

## Original Research Article

# A study on risk factors for malignancy in solitary thyroid nodules at a tertiary care hospital

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## ABSTRACT

**Background:** Thyroid nodules are a common entity encountered in clinical practice and the prevalence by palpation is only 3-7%, but on ultrasonographic evaluation it is 20-76% with wide variability. Accurate prediction of malignancy with minimal diagnostic modalities and assessing the risk factors in malignancy may help in reducing extensive procedures. The objective of the study is to assess the risk factors associated with development of malignancy in solitary thyroid nodules and to find out the percentage of malignancy among the cases of solitary nodules.

**Methods:** A three year prospective study was conducted at ACSR medical college and all cases diagnosed as solitary thyroid nodules were enrolled and institutional ethical approval was obtained. Socio demographic data, clinical history and ultrasonogram findings were collected and entered in a separate data sheet for analysis. Fine needle aspiration cytology, histopathological examination was done and reported findings were noted. Statistical analysis was done in SPSS version 20 and 'p' value <0.05 was considered significant.

**Results:** 128 cases of solitary thyroid nodules (STN) with 41 male and 87 female cases and F:M ratio of 2.13:1 with mean age of 46.6±10.8 years was enrolled. 43.75% were euthyroid, 47.66% were hypothyroid and 8.59% were hyperthyroid on hormonal evaluation. Micro calcification was observed in 50.78%, increased vascularity in 38.28% and irregular margins in 34.38% of cases. Colloid goitre was predominant observation on fine needle aspiration cytology (40.6%) and follicular adenoma (32%) on histopathology.

**Conclusions:** Features of micro calcification, solid echogenicity, and associated lymphadenopathy are associated features with increased risk of malignancy among STN.

**Keywords:** Colloid goitre, Euthyroid, Lymphadenopathy, Micro calcification, Solitary thyroid nodule

## INTRODUCTION

Thyroid nodules are a common entity encountered in clinical practice of a general physician. These are more commonly observed in female population than males. The incidence of the nodules is increasing with advances in the diagnostic modalities. Recent studies state that the prevalence of thyroid nodules by palpation is only 3-7%, but on ultrasonographic evaluation it is 20-76% with wide variability.<sup>1</sup> these nodules can be either solitary or

multinodular. Both these nodules are associated with malignancy. Several studies state that the risk of malignancy is higher in solitary thyroid nodules (STN) than multinodular and some state that risk is equal in both.<sup>2</sup> Hence a high risk of suspicion and systematic management strategy is essential in diagnosing a case of malignancy in cases of thyroid nodules. But it is impossible to examine every case of thyroid nodule and perform elaborative tests to evaluate the nature of nodules and plan the management. Accurate prediction of

malignancy with minimal diagnostic modalities and assessing the risk factors in malignancy may help in reducing extensive procedures and diagnostic thyroidectomy which brings potential adverse effects such as hypothyroidism.

Thyroid cancers occur in approximately 5% of all thyroid nodules independent of their size. Recent studies report an increasing incidence of malignancies of the thyroid. The risk factors associated with malignancy are variable and associated with thyroid status in case of nodular goitre. Many surgeons feel that surgical resection (Total thyroidectomy) as a plan of management to prevent occurrence of malignancy. Most of the nodules of thyroid are benign and require regular follow up and evaluation of the thyroid status regularly. A regular assessment of risk factors would help in evaluation of a patient with thyroid nodules which patient could benefit from surgery. Hence unnecessary surgical interventions can be reduced and postoperative complications also.

The present study was undertaken with an aim to assess the risk factors associated with development of malignancy in solitary thyroid nodules and to find out the percentage of malignancy among the cases of solitary nodules.

**METHODS**

A prospective observational study was conducted for a period of two years from September 2016 to August 2018 by the department of General Surgery at Narayana Medical College and Hospital, a tertiary care hospital. All the patients attending the OPD of general surgery and referred cases with swelling of the thyroid were selected. All the cases with solitary thyroid nodule diagnosed clinically were enrolled in the study. The study was presented before the institutional ethical committee and approval was obtained. The study was conducted strictly in accordance with the guidelines of the committee. Socio demographic data including sex, age, family history, history of medications, past history of surgery was noted by interviewing the cases. Thorough clinical examination was done and all the characteristics of the nodule like size, location, flexibility were noted. The study details were clearly explained to all the participants in the study and a written informed consent was obtained. Complications of surgery and anaesthesia were explained and postoperative complications were clearly explained. All the data was collected in a pre-structured and designed questionnaire sheet and noted. A thorough clinical examination including symptoms and signs, lymph node involvement and general examination was done in all the cases enrolled in the study. Basic investigations which include complete haemogram, chest X ray, surgical profile was done and the results were noted. Thyroid profile was done in all the cases enrolled and fine needle aspiration cytology (FNAC) was performed by senior pathologist. Ultrasound was performed and parameters like calcification, nodularity

and echogenicity was noted. Computed tomography was performed in cases with multiple secondaries of lymph node involvement was observed and the findings were recorded. Hemi thyroidectomy was the common surgical procedure performed and all the surgical specimens were sent for histopathological examination and the results were noted.

**Statistical analysis**

All the collected data was entered in Microsoft excel spread sheet and corrected. Continuous variables were expressed as mean and SD. Categorical variables were expressed as frequencies and percentages. A significance level of P less than 0.05 was used in all the tests. All statistical procedures were carried out in SPSS version 20 for windows. (Chicago; USA).

**RESULTS**

The present study was conducted for a period of two years and all the cases of thyroid swellings which attended the surgical OPD were included. A total of 458 cases were examined and 128 cases of solitary thyroid nodules (STN) were identified and included in the study. The prevalence of STN in the present study was 27.95%. 41 cases of male (32.03%) and females were 87 (67.97%) with F:M ratio of 2.13:1. A clear female dominance is observed in the present study. Majority of the cases of STN were in the age group of 21-40 years (50.78%) followed by 41-60 years (25.78%), greater than 60 years (15.63%) and 7.81 % in less than 20 years age group. Mean age of the cases was 46.6± 10.8 years, with a range (minimum- maximum: 16-74 years). The mean age of the female population in the study was 38.15±8.12 years and male were 41.1±6.58 years. No statistical significance was observed with regarding to age in our study (Table 1).

**Table 1: Age distribution of cases in the study.**

Age group (in years)	Male (N)	Female (N)	Total N (%)
<20	2	8	10 (7.81)
21-40	21	44	65 (50.78)
41-60	10	23	33 (25.78)
>60	8	12	20 (15.63)
<b>Total</b>	<b>41</b>	<b>87</b>	<b>128</b>

With regard to signs and symptoms of the cases, dyspnoea was observed in 25% of cases followed by other like dysphagia in 21.88%, toxic symptoms (18.75%), palpable lymph nodes (14.06%), Hoarseness of voice (8.59%) and pain in 7.81% of cases (Table 2). In the present study, 43.75% were euthyroid, 47.66% were hypothyroid and 8.59% were hyperthyroid on hormonal evaluation. On ultrasonography, 50.78% were hypoechoic, 35.16% were isoechoic and 14.06% hyperechoic and 65.63% were solid and 10.94% were

cystic in consistency. Micro calcification was observed in 50.78%, increased vascularity in 38.28% and irregular margins in 34.38% of cases in the study. 17.19% of cases demonstrated regional lymphadenopathy. Statistical significance was observed with regarding to calcification, increased vascularity (p value >0.05) and no association with consistency (Table 3).

**Table 2: Distribution of study subjects with regard to signs and symptoms.**

Signs and symptoms	N	%
Pain	10	7.81
Toxic symptoms	24	18.75
Dyspnoea	32	25.00
Dysphagia	28	21.88
Regional palpable lymph node	18	14.06
Hoarseness of voice	11	8.59

**Table 3: Ultrasonography features of the nodules and hormonal status of cases in the study.**

Risk factors in study	N	%	
<b>Ultrasonogram findings</b>			
Microcalcification	65	50.78	
Increase in vascularity	49	38.28	
Irregularity	44	34.38	
Isoechoic	45	35.16	
Hypoechoic	65	50.78	
Hyperechoic	18	14.06	
Solid	84	65.63	
Cystic	14	10.94	
Lymphadenopathy	22	17.19	
<b>Thyroid status</b>	Euthyroid	56	43.75
	Hypothyroid	61	47.66
	Hyperthyroid	11	8.59

**Table 4: FNAC and histopathological findings of STN in the study.**

Histopathological findings	N	%
Papillary carcinoma	22	17.2
Follicular carcinoma	6	4.7
Medullary carcinoma	8	6.3
Follicular adenoma	41	32.0
Nodular colloid goitre	28	21.9
Nodular hyperplasia	13	10.2
Hashimotos disease	10	7.8
<b>FNAC report</b>		
Benign	18	14.1
Malignant	16	12.5
Malignant suspicion	21	16.4
Colloid goitre	52	40.6
Follicular neoplasm	10	7.8
Non diagnostic cytology	11	8.6

The FNAC results are as follows: colloid goitre (52/128; 40.6%), malignant (16/128; 12.5%), malignant suspicion (21/128; 16.4%), benign (18/128; 14.1%), follicular neoplasm (10/128; 7.8%) and non diagnostic cytology (11/128; 8.6%). On postoperative histopathological evaluation the findings are summarized as follows: follicular adenoma (41/128; 32%), nodular colloid goitre (28/128; 21.9%), papillary carcinoma (22/128; 17.2%), nodular hyperplasia (13/128; 10.2%); Hashimoto’s disease (10/128; 7.8%) and follicular carcinoma (6/128; 4.7%) (Table 4). Of the 22 cases of papillary carcinoma, 10 were reported as follicular variant of papillary carcinoma on histopathology.

**DISCUSSION**

Solitary thyroid nodule is defined as a localized thyroid enlargement with an apparently normal remaining gland. In our present study, of the 128 cases of STN the incidence of malignancy on histopathological confirmation was 28.125% which is higher than the reports of Kuru et al who reported an incidence of 12% in his study and on par with the findings of Kishan et al with a reported incidence of 27% in their study.<sup>3,4</sup> As reported in many studies earlier and also a controversial finding of many studies malignancy is more associated with multinodular goitre than solitary nodule.

As mentioned in many studies universally, thyroid lesions are more commonly associated with females than males the reason being not clearly explained till now. In our study also there was a clear-cut dominance of thyroid nodules in females than males. Few studies suggest that incidence of malignancy in thyroid is more commonly observed in males than females even though the lesions are reported higher in females. In our study, of the 36 malignant cases, 22 (61.1%) were males and 14 were females (38.9%) which is quite similar to the findings of many studies. The Mean age of the malignant cases in the study was 48.2±1.8 years and increasing age is significantly associated with increased risk of malignancy in cases of STN which is also reported by Tai et al.<sup>5</sup> Our study state that, male sex is an independent predictor of malignancy which is in accordance with many other studies. 28 cases (77.78%) of malignancy were euthyroid in our study which is similar to the findings of Krashin et al with 74% of euthyroid cases in his study.<sup>6</sup> There was no statistical significant association between thyroid status and malignancy in our study.

Findings of the few studies earlier suggested that USG findings like irregular shape, borders, micro calcification, increased vascularity; regional lymph node invasion, solid texture and hypo echogenicity are some findings associated with increased chances of malignancy. In our study, microcalcification was observed in 72% of malignant cases and in only 31% of benign cases. This suggests that in presence of micro calcification the incidence of malignancy is more. Presence of solid echogenicity and presence of cervical lymphadenopathy

also exhibited significant statistical association with malignancy in our study. Findings of our study were in association with findings of Azizi et al.<sup>7</sup> Papini et al in their study opined that USG guided FNAC should be performed on all hypoechoic nodules, with micro calcification, irregular borders and increased vascularity.<sup>8</sup>

Some of the studies suggest FNAC as the cost-effective procedure in the initial assessment and management of thyroid nodules. In our study, by FNAC 16 cases (44.4%) were identified as malignant however a negative FNAC report does not exclude the possibility of occult carcinoma because the degree of error in sampling the appropriate area is greater. Colloid goitre was the predominant finding in our study which correlates with the findings of Castro et al.<sup>9</sup> Sensitivity of FNAC can be increased by performing Ultrasound guided FNAC and multiple aspirations from the identified nodules.

On histopathological examination of postoperative specimens, follicular adenoma was the commonest finding in our study. Papillary carcinoma was the commonest malignant (17.2%) finding followed by follicular type (4.7%). Findings of our study was consistent with findings in the literature and studies globally.<sup>10</sup> Colloid nodular goitre was the benign common lesion (21.9%) in our study, findings of our study were consistent with the findings of Jahhen et al.<sup>11</sup> Other less common variants were follicular adenoma, colloid goitre, nodular goitre and Hashimoto's disease in our present study which is similar to the findings of many studies earlier.

## CONCLUSION

STN are one of the most common lesions than multinodular goitre. Management of the STN is always a challenge and depends on accurate diagnosis and identification of malignancy early. Results of the present study suggest that USG along with FNAC could help in identification of STN with malignant features. Features of micro calcification, solid echogenicity, and associated lymphadenopathy are associated features with increased risk of malignancy among STN. Papillary carcinoma was the most common type of malignancy and nodular colloid goitre most common benign lesion among STN.

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