

# Histopathological Evaluation of Solitary Nodules of Thyroid

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## ABSTRACT

**Introduction:** Solitary Thyroid nodules (STNs) can be of both non-neoplastic or neoplastic in nature and it is difficult to assess whether an STN is neoplastic or non-neoplastic by clinical examination alone. Imaging technique may help in differentiating them preoperatively but histological examination offers the final diagnosis. This study was aimed at studying the incidence rates of various types of STNs as it varies from one geographical area to another.

**Material and methods:** A total of 58 cases of STNs received over the period of 18 months were studied and histopathological features were analysed.

**Results:** In this study, non-neoplastic STNs were 32 (55.17%) and neoplastic were 26 (44.82%), the former being more common. There was a female preponderance in both non-neoplastic and neoplastic STNs with an incidence of 90.62% and 84.61% respectively. Mean age of presentation of STNs was 42.09 years. Non-neoplastic lesions of thyroid were; 18 cases of colloid nodules, 10 cases of hyperplastic nodular goitre, 04 cases of Hashimoto Thyroiditis and the neoplastic lesions were; 05 cases of follicular adenoma, 11 cases of typical/conventional papillary carcinoma of thyroid (PTC), 6 cases of papillary carcinoma thyroid variants, 01 case of follicular carcinoma 01 case of Undifferentiated carcinoma, 01 case of Squamous cell carcinoma and 01 case of medullary carcinoma.

**Conclusion:** STNs are not so uncommon and comprise of a gamut of both non-neoplastic and neoplastic lesions. Colloid nodule and PTC are the most common of non-neoplastic and neoplastic STNs respectively.

**Keywords:** Non-neoplastic Lesions of Thyroid, Neoplastic Lesions of Thyroid, Colloid Nodule of Thyroid, Hyperplastic Nodule of Thyroid, Hashimoto Thyroiditis, Papillary Carcinoma of Thyroid, PTC

Solitary nodules of Thyroid can be of both non-neoplastic or neoplastic in nature. Though it is difficult to assess whether a nodule in thyroid is neoplastic or non-neoplastic by clinical examination alone, imaging technique may be of some use in differentiating them preoperatively. There is no perfect test to distinguish the benign nodule from the malignant one. However, a reasonable amount of success can be achieved by a good clinical evaluation and investigations.

## MATERIAL AND METHODS

A cross sectional study of a total of 58 cases of solitary nodules of thyroid which were removed by various surgical procedures and received for histopathological evaluation for over a period of 18 months. This study was conducted at G S L Medical College, Rajahmundry after ethical clearance and obtaining informed consent from the patient. Cases diagnosed as solitary nodules on imaging but were found to be multinodular on examination of the surgical specimen, were excluded from the study. Clinical data was obtained, and histopathological features were analysed. 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 20.0 and MS Excel 2007 and were compared with the previous similar studies conducted elsewhere.

## RESULTS

Age and gender-wise distribution of Solitary Nodules of Thyroid is as in Table No 1.

When the Frequency of involvement of lobes of thyroid was analysed, curiously, right lobe appears to be involved more frequently than the left lobe.

Out of the 58 cases of solitary nodules of thyroid, 32 cases were found to be of non-neoplastic in nature whereas 26 cases were found to be of neoplastic in nature (table-2). On further categorisation of Non-neoplastic nodule cases basing

## INTRODUCTION

Thyroid nodule is defined as a single palpable or radiologically identifiable lesion standing out distinctly from the surrounding thyroid parenchyma<sup>1</sup> Thyroid nodules are very common entities globally, though incidence varies in different geographical regions.<sup>2</sup> Solitary nodules of thyroid are about four times more common in women than in men.<sup>3-9</sup> STNs are more likely to be malignant than the multiple nodules. Because of this reason, STNs have to be investigated with high degree of suspicion and treatment planned in a systematic manner.<sup>2</sup> In India, the prevalence of a palpable solitary thyroid nodule is about 12.2%.<sup>2</sup> and 10% to 30% of STNs are of malignant aetiology.<sup>3</sup> However, the overall incidence of thyroid cancer is relatively rare, with an incidence rate of 8.7 per 100,000 population per year, though this seems to be increasing over the years.<sup>10-12</sup>

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Age group in years	Male	Female	Total
0-10	00	00	00
11-20	00	01	01
21-30	01	09	10
31-40	00	11	11
41-50	01	17	18
51-60	03	07	10
60	02	06	08
Total	07	51	58

**Table-1:** Age and Gender-wise incidence of Solitary nodules of Thyroid

Gender	No of Non neoplastic nodules (n=32)		No of neoplastic nodules (n=26)		Total (58)
	Reactive	Inflammatory	Benign	Malignant	
Male	03	00	02	02	07
Female	25	04	03	19	51
Total	28	04	05	21	58

**Table-2:** Gender wise categorisation of Non-neoplastic and Neoplastic STNs

Reactive (Colloid/Hyperplastic/Adenomatoid)		Inflammatory	
Type of lesion	Number of cases	Type of lesion	Number of cases
Colloid nodule	18	Hashimoto Thyroiditis	03
Adenomatoid nodule	10	Hashimoto Thyroiditis with colloid nodule	01
Total	28		04

**Table-3:** Categorisation of Non-neoplastic nodules

S No	Type of neoplastic nodule	No of cases	
1	Follicular adenoma	05	
2	Papillary Carcinoma	17	
	Conventional variant		- 11
	Tall cell variant		- 01
	Follicular variant		- 01
	Oxyphil variant		- 01
	Micropapillary variant		- 03
	Total	- 17	
3	Follicular Carcinoma	01	
4	Medullary Carcinoma	01	
5	undifferentiated carcinoma	01	
6	Squamous Cell Carcinoma	01	
	Total	26	

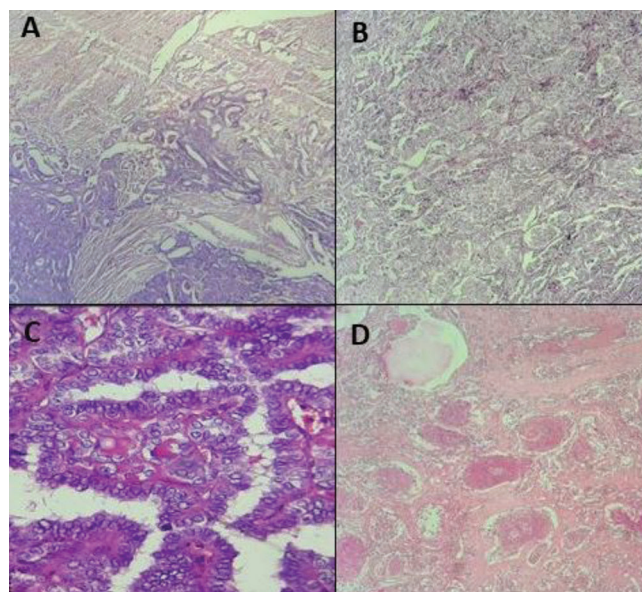
**Table-4:** Incidence of different types of solitary neoplastic nodule of thyroid

on gender and aetiology as reactive (Colloid/Hyperplastic/Adenomatoid) and inflammatory lesions, 18 cases were categorised as colloid nodules, 10 cases as adenomatoid nodules, 03 cases as Hashimoto Thyroiditis and 01 case was found to be having overlapping features of both Hashimoto Thyroiditis and Colloid nodule (table-3) and it was included in the category of Hashimoto Thyroiditis for statistical analysis.

Neoplastic nodules were classified into benign and malignant types and further, the malignant nodules were classified according to their histological features. Benign nodules were 05 in number whereas malignant ones were 21.

## DISCUSSION

A total of 58 cases of solitary nodules of thyroid have been finalised for analysis in this study that were diagnosed



**Figure-1:** Photomicrographs of (A) Follicular carcinoma (B) Undifferentiated carcinoma (C) Papillary carcinoma (D) Squamous cell carcinoma

as solitary nodules of thyroid on the resected surgical specimen received by various surgical procedures for over a period of 18 months and this study was conducted at G S L Medical College, Rajahmundry Data was collected from histopathology reports.

Most common complaint was swelling in front of the neck. The rate of incidence of solitary thyroid nodules in this study in comparison to the studies conducted by Manoj Gupta et al., has been found to be slightly less.<sup>5</sup> It can be due to the fact this centre is a Private Medical College where services

are chargeable and is located in rural area.

When it comes to frequency of age wise incidence of STNs, it has been seen that maximum incidence of solitary thyroid lesions occurred during the age intervals of 40-50 years for non-neoplastic lesions (13 out of 32 cases – 40.6%) and 50-60 years for neoplastic lesions (6 out of 25 cases - 24%) but if we widen the age intervals then it has been seen that nearly 53.12% (17 out of 32 cases) and 40% (6 out of 25 cases) of total cases occurred between the ages of 40-60 years for both non-neoplastic and neoplastic cases respectively. This is in consonance with the studies conducted by Monika et al, Manoj Gupta et al and Rabia Basharat et al.<sup>5,7</sup> Hence, in this study it has been seen that maximum number of cases occurred between 4<sup>th</sup> and 6<sup>th</sup> decades for both non-neoplastic and neoplastic lesions.

In our study, mean age of patients presenting with solitary thyroid nodule irrespective of the nature of the lesion was 42.9 years whereas in the study of Manoj Gupta et al., it was 38.7 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. 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. The mean age of incidence of STNs in our study is in close proximity to that of the other studies in reference with a variation of 4 years (10%) on either side.<sup>5,8</sup>

The youngest patient in our study was a 20 years old lady who presented with a solitary nodule diagnosed as follicular adenoma (fig-1) and the oldest patient was a woman of 72 years of age diagnosed as undifferentiated carcinoma. The observation of our study matches with that of Manoj Gupta et al.<sup>5</sup> In the remaining studies on solitary nodules, it has been observed that STNs have occurred at a much younger age and in patients with less than 10 years of age. It can be because of a smaller number of cases in our study and that of Manoj Gupta et al, as well.<sup>2,4,7</sup>

The mean age of presentation of STNs in non-neoplastic cases was 41.95 years which was slightly less when compared to that of neoplasms. The mean age of presentation of neoplastic lesions was 43.07 years. Similar results were found in the studies conducted by Amitabh Jena et al. and Manoj Gupta et al.<sup>2,5</sup>

In this study, out of 58 patients, 51 were female and 7 patients were male with a male female ratio of around 1:7.28 indicating female preponderance.

In the study conducted by Gupta et al, out of 100 patients, females (77cases) outnumbered the males (23 cases) with male-female ratio of 1:3.4. 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 whereas it was 1:4.21 in the study of Sangal G et al (2006), 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. However, our results are in close proximity to the observations by HS Sachdeva, et al. (1:6), Fahim, et al.

(1:5.6) and Mandal S, et al (1:5)<sup>5,7,8,9,12</sup> Similar results were observed by Chukudebeblu O et al, Salama et al, Ashwini et al, and Khadilkar et al.<sup>13</sup> This female preponderance is apparently due to the fact that females are more prone to thyroid disorder owing to the presence of oestrogen receptors in the thyroid tissue<sup>6,8,9,11,12</sup>

A curious observation in the present study was that right lobe of thyroid (58.63%) was more commonly involved than left lobe (41.37%). Similar observations were also noted in the studies of Khadilkar et al and Manoj Gupta et al.<sup>6,5</sup>

In this present study, reactive/hyperplastic and inflammatory nodules constituted the non-neoplastic STNs. Reactive/hyperplastic STNs were principally constituted by colloid and adenomatoid nodules and that of inflammatory were by Hashimoto thyroiditis, predominantly. And out of them, the non-neoplastic lesions were colloid and adenomatoid nodules constituted 48.27% whereas 6.89% were Hashimoto thyroiditis. Like in the studies of Manoj Gupta et al, Amitabh Jena et al and Rabia Basharat et al, the incidence of Hashimoto thyroiditis is quite less when compared to the incidence of colloid/hyperplastic nodules and incidence ranged from 5 to 7%. The incidence of Hashimoto thyroiditis in our study is nearly similar to that observed by Rabia Basharat et al.<sup>5,2,7</sup>

In neoplastic lesions, we found 05 cases to be benign (follicular adenomas) and 21 cases were malignant. Out of the malignant cases, 17 were papillary carcinomas and its variants { typical/conventional PTC -11 cases and variants of namely a)tall cell variant 1 case b) follicular variant 1 case c) micropapillary variant 3 cases d)oxyphil variant 1 case} 1 was squamous cell carcinoma, 1 case was medullary carcinoma, 1 case was follicular carcinoma and 1 case was Undifferentiated carcinoma. 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.<sup>17,18,19</sup>

In this study we have encountered relatively more cases of malignancies in comparison to benign lesions which is in contradiction to the studies of Manoj Gupta et al, Rabia Basharat et al in which benign lesions outnumbered the malignant ones. But in the studies of Amitabh Jena et al and Khadilkar et al malignant lesions were reported to be higher when compared to that of the benign ones.<sup>2,6,7,13,15,16</sup> The relatively higher incidence of malignant lesions in our 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 centre.

The most frequent of the benign STNs is Follicular adenoma whereas the most frequent malignant STNs is Papillary carcinoma. However rare cases of Undifferentiated carcinoma, Squamous cell carcinoma and medullary carcinoma 01 case of follicular carcinoma were encountered to a tune of one each in each category.

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, CK 903, CITED1, CD44, CD 57, cyclin D1. However due to cost constraints immunohistochemistry marker studies was not conducted in this study

## CONCLUSION

To conclude, the peak age at presentation of solitary nodule thyroid has been found to be between 4<sup>th</sup> and 6<sup>th</sup> decade and 4<sup>th</sup> and 5<sup>th</sup> for non-neoplastic and neoplastic STNs respectively. Solitary thyroid nodule is more common in females. Non neoplastic lesions are more common than neoplastic lesions and the most common non-neoplastic lesion in solitary nodule of thyroid is colloid goitre. Most common malignancy in solitary nodule thyroid is papillary carcinoma.

Thus, this study has given an insight into incidence of solitary thyroid nodule, their frequency, gender predilection, their nature and histological varieties. This study has also helped in gaining experience on seeing many of the histological variants of malignant tumours of Thyroid that included rare ones like primary Squamous cell carcinoma of Thyroid. Differentiating Follicular adenoma from hyperplastic / adenomatoid nodule remains an enigma in certain cases.

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