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Original Research Article

Diagnostic Accuracy of Fine Needle Aspiration Cytology in Thyroid Swellings

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Abstract

Background and Objectives: Thyroid is unique in being largest endocrine organ amenable to physical examination and is affected by plethora of disorders ranging from developmental to neoplastic. After diabetes mellitus, commonest of the endocrine disorders are of thyroid gland. Solitary thyroid nodule leads to cosmetic issues, compression on adjacent organs or can have malignant potential. FNAC has been foremost diagnostic tool compared to others, requiring no admission/anesthesia. This study is done to determine age and sex distribution of thyroid lesions with clinical correlation, to evaluate diagnostic accuracy of FNAC in diagnosing lesions of thyroid. *Materials and Methods:* This Prospective study (June 2014 – November 2016) comprised of 162 cases, referred to Navodaya Medical College Hospital & Research Centre, Raichur and FNAC of thyroid lesions were done with histopathological correlation in 78 patients and statistical analysis was performed in 71 cases, as 7 cases with cytological diagnosis of follicular neoplasm and hurthle cell neoplasm were excluded because cytologically it cannot be differentiated as benign /malignant. *Results*: Thyroid lesions were common in age group of 31-40 years, with female predilection (83.95%), neck swelling was predominant clinically (100%) and least common was fever and pain. Among the non neoplastic lesions-nodular goiter (93 cases; 57.40%) was common followed by lymphocytic thyroiditis (13 cases; 8.02%), hashimotos thyroiditis (11 cases; 6.79%), Multi nodular goiter (8 cases; 4.93%), hyperplastic nodule (6 cases; 3.70%) Colloid cyst (5 cases; 3.08%) colloid nodule (3 cases; 1.85%) and in Neoplastic follicular neoplasm (6 cases; 3.70%), Hurthle cell adenoma (1 case; 0.61%) papillary carcinoma (10 cases; 6.17%), medullary carcinoma (2 case; 1.22%), (papillary carcinoma with hashimotos thyroiditis (1 case; 0.61%) and anaplastic carcinoma (1 case; 0.61%) were seen. By comparing the result of FNAC and histopathology, FNAC has sensitivity of 80%, specificity 96.4% & PPV 85.7% and NPV 94.7% and accuracy of 93.0%. *Conclusion*: Thyroid cytology proves to be a reliable, simple and cost-effective first line diagnostic procedure with high patient acceptance and without complications. The ideal test should have a sensitivity and specificity of 100%. The closest method to ideal test

is, thus, FNAC which has high sensitivity and specificity. However, a combination of both FNAC and Ultrasound will give optimal results and avoid mismanagement. Thus FNAC is followed as first line pre-operative procedure due to its simplicity, cost-effectiveness & good diagnostic accuracy.

Keywords: Fine Needle Aspiration Cytology (FNAC), Thyroid Swellings.

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Introduction

The word thyroid originated from thyreos a Greek word meaning shield and was first used by Thomas Wharton (1614-1673) of London, who later named it as 'Glandular thyroideis' (1656). In ancient times it was called struma bronchocele (a cystic mass in the neck) and goiter (Latin word gutter meaning throat) while the latter term is in use, even today [1].

Thyroid is unique as it is largest, superficial of all the endocrine glands and is only one that is amenable to direct physical examination. This gland is affected by a vast array of developmental, inflammatory, hyperplastic and neoplastic disorders and may lead to hypothyroidism, hyperthyroidism, cosmetic issues and problems in other organs such as compression and may also have potential for malignancy [2,3].

Worldwide, 122000 individuals are affected each year and predominantly affecting females and young adults. The incidence of congenital hypothyroidism is approximately 1 in 2640 child birth. The most common endocrine malignancies are the thyroid carcinomas accounting to about 1% of the total malignancies globally [4].

Among endocrine disorders, thyroid disorders are most common and next to diabetes mellitus. Diffuse thyroid lesions are those that are associated with conditions affecting entire gland such as hyperplasia and thyroiditis. Nodular lesion comprises those disorders that produce a clinical nodule and consists of non-neoplastic hyperplasia as well as benign and malignant tumors. A solitary thyroid nodule is defined as a palpable single, clinically detected nodule in the thyroid. They cause more concern because of high probability of malignancy in them, which can range from 5-35% of all solitary thyroid nodules [5,6].

Fine needle aspiration cytology has been used for pre-operative diagnosis for more than half a century and in the assessment of thyroid nodules. This technique has reduced the number of patients subjected to thyroidectomy for benign diseases of the thyroid. Thyroid cancer account for 1% of all cancers and 0.5% of cancer related deaths [7,8].

Fine needle aspiration cytology (FNAC) is now widely accepted as a simple, cost-effective, minimally invasive, pre operative investigation, which can be performed on out-patient basis, is considered to be the "gold standard" in the selection of patients for thyroid surgery. This procedure is being performed on an increasing number of patients, as it is safely and widely recommended due to absence of major complications and has led to the detection of thyroid cancers at earlier stages and has also reduced the number of thyroidectomies resulting in better outcome of patients [7,9,10].

FNAC has become a common diagnostic procedure replacing other diagnostic methods as it requires no anesthesia, easy to perform and can be repeated without much discomfort to the patient and has a high diagnostic accuracy [11]. By giving direct morphological information, FNAC has supplanted most other tests for preoperative evaluation of thyroid nodules. Practice guidelines set forth by the American Thyroid Association and National Comprehensive Cancer Network, state that FNA should be used as an initial diagnostic test because of its superior diagnostic reliability and cost- effectiveness. There are various causes for thyroid malignancy like Genetic, environmental, hormonal factors. Early detection has improvised the treatment regimen and better survival [6,12]. As Fine needle aspiration cytology carries diagnostic and therapeutic significance, this study was conducted in our institution to diagnose various thyroid lesions.

Aims & Objectives

1. To evaluate the diagnostic accuracy of FNAC in thyroid lesions
2. To correlate clinically and study the age and sex distribution of various lesions of thyroid
3. To correlate the cytological and histopathological findings of thyroid lesions wherever possible, in patients attending Navodaya Medical College Hospital and Research Centre, Raichur

Materials and Methods

The present study 'Diagnostic Accuracy of Fine Needle Aspiration Cytology in Thyroid Swelling was a prospective study carried out during October 2014 to September 2016.

A total number of 162 cases were included in the study which comprises of all the patients with thyroid swelling attending Navodaya Medical College Hospital and Research Centre, Raichur and all those which were referred to the above mentioned centre.

The average number of FNC passes recommended for adequate sampling of thyroid swelling is two to five**.**

Air dried smears were stained with May-Grunwald-Giemsa (MGG) and Hematoxylin and Eosin stains. Papanicolaou staining was used wherever necessary, after the smears were fixed in ethyl alcohol / isopropyl alcohol. Whenever fluid was obtained, all the contents was aspirated using a syringe attached to the aspiration needle. Later it was centrifuged and smears were prepared from the sediment and stained by the stains, mentioned earlier. Operated thyroid specimens were collected and immersed in 10% formalin in fresh state and allowed to fix for 24 hours. Detailed Gross examination was done and representative bits were allowed for routine histopathological processing. Paraffin stained sections obtained were studied under light microscope, after haematoxylin and eosin staining. Cytological diagnosis was correlated with that of histopathology and efficacy of FNAC was estimated by using the methodology of Galen and Gambino.

Inclusion criteria

- All patients presenting with thyroid swelling in whom FNAC was indicated.
- Patients aged between 7–70 years were included in the study.

Exclusion criteria

- Patients with swellings in the neck other than that of thyroid gland.
- Patients aged <7 and >70 years were excluded in the study as there was refusal for the procedure.
- Patients with thyroid swelling in whom there was inadequate aspirate, were excluded from the study.

Results

The present prospective study was carried out in Department of Pathology over a period of two years from October 2014 to September 2016. The study comprised of a total number of 162 cases with thyroid swelling attending Navodaya Medical College Hospital and Research Centre, Raichur and all those cases which were referred to the above mentioned centre.

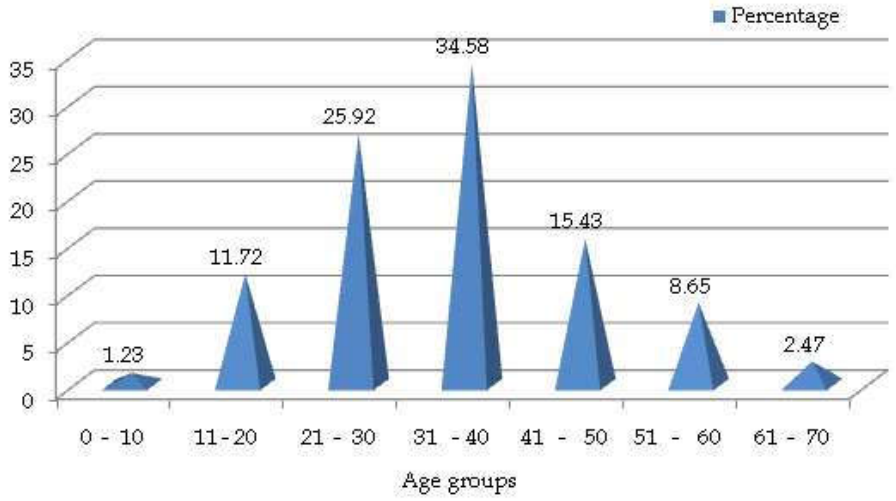
Table 1 demonstrate age incidence of thyroid lesion. Age of the youngest patient in this series was seven years, with cytological diagnosis of thyroglossal cyst, whereas the oldest patient was of 70 yrs with a cytological diagnosis of nodular colloid goiter.

Table 1: Age Distribution of Cases with Thyroid Swellling

Age group in years	No. of cases	Percentage (%)
0–10	2	1.23
11–20	19	11.72
21–30	42	25.92
31–40	56	34.58
41–50	25	15.44
51–60	14	8.65
61–70	4	2.47
Total	162	100.0

Table 2 demonstrate sex distribution, the thyroid lesions were more common in females (136 cases; 83.95%) than males (26 cases; 16.05%), with M:F ratio of 5.2:1

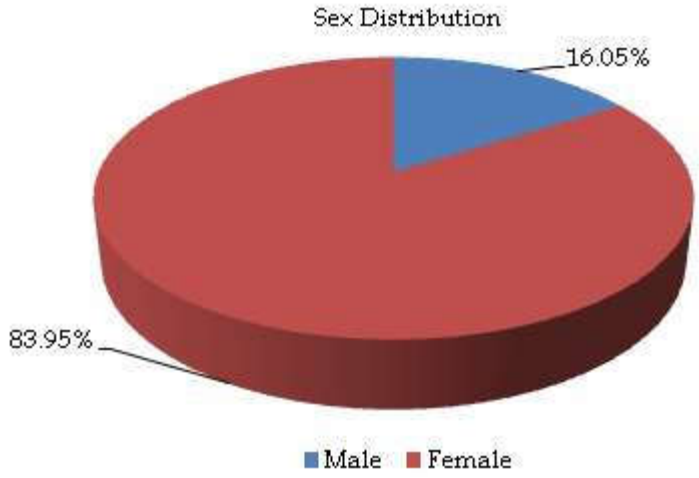
Table 3 demonstrate the site involved most common site involved was right lobe (75 cases; 46.30%) and the least common was left lobe with isthmus (3 cases; 1.86%).



Graph 1: Age Distribution of Caseswith Thyroid Swellling

Table 2: Sex Distribution of Cases with Thyroid Swelling

Sex	No. of patients	Percentage (%)
Male	26	16.05
Female	136	83.95
Total	162	100.0

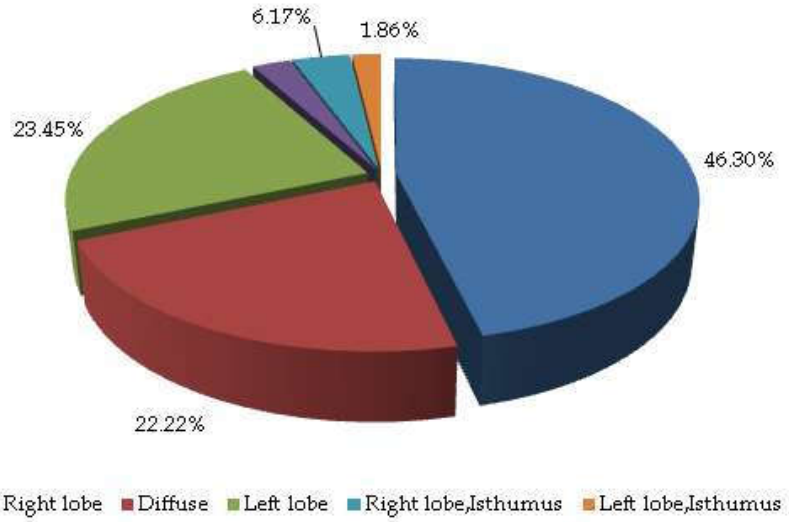


Graph 2: Sex Distribution of Cases with Thyroid Swelling

Table 3: Site Predilection of Cases with Thyroid Swelling

Site of thyroid lesion	Number	Percentage (%)
Diffuse swelling	36	22.22
Right lobe	75	46.30
Left lobe	38	23.45
Right lobe and Isthmus	10	6.17
Left lobe and Isthmus	3	1.86
Total	162	100.00

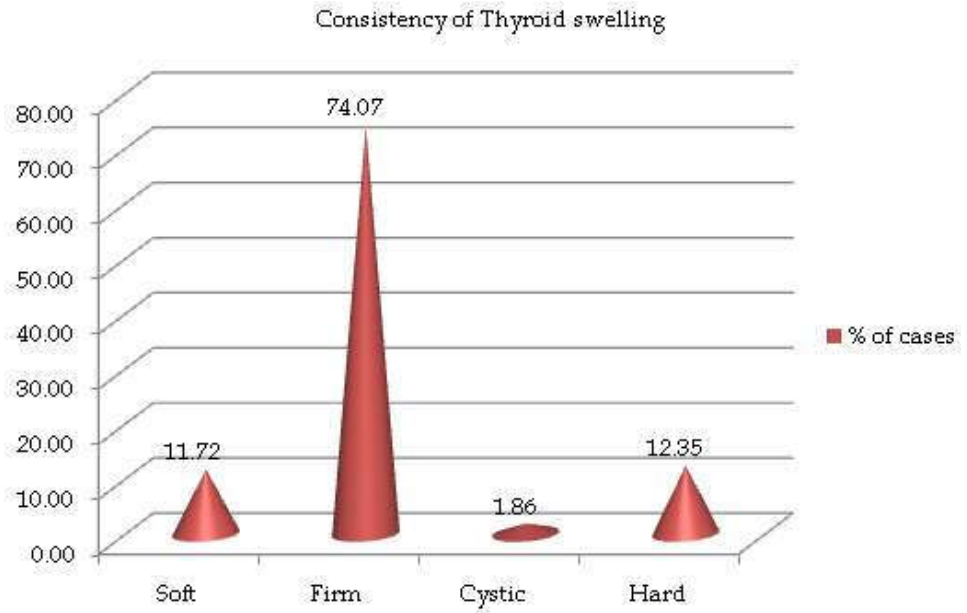
Table 4 demonstrate consistency of lesions on palpation, maximum number of thyroid lesions were firm in consistency (120 cases; 74.07%) and the least common was swelling with cystic consistency (03 cases; 1.86%).



Graph 3: Site Predilection of Cases with Thyroid Swelling

Table 4: Consistency of Thyroid Lesions

Consistency of Thyroid swelling	Number of cases	Percentage (%)
Soft	19	11.72
Firm	120	74.07
Cystic	3	1.86
Hard	20	12.35
Total	162	100.00



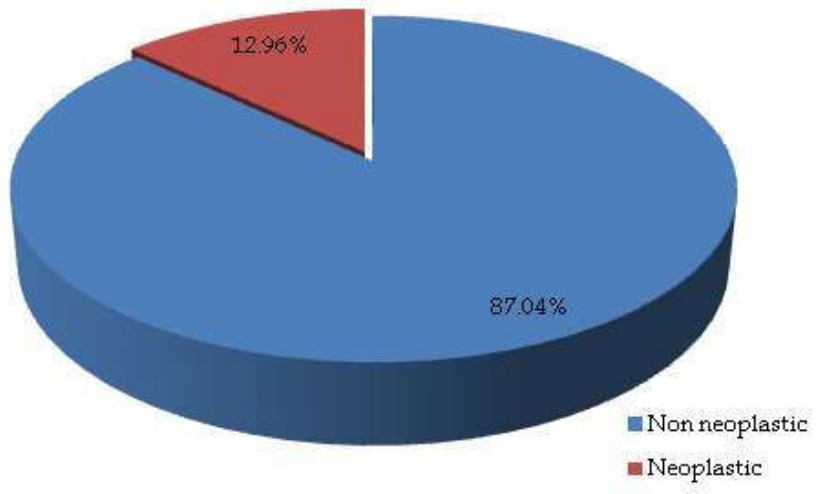
Graph 4: Consistency of Thyroid Lesions

Table 5 demonstrate the distribution of neoplastic and non neoplastic lesions majority of lesions were non neoplastic (141 cases; 87.04%) compared to neoplastic (21 cases; 12.96%).

Table 6 demonstrate spectrum of thyroid lesions Among Non neoplastic lesions, Nodular goiter (93 cases; 57.40%) was most commonly seen in 31-40 years with age range of 7-70 years and the mean age was 34.96 ± 13.40 and male to female ratio of 1:4.6, while lymphocytic thyroiditis (13 cases; 8.02%) was commonly seen in the age group 31-40 years with age range of 21-45 years and the mean age was 33.92 ± 7.53, hashimotos thyroiditis (11 cases; 6.80%) was commonly seen in the age group 31-40 years with age range of 17-53 years and the mean age was 34.73 ± 8.70, with female preponderance, hyperplastic nodule was most commonly seen in 21-30 years, age ranged from 14-60 years out of which majority

Table 5: Distribution of Neoplastic and Non Neoplastic Lesions Based on Cytological Study

Lesions	Number	Percentage (%)
Non neoplastic	141	87.04
Neoplastic	21	12.96
Total	162	100



Graph 5: Distribution of Neoplastic and Non Neoplastic Lesions Based on Cytological Study.

Table 6: Distribution of Spectrum of Thyroid Lesions Based on Cytology

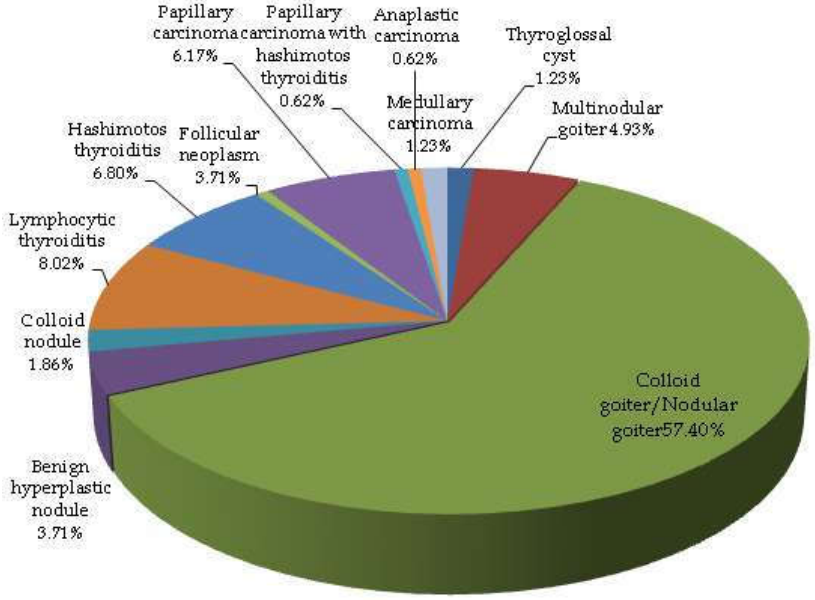
	FNAC Diagnosis	No	Percentage (%)
Non Neoplastic			
	Colloid Goiter/Nodular Goiter	93	57.40
	Colloid cyst	05	3.08
	Thyroglossal cyst	02	1.23
	Multinodular goiter	08	4.93
	Benign hyperplastic nodule	06	3.71
	Colloid nodule	03	1.86
	Lymphocytic thyroiditis	13	8.02
	Hashimotos thyroiditis	11	6.80
Neoplastic			
Benign	Follicular neoplasm	06	3.71
	Hurthle cell neoplasm	01	0.62
Malignant	Papillary carcinoma	10	6.17
	Papillary carcinoma with hashimotos thyroiditis	01	0.62
	Anaplastic carcinoma	01	0.62
	Medullary carcinoma	02	1.23
	Total	162	100

were females (5 cases; 83.33%) and very few were males (1 cases; 16.67%) males, colloid nodule and colloid cyst (8 cases 4.93%) were most commonly seen in the age group 31-40 years with age range of 20-70 years and thyroglossal cyst (2 cases; 1.23%) was most commonly seen 0-10 years with age range of 7-14 years and mean age of 10.5 ± 4.95 years.

Among neoplastic lesions papillary carcinoma (11 cases; 6.78%) was most frequently seen in 21-30 years with age range between 25-58 years and mean age was 40.36 ± 11.46, whereas follicular neoplasm (6 cases; 3.70%) was seen in the age group 21-30 years with age range of 19-45 years and mean age was 37.33 ± 6.98 with male to female ratio of 1:2, medulllary carcinoma was seen in the age range of 45-50 years with mean age of 45 years and a solitary case of anaplastic carcinoma was seen in the age group of 68 years.

Table 7 shows correlation of cytologically diagnosed cases with histopathology.

Out of 162 cases histopathological correlation was available in 78 cases (48.14%). Out of 78 cases 7 cases were excluded from the study as lesions (follicular neoplasm and hurthle cell neoplasm) cannot be differentiated on cytology. Among 71 cases 66 had good histopathology correlation comprising of different spectrum of thyroid lesion; nodular goiter (50 cases; 70.42%), hashimotos thyroiditis (1 case; 1.40%), hyperplastic nodule (1 case; 1.40%), colloid cyst (1 case; 1.40%.), thyroglosssal cyst (1 case; 1.40%.), papillary carcinoma (9 cases; 12.67%), medullary carcinoma. (2 case; 2.80%) and anaplastic carcinoma (1 case; 1.40%). 5 cases did not correlated on histopathology, out of which 2 cases which were diagnosed as nodular goiter on cytology turned out to be papillary carcinoma on



Graph 6: Distribution of Spectrum of Thyroid Lesions Based on Cytology

Table 7: Correlation of Cytologically Diagnosed Cases with Histopathology

	No of Cases	HPE Correlation	No of Cases Correlated
Non neoplastic	57	50-nodular goiter	50
Nodular goiter	53	3-papillary carcinoma	
Hashimotos thyroiditis	01	01-hashimotosthyroiditis	01
Hyperplastic nodule	01	01-toxic nodular goiter	01
Colloid cyst	01	01- colloid cyst	01
Thyroglossal cyst	01	01-thyroglossal cyst	01
Papillary carcinoma	11	9-papillary carcinoma 2-nodular goiter	9
Medullary carcinoma	2	2-medullary carcinoma	2
Anaplastic carcinoma	1	1- anaplastic carcinoma	1
Total	71		66

histopathology and 3 cases which were diagnosed as papillary carcinoma on cytology turned out to be nodular goiter on histopathology.

Table 8 shows the stastical index Out of 71 patients, 12 cases (16.90%) diagnosed as malignant on cytology, turned out to be malignant on histopathology and hence were considered as true positive cases, 54 cases (76.06%) had benign cytological finding on FNA and the same were confirmed by histopathological examination, which represented true negative cases. There were 03 cases (4.22%) diagnosed as benign by FNA which turned out to be malignant on histopathological examination representing false negative cases and there were 2 cases (2.81%) cytologically diagnosed as malignant, but turned out to be benign on histopathological examination, thus representing false positive cases.

Table 9 shows the statistical values of thyroid lesions calculated by galen and gambino's method.

Majority of lesions were true negative (54 cases; 76.05%) followed by true positive (12 cases; 85.71%), false negative (3 cases; 4.2%) and false positive (2 cases; 2.81%) Following stastical analysis were noted.

$\chi^2 = 38.96$, $p<0.0001$

Sensitivity = 80%

Specificity = 96.4%

PPV = 85.7%

NPV = 94.7%

Diagnostic accuracy = 93.0%

Table 8: Stastical Index

Statical index	No of cases	Percentage
True positive	12	16.90
True negative	54	76.06
False positive	02	2.82
False negative	03	4.22

Table 9: Statistical Values of Thyroid Lesions Calculated by Galen and Gambino's Method

Test being evaluated FNAC) Cytology	Reference standard test (Histopathology)		Total
	Positive Malignant	Negative Benign	
Positive Malignant	12	2	14
Negative Benign	3	54	57
Total	15	56	71

Nodular Goiter

Fig. 8: Clinical photograph: Nodular goiter

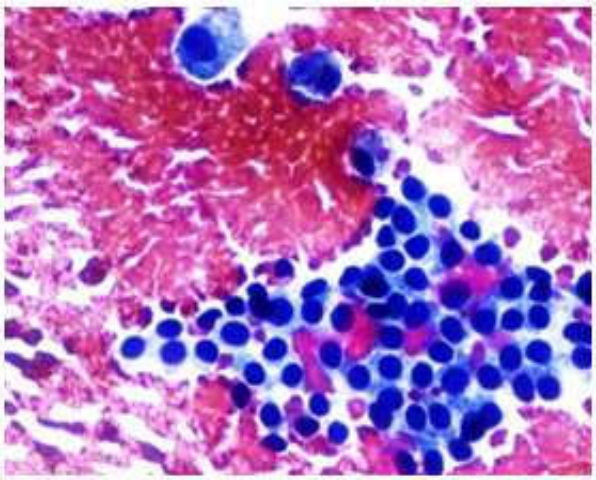


Fig. 9: Microscopy : Nodular goiter; Follicular cells in background of colloid with cyst macrophages (H &E 200X)

Fig. 10: Cut section: Cysts of variable size containing colloid with areas of haemorrhage

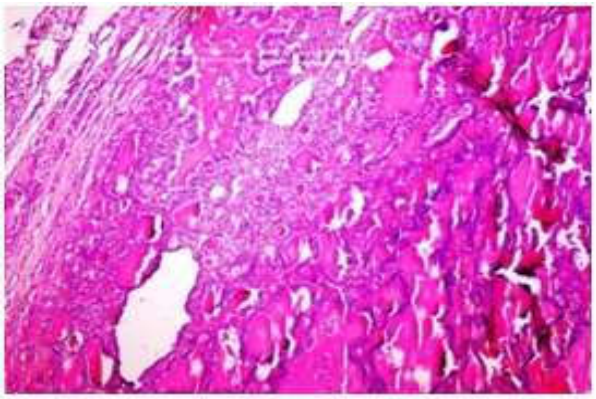


Fig. 11: Microscopy (H): Varying sized follicles showing scalooping of colloid (H&E 100X)

Hashimoto's Thyroiditis

Fig. 12: Clinical photograph: Hashimoto's Thyroiditis

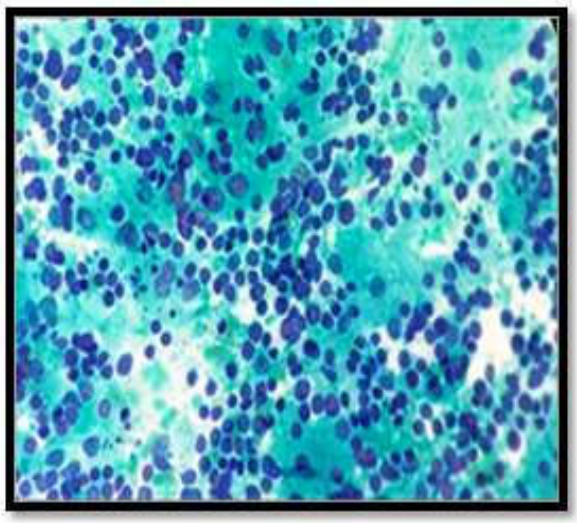


Fig. 13: Microscopy: Hashimotos thyroiditis: Lymphocyte impinging on thyroid follicles (H&E 400X)

Fig. 14: Cut section: pale – yellow tan, firm and nodular with intact capsule.

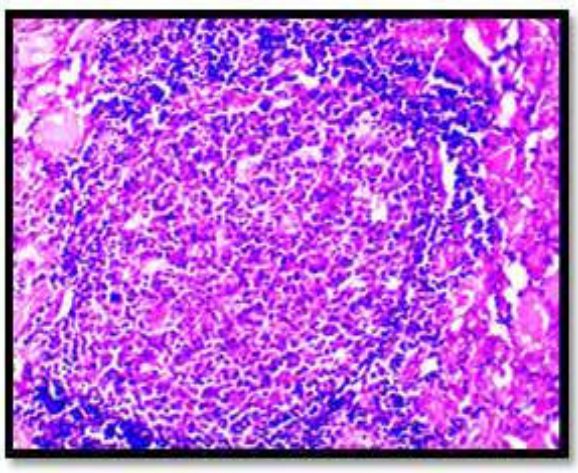


Fig. 15: Microscopy (H): Hashimotos thyroiditis: scanty colloid filled follicles with lymphocytic infiltration and a prominent lymphoid follicle (H& E 400X)

Colloid Goiter

Fig. 16: Clinical photograph: colloid goiter.

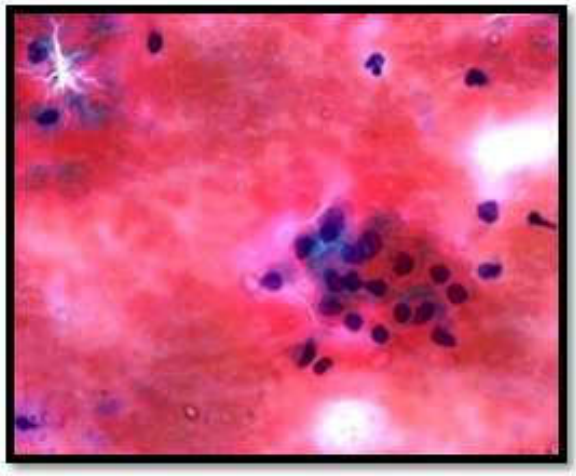


Fig. 17: Microscopy: Colliod goiter: Thick & thin colloid with thyroid follicles(H&E 100X)

Fig. 18: Cut section showing colloid with adjacent normal thyroid

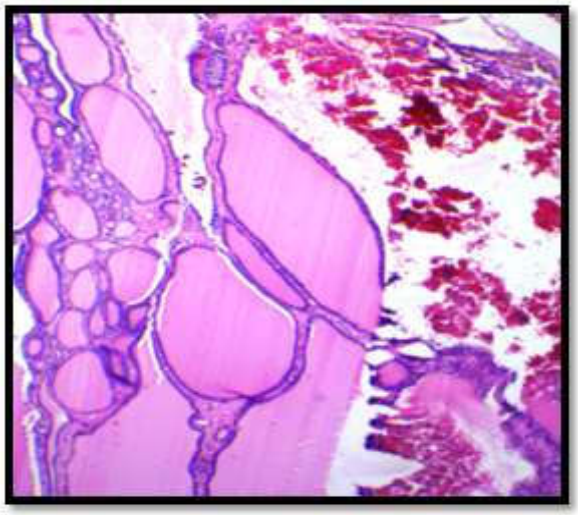


Fig. 19: Microscopy (H): colloid goiter: variable size colloid filled follicles (H&E 100 X)

Follicular Neoplasm

Fig. 24: Clinical photograph: follicular neoplasm

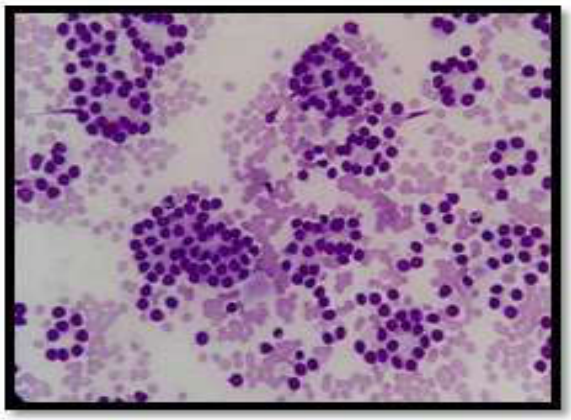


Fig. 25: Microscopy: acinar pattern with microfollicular clusters. (H&E 200 X)

Fig. 26: Cut section:well circumscribed Nodule with compressed Adjacent thyroid tissue.

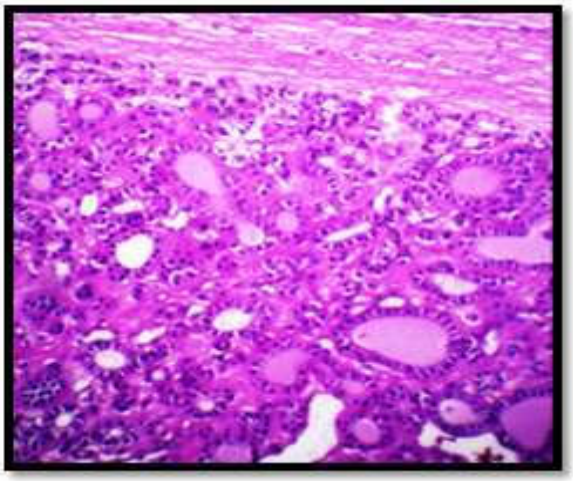


Fig. 27: Microscopy(H): Encapsulated tumour mass showing compressed adjacent normal thyroid tissue.

Hurthle Cell Neoplasm

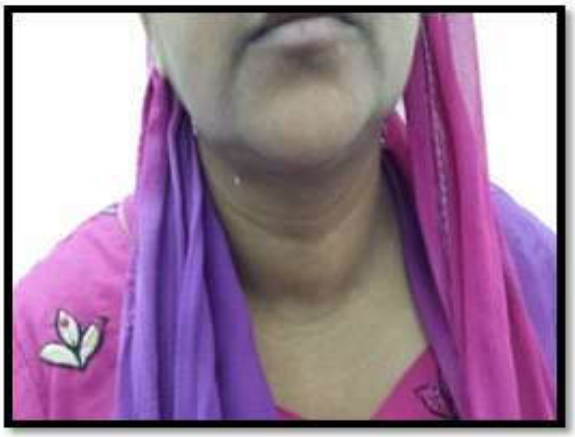


Fig. 28: Clinical photograph: Hurthle cell Neoplasm

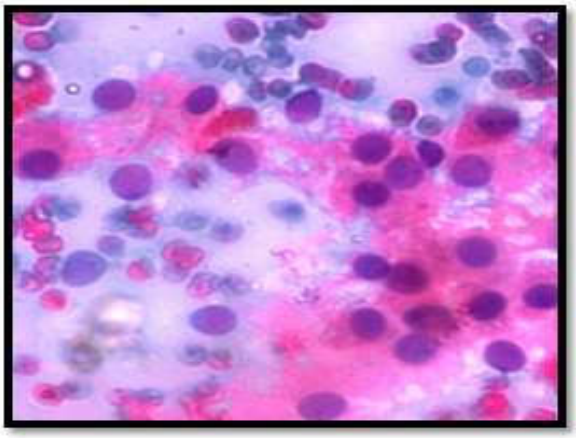


Fig. 29: Microscopy:Hurthle cell neoplasm (H&E 200X)

Fig. 30: Cutsection: Solid, tan, encapsulated growth

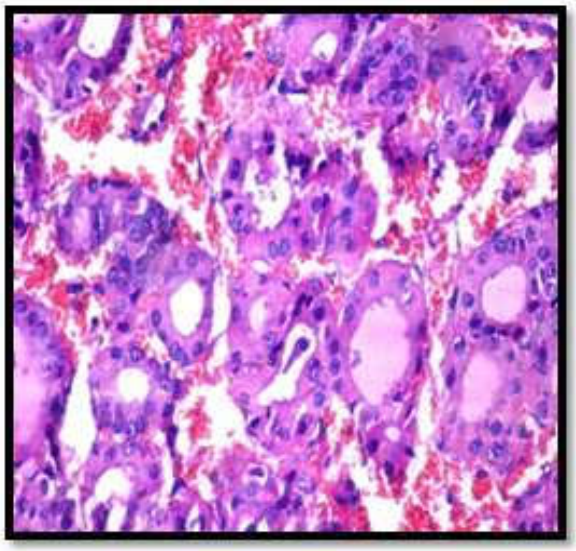


Fig. 31: Microscopy(H): Hurthle cell adenoma: Hurthle cells with abundant granular eosinophilic Cytoplasm (H&E 200X)

Papillary Carcinoma with Hashimoto's Thyroiditis

Fig. 32: Clinical photograph: Papillary carcinoma with Hashimoto's Thyroiditis.gro

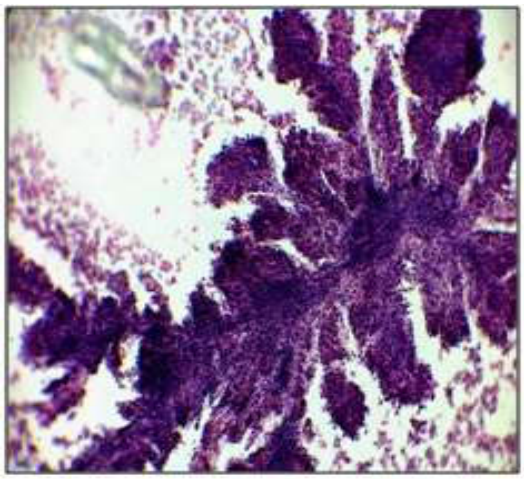


Fig. 33: Microscopy: Papillary carcinoma: cells arranged in papillae (MGG 100 X)

Fig. 34: Cut section showing in regular growth with areas of necrosis with Hashimoto's Thyroiditis

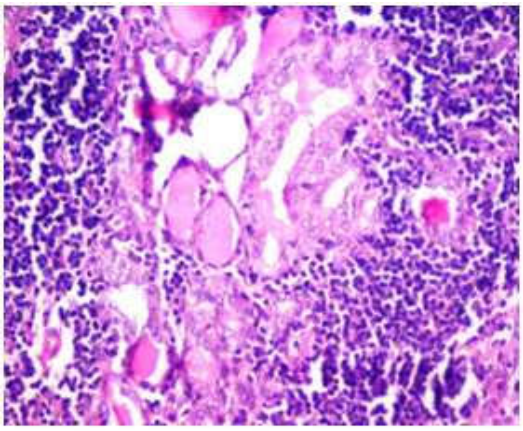


Fig. 35: Microscopy (H): Papillary carcinoma with hashimotos thyroiditis: Lymphocytes and ground glass appearance of nuclei gro

Medullary Carcinoma

Fig. 36: Clinical photograph: Medullary Carcinoma

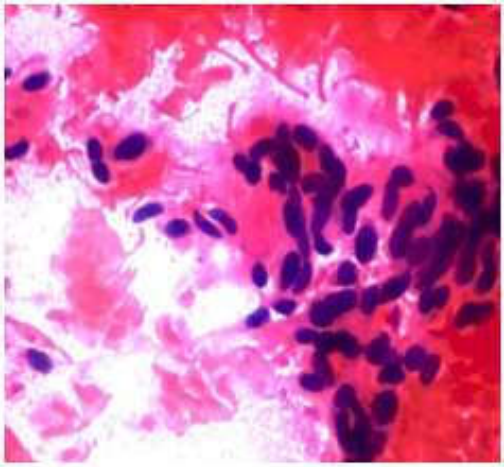


Fig. 37: Microscopy (C): Medullary carcinoma of thyroid (H & E 100X)

Fig. 38: Cut section showing nonencapsulated solid grey tan yellow firm growth.

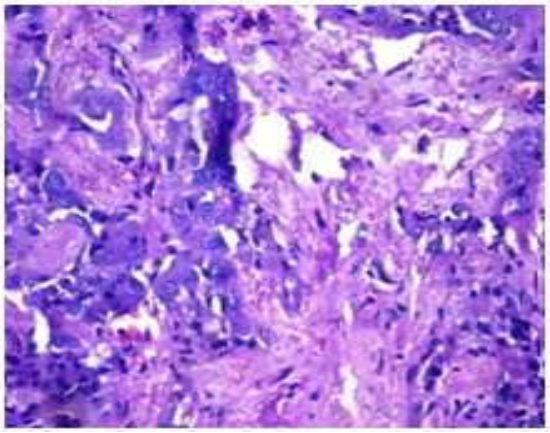


Fig. 39 (H): Amyloid With spindle Shaped cells with nucleus showing granular chromatin.

Anaplastic Carcinoma

Fig. 40: Clinical photograph: Anaplastic Carcinoma.

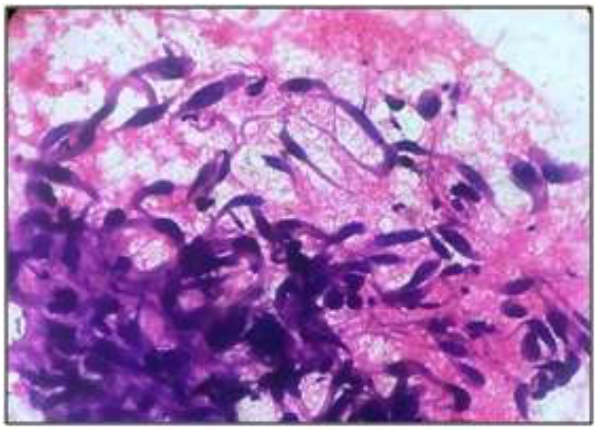


Fig. 41: Microscopy: Anaplastic carcinoma: Spindle cells with the giant cells (H & E 200X)

Fig. 42: Cut section showing solid encapsulated tumour with areas of haemorrhage and necrosis.

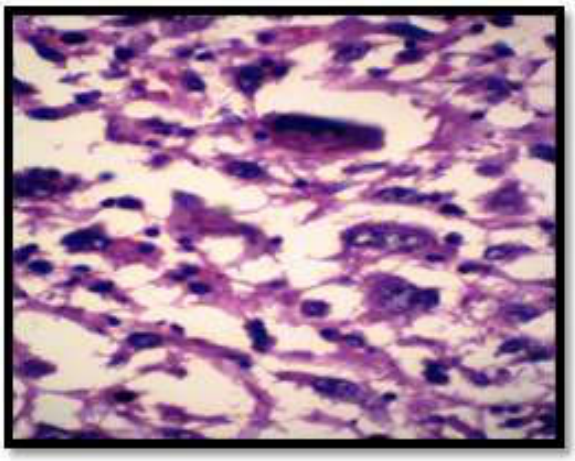


Fig. 43: Microscopy (H): Spindle shaped pleomorphic tumour cells (H & E 400X)

Discussion

The age of the patients in this study ranged from 7 to 70 years with a mean age of 35.21 ± 12.56 years, which almost corrrelated with study of patel et al. and the mean age was lower when compared with the studies conducted by Ujwala S. Chavan *et al*., Asri Mutali *et al*., Fatemeh Hajmanoochehril *et al*. and Pinkey Pandey *et al.* [3,13,14,15,16].

There was a female preponderance (136 cases; 83.95%) when compared to males (26 cases; 16.05 %) and the male to female ratio was 1:5.2 in this study, which corroborated well when compared with similar study conducted by fatemeh hajmanochehri et al. where it was 1:5.3, whereas it was lower when compared to patel et al. and Ujwala S. Chavan *et al.* and higher when compared to Asri mutali et al. [3,13,14,15].

In the present study, consistency of cases on palpation were mostly firm (120 cases; 74.07%) followed by those (20 cases; 12.35%) with hard in consistency, soft (19 cases; 11.72%) and few were cystic (3 cases; 1.86%) and these findings correlated well with the study of Arun Sen Gupta *et al*. [10].

Non neoplastic lesions were more common when compared to neoplastic lesions in this study, which corroborated with other studies [17,18].

Among the non neoplastic lesions most frequent thyroid lesion in this study was colloid goitre/ nodular goiter (93 cases**;** 57.40%**)** and this was in synchrony with the study conducted by Lakshmi *et al.* (127 cases; 50.59%). Next common lesion was Thyroiditis (Hashimotos and lymphocytic together- 24 cases; 14.81%) the occurrence of which was higher when compared to Patel *et al.* (21 cases; 16.1%). Cases of multinodular goiter (8 cases; 4.93) of this study was higher when compared to that of Ujjawal chavan *et al.* and cases of Hyperplastic nodule (6 cases; 3.70%) of the study almost correlated with patel et al and was lower when compared to Gulia *et al.* Few cases of colloid cyst (5 cases; 3.08%), colloid nodule (3 cases; 1.85%), and thyroglossal cyst (2 cases; 1.23%) were encountered in this study. These when compared with the study of Ujjwal Chavan *et al.* and Gulia *et al.* there was lower number of cases in the present study, whereas there was a higher incidence when compared with study of Patel *et al.* [13,14,19,20].

In our study, most frequent neoplastic lesion encountered was papillary carcinoma (11 cases; 6.93%) which correlated with the study conducted by Gulia *et al.* (9 cases; 6.43%). In our study, out of the 11 cases of papillary carcinoma of thyroid, one case (0.61%) was associated with hashimoto's thyroiditis and this finding was relatively similar to the study conducted by S lakshmi et al., where they encountered 2 (2.78%) out of 7 cases of papillary carcinoma of thyroid [19, 20].

Follicular neoplasm (6 cases; 3.70%) was next frequent in the study and when compared, was lower when compared with the study conducted by Ujjawal *et al*. and patel *et al.* Other few cases constituted medullary carcinoma (2 cases; 1.23%) and anaplastic carcinoma (1 case; 0.61%) in the present study and these were similar to the study conducted by Sinna E. A *et al.* and Patel *et al.* respectively where they had 6 (2.07%) cases of medullary carcinoma and a single case (0.8%) of anaplastic carcinoma [13,21].

Out of 71 patients, There were 3 (4.2%) false negative cases which were diagnosed as benign upon FNAC but turned out to be papillary carcinoma after histopathological examination. 14 (8.64%) were diagnosed as malignant on FNAC, out of which 12 (85.71%) cases turn out to be malignant on histopathological examination, thus considered as true positive cases. There were 2 (2.81%) false positive cases, which were cytologically diagnosed as malignant but turned out to be benign upon histopathological examination.

True positive cases were almost similar to Nasib Chand *et al.* and it was higher when compared to Arun Sen Gupta and Khan *et al*. True negative cases were almost similar to Nasib Chand *et al.* Our study was in comparison with khan et al. but when compared to Nasib Chand *et al.* there were more true negative cases [22].

Stastical analysis of present study ie PPV of 85.7%, NPV of 94.7%, sensitivity of 80%, specificity of 96.4% and diagnostic accuracy of 93% was in comparison with other studies where PPV was almost similar to Nasib chand *et al*., Khan *et al*. and Sinna *et al*., it was higher when compared to Mamoon *et al*. NPV was almost similar to all the studies mentioned in the above table, Sensitivity was similar to Nasib chand *et al*., Khan *et al*., Mamoon *et al.* and it was lower when compared to Sinna *et al.* Specificity was similar to Nasib chand *et al*., Khan *et al*., Sinna *et al*. and it was higher when compared to Mamoon *et al*. Diagnostic accuracy was almost similar to Nasib Chand *et al*., Sinna *et al*., Khan *et al*. and it was higher when compared to Mamoon *et al*., [21,22,23,24].

Conclusion

Fine needle aspiration cytology (FNAC) is one of the most rapidly advancing fields of diagnostic cytopathology and infact, cytopathology has already attained a status of independent specialization, However FNAC remains first choice for the initial investigation and diagnosis of both superficial and deep seated lesions.

FNAC is a simple, well developed cost-effective procedure and is widely accepted as most accurate procedure to differentiate benign and malignant thyroid nodules and also helps preoperatively in selecting patients for surgery. This method can be repeated when required as this is opd procedure carrying low morbidity and in cases of hashimotos thyroiditis they can be excluded from undergoing surgery, as these cases can be treated medically.

It has the best predictive value of all currently available diagnostic procedures and simplicity, rapidity, lack of morbidity, a high sensitivity, specificity and diagnostic accuracy, makes it most valuable tool in the evaluation of thyroid lesions.

All the FNA diagnoses must be viewed in the light of the clinical pictures and other related investigation to minimize the risks of false negative report.

Our study concluded the fact that among non neoplastic lesions nodular goiter (57.40%) was the most common cause of thyroid enlargemen and the least common was thyroglossal cyst (1.23%). Most cases of nodular goiter occurred in the age group of 31–40 yrs but was seen in the age group of 7 yrs to 70 yrs.

Among neoplastic lesions most common malignant lesion was papillary carcinoma (6.78%) and the least common was anaplastic carcinoma (0.61%). Follicular neoplasm (3.70%) was most common among benign lesions and the least common was hurthle cell neoplasm (0.61%).

FNAC should be treated as a first line of diagnostic tool for thyroid swelling while this technique is not a substitute for conventional surgical histopathology.

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