

## Histopathological Spectrum of Solitary Thyroid Nodule

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## Abstract

## Original Research Article

**Introduction:** Solitary Thyroid nodule (STN) has been the subject of vigorous disagreement with divergent opinions. They can be of both non-neoplastic and neoplastic in nature and it is difficult to assess their nature by clinical examination alone. Imaging technique may help in differentiating them preoperatively but histological is the gold standard. The aim of the study was to differentiate various thyroid disorders manifesting as Solitary thyroid nodule on the basis of histomorphological features. **Material and methods:** A total of 68 cases of STNs received over the period of 24 months were studied and histopathological features were analysed. **Results:** In this study, non-neoplastic STNs were 38 (55.9%) and neoplastic were 30 (44.1%), the former being more common. There was a female preponderance in non-neoplastic and neoplastic STNs. Mean age of presentation of STNs was 42.09 years. Non-neoplastic lesions of thyroid were; 28 cases of colloid nodules, 7 cases of adenomatous nodule, 1 case of hyperplastic nodule and 2 cases of colloid cyst and the neoplastic lesions were; 17 cases of follicular adenoma, 11 cases of papillary carcinoma of thyroid (PTC), and 2 cases of follicular carcinoma. **Conclusion:** STNs are not so uncommon and comprise of a range of both non-neoplastic and neoplastic lesions. Colloid nodule and PTC are the most common of non-neoplastic and neoplastic STNs respectively.

**Keywords:** Solitary thyroid nodule, Colloid Nodule, Hyperplastic Nodule, Papillary Thyroid Carcinoma.

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## INTRODUCTION

Solitary thyroid nodule (STN) is a single palpable or radiologically identifiable lesion and is markedly demarcated from the surrounding thyroid parenchyma [1]. Solitary thyroid nodule is a very common entity worldwide, though incidence varies in different geographical regions [2]. These are about four times more common in women than in men [3-9]. As STNs are more likely to be malignant than the multiple nodules, hence STNs have to be investigated with high degree of suspicion and treatment planned in a systematic manner [2]. In India, the prevalence of a palpable solitary thyroid nodule is about 12.2% [2] and about 10-30% of STNs are malignant [3]. However, the overall incidence of thyroid cancer is relatively rare, though this appears to be increasing over the years [10-12].

STN can be of both non-neoplastic and neoplastic in nature. Clinically, it is difficult to assess the neoplastic or non-neoplastic nature of the STN, aspiration cytology with or without radiology may be of some use in differentiating them preoperatively. It is very difficult to distinguish the benign nodule from the

malignant one. However, histopathological evaluation is the gold standard to distinguish between non-neoplastic from neoplastic one. The current study was aimed to differentiate various thyroid disorders manifesting as Solitary thyroid nodule on the basis of histomorphological features.

## MATERIALS AND METHODS

This is a case series of a total of 68 cases of solitary thyroid nodules which were removed by various surgical procedures and received for histopathological evaluation in a tertiary care hospital over a period of 2 years. Cases diagnosed as solitary nodules on clinical evaluation along with radiology but were found to be multinodular goiter on gross examination of the surgical specimen, were excluded from the study. The resection specimens were evaluated grossly for size, status of the capsule, consistency, colour, presence or absence of calcification, haemorrhage, necrosis, cystic changes, colloid and papillary projections. Multiple representative sections were submitted for routine paraffin processing and microscopic evaluation of the cases was done on Hematoxylin and Eosin (H&E) stain sections. The

clinical details and imaging studies were obtained. Microscopic examination was done and the diagnosis was given. Neoplastic nodules were categorized into benign and malignant types and further, the malignant nodules were classified according to their histological features.

The patients were grouped according to different variables such as age, gender, and histopathological examination reports. The results were tabulated and statistically analysed by using SPSS software version 24.0.

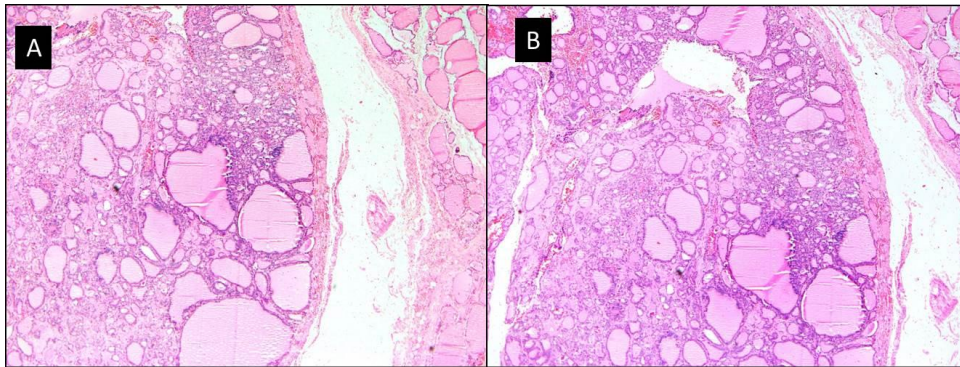
## RESULTS

55.9% (n=38) of STNs were non-neoplastic and 44.1% (n=30) were of neoplastic nature. Out of 68 cases of STN, 41.2% (n=28) non-neoplastic lesions were reported as colloid nodules, 10.3% (n=7) as

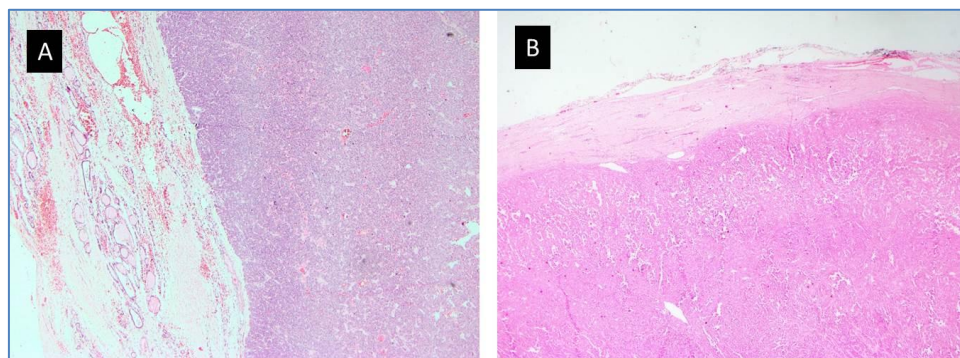
adenomatous nodules, 1.5% (n=1) as hyperplastic nodule and 2.9% (n=2) as colloid cysts.(Figure 1) Among the neoplastic lesions, 25% (n=17) were follicular/hurthle cell adenomas (figure 2); 16.2% (n=11), papillary thyroid carcinoma (figure 4) and 2.9% (n=2), follicular thyroid carcinoma (figure 3), (Table 1). The age range for STNs was from 15 to 58 years; the non-neoplastic lesions were seen over a wider range than the neoplastic ones, which were commoner between 20 and 40 years (Table 1). The peak incidence of colloid nodule was between 15-40 years and adenomatous nodule was found commonly between 21-30 years. The peak incidence of follicular adenoma was between 21-35 years and papillary thyroid carcinoma between 21-45 years. The STNs were more common in females with a F: M ratio of 5.3:1 for benign lesions and F: M 4:1 for malignant lesions (Table 1).

**Table-1: Age and gender wise distribution of cases of solitary thyroid nodule**

Lesions	No. of cases	Peak incidence	No. of women	No. of men
Non neoplastic	55.9% (n=38)			
Colloid nodule	41.2%(n=28)	15-40 years	24	4
Adenomatous nodule	10.3%(n=7)	21-30 years	6	1
Hyperplastic nodule	1.5%(n=1)	58 years	-	1
Colloid cyst	2.9%(n=2)	18-35 years	2	-
Neoplastic	44.1%(n=30)			
Follicular/hurthle cell adenoma	25%(n=17)	21-35 years	16	1
Papillary thyroid carcinoma	16.2%(n=11)	21-45 years	5	6
Follicular thyroid carcinoma	2.9%(n=2)	31-60 years	1	1

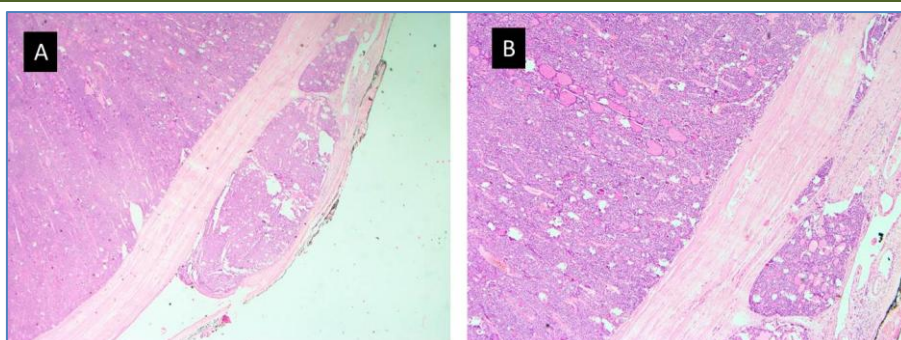


**Fig-1(A-B): Adenomatous nodule (H&E X 100)**

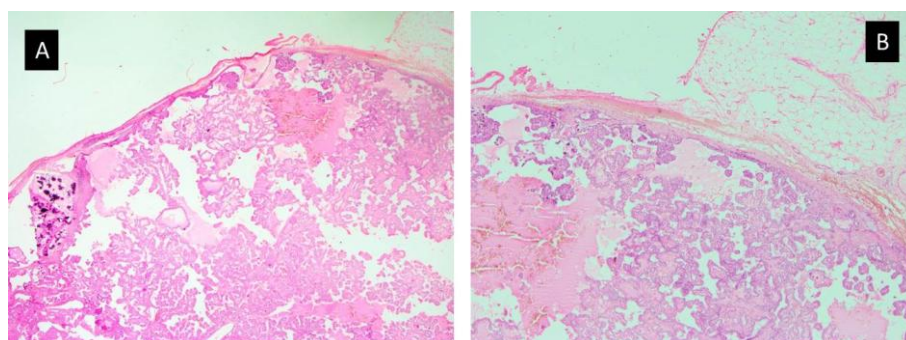


**Fig-2 (A-B): Follicular adenoma (H&E X 100)**





**Fig-3 (A-B): Follicular thyroid carcinoma (H&E X 100)**



**Fig-4 (A –B): Papillary thyroid carcinoma (H&E X 100)**

## DISCUSSION

A total of 68 cases of solitary thyroid nodules of thyroid have been analyzed in the current study that were diagnosed as solitary nodules of thyroid on the resected surgical specimen received by various surgical procedures for over a period of 24 months.

Most common clinical complaint was midline neck swelling. The rate of incidence of solitary thyroid nodules in this study in comparison to the study conducted by Gupta M. *et al.*, has been found to be slightly more [5]. It can be due to the fact this study has been conducted in a tertiary care center.

Maximum numbers of solitary thyroid nodules were observed during the age intervals of 15-40 years for non-neoplastic lesions (28 out of 38 cases – 41.2%) and 21-45 years for neoplastic lesions (17 out of 30 cases - 44%). This age incidence is much younger in comparison with the studies conducted by Monika *et al.*, Gupta M. *et al.* and R. Basharat *et al.* [5, 7]. In the current study, mean age of patients presenting with solitary thyroid nodule irrespective of the nature of the lesion was 35.5 years whereas in the study of Gupta M. *et al.*, it was 38.7 years. Rangaswamy M *et al.*, studied 585 cases of solitary nodules of thyroid and age range noted was 11-70 years and mean age was 40.57 years. Singh P *et al.*, in 2000, reported a mean age incidence of solitary nodules as 47 years in their study conducted on 108 cases which fell in the age range of 12-80 years. The minimum age of presentation in our study was 15 years. She presented with a solitary thyroid nodule diagnosed as colloid nodule. The oldest patient in the study was a 60 years old male diagnosed as follicular

thyroid carcinoma with dedifferentiation. The observation of our study matches with various studies on solitary nodules and it has been observed that STNs have occurred at a much younger age and in patients with less than 10 years of age and in patients with less than 10 years of age [2, 4, 7].

The mean age of presentation of STNs in non-neoplastic cases was 36.4 years which was slightly less when compared to that of neoplasms. The mean age of presentation of neoplastic lesions was 38.1 years. Similar results were found in the studies conducted by Jena A. *et al.* and Gupta M. *et al.* [2, 5].

In the current study, out of 68 patients, 54 were female and 14 patients were male with a male female ratio of around 1:3.9 indicating female preponderance. This female preponderance is apparently uniform in many studies as similar results were observed in other studies also. In the study of Singh P *et al.*, conducted in 2000, male-female ratio was 1:3.13 however it was 1:4.21 in the study of Sangal G *et al.*, 1:5 in the study of Mandal S, *et al.*, and 1:4 in the study conducted by Kilpatrick, *et al.* and 1:5.6 in the study of Fahim, *et al.*, In the study conducted by Gupta *et al.*, out of 100 patients, females (77 cases) outnumbered the males (23 cases) with male-female ratio of 1:3.4. Similar results were observed by Salama *et al.*, Chukudebeblu O *et al.*, Ashwini *et al.*, and Khadilkar *et al.* [13] This female preponderance is apparently due to the fact that females are more prone to thyroid disorder due to the presence of oestrogen receptors in the thyroid tissue [6, 8, 9, 11, 12].

In the current study, colloid nodules/cysts and hyperplastic/adenomatous nodules constituted the non-neoplastic STNs. In neoplastic lesions, we found 17 cases to be benign (follicular adenomas) and 13 cases were malignant. Out of the malignant cases, 11 were papillary carcinomas and its variants (conventional, 7 cases; follicular variant, 3 cases; columnar cell variant, 1 case) and 1 case was of follicular carcinoma and another 1 case was of follicular carcinoma with dedifferentiation. This increased trend of papillary carcinoma diagnosis among malignant tumours of thyroid is also seen in studies of of Amphlett *et al.* Yang *et al.* and Yildiz *et al.* [17-19].

In the study, we have encountered relatively more cases of malignancies in comparison to benign lesions which are in contradiction to the studies of Gupta M *et al.*, Basharat R *et al.* in which benign lesions outnumbered the malignant cases. But in the studies of Jena A *et al.* and Khadilkar *et al.* malignant lesions were reported to be higher when compared to that of the benign ones [2, 6, 7, 13, 15, 16].

The relatively higher incidence of malignant lesions in the current study can be because of the fact that there were lesser number of cases in our study and may also be because of the fact that this is an oncology referral center.

The most frequent of the benign STNs is Follicular adenoma whereas the most frequent malignant STNs are papillary thyroid carcinoma.

It is sometimes difficult to differ between hyperplastic adenomatoid nodules and a follicular neoplasm and in between follicular adenoma and follicular carcinoma by histopathological evaluation alone and hence we may have to resort to further investigation like immunohistochemistry marker studies like CK 19, galectin-3 HBME -1, CITED1, CD44, CD 57, cyclin D1 and pax8. However due to cost limitations immunohistochemistry marker studies was not conducted in this study.

## CONCLUSION

This study has given an insight into incidence of solitary thyroid nodule, their frequency, gender predilection, their nature and histological varieties. As the finding of a thyroid nodule is a common clinical problem and the percentage of such nodules that prove to be malignant is small, investigations are of immense help to verify with the clinical and morphological findings. Fine needle aspiration and biopsy has been shown to establish a correct diagnosis in a substantial number of cases before surgery. Thyroid lobectomy then becomes the only alternative procedure in order to reach a correct diagnosis for STN by histomorphologic analysis.

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