

Clinicopathological Correlation of Thyroid Cytology with Thyroid Function Tests: A Study of 100 Cases

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Abstract

Background: Thyroid Swellings are most common in routine clinical practice. Fine needle aspiration cytology (FNAC) gives quick results with good sensitivity and specificity. It minimize further investigations and surgeries. Combined approach of Thyroid functions test (TFT), FNAC and Histopathological findings will increase the specificity for the diagnosis of thyroid lesions. *Aims & Objectives:* Study aims to correlate cytological findings, TFT and Histopathological findings. *Materials and Methods:* The present study was undertaken in Department of Pathology, KBN institute of Medical Sciences, Kalburagi from June 2016 to May 2017. Total of 100 cases presented with Thyroid swellings, who underwent FNA and TFT. Among 100 cases, 25 cases had Histopathological Follow Up. *Results:* Total of 100 patients with thyroid swellings were included in this study. 90 females and 10 were males. Maximum patients were in age group of 21-30 years. Most Common Lesions were Non-Neoplastic accounting 88 % of cases, among these Colloid Goitre was commonest. 12% cases were found to be neoplastic, among these, Follicular Neoplasm were the most common, followed by Papillary Carcinoma. 70 % were Euthyroid, 2 % were Subclinical hyperthyroid, 16% were hypothyroid, 5% were hyperthyroidism and 7 % were subclinical hypothyroidism. Among these 25 cases had histopathological Examinations, 21 were correlated with cytological studies, 2 were false Negative and 1 was False positive. So, the sensitivity of FNAC was 83.3%, Specificity was 91.6% and Accuracy was 84%. *Conclusion:* FNAC gives High accuracy and specificity for further management of Thyroid lesions. All the FNA diagnosis must be viewed in the light of the clinical picture and thyroid hormone profile to minimize the risks of false negative reports.

Keywords: FNAC; Thyroid Function Tests; Thyroid Swelling.

Introduction

Neck swelling is a common clinical presentation besides, cosmetic deformity and it carries significant morbidity and even mortality if not managed properly. Thyroid swelling being the most common type [1].

Thyroid lesions are common worldwide and the prevalence of goiter is more than 40 million in India and more than 2 billion worldwide. Suspicious of malignancy can be considered in male gender; young people (aged <20 years), old people (aged >70 years) and with large lesions (>4 cm size). In last two decades, fine needle aspiration cytology (FNAC) has become a preferred test, being a fast, safe, reliable, minimally

invasive, cost effective, and reaching high sensitivity and specificity in the evaluation of thyroid nodules [2].

It causes concern because of high probability of malignancy in it, which ranges from 5-35% of all solitary thyroid nodules. But overall malignancy rate in thyroid are relatively less compared to benign ones. They constitute only 0.7% of all cancers in female and 0.2% in males. Fine needle aspiration and cytology (FNAC) is a well established out-patient procedure used in primary diagnosis of thyroid swellings [3].

Materials and Methods

A total of 100 patients with thyroid swelling were taken for FNA and TFT Among 100 cases, 25 cases diagnosed as follicular neoplasm had Histopathological Follow Up. A 23-24 gauge needle was used,

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either without or with aspiration by a 10 ml disposable syringe. Two to three passes were made in each case. The aspirated contents of the needle are expelled on to glass slides. In the case of cystic nodules, the cyst's contents were aspirated, centrifuged, and slides made from the sediment for cytological examination. Minimum four slides smear were made, two were air dried and then fixed and remaining were immediately fixed in 95% ethyl alcohol for about 15 minutes. Air dried smears stained with May graunwald Giemsa (MGG). Fixed smear were stained with hematoxylin and eosin and papanicolaou stain. Serum T3 T4 and TSH levels was measured in all the patients by fully automated Beckman coulter ACCESS 2 hormone analyzer by immunoassay system .

12 complete thyroidectomy and 13 hemithyroidectomy samples in formalin were received. Blocks were made 5mm thick sections were made and Routine hematoxylin and eosin staining was done.

Results

Out of 100 cases female patients were 90% and male patients were 10% . highest number of cases were seen in age group 21-30 years (32 cases) and least number of cases were seen 1-10(1%) and 60- 70 years (1%) [Table 1].

Of 100 cases 88 (88%) were non neoplastic, among these 70 (79.5%) were colloid goiter, 13 cases (14.7%), 1 (1.1%) colloid cyst, 1 hyperplasia, 2 (2.2%) were de Quervian's thyroiditis, 1 (1.1%) lymphocytic thyroiditis on FNAC [table 2].

Among 88 non neoplastic lesions 61 (69.3%) were euthyroid. 14(15.9%) hypothyroid 4 (4.4%)cases hyperthyroid, 2(2.2%) were subclinical hyperthyroid and 7 (7.9%) were subclinical hypothyroid.[Table 3].

Out of 100, twelve (12%) were neoplastic, among 12, nine (75%) were follicular neoplasm, 2 cases (16%) Papillary carcinoma, one (8.3%) was medullary carcinoma [Table 2].

Out of 12 neoplastic cases in which 8 follicular neoplasms (66.6%) were euthyroid one (8.3%)

follicular neoplasm was hyperthyroid. Out of 2 papillary carcinoma one (8.3%) was euthyroid and another was hyperthyroid (8.3%). Among 12 one was medullary carcinoma which was hyperthyroid [Table 4].

FNAC in Hashimoto's thyroiditis showed clusters of benign follicular epithelial cells with hurthle cell metaplasia and characteristic feature of impingement of lymphocytes on follicular epithelial cells with destruction of follicles [Figure 1]. Histopathology in four cases confirmed the diagnosis, remaining patients did not undergo surgical procedure.

De Quervian's thyroiditis, the predominant features were granulomatous aggregates of epithelioid cells, degenerated follicular epithelial cells, occasional multinucleated giant cells background showed inflammatory cells [Figure 2].

Hyperplasia (Figure 3), smears showed high cellularity consisting of monolayered sheets of follicular cells with moderate amount of vacuolated cytoplasm and clusters having marginal vacuoles (fire flares) [Figure 4].

In a female patient aged 35 with single nodule the aspirate showed highly cellular smear having papillae with anatomical border, overcrowding of nucleus and anisokaryosis giving rise to suspicion of malignancy [Figure 5]. The histopathology showed features of hyperplasia that ruled out malignancy.

Follicular Neoplasm, the smears showed microfollicles and rosettes in a repetitive manner [Figure 6]. The histopatholgy in 8 cases out of 9 showed features of Follicular adenoma [Figure 7] and in one case Hurthle cell Adenoma [Figure 8].

Papillary Carcinoma, highly cellular smears forming syncytial aggregates and sheets focally with adistinct 'anatomical border', nuclear crowding and over lapping, Flat sheets, three-dimensional tissue fragments and papillary tissue fragments without a fibrovascular core, Enlarged, ovoid, strikingly pale nuclei, finely granular, powdery chromatin, Intranuclear cytoplasmic inclusions and nuclear grooves. Histopathology confirmed the diagnosis (Figure 9,10,11).

Table 1: Age and sex distribution of the thyroid lesions

Age	No. of Cases	Males	Females
1-10	01	-	01
11-20	12	02	10
21-30	32	-	32
31-40	25	01	24
41-50	19	05	14
51-60	07	02	05
61-70	04	-	04
Total	100	10	90

Table 2: Distribution of cases according to gender and cytological diagnosis (Percentage taken Separately for Non - Neoplastic and Neoplastic)

Cytological Diagnosi	Number of Cases (%)	Males	Females
Colloid Goitre	70 (79.5 %)	08	62
Colloid Cyst	01 (1.1 %)	-	01
Hyperplasia	01(1.1 %)	-	01
Dequervian’s Thyroiditis	02 (2.2 %)	01	01
Lymphocytic Thyroiditis	01(1.1 %)	-	01
Hashimoto’s Thyroiditis	13 (14.7 %)	-	13
Follicular Neoplasm	09 (75%)	-	09
Papillary Carcinoma	02 (16%)	-	02
Medullary carcinoma	01 (8.3%)	01	-
TOTAL	100	10	90

Table 3: Distribution of cases according to hormone status

Hormonal Status	Non - Neoplastic	Neoplastic
Euthyroid	61 (69.3%)	09 (75%)
Hyperthyroid	04 (4.5%)	01 (8.3%)
Hypothyroid	14 (15.9%)	02 (16.6%)
Subclinical Hyperthyroidism	02 (2.2%)	00
Subclinical Hypothyroidism	07 (7.9%)	00
Total	88 (100%)	12 (100%)

Table 4: Distribution of cases according to cytological and hormone status. (Percentage taken Separately for Non - Neoplastic and Neoplastic)

Cytological Diagnosis	Euthyroid	Hypothyroid	SubClinical Hypothyroid	HyperThyroid	Subclinical Hyperthyroid
Colloid Goitre	57(64.7%)	05 (5.6%)	05 (5.6%)	01 (1.1%)	02 (2.2%)
Colloid Cyst	01 (1.1%)	-	-	-	-
Hyperplasia	-	-	-	01 (1.1%)	-
Dequervian’s Thyroiditis	-	02 (2.2%)	-	-	-
Lymphocytic Thyroiditis	-	01 (1.1%)	-	-	-
Hashimoto’s Thyroiditis	03 (3.4%)	08 (9.0%)	02 (2.2%)	-	-
Follicular Neoplasm	08 (66.6%)	-	-	01 (8.3%)	-
Papillary Carcinoma	01 (8.3%)	-	-	01 (8.3%)	-
Medullary carcinoma	-	-	-	01 (8.3%)	-
TOTAL	70	16	07	05	02

Table 5: Correlation of FNA diagnosis with final histopathology

FNAC - diagnosis	Histopathology - Benign	Histopathology - Malignant
Benign (13)	11(True Negative)	2 (False Negative)
Malignant	1 (False Positive)	10 (True Positive)

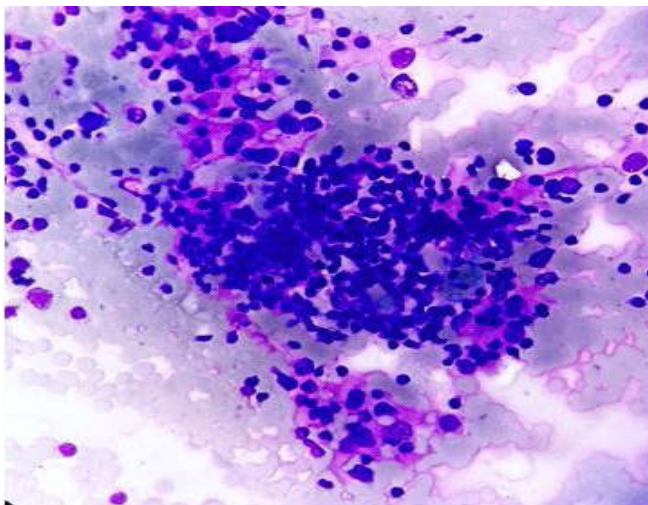


Fig. 1: Hashimoto’s thyroiditis. Lymphocytes impinged on Hurtle cells. (MGG 400 X)

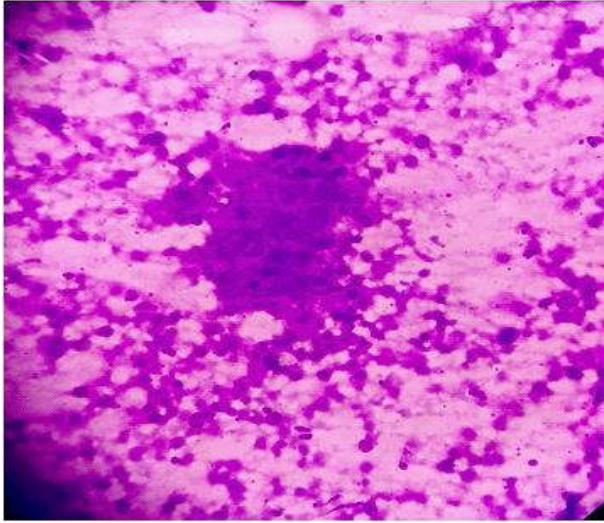


Fig. 2: De Quervain's thyroiditis. Aggregates of epithelioid and lymphocytes in dirty background. (MGG 400 X)

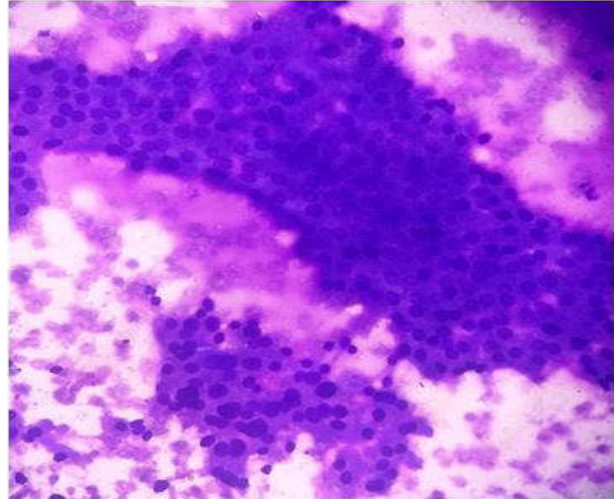


Fig. 5: Suspicious of papillary neoplasm . showing papillary structures with anatomical borders and anisokaryosis . (MGG 400 X)

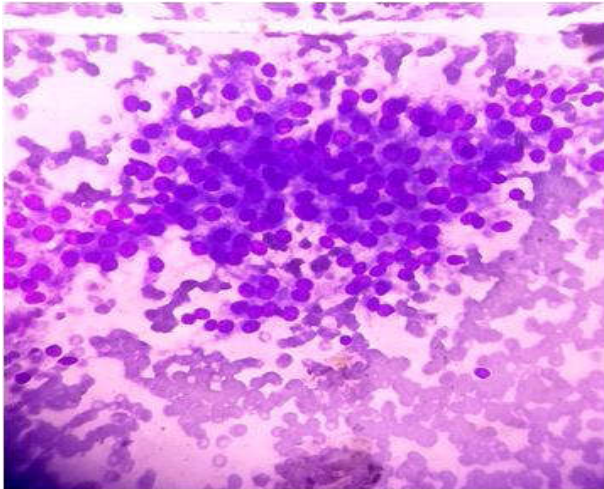


Fig. 3: Hyperplasia Clusters of hyperplastic epithelial cells with a follicular arrangement (MGG 400 x)

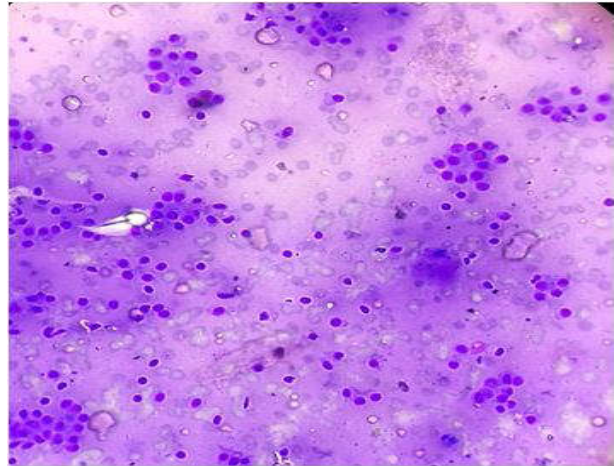


Fig. 6: Follicular neoplasm Cellular smears of single cells, and cells arranged in microfollicles (MGG400X)

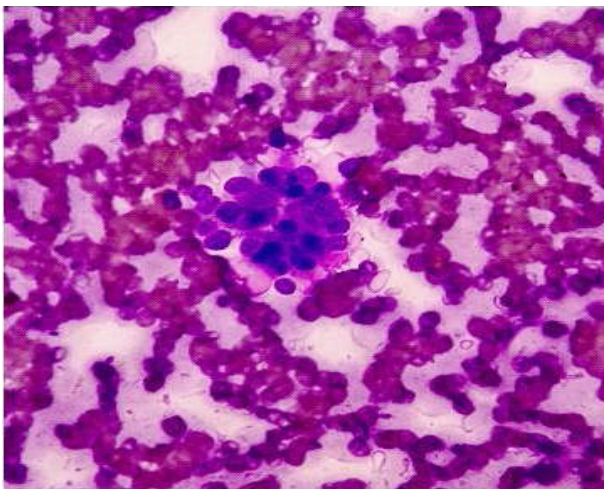


Fig. 4: Marginal vacuoles/'fire flares' clumps of homogeneous pale pink material around periphery of follicular cells in hyperplasia

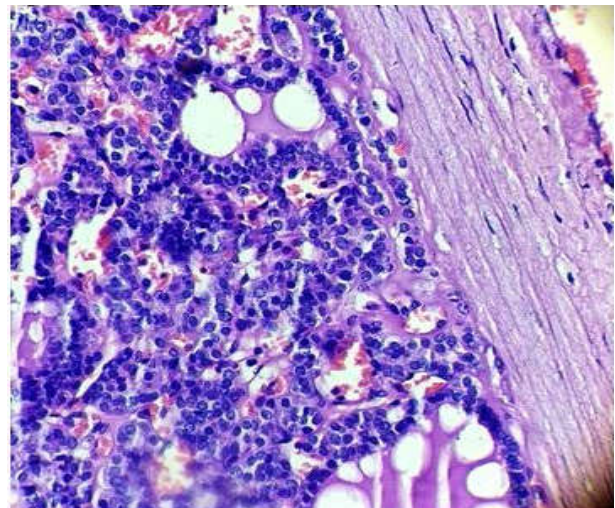


Fig. 7: Follicular Adenoma. Well Encapsulated tumor composed of follicular epithelial cells arranged in microfollicles (H & E 400 X)

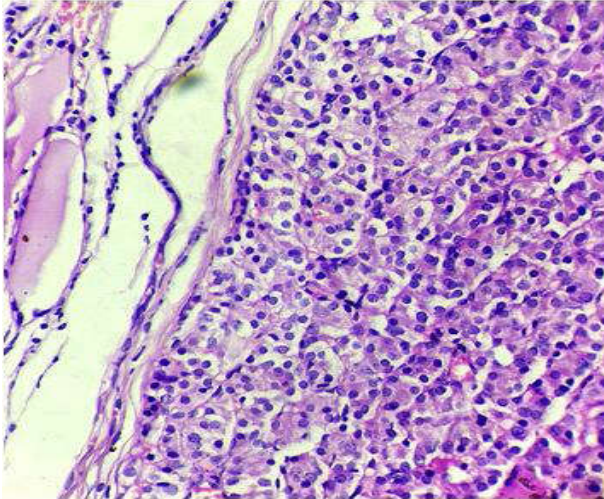


Fig. 8: Hurtle cell Adenoma. showing trabecular pattern of hurthle cells with abundant eosinophilic cytoplasm (H & E 400 X)

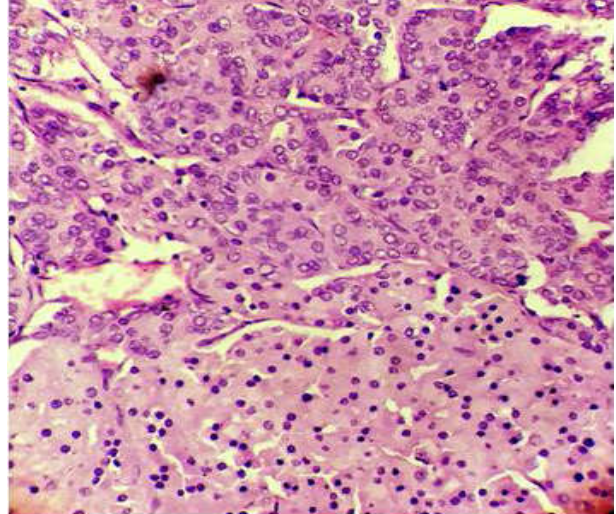


Fig. 11: Histopathology shows Papillary Carcinoma arising in background of Hurtle cell adenoma (H& E 400 X)



Fig. 9: Papillary carcinoma. papillary fragment (PAP 100 X)



Fig. 12: Gross photograph showing thyroid swelling in male patient of medullary Carcinoma

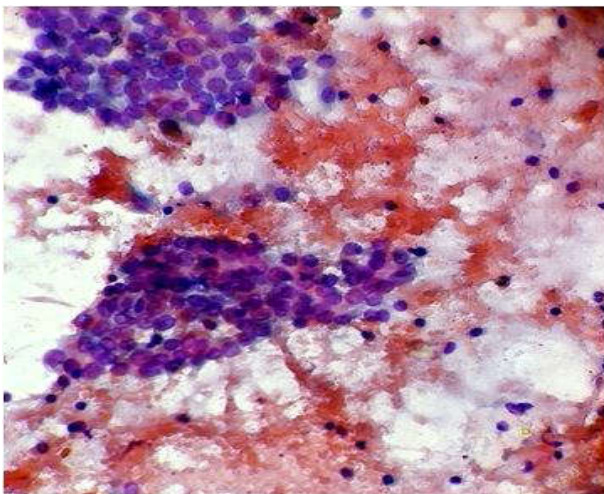


Fig. 10: Papillary carcinoma Sheet of cells with large, pale, crowded nuclei; powdery chromatin with longitudinal Grooves and intranuclear Inclusions (Pap, 400X).

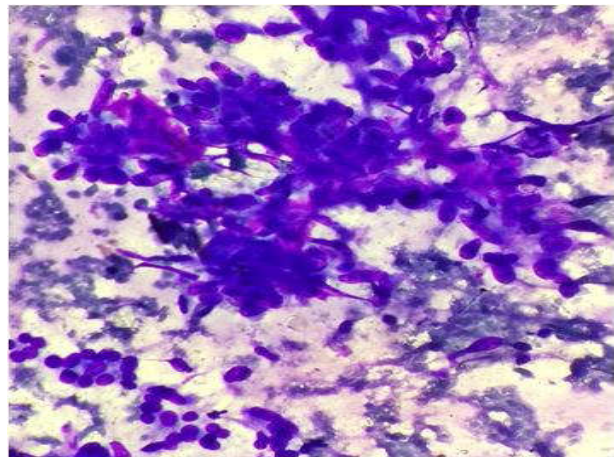


Fig. 13: Medullary carcinoma, spindle cell variant Dispersed and clustered spindle cells with elongated nuclei & speckled nuclear chromatin with magenta coloured amyloid like material. (MGG 400X)

Medullary carcinoma, the smears stained with MGG showed clusters and singly dispersed spindle cells with elongated nuclei with speckled nuclear chromatin and a magenta colored hyaline material was seen [Figure 13] the cong red stain was positive confirming the amyloid. Histopathology was not done as we lost follow up in this particular patient .

Out of 25 cases which had histopathological follow up , 12 cases were reported as malignant on cytology, 11 cases correlated with histopathology, whereas 1 case was reported as suspicious of papillary carcinoma turned out to be hyperplastic colloid goiter and among 13 cases reported as benign on cytology, 2 cases which were reported as colloid goiter showed encapsulated follicular variant of papillary carcinoma on histopathology. 10 cases which were reported as colloid goiter confirmed the diagnosis on histopathology, 9 Follicular Adenomas and 4 Hashimotos thyroiditis diagnosed on FNAC confirmed by histopathology .

Discussion

FNAC of the thyroid is widely used as it is safe, rapid, inexpensive, and reliable in the diagnosis of thyroid Lesion [4]. Colloid goiter was most common among the thyroid swelling (70%) which is commonly seen in females. followed by Hashimoto's thyroiditis correlating with study conducted by Makwana C et al [2], and vanita Patil et al [4]. Thyroid disorder is female prone owing to the presence of estrogen receptors in the thyroid tissue. Extreme of age, male sex are always suspicious for malignancy in solitary thyroid nodule hence requiring investigations. FNAC is usually the first line of investigation and other investigations like ultrasonography (USG) examination, thyroid function tests done subsequently, with an aim to select the patients who require surgery and those that can be managed conservatively [4]. The sensitivity of the thyroid FNAC ranges from 80 to 98% and its specificity from 58 to 100% [4]. This difference may be due to different study population, genetic factors, environmental factors and a hormonal effect which varies with age and gender [4].

In our study, a total of 100 patients presenting with thyroid swellings were included. FNAC and serum t3 t4 TSH level were done in all these patients. Histopathological follow up was done whenever possible. The age of the patients in this study ranged from 8 to 69 years, the commonest age affected was between 21-30 which was one decade earlier comparable with the studies done by Khadilkar and Maji [5], Makwana et al [2] and Afroze et al [6]. Females were most commonly affected with male to female

ratio of 1:9; similar done by Kamal et al [7], Makwana et al [2] and Tabaqchali et al [8].

In this study, of the total 100 cases, 88 cases were benign and 12 cases malignant. This finding was near comparable with the study done by Makwana et al [2] Ikram et al [9].

Of the 100 cases, 70 cases were colloid goiter, 13 cases were Hashimoto's thyroiditis, this study was correlated with Makwana et al [2] and Afroze et al [9]. 2 cases were de Quervian's thyroiditis, 1 case of Lymphocytic throiditis, 1 case of Hyperplasia , this was correlating with study conducted by Ritica Chaudhary et al [1]. 9 cases were Follicular neoplasm, 2 cases were and one case of Medullary Carcinoma correlated with study done by Ritica Chaudhary et al [1] and Gupta A et al [3].

In this study, of the 100 cases of FNAC of thyroid lesions, two cases that were of benign pathology on cytological find-ings proved malignant on histopathological findings; one case that was malignant on cytology proved benign on histopathological findings, ten cases showed malignancy in both cytological and histopathological findings; and 11 cases showed benign pathology both on cytological and histopatho-logical findings. So, the sensitivity of FNAC was 83.8%, specificity 91.6%, and accuracy 84% which is higher compared to study done by Makwana et al [2], Sarfirullah et al [10].

This study observed that 16.6% malignant cases showed Hyperthyroid state which was opposite to study conducted previously and none of neoplastic (both Benign and Malignant) were Hypothyroid . Most of the studies done previously have findings of Hypothyroidism in neoplastic conditions which is not correlating with our study. Remaining 75% of neoplastic cases were showing Euthyroid state a new finding in our study and similar finding were not found in other studies .

Conclusion

Thyroid swellings are more common in females but more worrisome in males due to the increased incidence of malignancy. FNAC along with Thyroid Function Tests are simple and minimally invasive techniques in investigation of thyroid swellings with high accuracy and specificity, which also helps in differentiating neoplastic from non-neoplastic diseases and also its an important parameter in decision making by a surgeon to opt for modalities like surgical procedures or conservative therapy. Inflammatory lesions were common than neoplastic

lesions. Among the neoplastic lesions, benign were more common than malignant. Colloid goiter was the most common lesion, followed by Hashimoto's thyroiditis. Follicular adenoma was the most common benign tumor, and papillary carcinoma was the most common malignant tumor. Euthyroid state was noted in maximum cases of both neoplastic and non neoplastic lesions which was a finding and not correlating with other previous studies. This could be due to environmental effects. Organic diseases of thyroid gland may or may not have influence on functional status of thyroid gland. Hence patient may have Euthyroid, hypothyroid or Hyperthyroid state while presenting with thyroid swellings. Hence we conclude FNAC is an important tool irrespective of Functional thyroid state of individual in deciding further management.

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