According To Conventional Category

	Number	Percent
Inadequate	0	0.0%
Benign	73	73.0%
Equivocal	3	3.0%
Follicular neoplasm	21	21.0%
Malignant	3	3.0%
Total	100	100.0



Graph 3 Distribution Of Patients According To Conventional Category

Table 6 Comparison Of Bethesda And Conventional System Of Reporting

	Diagnosis on Bethesda Category						
Diagnosis on Conventional Category	Non-Diagnostic /Unsatisfactory	Benign	Atypia of undetermined significance	Follicular neoplasm	Suspicious for Malignancy	Malignancy	Total
Inadequate	0	0	0	0	0	0	0
Benign	0	73	0	0	0	0	73
Equivocal	0	0	0	3	0	0	3
Follicular neoplasm	0	0	0	21	0	0	21
Malignancy	0	0	0	0	0	3	3
Total	0	73	0	24	0	3	100

Comment: Bethesda System is almost equivalent to Conventional system

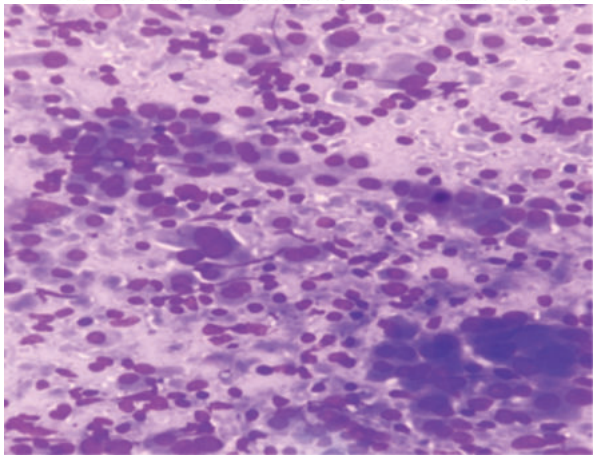


Fig.: Mixed population of Hurthle cells (oncocytes) with prominent aniso nucleosis and polymorphic lymphocytes in Hashimoto thyroiditis (40X) MGG stain

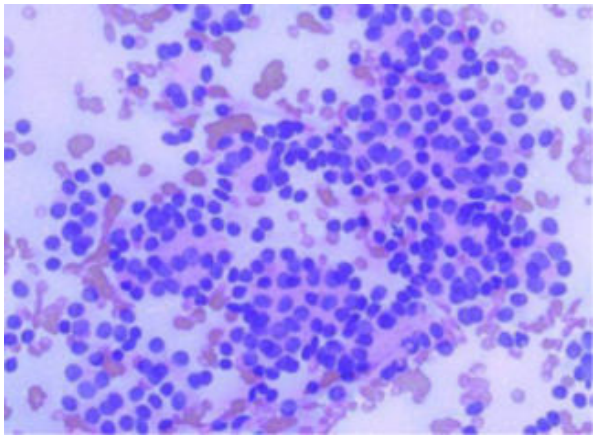


Fig-. Follicular neoplasm (40X) Pap stain.

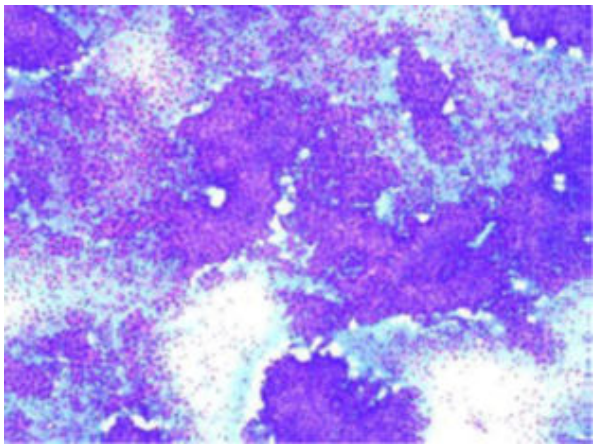


Fig -Papillary thyroid carcinoma (10X) PAP stain

DISCUSSION:

The age of patient with thyroid lesion ranged from 10-78 year. The mean age of presentation of patients in present study is 38.06 .Similar results were noted in the study performed by Poudel et al [8] with mean age 37.91 and 20-49 years being the most common age group that presented with thyroid lesion which was similar to present study. Study done by Gupta et al[9](with mean age 38.7, Naz et al[10] with mean age 39.7 and Mehrotra et al [11] 86 with mean age 36.2 were in concordance with present study.

The present study showed that out of the 100 patients with thyroid lesions 78 were females and 22 were males. Female to male ratio was3.5:1. Thyroid lesions were more common in female. This figure is comparable with studies Ji Hye park et al [12] with 3.8:1, Naz et al [10] with3.6:1, Thakor et al [13] with F: M ratio 5.1:1. Adequacy rate of present study is 100% which is comparable with similar studies Joshi et al[14] with 100%, Melo Uribe et al[15] with adequacy rate 95.6%, Mondal et al [16] with 98.8%,Kim et al [17] with 98.2%, Mehrotra et al [11] with 95.92% of adequacy rate.

The present study showed distribution of thyroid lesion according to Bethesda system into Neoplastic 27.0% and as Non neoplastic 73.0%.The ratio of Non neoplastic and Neoplastic lesion was 2.7:1 by Bethesda (system and 3.0:1 by Conventional system. This finding is similar with studies done by Tabaqchali et al [18] Melo uribe et al [15], Yang et al [19] which also showed that non neoplastic thyroid lesions are far more common.

The data shows that, introduction of the new simplified Bethesda thyroid reporting system into six categories logically relates to the prognosis of thyroid diseases and may increase the reproducibility of diagnosis.[20] Each diagnostic category conveys specific risks of malignancy, which offers guidance for patient management.[21]

According to the 2017 Bethesda system of reporting thyroid cytopathology in present study showed that category I (unsatisfactory) contributed to - 0%, category II (benign)- 73%, category III (Atypia of undetermined significance or follicular lesion of undetermined significance)- 0%, category IV (Follicular neoplasm or suspicious for a follicular neoplasm)- 24%, category V (Suspicious for malignancy)- 0%, category VI (Malignant)-3%.

Majority of patients were reported as category II contributing 73%, followed by category IV which correlates well with the studies conducted by Mondal et al [16] which categorized the various lesions as (Cat-I-1.2%, Cat-II-87.5%, Cat-III- 1%, Cat-IV- 4.2, Cat-V- 1.4, Cat-VI-4.7%).

A study done by Mehra et al [22] done in 2015 presented the various lesions as (Cat-I-7.2%, Cat-II-80%, Cat-III- 4.9%, Cat-IV- 2.2, Cat-V- 3.6%, Cat- VI-2.2%), by Thakor et al [13] in 2020 as (Cat-I 6.4%, Cat-II-80%, Cat-III- 2.4%, Cat-IV- 4.4, Cat-V-4.0%, Cat-VI-3.2%) and by Anand et al [23] in 2020 as (Cat-I-13.8%, Cat-II-75.9%, Cat-III- 2.6%, Cat-IV- 3.7, Cat-V- 2.6%, Cat-VI-2.8%).

These studies including present study showed wide variation in distribution of lesion in category I. This is probably due to the nature of lesion for example some nodules are very vascular and with repeated passes yield only blood or due to FNA technique, proper training may improve cellularity by using a smaller gauge needle, avoiding negative pressure and with proper staining technique. According to Bongiovanni M and Spitale A et al [24] the malignancy rate is 9-32% in surgically excised nodules which were initially reported as unsatisfactory, so it should be re-aspirated for better results, even after two successive unsatisfactory specimens there should be close clinical and radiological follow up. In our set up when smears were looked for adequacy if they were found inadequate, re-aspiration was performed on those patients and was diagnosed accordingly. Maximum percentages of distribution of lesions were in category II (Benign) which is similar in the other studies. Ability to identify benign thyroid nodules is of great clinical value because a simple procedure like FNA can save unwanted surgeries. In our study abundant colloid was seen in colloid goitre, nodular goitre with cystic degeneration, benign cystic lesions. Mild to moderate amount of colloid was seen in thyroiditis. Hurthle cell changes were also noted in goitre as it is not specific of only Hashimoto thyroiditis. According to Gharib H et al [25] and Yassa L et al [26] a benign lesion is the most common FNA interpretation in approximately 60-70% of all cases. Category III- Atypia of undetermined significance or follicular lesion of undetermined significance also showed variation in present studies and different studies that is probably because it is somewhat heterogeneous and subjective.

The incidence also varies with experience and training of cytopathologists. Cibas and Ali suggest that the upper limit of category III should not be more than 10%. AUS is an interpretation of last resort and should be used judiciously. After benign category the next most common category in the present study was category IV with 24% which is similar to study done in 2015 by Mehrotra et al[11] (Cat-I-4.57%, Cat-II-68.5%, Cat-III- 5.72%, Cat-IV- 17.14, Cat-V- 1.14%, Cat-VI-2.85%). Here FNA can be considered as a screening test, to detect a great probability of malignancy in thyroid nodules for performing surgical resection. Final diagnosis done by histopathological examination which show vascular invasion in follicular carcinoma. Frank benign and malignant cases does not pose diagnostic difficulties and majority of the cases

can be reported without difficulties [27]. However, there is a grey zone area consisting of overlapping entities like Adenomatous goitre, Follicular adenoma and Follicular carcinoma referred collectively as follicular patterned lesions. Not only cytology, even the histological diagnosis is at times difficult. This may be due to the fact that all the three lesions involve follicular cell hyperplasia with the difference being the clonality between the neoplastic and non neoplastic lesion. In malignant category, category VI some cases were described as Papillary carcinoma thyroid, because some cases presented nuclear features which are diagnostic in papillary carcinoma of thyroid this includes intranuclear inclusion and grooves. One case also described as Anaplastic carcinoma of thyroid, because case presented with highly pleomorphic cell clusters with multinucleated giant cell and abnormal mitosis in necrotic background.

CONCLUSION:

The mean age of presentation is 38 years with female preponderance amongst the patients. The classification of thyroid FNA smear according to the Bethesda system into six categories is a simple, convenient method which gives precise cytological diagnosis and also provides the clinician a better management plan and better prognosis and minimizes the unnecessary surgical procedures for thyroid swelling. Bethesda system of reporting can effectively determine which patient needed surgery/ follow-up. Bethesda system may be used as national standardized terminology for thyroid reporting. The clinicians should be encouraged to embrace this procedure in the initial management of such patients. In our study Bethesda system is better than Conventional system and results of both systems of reporting are comparable. In some cases, conventional system is almost equivalent to Bethesda system (viz. benign and malignant category) while in some cases, Bethesda system is much better than conventional system (viz. Follicular neoplasm and equivocal category).

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