

Cytomorphological study of all thyroid lesions and radionuclide thyroid scintigraphy in a solitary thyroid nodule

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Background -Thyroid diseases are common in the Himalayan belt, especially in females. **Objective** -To classify thyroid lesions on cytology and study the association between a solitary thyroid nodule and radionuclide scintigraphy. **Methods**-This was cross-sectional and descriptive study undertaken in the Department of pathology and nuclear medicine. A total of 249 cases were studied between 2012-2013. All the thyroid lesions were categorized on cytology. Radionuclide scintigraphy was done on 50 cases including solitary thyroid nodule. **Result** -Out of 249 cases, most of lesions were non neoplastic, colloid goiter being highest in number. Out of 50 thyroid scan, 30 were hypofunctional, 13 were mixed functional and 7 were normofunctional. Out of these 13 cases were of solitary thyroid nodule out of which the maximum were hypofunctional on scan including mostly colloid goiter and 2 papillary carcinoma. **Conclusion** -Most of thyroid lesions were hypofunctional on thyroid scan which were mostly of colloid goiter and overlapping features of hyperplasia and thyroiditis. The number of solitary nodule was less, but they correlated well.

INTRODUCTION

Thyroid gland, though a small structure on the anterior aspect of neck has many important functions to perform, failing in its duty it might lead to serious consequences. Thyroid gland has been the target of interest because of its numerous metabolic, neoplastic and inflammatory aberration. Fine needle aspiration is now recognized to be the first line of investigation for a solitary or dominant thyroid nodule. It has a valuable role in the diagnosis of the diffuse non toxic goitre and can be used to confirm the diagnosis of clinically obvious malignancy, enabling the separation of treatable lymphomas from poor prognosis anaplastic carcinoma. (1)

Exposure to ionizing radiation in Childhood and adolescence increases the risk of solitary thyroid nodule and thyroid carcinoma. Technetium-99m was discovered in 1938 as a product of cyclotron bombardment of molybdenum. Isotope scanning is generally used to classify nodules into non-functioning (cold) or functioning (warm or hot) nodules. Combined use of isotope scanning, fine needle aspiration cytology, and histopathology of thyroid offers the best diagnostic strategy (5).

Uttarakhand State of India is part of Himalayan foot hills where thyroid diseases are common. We therefore felt a need to study the pattern of thyroid diseases cytomorphologically in our hospital using FNAC which is an established technique and also its association with Radio nucleotide thyroid scintigraphy which is a new technique.

MATERIALS AND METHOD

The study was carried out in the department of Pathology, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun.

Study design:Type of the study: Cross sectional and descriptive. The study included 249 cases from the year 2013 to 2014 of patients coming in the department of pathology. Signed informed consent of patients were taken prior to the procedure.

Selection of subjects

1. All the cases of thyroid lesions, attending HIMS form the subjects of study.
2. Patients of all age group were included.
3. The clinical diagnosis and clinical details were recorded in the proforma.
4. Fine needle aspiration cytology was performed in the department of pathology.
5. Patients of solitary nodule thyroid underwent nuclear scanning in the department of Nuclear Medicine, CRI.

Method of FNAC

FNAC was done without aspiration after taking careful clinical examination of the thyroid mass to confirm its presence, consistency, mobility, pain, tenderness and any signs suspicious of malignancy. Cytomorphologic study of thyroid lesion was done using

Papanicolaou and Haematoxylin and Eosin (H&E) on wet fixed smears. And May Grunwald Giemsa for air dried smears.

Radionuclide thyroid scan

Radionuclide thyroid scan was performed in all cases presenting clinically with solitary thyroid nodules. Clinical details was recorded in all cases.

Selection of subjects

- Inclusion criteria: Solitary thyroid nodules
- Exclusion criteria: Pregnant females/history of thyroid containing drugs.

Radionucleotide scan protocol:

1. 5-7mCi of Tc-99m pertechnetate injection in the ante-cubital vein.
2. Flow images were taken in the initial one minute at 2-3 second per frame.
3. This was followed by static delayed image at 20 minutes in anterior left and right lateral oblique views.
4. This was followed by single photon emission computed tomography study (SPECT).

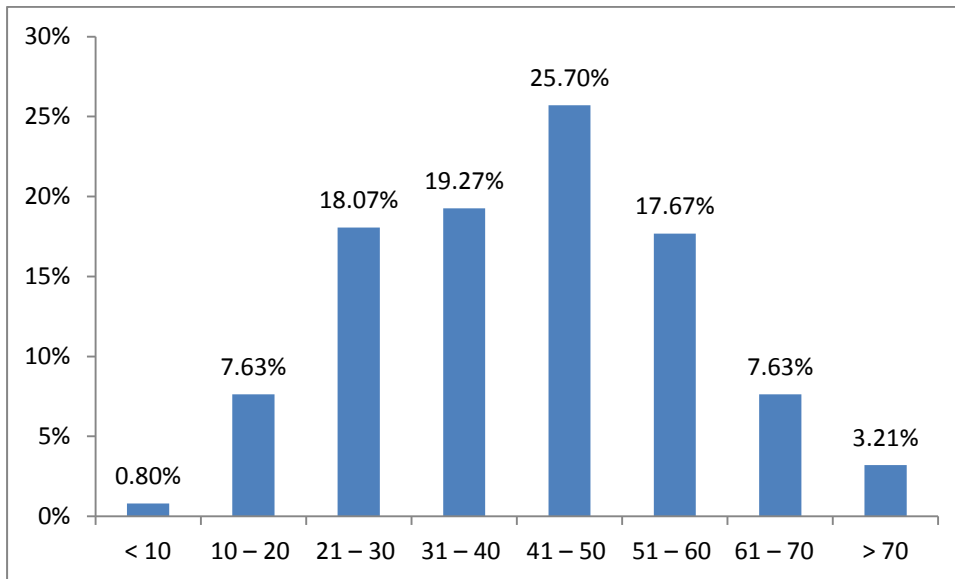
Results were entered in four categories-Normofunctional, hypofunctional and mixed functional.

Data Management and statistical Analysis

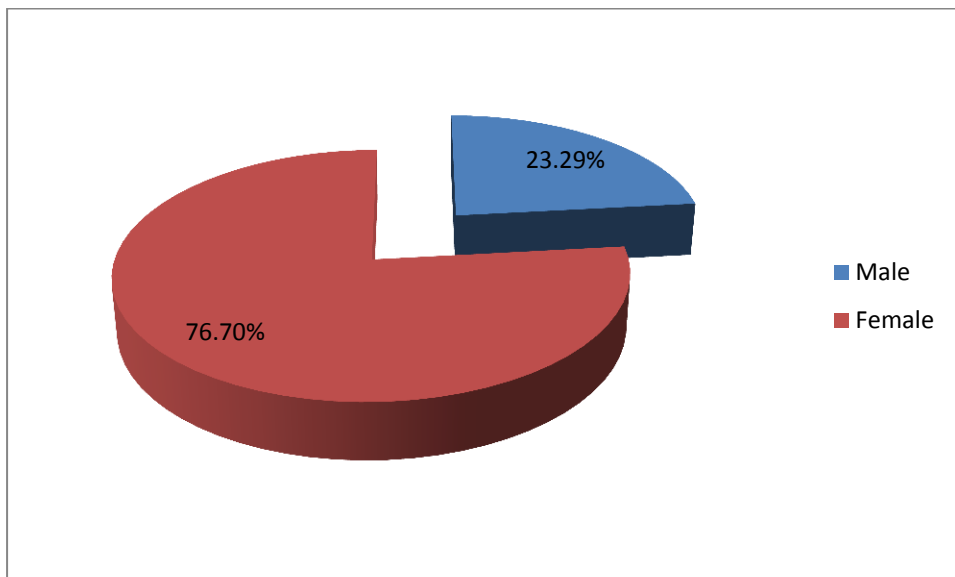
Data analysis was done using SPSS 17.0 and Microsoft Excel software. The results were analysed using tables, bar charts, pie diagrams and proportional percentage was calculated.

1. Descriptive statistics
2. Categorical variables of all the groups using chi-square test

RESULT



This table shows maximum number of cases in the study group (n=64, 25.70%) were in 41-50 years age group, followed by 31-40 year age group (n=48,19.27%) and then 21-30 year age group (n=45,18.07%). The youngest patient was a 9 year old girl with benign thyroid disease and the oldest was a 85 year old female with colloid goitre.



This Fig. show 191 (76.70%) patients in our study were female which was three times more than the male patients which were 58 (23.29%).

Table 1: Clinical Examination of thyroid swelling (n=249)

Examination	No. of Cases	Percentage
Diffuse	210	84.33%

Diffuse and Nodular	17	6.8%
Solitary	22	8.83%
Total	249	100%

Out of 249 cases, 210 (84.33%) presented clinically as diffuse swelling, 17 (6.8%) presented as diffuse nodular swelling and 22 (8.83%) presented as solitary thyroid nodule. Many cases presenting as diffuse swelling were later seen to be nodular on ultrasonography

TABLE 2: Subdivision Of non neoplastic thyroid lesions (n=220)

Thyroid Lesions	No. of Cases	Percentage
1) Colloid goiter	132	60%
2) overlapping features of thyroiditis and hyperplasia	48	21.8%
3) Thyroiditis	28	12.7%
4) Hyperplasia	10	4.5%
5) Cysts	02	0.90%
Total	220	100%

This Table shows 220 cases which we have categorized as non neoplastic lesions. 48 (21.8%) out of these showed overlapping features of thyroiditis and hyperplasia, 28 (12.7%) were of thyroiditis, 10 (4.5%) of hyperplasia and 2 (0.90%) of colloid cyst.

TABLE 3: Subdivision Of neoplastic thyroid lesions (n=220)

Thyroid Lesions	Total no	No. of Cases	Percentage
1) Papillary carcinoma		15	60%
2) Follicular neoplasm		4	16%
3) Medullary Carcinoma		3	12%
4) Hurtle cell neoplasm		2	8%
5) Anaplastic carcinoma		1	4%
Total	25		100%

This table shows neoplastic thyroid lesions which are 25 in number. Out of this 15 (60%) papillary carcinoma, 4 (16%) follicular neoplasm, 3 (12%) medullary carcinoma, 2 (8%) hurthle cell neoplasm, 1 (4%) anaplastic carcinoma. Among the malignant lesions papillary carcinoma shows highest number cases.

TABLE 4 on thyroid Scan (n=50)

Thyroid scan	No. of Cases	Percentage
Normofunctional	7	14%
Hypofunctional	30	60%
Mixed functional	13	26%
Total	50	100%

This table shows that 50 patients had undergone thyroid scan out of which 30 (60%) show a hypofunctioning gland, 13 (26%) are showing mixed functioning gland 7 (14%) show a normofunctioning gland. It shows higher number of patients with a hypofunctioning thyroid scan.

TABLE 5: Subdivision Of neoplastic thyroid lesions TABLE 5: Subdivision Of neoplastic thyroid lesions (n=220)

Thyroid Lesions	No. of Cases	Percentage
(i) Thyroiditis	2	28.5%
(ii) Colloid goiter	2	28.5%
(iii) Inadequate	3	42.8%
Total	7	100%

This table shows most of cases 3(42.8%) reported as inadequate which showed a normofunctioning thyroid scan, 2(28.5%) of thyroiditis, 2(28.5%) of colloid goiter.

TABLE 6: Subdivision Of neoplastic thyroid lesions (n=30)

Thyroid Lesions	No. of Cases	Percentage
(A) Non neoplastic		60%
(i) Colloid goiter	18	16.66%
(ii) Hyperplasia	5	6.66%
(iii) Thyroiditis	2	3.33%
(iv) Cysts	1	
(B) Neoplastic lesions		
(i) Papillary carcinoma	3	10%
(ii) Anaplastic carcinoma	1	3.33%
Total		100%

This table demonstrates 30 cases of cases showing hypofunctioning areas on thyroid scan. Out of these colloid goiter 18(60%) forms the highest percentage. 5(16.66) of hyperplasia, 2(6.66%) of thyroiditis, 1(3.33%) of cyst. 3(10%) of papillary carcinoma and 1(3.33%) of anaplastic carcinoma

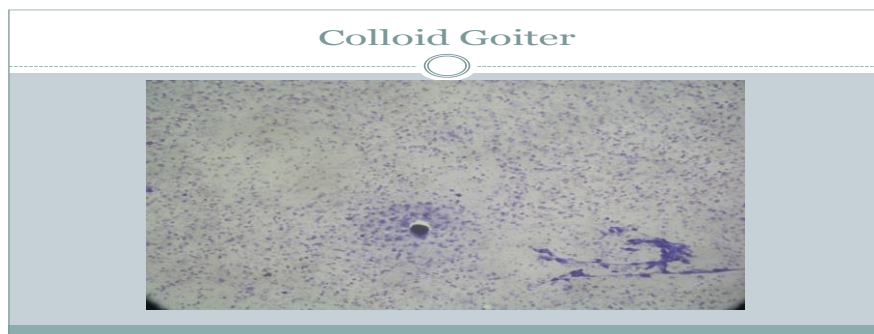
TABLE 7: Mixed functional thyroid scan (n=13)

Thyroid Lesions	No. of Cases	Percentage
(i) Thyroiditis	4	30.7%
(ii) Hyperplasia	3	23.07%
(iii) Overlapping features of thyroiditis and hyperplasia	3	23.07%
(iv) Colloid goiter	3	23.07%
Total	13	100%

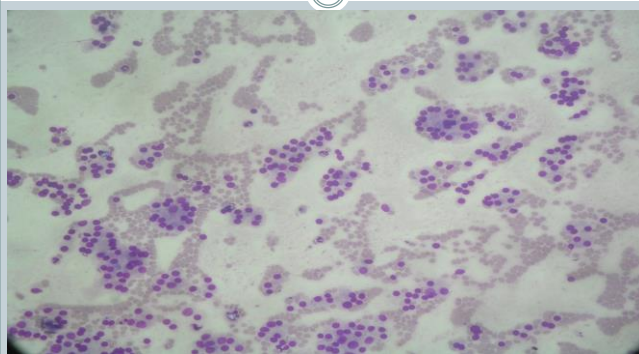
TABLE 8: Cases of solitary thyroid nodule (n=13)

Thyroid scan	Thyroid Lesions	No. of Cases	Percentage
1. Hypofunctional	Colloid goiter	9	69.2%
	Hyperplastic nodule	1	7.69%
	Papillary Carcinoma	2	15.38%
2. Mixed functional	Benign thyroid disease	1	7.69%
Total		13	100%

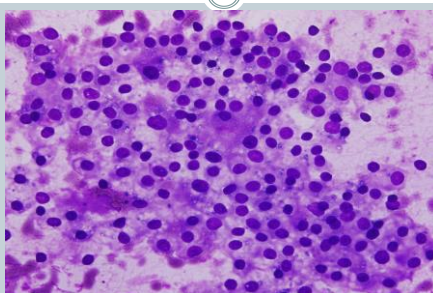
This table shows 13 cases of cases presenting clinically as solitary thyroid nodule out of which 12 were hypofunctioning and 1 (7.69%) mixed functioning on thyroid scan. 6(46.15%) of colloid goiter, 3(23.07%) of hyperplastic nodule, 2(15.38%) of papillary carcinoma showed hypofunctioning gland and 1(7.69%) benign thyroid disease showed mixed functioning areas on scan.



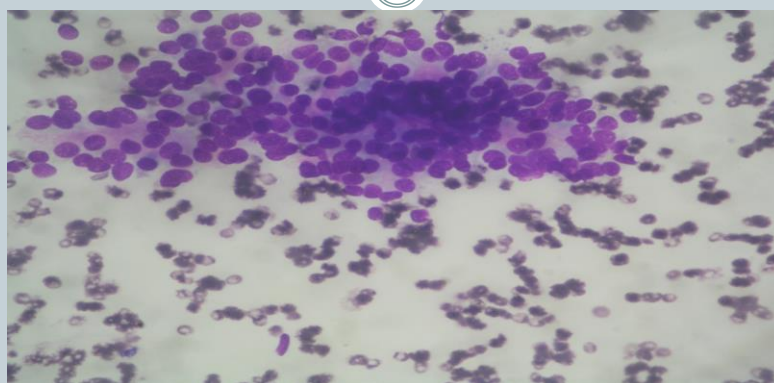
Follicular Variant of Papillary Carcinoma

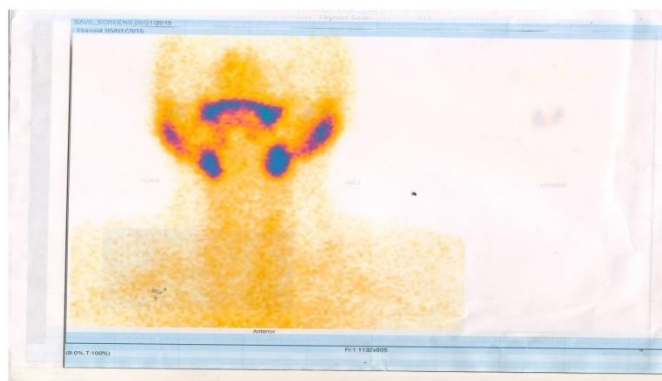


Hyperplasia



Overlapping features





DISCUSSION

Fine needle aspiration cytology is regarded as the gold standard initial investigation in the diagnosis of thyroid swellings. The technique is safe, simple and quick with a low complication rate. Several other tests, such as high resolution ultrasonography, radioisotope scanning and others have been used for evaluation of thyroid swellings before proceeding to thyroid surgery. Studies have demonstrated that among all these diagnostic modalities, FNAC is the most accurate, cost effective screening test for rapid diagnosis of thyroid swelling (52).

Sinna et al conducted a study in 296 patients. The age of patients ranged from 14 to 77 years, with median of 44 years, being slightly higher in neoplastic lesion. This is close to our study of 249 patients aged between 10 to 85 years in which maximum number of patients 64(25.70%) were between the age group of 41 to 50 years.

Basharat et al conducted a study on 50 patients. This included 41 (82%) females and only 9 (18%) males. Similarly in our study of 249 patients we have 191(76.70%) females and 58 (23.29%) male, with male female ratio of 3:1.

In a study by M Rangaswamy 585 cases of thyroid FNACs were done. Majority of cases presented with solitary nodule while few cases presented with diffuse or nodular swelling. In the present study the patients mostly presented as a diffuse thyroid swelling, 210 (84.33%) presented as diffuse thyroid enlargement, 17 (6.8%) presented as diffuse nodular enlargement and 22 (8.83%) presented as a solitary thyroid nodule.

In a study conducted by Tariq et al on 50 patients FNAC showed 43(86%) benign and 7(14%) malignant. In our study 88 patients (35.4%) were diagnosed having a non neoplastic lesion, 157(63.5%) were categorised under neoplastic lesions of thyroid, 4(1.6%) were inadequate for a definite diagnosis out of which 2(50%) were haemorrhagic and 2(50%) showed only occasional follicular cells.

In our study out of 249 patients we categorised 88 patients having non neoplastic lesion out of which 28(31.81%) were diagnosed thyroiditis, 2(2.27%) as cysts, 10(11.36%) with hyperplasia, 1(1.13%) with lymphocytic thyroid lesion, 47(53.40%) patients were having mixed features of thyroiditis and hyperplasia. No patient presented with a congenital anomaly during our study period. Nonneoplastic lesions were 157 out of 249. Malignant lesions were categorised as Papillary carcinoma 15(53.57%), 4(14.28%) follicular neoplasm, 3(10.71%) Medullary carcinoma, 2(21.42%) hurthle cell neoplasm and 1 case of Anaplastic carcinoma.

Out of 249 patients, thyroid scan was done in 50 patients, out of which 7(14%) were categorised as normofunctional, 30 (60%) hypofunctional, 13(26%) cases showed mixed areas of hyperfunctioning and hypofunctioning. No case of purely hyperfunctioning gland was seen. This was close to the study done by Bashart R et al took 50 cases of solitary thyroid nodule out of which 40 (80%) were having a hypofunctioning nodule and only 10 (20%) patients revealed a hot nodule. The study included 23(46)% benign lesions and only 5 (10%) malignant lesions (17,40).

Kamaljeet et al did a study on 50 patients of solitary thyroid nodules out of which 39(78%) showed cold nodule and 9(23%) cold nodule were malignant as well. In our study we have many cases showing overlapping features of thyroiditis and hyperplasia. In the solitary thyroid nodule 12 cases of hypofunctioning areas on thyroid scan out of which 6(46.15%) colloid goitre, 3(23.07%) colloid goitre with cystic change, 2(15.38%) papillary carcinoma and 1(7.69%) of a hyperplastic nodule, 1(7.69%) case of benign thyroid disease which showed mixed functional gland. This is already supported by the studies discussed above

Our study shows mostly nonneoplastic lesions in which colloid goitre is highest in number and in the malignant lesions papillary carcinoma is highest in number. This is supported by many studies. Thyroiditis in the pure form along with overlapping hyperplasia is also seen in maximum cases and its etiology has already been discussed. Solitary thyroid nodules were mostly hypofunctional on scan with mostly neoplastic diagnosis on cytology. Most of the cases were of colloid nodule with some cases of papillary carcinoma. The number of cases where thyroid scan was done were too less, specially in case of solitary thyroid nodule, however they correlated well. Only one show discrepancy where in despite the uptake was hypofunctional, cytology showed hyperplastic changes. A bigger study is required for more conclusive results.

CONCLUSION

The present study was done using thyroid FNAC and routine microscopic examination was done to diagnose and categorise the lesions. Radionucleotide thyroid scintigraphy was done in patients with solitary thyroid nodule. It was seen that most of the lesions were non neoplastic under which colloid goiter was highest in number which is a benign entity. Among the malignant lesions most of the cases were of papillary carcinoma. In the non neoplastic lesions most of the cases had overlapping features of thyroiditis and hyperplasia followed by thyroiditis lesions. This shows that thyroiditis and colloid goitre is more common in the region of foot hills of Himalayas and patients may present with overlapping features of with this entity. In the solitary thyroid nodule most of the cases were hypofunctioning on thyroid scan among which many were benign and few were of papillary carcinoma. The number of cases in where thyroid scan was done was too less, specially in case of solitary thyroid nodule however they correlated well. Only one case show discrepancy where despite the uptake was hypofunctional, cytology showed hyperplastic changes. A bigger study is required for more conclusive results.

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