

## Research Article

# A study on the clinical manifestations and the incidence of benign and malignant tumors in a solitary thyroid nodule

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### ABSTRACT

Tumors are either benign or malignant. The thyroid nodule, which is usually a clinical manifestation of most of the thyroid disorders, is one among them which has been the subject of controversies with divergent opinions and views. Clinical presentation of thyroid nodules varies widely ranging from solitary nodules to benign and malignant tumors. Thyroid nodules accounts up to 8% of the adult population having palpable nodules. However studies on its incidence in the population residing near seacoast are limited. Hence, the present study is carried in an aim to evaluate the clinico-pathological correlation of solitary thyroid nodule and the incidence of malignancy in the population residing at sea coast. The study is conducted in the Narayana Medical College & Hospital (NMCH), which is situated within 10-15 km radius of the seacoast in Nellore district of Andhra Pradesh, India. In this study, 73 subjects were selected who presented with thyroid swelling which was clinically confirmed as solitary thyroid nodule. Out of 73 cases, 12 cases (16.5%) were found to have malignant lesions with remaining 61 cases (83.5%) being benign lesions. The incidence of malignancy among solitary thyroid nodule subjects is up to 16.5% in the population residing near seacoast. Thus the present study warrants people to consult surgeons for early diagnosis and adequate treatment without being passive as most of these swellings are asymptomatic for long duration.

**Keywords:** Benign, Malignant tumors, Solitary thyroid nodule, FNAC, Follicular adenoma, Papillary carcinoma

### INTRODUCTION

Tumors are either benign or malignant. Benign tumors are indolent, grow in situ and do not spread while malignant forms are more aggressive with rapid growth. These malignant forms will turn harmful, if they infiltrate into other organs.<sup>1</sup> The thyroid nodule, which is usually a clinical manifestation of most of the thyroid disorders, is one among them which has been the subject of controversies with divergent opinions and views.<sup>2</sup>

Solitary thyroid nodule is defined as a discrete mass which is palpable in the thyroid gland. Most of the diseases related to thyroid gland may present as solitary

thyroid nodule (STN). In most cases thyroid nodules which are detected clinically as solitary, are actually hyperplastic nodules in multinodular goitres.<sup>3</sup> Solitary nodules in the thyroid are common in adults and account up to 4-7% in general population. Various studies demonstrated that the majority of thyroid nodules were detected as benign hyperplastic lesions, cases up to 5-20% found to be true malignant lesions.<sup>3</sup> Studies related to STN have shown that it is common in women, while the incidence of malignancy is more in men, along with the young.<sup>1,4,5,6,7</sup> It was observed that younger patients tend to possess lower grade tumors than the older patients who tend to have a more aggressive form of malignancy.<sup>4</sup>

Thyroid nodules which occur during childhood as mentioned above need to be assessed carefully due to their tendency to progress into malignant form (15-25%) when compared to adults. The metastatic spread is from local to regional lymph nodes and the distant sites include organs like the lungs and bones.<sup>8,9</sup> The clinical observations in few studies reveal that the nodule will be detected if it is more than 1cm in size. The etiology of formation of the nodules is controversial. Previous studies indicate that 38% of these palpable lesions were observed to disappear completely with time.<sup>10,11</sup> However, various factors like age, sex, iodine deficiency and history of radiation exposure contribute to the formation of nodules. Previous history of ionizing radiation is associated with a risk of higher incidence of benign as well as malignant nodules of thyroid. Malignancy rates in the presence of radiation history is between 20-50%.<sup>12,13</sup>

The thyroid gland carcinoma is the most common malignancy of the endocrine system. It accounts up to 10.5% of all malignant tumors of head and neck region.<sup>7</sup> The progression of thyroid neoplasia appears either as discrete nodules or diffusely enlarged gland, although the former more likely can be malignant.<sup>14</sup> The incidence of thyroid malignancy in solitary thyroid nodule (STN) varies from 4.7-18.3%.<sup>15</sup> Depending upon origin from the various cell types thyroid carcinomas are classified in to either Medullary thyroid cancers (MTCs) or Non medullary thyroid cancers (NMTCs). Most thyroid carcinomas are nonmedullary thyroid cancers (NMTCs) accounts up to 95% of tumors and they arise from the thyroid follicular epithelial cells. These NMTCs are divided into four histological subtypes: papillary (85%), follicular (11%), Hurthle cell (3%), and anaplastic (1%). Mostly up to 95% are sporadic tumors and the remaining represents a familial origin, which are also referred as familial nonmedullary thyroid cancers (FNMTc) which are very rare.<sup>16</sup>

FNMTc can be detected and diagnosed early when thyroid cancer appears in two or more first-degree relatives.<sup>17</sup> FNMTcs clinically, categorized in to two groups in which first consists of familial tumor syndromes characterized by a preponderance of non-thyroidal tumors include familial adenosis polyposis (Gardner syndrome), familial hamartoma syndrome (Cowden syndrome), and the Carney complex type-1 where as other group include mostly NMTCs.<sup>18</sup> FNMTc tend to appear at an earlier age as benign thyroid nodules, associated with multifocal disease, and with high rates of loco-regional recurrence.<sup>19,20</sup> MTCs originate from the calcitonin-producing parafollicular cells of the thyroid. Medullary thyroid cancers (MTCs) accounts up to 5% of all thyroid malignancies, out of which 20% are familial and occur as part of the multiple endocrine neoplasia (MEN) syndromes. Earlier studies revealed that the clinical examination of thyroid is the characteristic feature of the nodule, whether it is solitary or dominant in a multi-nodular goiter. The nodule characteristics include

size, consistency for instance soft or firm or woody or hard, and involvement with adjacent structures.<sup>16</sup>

Thus, solitary thyroid nodules represent a multitude of thyroid disorders. Therefore the present study is undertaken with an aim to thoroughly understand the manifestations and the incidence of benign and malignant tumors of solitary thyroid nodule.

## METHODS

**Inclusion criteria:** All cases of STN who presented to General Surgery OP at Narayana Medical College, Nellore.

**Exclusion criteria:** Subjects who presented with symptoms other than thyroid swelling.

All the data of the 73 cases which were studied was collected from patients admitted at Narayana Medical College & Hospital, Nellore between the period of one year between August 2012 to July 2013 with informed consent and after obtaining clearance from the ethical committee. All the required investigations for the study were done routinely during the admission period. All the subjects who presented with thyroid swelling underwent FNAC and Thyroid function tests along with ultrasound scan, and X-ray neck. Importance was given to detailed history, duration of swelling, pressure symptoms, toxic symptoms associated illnesses, previous exposure to neck irradiation, history of anti-thyroid drug use, positive family history. A thorough local examination was done in all cases followed by systemic examination.

## Statistical Analysis

Statistical analysis was performed using SPSS -16 version software. The data was collected, analyzed and tabulated on the basis of objectives and hypothesis of the study.

## RESULTS

Solitary thyroid nodules are common in 3<sup>rd</sup> and 4<sup>th</sup> decades of life. Therefore, we assessed the pattern of STNs among the subjects belonging to various age groups who were admitted at NMCH. The findings suggest that the youngest patient in this study was 15 years old and the oldest being 65 years (Table 1).

**Table 1: Distribution of solitary thyroid nodule according to age and sex.**

Age	Males	Females	Total
<30	4	21	25
30-39	4	12	16
40-49	2	14	16
50-59	0	10	10
60-79	0	6	6
Total	10	63	73

**Table 2: Clinical presentations of solitary thyroid nodule.**

Entity	No. of cases	Percentage
<b>Symptoms</b>		
Swelling in the thyroid region	73	100
Pain in the nodule	4	5.4
Pressure symptoms	3	4.1
Toxic Symptoms	2	2.73
Metastatic symptoms	0	0
<b>Lobe involved</b>		
Right Lobe	54	73.9%
Left Lobe	19	26.1%
<b>Physical signs</b>		
Unilateral enlargement	73	100
Movement with deglutition	73	100
Deviation of trachea	-	-
Regional L.N. involvement	2	2.7
Signs of toxicity	1	1.4
<b>Consistency</b>		
Soft	3	4.1%
Firm	66	90%
Hard	4	5.4%
<b>FNAC</b>		
Benign	45	61.6%
Malignant	3	4.1%
Suspicious	19	26.1%
Indeterminate	6	8.2%
<b>Operation</b>		
Hemithyroidectomy alone	66	90%
Near total thyroidectomy	1	1.4%
Total thyroidectomy	3	4%
Total thyroidectomy with LN dissection	3	4.1%
<b>HPE Report</b>		
Nodular colloid goiter	32	43.8%
Follicular adenoma	24	32.9%
Papillary carcinoma	9	12.3%
Follicular carcinoma	3	4.1%
Medullary carcinoma	-	-
Thyroiditis	2	2.7%
Multi Nodular Goiter	3	4.1%
<b>Incidence Report</b>		
Malignant lesions	12	16.5%
Benign lesions	61	83.5%

Moreover, the prevalence of STNs is in the ratio of 6:1 between females and males but nodules in males have higher risk for malignancy. Later we assessed the clinical manifestations (Table 2) among the subjects to demonstrate the symptoms and to differentiate the incidence of benign and malignant lesions of STNs. The

clinical examination of STN revealed that the swelling in front of the neck is the most common symptom which has been observed in all the subjects. The other symptoms noticed in STN include pain in 4 subjects (5.4%), followed by pressure symptoms in 3 subjects. Further examination by palpation indicated that most of the STNs found to be in the right lobe 74% (54 subjects) where as in the left lobe is 26% (19 subjects) respectively (table 2). Later, we assessed the consistency which varied from soft (4.1%), firm (90%) and hard (5.9%) (Table 2). All the STNs underwent routine thyroid profile and findings indicate that the majority were in the euthyroid status (90%). All the other investigations like ultrasound scan of the neck, X-ray neck, laryngoscopy were performed. These cases were subjected to FNAC (Fine needle aspiration cytology) analysis to differentiate the histological subtypes and the incidence of benign and malignant lesions. The findings indicated that the observed lesions which were soft in consistency turned out to be colloid and 3 out of 4 hard swellings were found to be malignant lesions. Out of 66 swellings observed, 9 were malignant and the remaining were benign lesions (Table 2). FNAC has been able to differentiate benign and malignant lesions in 65.7% subjects observed. Thus, FNAC has been proved to be an efficient diagnostic tool in identifying benign or malignant lesions. Later, all these total subjects were subjected to definitive surgical intervention. Hemithyroidectomy alone has been performed in 68 subjects (90%) (Table 2). Further clinical specimens have been evaluated by histopathological examination (HPE). The results displayed that there is a higher incidence of colloid goiter (43.8%) followed by follicular adenoma (32.9%) among all the 73 solitary nodule of thyroid cases (table 2). Of all the 73 subjects studied 12 cases (16.5%) were malignant lesions in which 8 (66.6%) were males and 4(33.3%) were females while the rest of 61(83.5%) cases were benign lesions (Table 2).

## DISCUSSION

The incidence of solitary nodules in the thyroid is more common among adults in general population.<sup>3</sup> It was observed that thyroid swellings are 3-4 times more in women when compared to men.<sup>21,22</sup> Several studies demonstrated that the majority of these thyroid nodules detected are either benign hyperplastic lesions or malignant lesions.<sup>3</sup> Recent studies suggested that STN is common in women while malignancy is found to be more in men and as well as in younger age groups.<sup>1,4-9</sup> Moreover thyroid enlargement may be either diffuse or nodular type necessitates several investigations, to rule out the possibility of a neoplastic or non-neoplastic progression.<sup>23</sup> Appropriate surgical interventions can reduce the higher rates of morbidity and mortality.

Therefore the present study is undertaken in an aim to assess and thoroughly understand the clinical manifestations of the disease and the incidence of benign and malignant tumors of solitary thyroid nodule. The

cases who presented with a complaint of thyroid swelling were selected, admitted at Narayana Medical College & Hospital and were enrolled in the study with their informed consent. All the required investigations, followed by FNAC and Thyroid function tests, Ultrasound scan, X-ray neck, were performed. Detailed history has been documented, followed by thorough systemic examination.

In the present study, findings suggest that the youngest patient was 15 years old and the oldest being 65 years and the prevalence of STNs is in the ratio of 6:1 between females and males (Table 1) which was consistent with some of the previous studies on STN.<sup>23-25</sup> The clinical manifestations among the subjects demonstrated the symptoms of STN related to swelling in front of the neck, which was the most common symptom observed (Table 2) in all the subjects along with the other symptoms like pain in 4 subjects (5.4%), and pressure symptoms in 3 subjects. Our findings were similar to other study by Ananthkrishnan et al which are comparable.<sup>26</sup> Robinson et al had shown that STNs were found in 80.4% in women and 19.6% in men.<sup>1</sup> Moreover some studies have shown that clinical examination of the thyroid demonstrated the characteristic features of the nodule includes size, consistency etc (Table 2).<sup>27,28</sup> Thus, solitary thyroid nodules represent a wide range of thyroid disorders

As mentioned earlier a thyroid nodule to be detected is usually more than 1 cm size in diameter.<sup>3</sup> Moreover the nodule detection by palpation also depends on its location within the thyroid gland, on patient's neck, and early detection yields better outcome. Hence, we followed the clinical examination by palpation and results indicated that most of the STNs were identified in the right lobe and up to 74% (54 subjects) whereas in the left lobe it is up to 26.1% (19 subjects) respectively which is consistent with other studies on STN (Table-2).<sup>23,25,29,30,31</sup> The pattern of consistency among these subjects varied from soft (4.1%), firm (90%) and hard (5.4%) subjects respectively. The results obtained in the present study is in co-relation with other studies (Table 2).<sup>27,28</sup> In one study conducted by Liechty et al, it has shown that the right lobe of the thyroid is involved more compared to the left for both benign and malignant nodules.<sup>32</sup> Similarly in another study it was also shown that in 40% of cases nodules were located in the right lobe thus, correlating with the present study where up to 73.9% of cases, right lobe is involved.<sup>1</sup> Next, we assessed the STNs to demonstrate the thyroid status. Hence, STNs subjects underwent routine thyroid profile and findings indicate that the majority were in the euthyroid status (90%). The findings observed in the present study are correlated with other study which has shown the similar results.<sup>33,34</sup>

Many studies have shown the importance of FNAC procedure and its accuracy for early diagnosis of thyroid nodules and also for differentiation of benign and malignant thyroid nodules.<sup>8,9,35-38</sup> Hence in the present

study also all the STNs were subjected to FNAC (Fine needle aspiration cytology) analysis to differentiate the histological subtypes and the incidence of benign and malignant lesions. We divided our FNAC cases into four groups into Benign, Malignant, Follicular and Indeterminate groups respectively. The results indicate that observed lesions were soft in consistency turned out to be colloid and 3 out of 4 hard swellings were found to be malignant lesions. Out of 66 firm swellings observed, 9 were malignant and the remaining were benign lesions. FNAC has been successfully differentiated benign and malignant lesions in 65.7% subjects observed (table-2). Indeterminate FNAC results were due to adenomas, follicular neoplasms and overlapping cytological features. With sensitivity and specificity of 90-95% of FNAC and its safety, reliability, minimally invasive, high diagnostic accuracy, economicity makes it an invaluable tool in the management of solitary thyroid nodule. This is consistent with other studies.<sup>11-14</sup> The current study is consistent with the previous study where the FNAC results of STNs showed that 65% of nodules were diagnosed as colloid goiter (n=98) followed by 12.6% cases as thyroiditis (n=19).<sup>23</sup>

Surgical intervention is required for solitary thyroid nodules if there is any cytological suspicion or evidence of malignancy. Therefore, all these subjects who were suspected with evidence of malignancy were subjected to definitive surgical intervention. Hemithyroidectomy has been performed in 68 subjects (90%) and the clinical specimens have been evaluated by histo-pathological examination (HPE) (table-2). In one previous study of STN, the majority of the subjects underwent Hemithyroidectomy (55.06%).<sup>27</sup> The results displayed that there is a higher incidence of colloid goiter (43.8%) followed by follicular adenoma (32.9%) among all the 73 solitary nodule of thyroid cases (table-2). Previous study also revealed the higher incidence of colloid goiter (33%), followed by nodular colloid goiter (28%), solitary nodule of thyroid (22%) and thyroiditis (11%).<sup>23</sup> Of all the 73 subjects studied 12 cases (16.5%) were malignant lesions in which 8 (66.6%) were males and 4 (33.3%) were females while the rest of 61(83.5%) cases were benign lesions. Similar findings were reported in another study.<sup>23</sup>

In one study it was shown that majority of carcinomas in STNs were papillary carcinomas (28.7%) followed by follicular and hurthle cell variants which is consistent with the present study where Papillary carcinoma is observed in upto 12.3% followed by Follicular carcinoma (4.1%). But in total, as mentioned earlier benign tumors like colloid goiter (43.8%) followed by nodular colloid goiter (32.9%) have been observed. Men had a higher rate of carcinoma (31.4%) when compared to women (27.8%) though overall prevalence of STN is more common in women as said earlier.<sup>5</sup> Thus, solitary thyroid nodules represent a wide range of thyroid disorders.

## CONCLUSION

Thus the present study highlights the incidence of malignancy among solitary thyroid nodule subjects is up to 16.5% in the population residing near seacoast. The prevalence of solitary thyroid nodule in this population is 4-7% with majority being benign lesions which requires a thorough clinical and histopathological approach in the evaluation and management of solitary thyroid nodules. 5% of these nodules being malignant and significant number of suspicious lesions mandate FNAC & HPE of these nodules, which remains the corner stone in the management of solitary thyroid nodule. A patient with an FNAC result that is suspicious or clearly malignant should also be counseled to undergo surgery, even in the absence of other risk factors. Fine needle aspiration cytology has become an invaluable, minimally invasive and reliable tool in the pre operative assessment of patients with suspicion of malignancy. Thus the present study warrants people to consult surgeons for early diagnosis and adequate treatment without being passive as most of these swellings are asymptomatic for long duration.

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