ejpmr, 2022,9(10), 341-346

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

CYTOMORPHOLOGICAL SPECTRUM OF VARIOUS THYROID LESIONS WITH RADIOLOGICAL AND BIOCHEMICAL GUIDANCE AS REQUIRED

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Article Received on 26/07/2022 **Article Revised on 16/08/2022** **Article Accepted on 06/09/2022**

ABSTRACT

Background: FNAC is an essential and economic tool in distinguishing between the various benign and malignant thyroid lesions. Biochemical assay and radiology (especially USG) also aid in this objective. **Materials and Methods:** Sixty patients with clinically apparent thyroid nodules were included in the study. They were subjected initially to USG thyroid, then aspiration from the thyroid nodule was done and thyroid function tests (T3, T4, TSH) was carried out. **Results:** Sixty patients were evaluated in the study; 45 females and 15 males. The most common age group was 31 to 40 years. Non neoplastic lesions constituted 85% of the study; the most common lesion being colloid nodule. Among the 8 neoplastic cases papillary carcinoma of thyroid comprised of the majority (50%). Most of the cases of colloid nodule and all but one cases of the neoplastic lesions were euthyroid on biochemical assay. **Conclusion:** FNAC is a very useful method in diagnosing the nodular lesions of thyroid; also differentiating the benign from the malignant lesions.

KEYWORDS: FNAC, USG, thyroid nodule, biochemical assay, cytomorphological correlation.

INTRODUCTION

In general, the incidence of thyroid nodules is 4-5%;[1] hypothyroidism being more common than hyperthyroidism in clinically apparent goitres. Benign causes are more common than malignancy; colloid goitre being the most common followed by Hashimoto's Thyroiditis.[2]

FNAC is a very useful tool for the initial diagnosis and workup of a thyroid nodule. The cytological picture should be correlated with the radiological findings whenever possible to avoid any unsampled foci of varied morphology which can alter the diagnosis. FNAC is a safe, minimally invasive, and economic method of diagnosis which is becoming very sensitive and specific and is the preferred method of evaluation of thyroid lesions in the past few years.[3] In India, thyroid lesions are reported according to the Bethesda System for reporting Thyroid Cytopathology.

This study was conducted to evaluate the various cytomorphological spectrum of thyroid nodules both benign and malignant along with radiological and biochemical correlation whenever possible and to determine the effectiveness of cytological evaluation of the lesions to render a proper diagnosis.

MATERIALS AND METHODS

This prospective observational study was conducted in the department of Pathology and Biochemistry in Midnapore Scan Centre Private Limited, West Bengal, India in the duration January, 2021 to March, 2021.

Inclusion Criteria

All patients in the age group 13 to 80 years with clinically apparent thyroid nodule.

Exclusion Criteria

Patients with previously diagnosed thyroid disorders and patients on drugs which may fluctuate the results of thyroid function tests.

All demographic data were collected from the patients (age, sex, socio economic status, possibility of iodine deficiency in diet). First the patients were subjected to ultrasonographical evaluation of the thyroid swelling. Next, they were sent for FNAC. The procedure of aspiration was carried out in a sterile environment. First, the thyroid nodule was examined locally, movement with deglutination was noted. Then patient was made to lie in supine position with neck extended over a pillow which aids in a better field of vision. Aspiration was done using a 24-gauze needle attached to a 10 ml syringe. An average of 4-6 slides were made per case. Few slides were air dried and stained for Leishman-Giemsa. Others were immediately kept in a fixative

(98% ethyl alcohol). These were stained with Papanicolaou (PAP) stain.

RESULTS

A total of 60 patients were included in the study out of which 45 were females and 15 males. All the patients were subjected to USG evaluation. The most common age group in the study was 31 to 40 years (Figure 1).

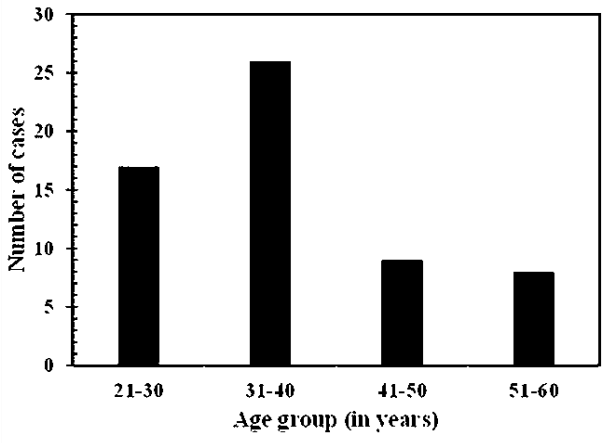


Figure 1: Age wise distribution of cases.

All the patients were subjected to FNAC testing and the slides were reported. Fifty-one cases were non neoplastic and 8 cases were neoplastic. In one case opinion was not possible because the aspirate yielded only thin cystic fluid.

Among the non-neoplastic lesions 30 were reported as colloid nodule followed by Hashimoto's thyroiditis (11 cases), Lymphocytic Thyroiditis (4 cases), Adenomatoid goitre (3 cases), De Quervian thyroiditis (2 cases) and Hyperplastic nodule (1 case) (Table 1).

Among the 8 neoplastic lesions, papillary carcinoma thyroid comprised of the majority (4 cases), followed by Anaplastic carcinoma (2 cases), Follicular neoplasm (1 case) and Medullary carcinoma (1 case) (Table 1).

The cytomorphological picture of colloid nodule showed abundant colloid along with cyst macrophages with or without presence of thyroid follicular cells.

The cytomorphological picture of lymphocytic thyroiditis showed abundant lymphoid cells with evidence of folliculolysis and hurthle cell change (Figure 2).

Table 1: Case distribution according to cytological diagnosis.

Sl. No.	Non-neoplastic	Number of cases	Neoplastic	Number of cases
1	Colloid nodule	30	Papillary carcinoma	4
2	Hashimoto's Thyroiditis	11	Medullary carcinoma	1
3	Lymphocytic Thyroiditis	4	Anaplastic carcinoma	2
4	De Quervian Thyroiditis	2	Follicular neoplasm	1
5	Hyperplastic nodule	1	-	-
6	Adenomatoid nodule	3	-	-

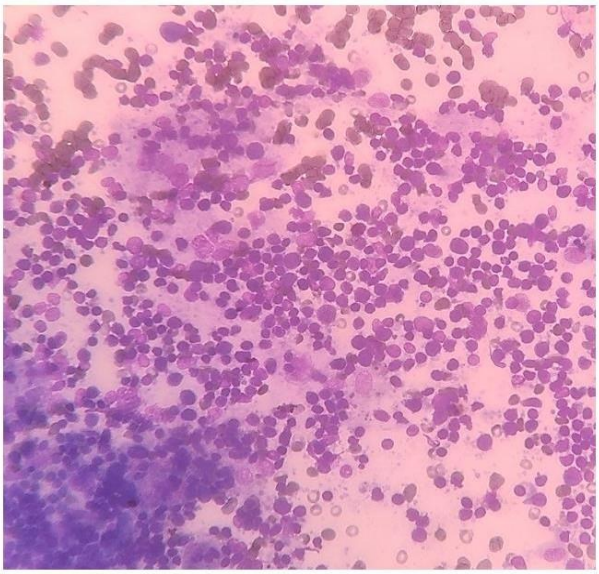
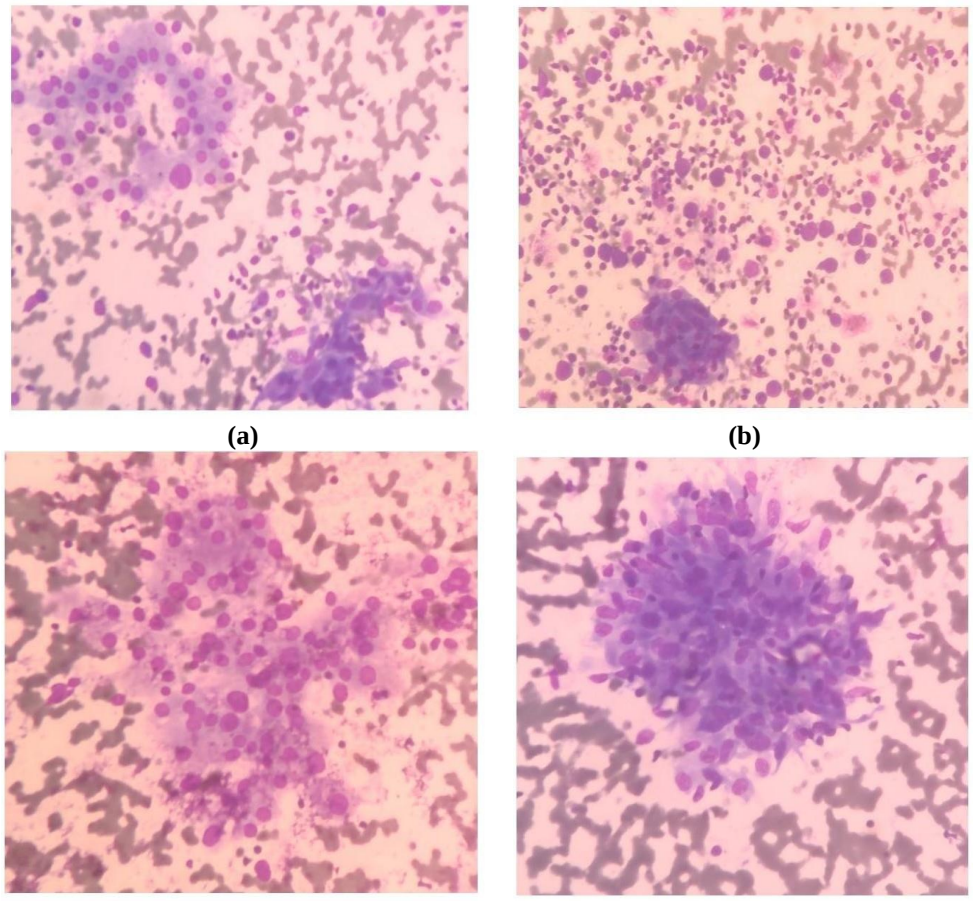


Figure 2: 40X magnification Leishman and Giemsa stain showing dense lymphocytic infiltration and evidence of folliculolysis in lymphocytic thyroiditis.

The cytomorphological picture of Hashimoto's thyroiditis showed hurthle cell changes with follicular cells showing oncocytic changes (finely granular cytoplasm, large hyperchromatic nuclei, occasional prominent nucleoli, mild to moderate anisonucleosis) and occasional epithelioid cell clusters (Figure 3). The follicular cells were carefully examined to rule outany nuclear features of papillary thyroid carcinoma.

The patients with De Quervian thyroiditis presented with a classical history of painful nodule;the cytology showed well defined granulomas along with giant cells and inspissated colloid.

One case was reported as hyperplastic nodule; the cytology of which showed hurthle cell changes and 'fire flare' appearance of cytoplasm. Clinically the patient showed fine tremor and exophthalmos on examination.



(a) (b) (c) (d)

Figure 3: (a) 40X magnification Leishman and Giemsa stain showing hurthle cell changes; (b) Lymphocytic infiltration and epithelioid cells cluster; (c) Hurthle cell changes and mild anisonucleosis; (d) Well defined epithelioid cells collection in Hashimoto's thyroiditis.

The cases reported as papillary carcinoma thyroid showed neoplastic thyroid follicular cells arranged in monolayered sheets and three-dimensional papillary architecture. The papillary fragments showed well defined 'anatomical borders'. There was presence of thick chewing gum colloid. The cells showed overlapping and overcrowding. The nuclear features were not very prominent in all the cases but showed occasional nuclear grooving and intranuclear cytoplasmic inclusions (Figure 4).

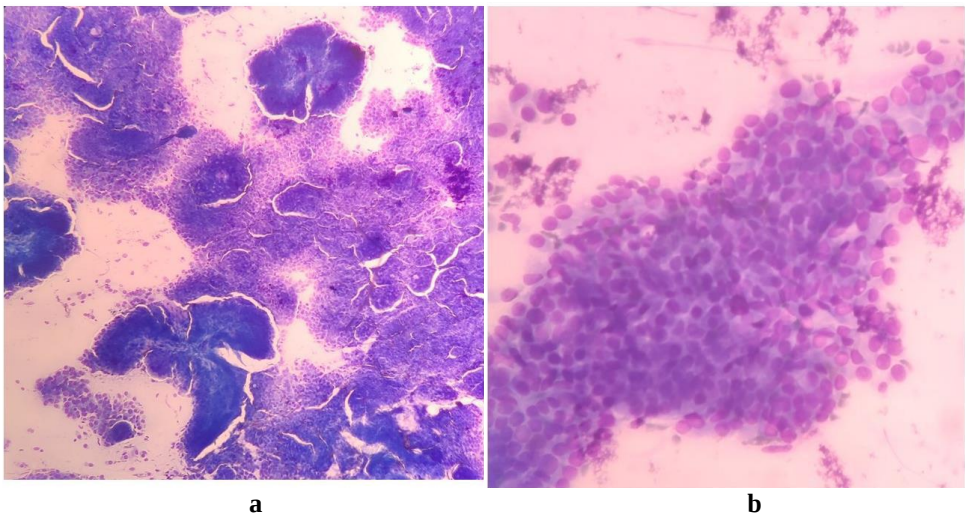


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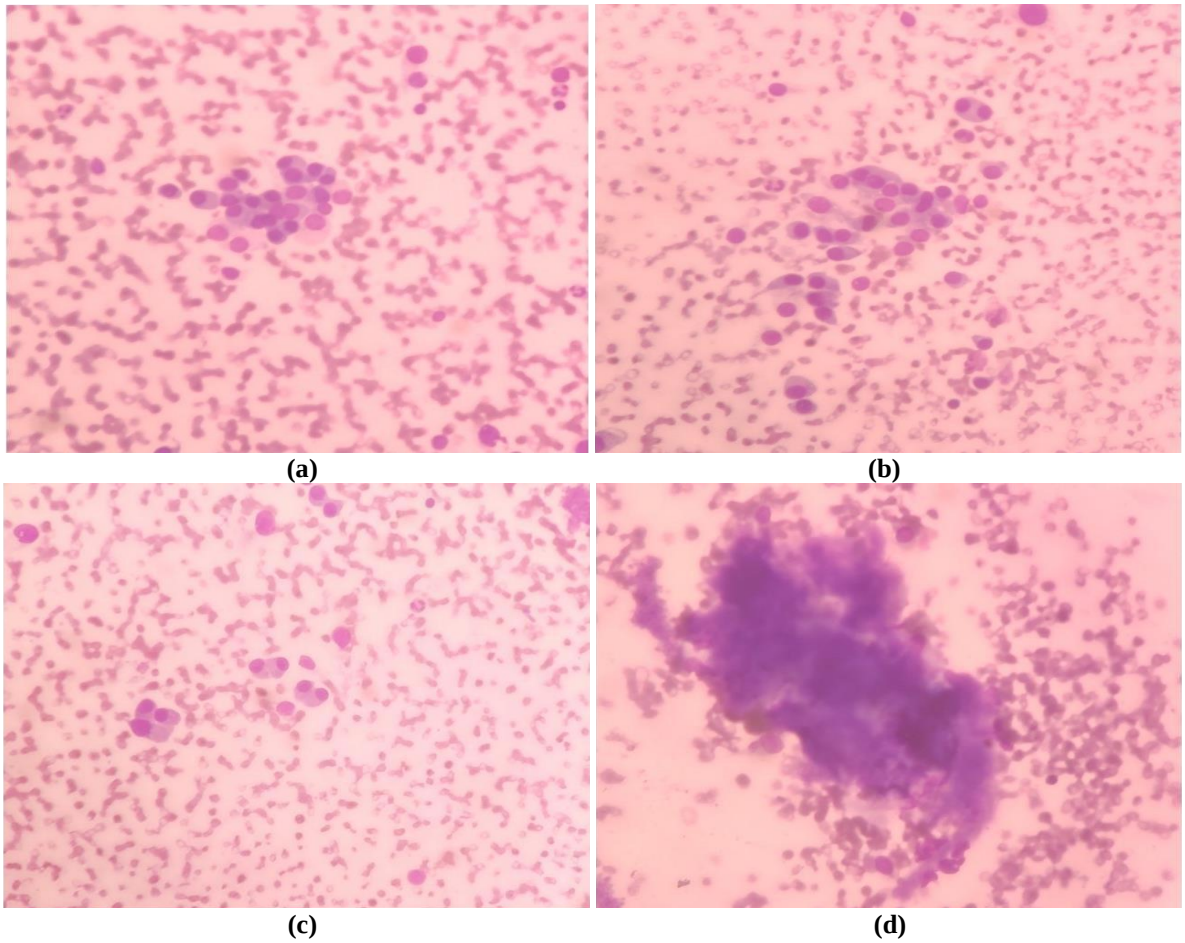
Figure 4: (a) 10X magnification Leishman and Giemsa stain showing papillary fragments with well-defined anatomical borders; (b) 40X view showing nuclear overlapping and overcrowding in papillary thyroid carcinoma.

The case reported as follicular neoplasm showed repetative microfollicles of thyroid follicular cells with scant colloid.

The case reported as medullary thyroid carcinoma showed mainly plasmacytoid cells scattered singly and in tiny clusters; having abundant cytoplasm, eccentric nuclei and 'salt and pepper' chromatin; amyloid was seen focally (Figure 5).



(a) (b) (c) (d)

Figure 5: (a) 40X magnification Leishman and Giemsa stain showing tumour cells in tiny clusters; (b) Tumour cells are plasmacytoid having abundant cytoplasm, eccentric nucleus and strippled chromatin; (c) Another focus of tumour cells in tiny clusters and singles; (d) Focus of amyloid in Medullary thyroid carcinoma.

The cases reported as anaplastic thyroid carcinoma showed large bizarre tumour cells and giant cells in a haemorrhagic background (Figure 6).

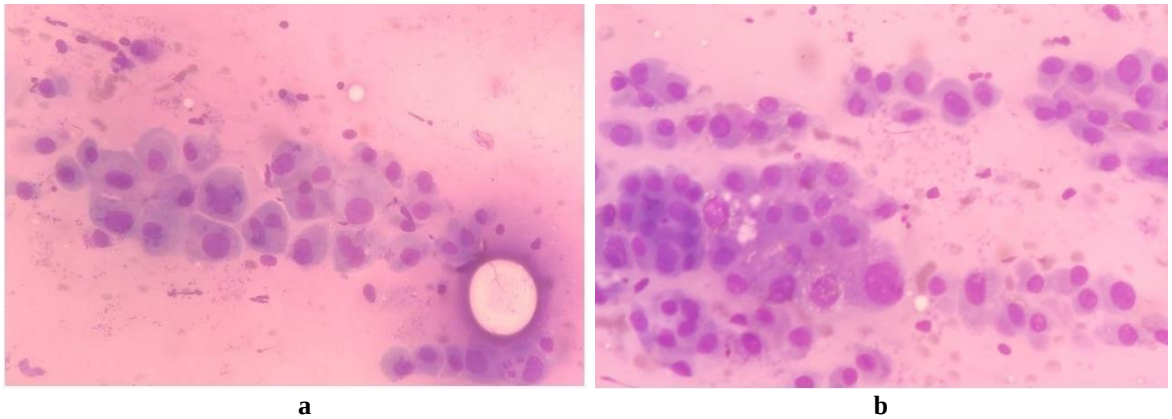


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Figure 6: (a) 40X magnification Leishman and Giemsa stain showing tumour cells in sheets; (b) Bizzare looking tumour cells showing significant pleomorphism in a haemorrhagic background in Anaplastic thyroid carcinoma.

Biochemical examination of the patients included T3, T4 and TSH levels. Among the non- neoplastic lesions maximum cases of colloid goitre (66%) were euthyroid, most cases of Hashimoto's thyroiditis (72%) showed hypothyroidism. The only case of hyperplastic nodule showed hyperthyroidism. Both cases of De Quervian's Thyroiditis and all 3 cases of adenomatoid nodule were euthyroid.

Among the neoplastic lesions all were euthyroid except a single case of papillary thyroid carcinoma which was hypothyroid.

The biochemical status of the thyroid lesions is displayed in Table 2.

When correlated with the ultrasonographical findings, 50 out of 51 benign cases showed hyperechoic lesions. All the malignant lesions showed hypoechoic lesions with microcalcifications.

Table 2: Case distribution according to biochemical status.

Sl. No.	Cytodiagnosis	Euthyroid	Hypothyroid	Hyperthyroid
1	Colloid nodule	20	7	3
2	Hashimoto's Thyroiditis	3	8	-
3	Lymphocytic Thyroiditis	1	2	1
4	De Quervian Thyroiditis	2	-	1
5	Hyperplastic Thyroiditis	-	-	1
6	Adenomatoid nodule	3	-	-
7	Papillary Carcinoma Thyroid	3	1	-
8	Medullary Carcinoma Thyroid	1	-	-
9	Anaplastic Carcinoma	2	-	-
10	Follicular neoplasm	1	-	-

DISCUSSION

The prevalence of thyroid nodules is 4 % and most of them occur in age group 30 to 60 years.[4] Most of them are benign; only 10 to 20 % being malignant.[4]

High resolution USG is an excellent emerging imaging modality for evaluation of any thyroid lesion. USG is very sensitive in detection of calcification, cystic changes, borders; therefore, aiding in USG guided FNAC.[5]

FNAC is essentially the first line of investigation for any kind of thyroid lesion.

In this study, females are the predominant group and the commonest age group affected was 31 to 40 years. This data is comparable to a study by Gupta et al.[6]

In this study, 51 out of 60 (85%) cases were benign and only 15 % were malignant. A similar study was conducted by Chandanwale et al.[7] and Chittawadagi et al.[8] which revealed the non-neoplastic lesions to be 94% of the study.

Colloid goitre was the most common non neoplastic lesion (60%) in this study similar to the study by Chittawadagi et al.[8] where colloid nodule comprised of 53% of the non-neoplastic lesions.

In this study, the most common malignant lesion was papillary carcinoma thyroid which is similar to the study conducted by Chandanwale et al.[7] and Tabaqchali et al.[9] However, in the study conducted by Chittawadagi et al.[8], follicular neoplasm was the commonest neoplastic lesion.

In this study, 50 out of 51 (98%) non-neoplastic lesions were hyperechoic on radiology (USG) and all malignant lesions were hypoechoic. These results were similar to other literatures that most benign nodules were hyperechoic and malignant nodules are hypoechoic.[10,11]

In our study, all benign lesions showed smooth margins whereas all malignant lesions showed irregular borders, this data is comparable to a study conducted by Ali et al.[12] which stated 80% of malignant nodules had irregular borders.

CONCLUSIONS

The study was concluded by putting forward the fact that FNAC and USG helps to identify thyroid abnormalities at an early stage. They work side by side and provide pathologists and clinicians strong significant correlation in diagnosing various benign and malignant disorders of thyroid gland. Biochemical study acts as a supporting data.

ACKNOWLEDGMENT

The author is grateful to the authorities of Midnapore Scan Centre Private Limited for providing the data to conduct this study.

Financial support and sponsorship

Nil.

Conflict of Interest

There are no conflicts of interest.

Ethical Approval

Since the data of this study was obtained from routine laboratory work and the patients'identity is not revealed, this study does not require ethical approval.

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