

## Fine needle aspiration cytology of thyroid lesions - A 2 Year Prospective study in a tertiary care centre

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### Abstract:

**Introduction:** At present FNAC of the thyroid is considered by many as first line procedure and it is fully accepted in the diagnostic work up of patients in conjunction with traditional methods. FNAC is widely accepted the most accurate, non-invasive, sensitive, specific and cost effective diagnostic procedure in the assessment of thyroid nodules and helps to select people pre operatively for surgery. The main purpose of FNAC thyroid is to distinguish patients with malignant nodules and those with benign nodules. It is the procedure of choice in the initial screening of thyroid nodules. A prospective work aimed to study the spectrum of cytological features of thyroid lesions in patients with thyroid swellings and to correlate the histological appearances where ever tissues were available in patients, who attended the Govt General Hospital, Vijayawada

**Materials and methods:** This study was conducted in the department of Pathology on patients with thyroid swellings who attended the Medical Surgical & ENT OPs of Government General Hospital Vijayawada during the period of June 2017 to May 2019. This study included patients of various age groups, both male and female

**Results:** A total number of 375 aspirations were performed on patients with thyroid swellings, both male and female, who attended Medical, Surgical, ENT OPs during the above period. Slides prepared were stained with H&E. Among the 375 cases aspirated material obtained was sufficient for diagnosis in 330 cases. Remaining 45 cases showed only blood cellular elements and occasional thyroid acinar cells.

**Conclusion:** FNAC has been found to be a most valuable, economized, safe and simple diagnostic procedure in the evaluation of thyroid swellings. The present study was found to be very useful in differentiating Neoplastic from Non neoplastic thyroid lesions. The present study aided in the diagnosis of Malignant Thyroid lesions with great accuracy.

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Date of Submission: 02-06-2019

Date of acceptance: 17-06-2019

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### I. Introduction

Fine needle aspiration cytology method for studying the thyroid was first developed in Sweden in the Radium Hospital of Stockholm during 1950. Martin Ellis of the Memorial Hospital for Cancer reported its use even earlier in 1930. At present FNAC of the thyroid is considered by many as first line procedure and it is fully accepted in the diagnostic work up of patients in conjunction with traditional methods. FNAC is widely accepted the most accurate, non-invasive, sensitive, specific and cost effective diagnostic procedure in the assessment of thyroid nodules and helps to select people pre operatively for surgery. The main purpose of FNAC thyroid is to distinguish patients with malignant nodules and those with benign nodules. It is the procedure of choice in the initial screening of thyroid nodules. and it can be repeated as many times as necessary due to the minimal invasiveness and low morbidity. With FNAC, the number of thyroidectomies has been halved whereas the incidence of malignant lesions has doubled which indicates that it is possible to diagnose even the latent and occult malignancies. The consequences of this conservative methodology are yet to be evaluated. Definitely there is a chance of missing a co-existing lesion. FNA is also indicated in the evaluation of goiter and in follow up of individuals who were exposed to irradiation of head and neck. FNA is also useful as a therapeutic procedure for drainage of cystic lesions.

### II. Aim

A prospective work aimed to study the spectrum of cytological features of thyroid lesions in patients with thyroid swellings and to correlate the histological appearances where ever tissues were available in patients, who attended the Govt General Hospital, Vijayawada.

### **III. Objectives**

1. To demonstrate the utility and limitations of aspiration cytology in thyroid lesions.
2. To prove the importance of FNAC as the first line diagnostic procedure for the evaluation of goiter.
3. To confirm its utility as a screening procedure for selecting cases to Surgery
4. To study the scope of FNAC in differentiating neoplastic from non neoplastic lesions

### **IV. Material And Methods**

This study was conducted in the department of Pathology on patients with thyroid swellings who attended the Medical Surgical & ENT OPs of Government General Hospital Vijayawada during the period of June 2017 to May 2019. This study included patients of various age groups, both male and female

Before proceeding to FNAC full clinical examination of the patient was done and data like present, past and personal history of the patient along with laboratory investigations including thyroid profile and ultrasound reports were collected. FNAC was done as an out patient procedure. A 23-24 gauge needle was used for aspiration. No local anesthetic was used. The stain used in the present study was H&E

### **V. Observations And Results**

A prospective Fine needle aspiration cytological study of Thyroid lesions was carried out in the department of Pathology, Siddhartha Medical College, Vijayawada between June 2017 and May 2019.

A total number of 375 aspirations were performed on patients with thyroid swellings, both male and female, who attended Medical, Surgical, ENT OPs during the above period. Slides prepared were stained with H&E.

Among the 375 cases aspirated material obtained was sufficient for diagnosis in 330 cases. Remaining 45 cases showed only blood cellular elements and occasional thyroid acinar cells. Out of the 330 cases diagnosed majority were non neoplastic lesions (276) neoplastic were (54) [315]. Nodular goiter was found to be the commonest among all the lesions with 106 cases (32%) showing high prevalence between 21-30 yrs and a male to female ratio of 1:8.7. Clinical presentation in most of the cases was Multi Nodular goiter involving both the lobes. In a small fraction of cases (15%) it presented as solitary nodule. Association of Nodular goiter with Hashimoto's thyroiditis was found in two cases and in one case Papillary Carcinoma.

27 cases of Adenomatous hyperplasia were diagnosed of which 26 were females. Solitary nodular presentation was found in 22% { 6 } cases. Common age group affected were 41-50 yrs. Cases of simple goiter diagnosed were 25, all in women, with a peak incidence in 21-30 yrs.

15 cases of cystic lesions were diagnosed, mostly in the 31-40 yrs age group with a female preponderance [12 females and 3 males].

Thyroiditis cases which were 94 presented as diffuse swellings involving the entire gland in the 2<sup>nd</sup> to 5<sup>th</sup> decade. Lymphocytic thyroiditis was diagnosed in 30 cases of which 2 were males. All the cases of Hashimoto's thyroiditis (59) and granulomatous thyroiditis [5] were diagnosed in middle aged women. 39 cases were diagnosed as Follicular neoplasms of these 34 were females and 5 were males. Clinical presentations of all these Follicular neoplasms were solitary nodules. They were commonly diagnosed in the 3<sup>rd</sup> to 4<sup>th</sup> decades.

Malignant neoplasms comprised 15 cases, Papillary Carcinoma accounting for 13 cases (86.67%) and the remaining two were Medullary Carcinoma and Anaplastic Carcinoma (13.33%)

Most of the Papillary Carcinomas were diagnosed in the 2<sup>nd</sup> -3<sup>rd</sup> decade and the female to male ratio was 3:1.

Both the Medullary and Anaplastic Carcinomas were diagnosed in the 40-50 yrs age group and in males. Surgical excision was done in 58 cases. Out of these, 26 patients with cytological diagnosis of Nodular goiter showed consistent picture in 17 cases. The remaining 11 cases were inconsistent. 6 cases were Follicular Adenomas: 2 cases were Papillary Carcinomas and 1 case of Thyrotoxicosis. 5 Cases diagnosed as cystic lesions were biopsied, 4 cases showed consistent picture (2 cases of thyroglossal cyst & 2 cases of infected cyst) and one case showed Nodular goiter.

18 cases diagnosed as Follicular neoplasms were subjected to histopathological examination. 12 cases showed Follicular Adenoma and two cases showed Follicular Carcinoma. The remaining 4 cases were hyperplastic lesions of MNG.

4 Cases of Papillary Carcinoma, 1 case of Anaplastic Carcinoma and 1 case of Medullary Carcinoma were excised and the histopathology was consistent in all the cases.

3 Cases were reported as inadequate on FNAC but after excision showed Follicular Adenomas.

As follicular carcinomas cannot be differentiated from follicular adenomas on cytology we considered 12 cases of follicular adenoma and two cases of follicular carcinoma as true positive. These 14 cases of follicular neoplasms, 4 cases of papillary carcinomas, one case of medullary carcinoma and one case of anaplastic carcinoma were reconsidered as true positive (total 20). 4 cases of MNG which were diagnosed as follicular

neoplasm cytology were considered as false positive. 2 cases of papillary carcinoma and 6 cases of follicular adenoma which were diagnosed as nodular goiter on cytology were considered as false negative.

The 18 cases of nodular goiter on FNAC (excluding 2 cases of papillary carcinoma and 6 cases of follicular adenoma) and five cases of cystic lesions were found to be non-neoplastic on histopathology and were considered as true negative.

**Table 1.** showing details of FNAC

Sl.No	Item	Number	Percentage
1	Adequate for reporting	330	88%
2	Inadequate for reporting	45	12%
3	Total aspirations done	375	100%
Percentage of adequacy 88%			

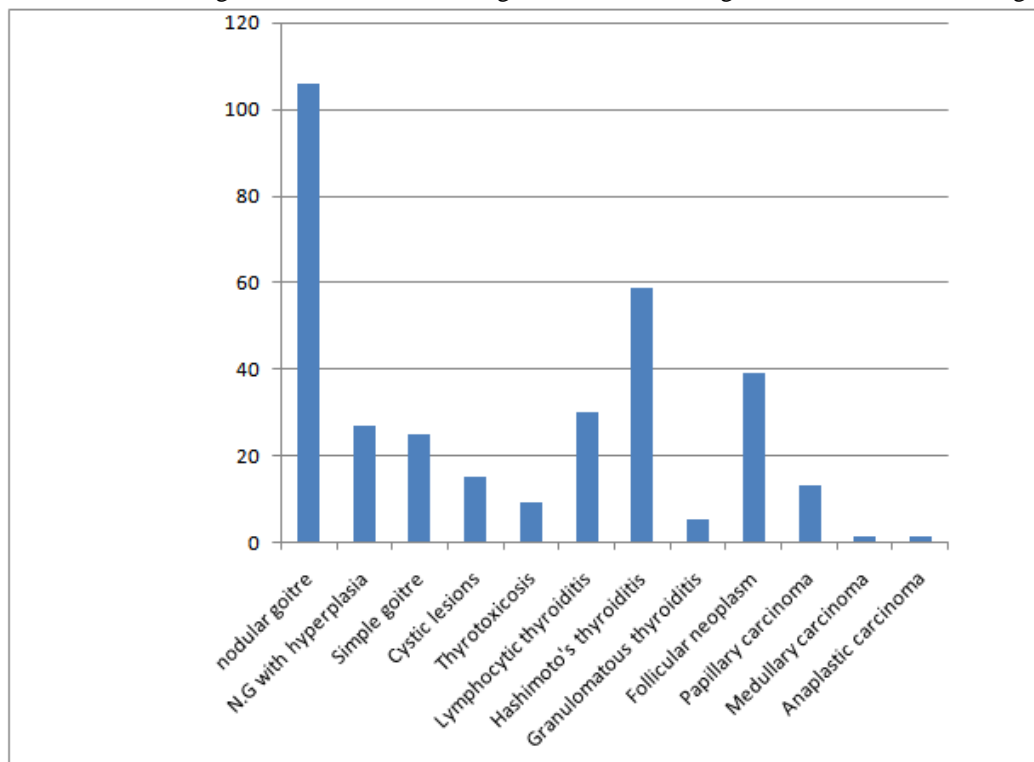
**Table 2.** Showing distribution of neoplastic non neoplastic cases

Sl.No	Item	Number	Percentage
1	Non neoplastic lesions	276	83.64 %
2	Neoplastic	54	16.36 %
Ratio of non- neoplastic to neoplastic lesions is 5:1			

**Table 3.** showing the lesions diagnosed on FNAC

Sl.No	Type of lesion	No of cases	Percentage
1	Nodular goitre	106	32.11%
2	Nodular goitre with hyperplasia	27	8.18%
3	Simple goitre	25	7.58%
4	Cystic lesions	15	4.55%
5	thyrotoxicosis	9	2.73%
6	Lymphocytic thyroiditis	30	9.09%
7	Hashimoto's thyroiditis	59	17.88%
8	Granulomatous thyroiditis	5	1.52%
9	Follicular neoplasm	39	11.82%
10	Papillary carcinoma	13	3.94%
11	Medullary carcinoma	1	0.30%
12	Anaplastic carcinoma	1	0.30%
Total		330	100%

**Figure 1.** Chart showing distribution of lesions Figure 1. Chart showing distribution of lesions diagnosed

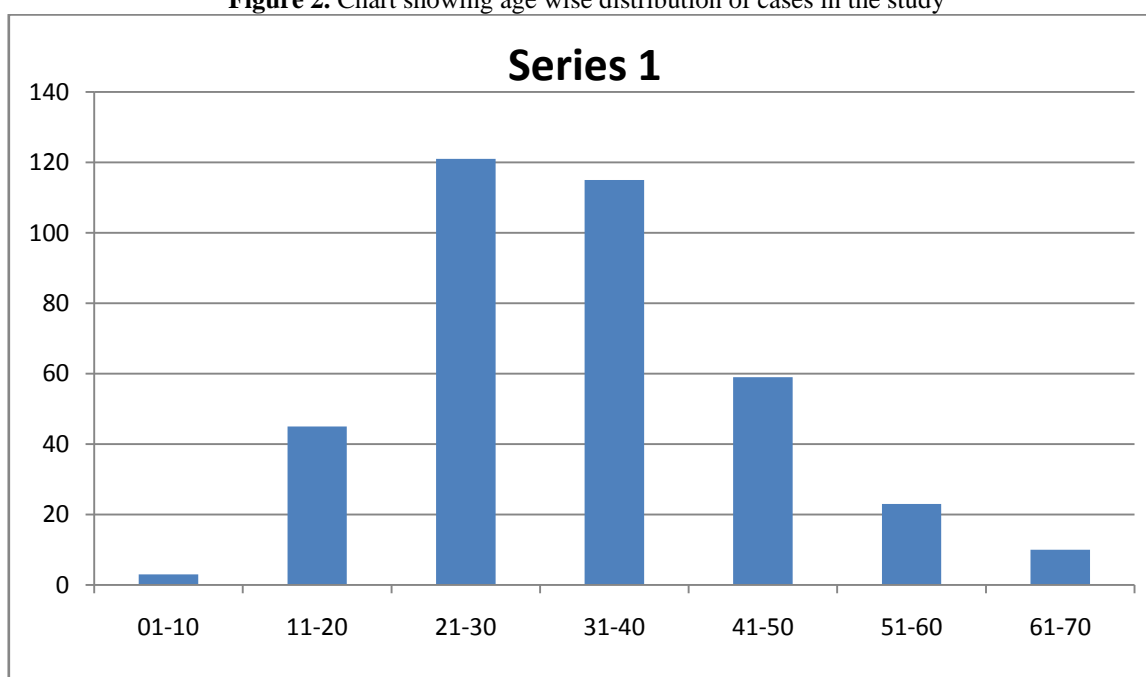


**Table 4.** Showing age wise distribution of cases

Sl.No	Type of lesion	1-10yrs	11-20	21-30	31-40	41-50	51-60	61-70	Total
1	Nodular goitre	1	8	37	34	14	8	4	106
2	NG with hyperplasia		2	8	6	9	1	1	27
3	Simple goitre		4	11	6	3		1	25
4	Cystic lesions		2	1	6	3	2	1	15
5	Thyrotoxicosis		1	2	3	2		1	9
6	Lymph thyroiditis		8	7	10	5			30
7	Hashi thyroiditis		12	18	22	4	3		59
8	Granulo thyroiditis			2	3				5
9	Follicular neoplasm		4	15	10	5	5		39
10	Papillary carcinoma			7	3	1	2		13
11	Medullary carcinoma					1			1
12	Anaplastic carcinoma					1			1
13	Inadequate	2	4	13	12	11	1	2	45
Total		3	45	121	115	59	23	10	375

Commonest age group affected is between 21-30 yrs

**Figure 2.** Chart showing age wise distribution of cases in the study



**Table 5.** showing common affected age group

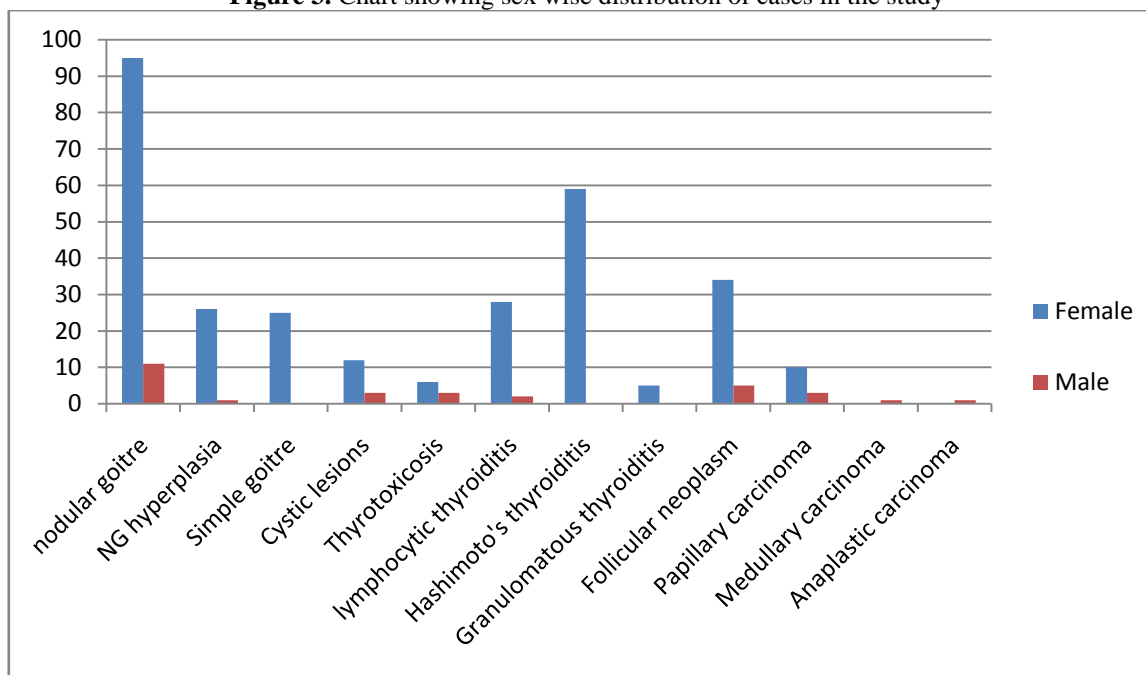
S1.No	type of lesion	Age group
1	Nodular goitre	21-30
2	Nodular goitre with hyperplasia	41-50
3	Simple goitre	21-30
4	Cystic lesions	31-40
5	Thyrotoxicosis	31-40
6	Lymphocytic thyroiditis	31-40
7	Hashimoto's thyroiditis	31-40
8	Granulomatous thyroiditis	31-40
9	Follicular neoplasm	21-30
10	Papillary carcinoma	21-40
11	Medullary carcinoma	41-50
12	Anaplastic carcinoma	51-60

**Table 6.** Showing sex wise distribution of cases

S1.No	Type of lesion	Females	Males	Total No.cases
1	Nodular goitre	95	11	106
2	Nodular goitre with hyperplasia	26	1	27
3	Simple goitre	25	0	25
4	Cystic lesions	12	3	15
5	Thyrotoxicosis	6	3	9

6	Lymphocytic thyroiditis	28	2	30
7	Hashimoto's thyroiditis	59	0	59
8	Granulomatous thyroiditis	5	0	5
9	Follicular neoplasm	34	5	39
10	Papillary carcinoma	10	3	13
11	Medullary carcinoma	0	1	1
12	Anaplastic carcinoma	0	1	1
13	Inadequate	41	4	45
	Total	341	34	375

**Figure 3.** Chart showing sex wise distribution of cases in the study



**Table 7.** Showing lesions with nodular presentation

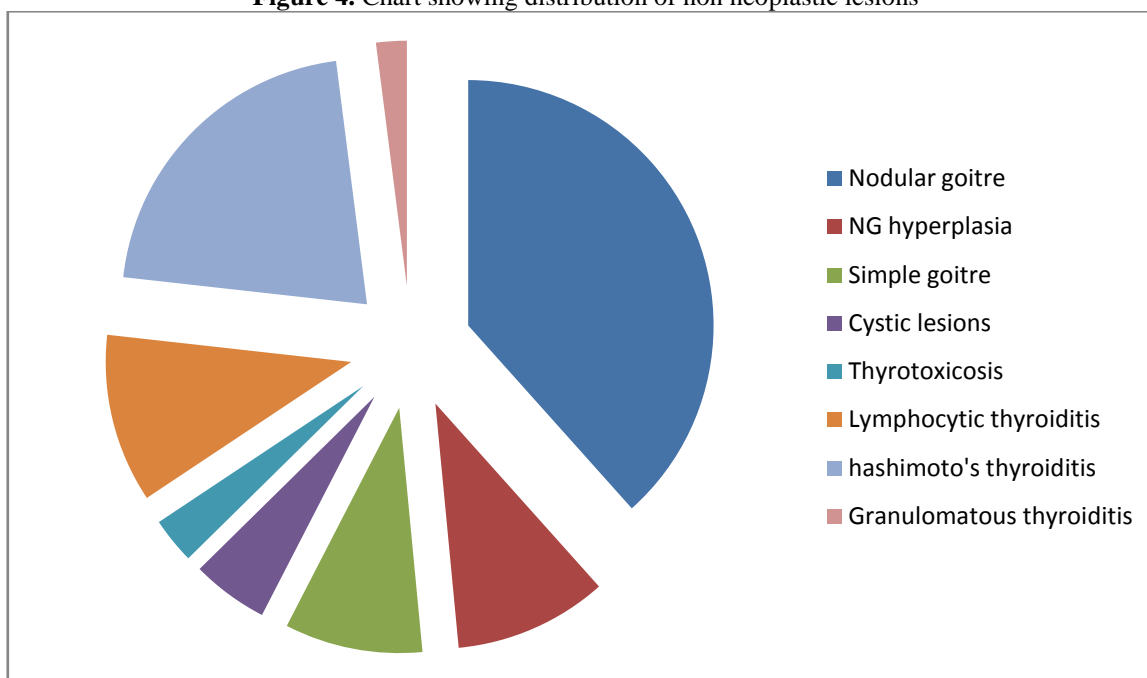
S1.No	Lesion	No of cases	%
1	Nodular goitre	11	18.33
2	Nodular goitre with hyperplasia	6	10
3	Cystic lesion	2	3.33
4	Follicular lesion	39	65
5	Papillary carcinoma	2	3.33
	Total	60	100%

**Table 8.** Showing percentage of non neoplastic lesions

S1.No	Lesion	No of cases	%
1	Nodular goitre	106	38.41
2	Nodular goitre with hyperplasia	27	9.78
3	Simple goitre	25	9.06
4	Cystic lesions	15	5.43
5	Thyrotoxicosis	9	3.26
6	Lymphocytic thyroiditis	30	10.87
7	Hashimoto's thyroiditis	59	21.38
8	Granulomatous thyroiditis	5	1.81
	Total	276	100%

Nodular goitre is the commonest lesion

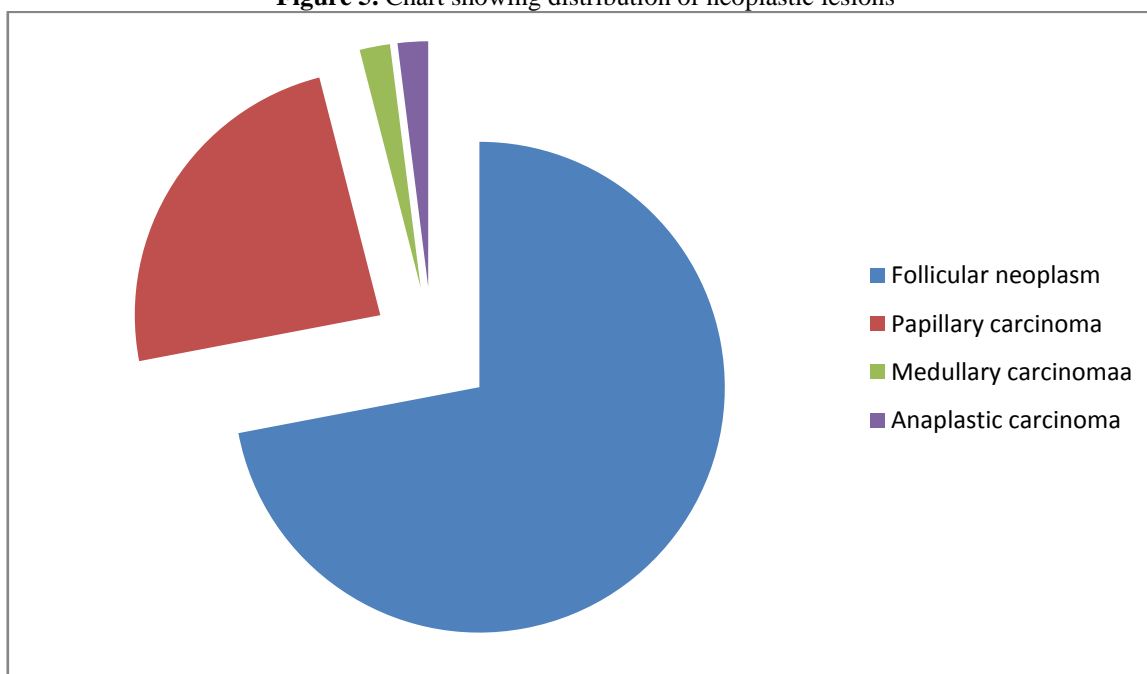
**Figure 4.** Chart showing distribution of non neoplastic lesions



**Table 9.** Showing percentage of neoplastic lesions

S1.No	Name of tumor	No of cases	%
1	Follicular neoplasm	39	72.22
2	Papillary carcinoma	13	24.08
3	Medullary carcinoma	1	1.85
4	Anaplastic carcinoma	1	1.85
	Total	54	100%

**Figure 5.** Chart showing distribution of neoplastic lesions



**Table 10.** showing number of cases subjected to HPE

S1.No	Lesin	No of cases
1	Nodular goitre	26
2	Cystic lesion	5
3	Follicular neoplasm	18

4	Papillary carcinoma	4
5	Anaplastic carcinoma	1
6	Medullary carcinoma	1
	Total	55

**Table 11** ,showing Histological correlation

S1.No	Type of lesion	Diagnose on FNAC	Biopsy correlation	% of correlatioin
1	Nodular goitre	26	17	65.83
2	Cystic lesion	5	4	80
3	Follicular neoplasm	18	14	77.78
4	Papillary carcinoma	4	4	100
5	Anaplastic carcinoma	1	1	100
6	Medullary carcinoma	1	1	100

**Table 14** .showing statistical comparison

Study	FNAC	Histopath	Sensitivity	Specificity	PPV	NPV	Insufficient	accuracy
kendrel	113	34	-	-	-	-	6%	-
Piromali et al	795	216	95%	98%	95%	97%	-	-
Burch et al	504	-	80%	73%	-	-	-	75%
Present	375	55	71.4%	85.2%	83.3%	74.2%	12%	78.2%

## VI. Discussion

Thyroid swellings are very common and can occur in various clinical settings and in various age groups. The modalities of treatment differ in different conditions Some require therapeutic management and some others surgery. FNAC was proved to be the single most sensitive investigation in differentiating neoplastic from non-neoplastic conditions, and benign from malignant conditions . At present this procedure is utilized extensively in diagnosing the condition and planning for surgery innecessary cases thus decreasing the unnecessary surgeries .

In the present study FNAC of Thyroid was done in 375 cases. Material sufficientfor reporting was obtained in 330 cases [ 88% ] and 45 cases (12 %) were inadequate showing only blood cellular elements and occasional thyroid acinar cells.

The rate of inadequacy ranged from 9-31% according to various publications. Various factors are responsible for getting inadequate material. It depends on the experience of the aspirator, the size of the nodule, type of the nodule, number of aspirations and the duration of the aspiration . Rate of inadequacy in our study was 12%.

In our experience 23 and 24G needles yielded sufficient material. Material obtained was scanty with 25 G needle and was very hemorrhagic with 22G needle Increased number of aspirations yielded more material when compared to a single aspiration for extended time.

Aspirations from cases of thyrotoxicosis and certain Adenomas were very menorrhagia. Non-aspiration technique described by Jayaram et al was used in these cases FNAC is safe, less expensive and of great patient compliance .Piramol reported skin bruises in 3.3% of cases and Safiullah recorded skin bruises and haematomas in 6% of cases; So the complication rate in our study was not high. We did't experience any major complications except in one case where the patient went to shock like state, but recovered in a few minutes without any treatment. Minor complications like haematoma and skin bruises were observed in 3% cases.

In the large series of Mayo clinic [6300 cases] benign diseases represented 65% of the total lesions which include benign and goitres and thyroiditis. In the series of schenek benign diseases represented 83%.

In the present study benign non-neoplastic cases were 276 representing 80% of the total cases, so our results were almost the same with the other studies.

## VII. Summary

The present study constituted 375 aspirations from thyroid lesions that were done during the period 2017-2019 in the Department of Pathology, Siddhartha Medical College, Vijayawada.

Out of the 375 cases who material was obtained in a 330 cases [88% ]. Maximum cases were in 20-30 yrs age group. Male to female ratio was 10:1. In the 330diagnosed cases the non-neoplastic lesions constituted 276 and neoplastic lesions constituted 54. The non-neoplastic and neoplastic ratio was 5:1.

Solitary nodule presentation was commonly identified in neoplastic lesions. Follicular neoplasms were the commonest among the neoplastic lesions. Follicular carcinomas occurred at an older age than follicular adenomas. Papillary carcinoma was the commonest malignancy diagnosed, constituting 13 cases. One case of anaplastic carcinoma and one case of medullary carcinoma were diagnosed on cytology in elderly males.

Histopathological examination was done in 58 cases. Consistency with cytological diagnosis was observed in 41 cases. Consistency with cytological diagnosis was 100% in malignancies. The cyto-histological correlation was slightly less in Follicular neoplasms and Nodular goiters.

In the present study the statistical values were consistent with other publications. Specificity was 85.19%, Sensitivity 71.42%, Positive predictive value 83.33% and Negative predictive value 74.2%. Overall diagnostic accuracy was 78.19%.

### VIII. Conclusions

FNAC has been found to be a most valuable, economized, safe and simple diagnostic procedure in the evaluation of thyroid swellings. The present study was found to be very useful in differentiating Neoplastic from Non neoplastic thyroid lesions. The present study aided in the diagnosis of Malignant Thyroid lesions with great accuracy. The utility of FNAC as a screening procedure, in selecting patients for Surgery was satisfactory (No surgery was performed in cases of thyroiditis).

FNAC was found to be less sensitive in differentiating follicular lesions and cystic lesions.

Diagnostic pitfalls were minimal when performed by experienced personnel.

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Dr. U. Arunajyothi. "Fine needle aspiration cytology of thyroid lesions - A 2 Year Prospective study in a tertiary care centre." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 6, 2019, pp 31-38.