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RESEARCH ARTICLE

FINE NEEDLE ASPIRATION CYTOLOGY WITH CLINICOPATHOLOGICAL STUDY OF THYROID LESIONS AT SRTRGMCH

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ABSTRACT

Aim: To study the clinicopathological features of Thyroid lesions at SRTRGMCH, rural set up.

Method: Total 312 of THYROID lesions were studied. Patients of all age group, of both sexes with complaints of swelling over neck were included. Patients were subjected for clinical palpation, Ultrasonography(USG), Lymph Nodes examination, thyroid profile, Fine-needle aspiration cytology (FNAC) and accordingly treated with surgical and medical mode of management. All operated specimens were sent for histopathological evaluation.

Results: 182 patients (58.33%) were between age group of 20 to 40 yrs with a female preponderance. Of total lesions Non-neoplastic category constituted the majority of lesions (79.80%). These cases include Nodular goiter, colloid goiter, hashimoto's thyroiditis, lymphocytic thyroiditis and toxic goiter. Neoplastic lesions constituted 20.20% of all cases which include follicular neoplasm, hurthle cell adenoma, papillary carcinoma, anaplastic carcinoma. 56 cases underwent histopathological examination of which 43 cases (76.78%) were benign and 13 cases (23.22%) were malignant.

Conclusion: Taking into consideration Histopathology report as a gold standard, correlation of FNAC finding with histopathology finding showed 78.50% sensitivity, 95.20% specificity with 84.61% positive predictive value and 93.02% negative predictive value.

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INTRODUCTION

The thyroid gland consists of two bulky lateral lobes connected by an relatively thin isthmus, usually located below and anterior to larynx. The thyroid gland maintains the level of metabolism in the tissues that is optimal for their normal function (Orell, 2005; Silverman, 1986). Disease of the thyroid gland are common and comprises a spectrum of entities causing systemic disease (Grave's disease) or a localized abnormality in the thyroid gland such as nodular enlargement (goiter) or a tumor mass (Das et al., 2004). Thyroid swellings are four times more common in females (Zygnunt, 2004). FNAC is diagnostic tool in which cells are extracted from palpable swellings using FNAC syringe and fine needle. In past five or six decades, FNAC of the thyroid has been increasingly utilized for investigation of the thyroid lesions. Simplicity, diagnostic accuracy and most of all cost effectiveness has given

FNAC the status of first line diagnostic test in pre operative evaluation of thyroid lesions. Its accuracy when applied by experienced and well trained practitioners, can approach that of histopathology in providing unequivocal diagnosis (Mac Donald, 1999). Its use has decreased the number of thyroid surgeries performed and increased the ratio of malignant to benign lesions resected. As a result many thyroid surgeries for benign Non-neoplastic diseases have been avoided (Jogai et al., 2005). This study is undertaken to study the cytology of palpable thyroid lesions to minimize surgical interventions and confirm the diagnosis by histopathological study for planning post surgical management of malignant thyroid lesions.

MATERIAL AND METHOD

The present study was carried out in Swami Ramanand Teerth Government Medical College and Rural Hospital from January 2012 to June 2014.

Inclusion criteria

The present study was carried out in a Rural Medical College, involving all patients with thyroid lesions who had undergone

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FNAC on out-patient and in-patient basis in cytology section with aspirates having adequate cellularity.

Exclusion criteria

Haemorrhagic or inadequate aspirates.

Staining

Pap and May Grunwald Giemsa for Cytological smears and H and E for histopathological specimens. The cytology reports were compared with the histopathological diagnoses. Sensitivity, specificity, accuracy, positive predictive value and negative predictive value were calculated.

RESULTS

Table 1. Distribution of Thyroid Lesions according to age

Age in years	No. of Persons	Percentage
0-20	18	5.76 %
21-40	182	58.33 %
41-60	100	32.05 %
61-80	12	3.86 %
Total	312	100 %

The majority of patients presenting with thyroid lesion were in age group of 21-40 years comprising 58.33% of total patients (Table 1). The youngest patient in present study was of age 14 yrs and oldest patient was 72 yrs of age with a mean age of 37.4 years. Incidence of thyroid lesions was low in children and old people.

Table 2. Distribution of cases according to sex

Sex	No. of Cases	Percentage
Female	266	85.22%
Male	46	14.88%
Total	312	100%

Total 312 patients were included in the study, out of which 266 (85.22%) were females and 46 (14.88%) were males. Male to female ratio is found to be 1:5.78 (Table 2). This shows a female predominance in the presentation of thyroid lesions.

Table 3. FNAC Results of the study group

FNAC Finding	No of Patients	Percentage (%)
Nodular goiter	76	24.35
Colloid goiter	98	31.41
Hashimoto's Thyroiditis	35	11.21
Lymphocytic Thyroiditis	26	08.33
Toxic goiter	14	04.48
Follicular Neoplasm	53	16.98
Papillary carcinoma	05	01.60
Hurthle cell Adenoma	03	00.96
Anaplastic carcinoma	02	00.64
Total	312	100%

FNAC was done in all 312 subjects. The subjects found to have Non-neoplastic Lesions like goiter, thyroiditis etc, were 249 (79.80%) and those found to have malignancy were only 63 subjects (20.19%) (Table 3).

Table 4. Histopathological findings of the study group

H/P Finding	Female	Male	No of patients	Percentage (%)
Colloid goiter	14	03	17	30.35
Multinodular goiter	16	01	17	30.35
Hashimoto's Thyroiditis	03	01	04	07.14
Hyperplastic goiter	03	00	03	05.35
Lymphocytic thyroiditis	01	00	01	01.78
Follicular Adenoma	05	02	07	12.50
Papillary Carcinoma	05	00	05	08.92
Follicular Carcinoma	01	00	01	01.78
Hurthle Cell Adenoma	01	00	01	01.78
Total	49	07	56	100%

Out of 312 studied patients, 56 underwent biopsy, majority of which were benign thyroid lesions (Table 4).

Table 5. Correlation between FNAC and Histopathological findings

True positive (a)	False positive (b)
11	02
False negative (c)	True negative (d)
03	40

Fisher exact t test was applied to the table no. 5 and data analysis was done by online software Open Epi and according to it P value is .0000168 which is less than 0.05 hence highly significant. In our study sensitivity was 78.50%, specificity was 95.20%, positive predictive value was 84.61% and negative predictive value was 93.02%.

DISCUSSION

The patients were between 14 to 72 years of age with a mean age of 37.4 years. These findings correlate with studies conducted by Das *et al.*, Silverman *et al.* and Jogai *et al.* Thyroid lesions are more prevalent in females than males. In present study 85.22% of cases were females and 14.88% males. Male to female ratio is 1:5.78. Male to Female ratio ranges from 1:2.4 to 1:5.78 in various studies. Male to female ratio in our study is well within range of most of studies and is comparable to study done by Das *et al.* and Patel *et al.* (2012). In the present study only 12 of the patients were posted for repeat FNAC due to inadequate sample. All other samples were adequate. The adequacy of the smear was 96.1% in our study, supported with studies of (Cap *et al.*, 1999), Bannur *et al.* (2006) where it was 92.5% and 90% respectively. In present study 249 cases were Non-neoplastic and 63 cases were Neoplastic with Neoplastic to Non-neoplastic ratio of 1:3.95 (Table 6 & 7).

Table 6. Comparative Study of Different Non-Neoplastic Lesions on FNAC

Study	Colloid/Nodular goitre	Hashimoto's thyroiditis	Lymphocytic thyroiditis	Toxic goitre
Afroze <i>et al.</i> (2002)	92	08	04	-
Chandanwale <i>et al.</i> (2012)	98	18	-	2
Parikh <i>et al.</i> (2012)	131	21	09	0
Bamanikar <i>et al.</i> (2014)	198	35	22	8
Present study(2014)	174	35	26	14

Table 7. Diagnosis of Thyroid Neoplasm on FNAC in different studies

Study	FNAC					Total
	Follicular Neoplasm	Papillary carcinoma	Anaplastic carcinoma	Medullary carcinoma	Hurthle Cell neoplasm	
Hall <i>et al.</i> (1989)	75	68	4	2	0	122
Bagga <i>et al.</i> (2010)	11	2	0	1	6	20
Ahmed <i>et al.</i> (2013)	23	6	1	1	1	32
Dhanadia <i>et al.</i> (2014)	14	6	2	1	2	25
Present study (2014)	53	5	2	0	3	63

Ratio in present study is well within range of most of studies and is comparable to study done by Kukar *et al.* (Kukar *et al.*, 2013). In our study amongst Non-neoplastic lesions Nodular goiter (39.35%) was found to be more common, followed by Colloid goiter (30.52%), followed by Hashimoto's thyroiditis (14.05%) and least common was Toxic goiter (5.64%) (Figures 1-4).



Figure 3. Shows Fire flare appearance with hyper plastic follicles in Toxic goiter (MGG-40X)

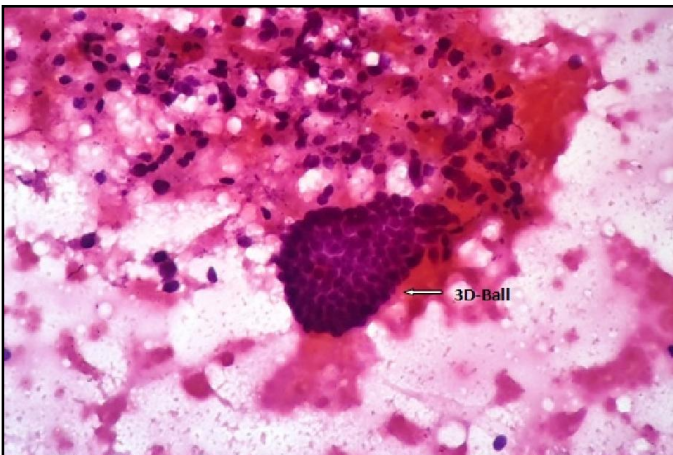


Figure 1. Shows 3D-Ball of follicular cells in background of thin colloid in Nodular goiter (Pap-40X)

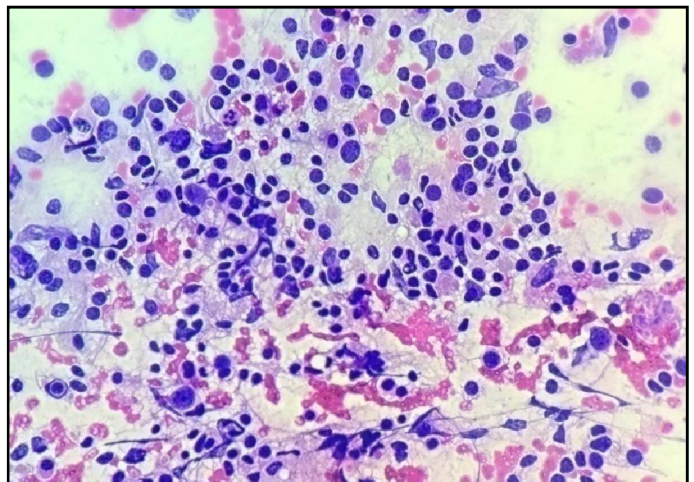


Figure 4. Shows mainly reactive lymphoid cells with interspersed thyroid follicular cells in lymphocytic thyroiditis. (Pap 40X)

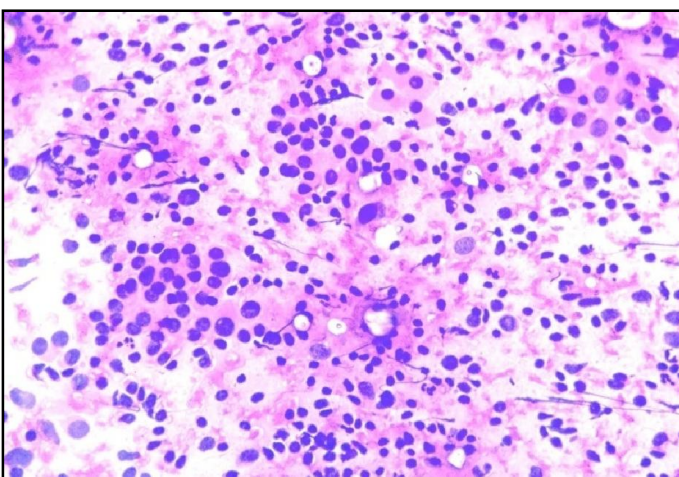


Figure 2. Shows group of follicular cells with Hurthle cell change, few epitheloid cells and lymphocytes in the background of thin colloid in Hashimoto's thyroiditis (Pap-40X)

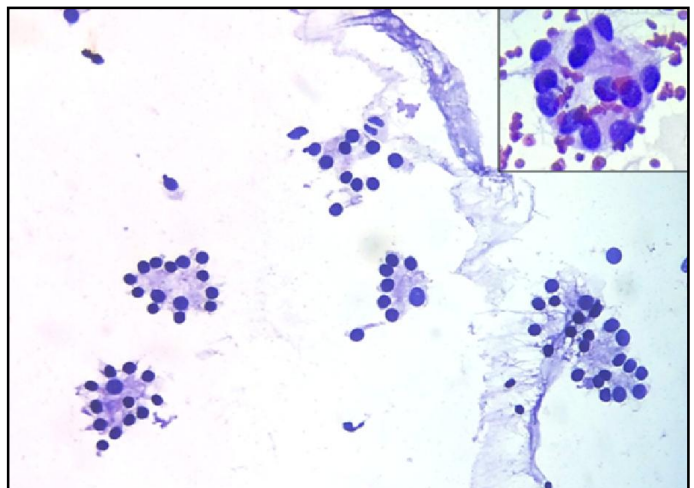


Figure 5. Shows Hyper plastic follicular cells arranged in Microacinar pattern in background of thin colloid in Follicular Neoplasm. (Pap-40X)

As shown in table no. 6 findings in present study are comparable with studies done by Afroze *et al.* (2002),

Chandanwale *et al.* (2012), Parikh *et al.* (2012) and Bamanikar *et al.* (2014).

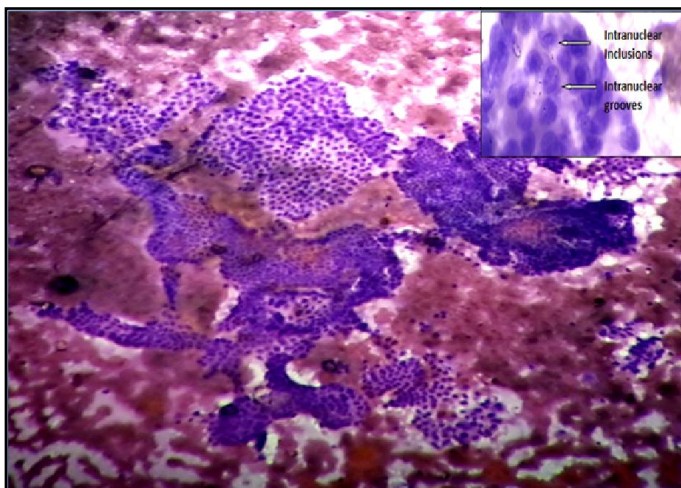


Figure 6. Shows Papillary arrangement of tumour cells in Papillary carcinoma (MGG-10X)

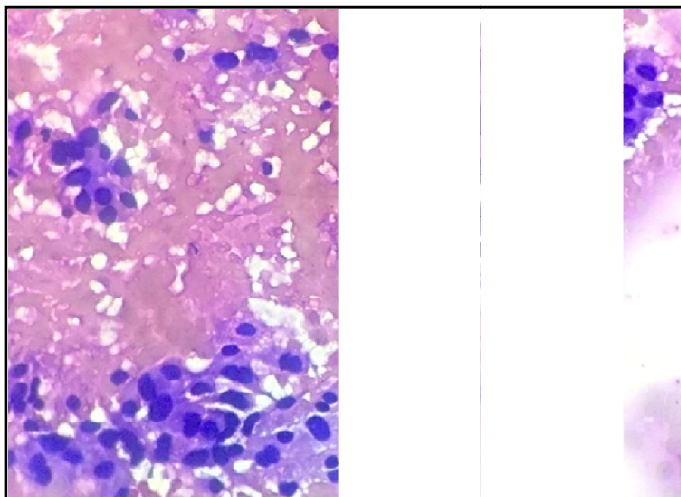


Figure 7. Shows poorly cohesive cells with a plasmacytoid appearance and moderate anisokaryosis along with fragments of colloid material in Hurthle cell adenoma. (Pap 40X)

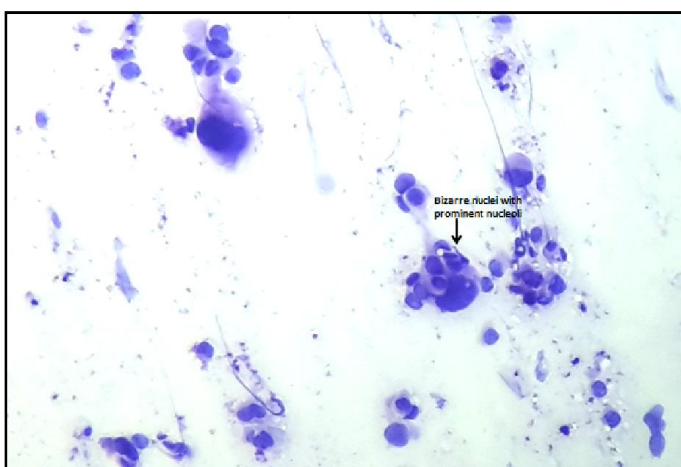


Figure 8. Shows Bizarre nuclei with prominent nucleoli in background of thin colloid in Anaplastic Carcinoma (MGG-10X)

As mentioned earlier out of 312 cases, there were 63 cases of Neoplastic thyroid lesion on FNAC. Most common neoplasm was found to be Follicular neoplasm 53 (84.12%) cases, followed by Papillary carcinoma 5 cases (7.93%), followed by Hurthle cell neoplasm 3 (4.76%) cases, followed by Anaplastic carcinoma 2 cases (3.20%) as shown in table no. 7 (Figures 5-8). These results are comparable with studies done by Bagga (2010) and Zulfikar *et al.* (2013). In all above studies most common neoplasm was follicular neoplasm while second most common was papillary Carcinoma. Taking into consideration Histopathology as a gold standard, correlation of FNAC finding with histopathology finding was done. Out of 312 FNAC studies, 56 patients underwent surgery and histopathological examination.

In the present study out of 56 histopathology reported, three cases of Non-neoplastic lesions i.e. two cases of nodular goiter were diagnosed as Neoplastic lesions i.e., follicular adenoma on histopathology and one case Colloid goiter was diagnosed as Papillary Carcinoma on histopathology. False negative diagnosis was given in FNAC for three cases. Hence false negative error rate was 5.36%. Two cases diagnosed as follicular adenoma cytologically, were diagnosed as multinodular goiter on histopathology, hence false positive diagnosis by FNAC is given in 2 cases with false positive error rate of 3.57%. On cytology many features of Follicular Adenoma and Multinodular goiter are similar which resulted in above discrepancy. All other cases of Non-neoplastic lesion available for correlation were confirmed on histopathology. Out of four cases of Papillary carcinoma which were diagnosed by FNAC were confirmed histopathologically but 1 case of colloid goiter given on FNAC was diagnosed as Papillary carcinoma on histopathology with diagnostic accuracy of 80%. One case of Follicular adenoma was diagnosed as Follicular carcinoma on histopathology, since diagnosis of carcinoma needs histopathological evidence of capsular/vascular invasion of the tumor hence this was taken as a positive correlation only. One case of Hurthle cell Adenoma available for correlation was confirmed on histopathology with diagnostic accuracy of 100%. Our study findings are similar to the findings of Bamanikar *et al.* and Kumar *et al.* In our study sensitivity was 78.50%, specificity 95.20%, Positive predictive value 84.61% and Negative Predictive value 93.02% which nearly correlates with the findings suggested by Afroze *et al.* Bagga *et al.* Harsoulis *et al.* (1986), Hawkins *et al.* (1987) and Gulia *et al.* (2010).

Conclusion

In present study, the procedure was safe and complications were not reported except a case of hematoma. Conclusions made from the present study are;

- Age range for thyroid lesions was 14-72 years with mean age 37.4 years. Most common age group affected is 21- 40 years for both Neoplastic and Non-neoplastic lesions.
- Females were more commonly affected than males. Male to female ratio was found to 1:5.78.
- On FNAC Colloid/Nodular goiter was the most common Non-neoplastic lesion while Follicular Neoplasm was most

common neoplastic lesion. Among Malignant lesions Papillary carcinoma was found to be most common.

- On cyto-histopathological correlation overall sensitivity and specificity was 78.50% and 95.2%. Diagnostic accuracy was found to be 91.07%.

Hence Fine Needle Aspiration Cytology is a sensitive and highly specific method of evaluating thyroid nodules for malignancy. Also FNAC is highly reliable diagnostic test so unnecessary surgery can be avoided in those patients. Hence we encourage our clinician to use this investigative procedure in the management of thyroid lesions.

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