



## Original Research Article

## Interobserver and intraobserver variation in thyroid cytopathology by conventional method and the Bethesda system

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## ABSTRACT

**Introduction:** Fine needle aspiration cytology (FNAC) is the most sensitive, correct and price effective initial technique for the clinical management of patient with thyroid nodules. Majority of the thyroid nodules are benign, with cancer accounting for less than 1% of all the lesions. Surgeons should understand the type of lesion before operation. Follicular patterned lesions is a grey zone area. If uniform standards are applied while reporting thyroid FNAC, thyroid lesions can be accurately categorized.

**Materials and Methods:** It is a retrospective observational, comparative hospital based study. Previous archived slides of thyroid FNAC ranging from a spectrum of benign to malignant lesions, belonging to different categories which can be classified according to Bethesda system over a period of 2 years. 20 FNA slides will be selected from different categories. The conventional system and the Bethesda system was used for reporting.

**Result:** Bethesda system clearly defines risk of malignancy. Good interobserver correlation is found in Cat I and Cat VII while category IV, V and VI shows poor correlation by conventional method. While good correlation is found by the observers in category I, II and VI, Moderate correlation is found in category V by Bethesda system.

**Conclusion:** Bethesda system of reporting thyroid cytopathology has high sensitivity as compared to conventional method and by this technique the interobserver and intraobserver variability can be reduced.

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### 1. Introduction

The word Thyroid started from “Thyreos”, a Greek significance shield.<sup>1</sup> Benign thyroid lesion don't need surgical operation. Clinically recognized single solitary nodule is of high concern as probabilities of malignancy is high in it.<sup>1,2</sup> In hyperplasia and thyroiditis the patient shows diffuse enlargement.

However, there has been a rise within the incidence of thyroid tumor in India and abroad. Fine needle aspiration cytology ((FNAC) is that the most delicate, exact and financially effective initial technique for the clinical management of patient with thyroid.<sup>1,2</sup>

Due to its simplicity, low cost, and absence of major complications, it's the initial investigation for the

management of thyroid swellings in our teaching hospital.<sup>3</sup> This study is aimed toward to determine the intraobserver and interobserver variation in thyroid cytopathology by the traditional methodology and also the Bethesda system.

### 2. Materials and Methods

It is a retrospective observational comparative hospital based study. Previous archived slides of thyroid FNAC ranging from a spectrum of benign to malignant lesions, belonging to different categories which can be classified according to Bethesda system over a period of 2 years.

Post M.D in Pathology and Pathologists who have experience of > 5 years in cytology were included as observers. 20 FNA slides will be selected from different categories. The Conventional System and the Bethesda System was used for reporting. In Our study 20 pathologists

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were included. All pathologists were given code numbers. A seminar was carried out on the Bethesda system before the start of the study. Proforma for reporting was circulated to each pathologist. Slides were re-circulated after gap of 1 month and code numbers of the slides were changed to avoid recognition. Double blind method will be used. Personal identity of the patient was not given to the observer. Microsoft Word and Excel were used to generate graphs and tables. Statistical analysis was done by using kappa statistics and Microsoft Excel.

### 3. Results

As criterias are not very clear in conventional method, the observers showed variation in certain categories. The category I of conventional method is of unsatisfactory or nondiagnostic variety. All the observers showed very good correlation in this category. If the smears are hypocellular or blood obscuring the cellular features they labelled that lesion into category I.

The II and III category by conventional method is of Colloid cyst and colloid goitre. Mild variation is observed in this category between the observers. If the cellularity is less some observers labelled the lesion as colloid cyst while others colloid goitre.

The category IV of follicular Lesion or follicular neoplasm showed maximum interobserver variation between the observers. There is some confusion in between the observers when to label as follicular lesion or follicular neoplasm amongst them. Again hypocellular smears were labelled as nondiagnostic by few observers.

The category V of Indeterminate variety also showed moderate to maximum variation because no definite criteria were available for this category.

The category VI of Suspicious for Malignancy also showed moderate variation amongst the observers if the cytological features are not very prominent. So some authors label this lesion in category V. While in category VII, i.e Malignant, the variation is less but more than that of category I, II & III.

In Bethesda system the interobserver variation in category I was very less. Most of the observers agreed on the unsatisfactory or non diagnostic category due to acellularity, obscuring blood. In category II interobserver variation was mild. The category II of benign thyroid lesion clearly mentions the various criteria to be seen. Therefore all showed little variation in their diagnosis for this category. Category III of Atypia of undetermined significance or follicular lesion of undetermined significance show more interobserver variation. In spite of the criteria defined for this category, some observers interpreted these lesion as follicular neoplasm or adenomatoid nodule. Category IV of follicular neoplasm or suspicious neoplasm poses problem for the observers if the cellularity is less. Therefore moderate interobserver variation is observed. Moderate

variation is seen in the category V, of suspicious of malignancy. When the features are not prominent to label the lesion as malignant one; the observers showed variation in the diagnosis. While in category VI, i.e in malignant the variation was mild. As the features are clear to label the lesion as malignant little variation is observed in this category.

By conventional method the Intraobserver variation is more as compared to Bethesda System; as most of the criterias are strict and clear in later system. By conventional method Intraobserver variation is maximum in category IV and V while mild variation is seen in category I, II, III and VII.

While by Bethesda System the Intraobserver variation is mild in most of the categories except Category III and IV which show maximum variation.

Even after Bethesda system there is poor interobserver correlation in borderline categories.

A strict application of the defined diagnostic criteria and help of ancillary techniques is required to overcome these issues. Substantial intrarobserver agreement was found for thyroid cytological lesions using Bethesda reporting criteria. It provides fine distinction between benign and malignant cytological lesions.

### 4. Discussion

To know the advantages of Bethesda over conventional system and inter and intraobserver variation this study was undertaken.

In both systems good interobserver correlation was found in inadequate, benign and malignant categories among all the 20 observers. Grey zone areas created problem in reporting.

Category AUS/FLUS has borderline findings which makes difficult to categorise them in malignant category which carries 5-10% risk of malignancy.

As per Bethesda system the total percentage of atypical category should be less than 7%.

In our study the interobserver correlation in this category is poor due to subjective observation. Similarly, a study done by Vanderlan P A et al,<sup>4</sup> in which they analysed AUS rates over a five-year period, revealed notable intra and interobserver variability.

Even though the criteria for atypical category are clearly mentioned, subjective variation was observed in various pathologists. In our study also poor agreement was observed in between pathologist for SFN/FN category. Stelow et al.<sup>5,6</sup> studied thyroid lesions showing predominantly colloid and follicular groups, and revealed poor interobserver agreement (k=0.35) for them. Similarly, Gerhard et al.<sup>5</sup> also reported major intra and interobserver agreement on follicular thyroid lesions.

We suspect that it may be because of the lack of stringent criteria on cellularity, proportion of follicular cells

forming microfollicles and amount of colloid present in the background. On the contrary, Clary et al. analysed interobserver agreement of follicular lesions among four observers and found correlation fair to substantial ( $k=0.199-0.617$ ).

Even after Bethesda system poor correlation amongst observers is found in borderline categories. Definite criteria and ancillary diagnostic techniques are required to solve such issues.

As per Bethesda system, minimum six groups of at least 10 cells which are undistorted and well maintained on a single slide is considered as adequate for FNAC reporting.

Layfield et al.<sup>6</sup> emphasized that nodules with an initial ND/ UF result should be reaspirated after a recommended three months interval to prevent false positive interpretations due to reactive and reparative changes and also mentioned ultrasound guidance with immediate on-site adequacy evaluation is preferred for repeat aspiration after an initial ND/UF specimen especially for solid nodules reduces the false negative diagnosis.

According to Raab et al.,<sup>7</sup> cystic lesions with a non diagnostic aspirate should undergo repeat FNAC. Layfield et al.<sup>6</sup> reported that AUS is a heterogeneous category, which reflects the difficulty in the cytological diagnosis of the follicular lesions of thyroid.

Major discrepancies in the cytological diagnosis between the two observers were observed for follicular lesions. A larger study with a more diverse group of cytopathologists might be needed to investigate the true interobserver variability in the interpretation of these lesions and to explain the reported differences in the rates of malignancy and even neoplasia that have followed the cytologic diagnosis of FL or FN.

Different studies by different authors were done to know the diagnostic accuracy.

Diagnostic accuracy of 96.2% with 66% sensitivity and 100% specificity was seen in study by Bagga et al.<sup>7</sup>

In his study Gupta et al.<sup>8,9</sup> studied 75 cases of solitary thyroid nodule. Correlation of FNAC with histopathology revealed sensitivity, specificity, accuracy, false positive ratio and false negative ratio of 80%, 86.6%, 84%, 13.3% and 20% respectively.<sup>10,11</sup>

## 5. Conclusion

Reporting by Bethesda system is better as compared to conventional method. As Bethesda system has a high sensitivity and high negative predictive values; by adapting it, interobserver and intraobserver variability and also unnecessary surgical procedures is reduced. Thyroid cytopathology should always be correlated with clinical, hormonal and USG findings.

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## 7. Conflict of Interest

None.

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