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# PREVALENCE OF INCIDENTAL THYROID CARCINOMA IN PATIENTS UNDERGOING THYROID SURGERY FOR BENIGN DISEASE

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## ABSTRACT

**Background:** The occurrence of incidental thyroid cancer (ITC) has increased by three times during the last decades and this rise could be attributed to many factors. To limit the prevalence of ITC with goiter especially nodular goiter, total thyroidectomy can become a procedure of choice.

**Objective:** To determine the prevalence of incidental thyroid carcinoma (ITC) in patients undergoing thyroidectomy for clinically or cytologically benign thyroid disease.

**Material and Methods**: A prospective study was conducted in department of General Surgery, during the period from January 2024 to June 2025 at Sree Mookambika Institute of Medical sciences. The study included 108 patients who underwent thyroidectomy for benign indications—such as multinodular goiter, colloid nodules. Cases with preoperative suspicion or diagnosis of thyroid malignancy were excluded. Histopathological examination of resected specimens was performed to detect incidental malignancies. Data were analyzed for prevalence, tumor type, size and correlation with demographic and clinical features.

**Results:** ITC was found in 23 patients (21.29%). There was no statistically significant difference in the occurrence of ITC based on age or gender ($p > 0.05$). However, a significant association was found between ITC and thyroid functional status. ITC was most commonly found in patients with nontoxic multinodular goiter (26.5%), showing a statistically significant association ($p = 0.043$). For the 23 patients diagnosed with ITC, 19(82.6%) cases were papillary microcarcinomas (<1 cm), and 4(17.4%) cases were classic papillary carcinomas.

**Conclusions:** Incidental thyroid carcinoma is relatively common in patients operated for benign thyroid diseases. Routine histopathological evaluation is essential for timely diagnosis and appropriate management, emphasizing the need for careful surgical planning.

**Keywords:** Histopathology, Incidental thyroid carcinoma, papillary microcarcinoma, multinodular goiter, thyroidectomy.

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## Introduction

Incidental thyroid carcinoma (ITC) is defined as a thyroid malignancy that is not identified through clinical examination or preoperative imaging but is discovered only upon histopathological evaluation of surgical specimens excised for benign conditions such as multinodular goiter or hyperthyroidism.[1,2]

By 2019, ITC was expected to be the third most common cancer in women in the US, following only breast and lung cancers.[3] It impacts mostly females, and there is a peak age for occurrence typically between ages 40 and 60, but it can occur in childhood or adolescence.[4] Estimated rates of ITC in patients after thyroid surgery for benign diseases range widely from 3% to 16%, depending on case selection and geography. In an interesting finding, ITC has occurred in patients with hyperthyroidism, since such patients were thought to have a lower risk of cancer from having lower thyroid-stimulating hormone (TSH) levels.[5]

The majority of ITC are papillary microcarcinomas, characterised as tumours with a diameter of less than 1 cm. Papillary thyroid carcinoma (PTC) can exacerbate Graves' illness, with an incidence between 1% and 9%, and certain studies indicate rates as high as 18.3%. Moreover, an increasing amount of research substantiates a correlation between Hashimoto's thyroiditis and thyroid cancer.[6] The ideal surgical strategy for multinodular goitre (MNG) continues to be a subject of contention, particularly with the growing awareness of ITC and its possible manifestation in recurring goitres.[7]

whole thyroidectomy for benign conditions has been contentious; nonetheless, complication rates - such as irreversible recurrent laryngeal nerve palsy (0–1.3%) and permanent hypoparathyroidism (about 1%) - are similar between subtotal and whole thyroidectomy. Total thyroidectomy offers the supplementary benefit of entirely eradicating undiagnosed cancers, hence obviating the necessity for complex completion thyroidectomy procedures.[8.9]

This study emphasises the hidden burden of ITC in individuals undergoing surgical treatment for benign thyroid diseases. It provides local data, correlates cytology and histology, and examines the effect of total thyroidectomy. The findings may influence surgical decision-making and contribute to the early detection of undiscovered thyroid cancers.

## AIMS

To determine the prevalence of incidental thyroid carcinoma (ITC) in patients undergoing thyroidectomy for clinically or cytologically benign thyroid disease.

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## MATERIALS AND METHODS

This prospective study was carried out in the Department of General Surgery at Sree Mookambika Institute of Medical Sciences from January 2024 to June 2025. The study encompassed participants who underwent thyroidectomy for benign thyroid disorders. Indications for surgery included multinodular goitre, colloid nodules, and other benign hyperplastic nodules. Only patients devoid of any clinical, radiological, or cytological indications of cancer prior to surgery were included.

Individuals having preoperative suspicion or confirmed diagnosis of thyroid cancer were excluded from the study. This encompassed individuals with images suggestive of malignancy, FNAC outcomes classified as Bethesda V or VI, or a history of previous thyroid carcinoma. Cases involving completed thyroidectomy for previously diagnosed cancer, as well as those with insufficient clinical or pathological records, were removed. A total of 108 individuals, presumed to have benign thyroid disease and scheduled for thyroidectomy, were included in the final analysis.

All patients received preoperative ultrasonography (USG) to assess gland size, the quantity and features of nodules (e.g., size, location, vascularity, calcifications), and the presence of lymphadenopathy. Computed tomography (CT) of the neck and chest was conducted in specific instances with suspected retrosternal extension. Fine needle aspiration cytology (FNAC) of the predominant nodule verified benign pathology in all participants.

Thyroid function tests indicated 69 (63.9%) euthyroid patients, 21 (19.4%) with thyrotoxicosis, and 18 (16.7%) with hypothyroidism. Toxic nodular goitre was identified in instances of suppressed TSH, regardless of increased T3/T4 levels. All hyperthyroid patients underwent preoperative antithyroid therapy, which was maintained until surgery to avert a thyroid storm. Patients with hypothyroidism were administered levothyroxine replacement therapy.

All patients received preoperative indirect laryngoscopy to evaluate vocal cord mobility. The scope of the procedure was ascertained by the operating surgeon according to clinical presentation and expertise. Surgical procedures encompassed hemithyroidectomy, partial thyroidectomy, near-total thyroidectomy, and total thyroidectomy. During surgery, the recurrent laryngeal nerve and parathyroid glands were systematically identified and preserved.

All excised specimens were sent for histological analysis. Postoperative problems

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were recorded and encompassed alterations in voice, hypocalcaemia, haemorrhage, and wound infection. The function of the recurrent laryngeal nerve was evaluated clinically and using laryngoscopy. Two patients experienced bleeding issues necessitating reoperation. Prophylactic tracheostomy was conducted in two patients with substantial goitres; no urgent tracheostomy was required.

Data were analysed via SPSS software (version 20.0). Patients were categorised into two age groups: under 45 years and 45 years or older, according to the most recent TNM staging standards. Variables were presented as frequencies and percentages. To investigate relationships between ITC incidence and preoperative diagnosis, thyroid function, and patient demographics, cross-tabulations were done. The chi-square test was utilised to ascertain statistical significance, with p-values less than 0.05 considered significant.

## RESULTS

Out of the 108 patients who underwent surgery for presumed benign thyroid disease, 21 (19.4%) were male and 87 (80.6%) were female. The mean age was 44 years, ranging from 16 to 72 years. Based on age, patients were divided into two groups: those under 45 years (n=77; 71.3%) and those 45 years and older (n=31; 28.7%). Regarding thyroid function status, 21 patients (19.4%) were classified as toxic, and 87 patients (80.6%) as non-toxic.

Among 108 patients, the most common preoperative diagnosis was nontoxic multinodular goiter, followed by solitary nodules and various forms of toxic thyroid disease. (Table 1)

| Preoperative Diagnosis | Number | Percentage (%) |
|---|---|---|
| Nontoxic Multinodular Goiter (MNG) | 68 | 63.0 |
| Nontoxic Solitary Thyroid Nodule | 19 | 17.6 |
| Toxic Multinodular Goiter (MNG) | 12 | 11.1 |
| Toxic Nodule | 5 | 4.6 |
| Diffuse Toxic Goiter (Graves') | 4 | 3.7 |
| **Total** | **108** | **100%** |

**Table 1: Distribution based on pre-operative diagnosis**

All patients underwent surgery for presumed benign thyroid conditions based on clinical, imaging, and cytological assessment. Histopathological analysis of surgical specimens revealed ITC in 23 patients, representing an overall incidence of 21.3%. Correlation between ITC with

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categorical variables was given in table 2. There was no statistically significant difference in the occurrence of ITC based on age or gender ($p > 0.05$). However, a significant association was found between ITC and thyroid functional status.

| Variable | Category | ITC (n = 23) | Benign (n = 85) | P Value |
|---|---|---|---|---|
| **Age (Years)** | < 45 | 17 (22.1%) | 60 (77.9%) | 0.773 |
| | ≥ 45 | 6 (19.4%) | 25 (80.6%) | |
| **Gender** | Male | 4 (19.0%) | 17 (81.0%) | 0.985 |
| | Female | 19 (21.8%) | 68 (78.2%) | |
| **Thyroid Function** | Toxic | 1 (4.8%) | 20 (95.2%) | 0.000 (*) |
| | Nontoxic | 22 (25.3%) | 65 (74.7%) | |

**Table 2: Correlation between ITC with categorical variables**

Among the 108 patients, 76 (70.4%) underwent total thyroidectomy, 26 (24.1%) had near-total thyroidectomy, and 3 patients (2.8%) each underwent hemithyroidectomy and subtotal thyroidectomy.

ITC was most commonly found in patients with nontoxic multinodular goiter (26.5%), showing a statistically significant association ($p = 0.043$). No carcinoma was detected in cases with diffuse toxic goiter, indicating a lower malignancy risk. (Table 3)

| Preoperative Diagnosis | No. of ITC Cases (%) | No. of Benign Cases (%) | p Value |
|---|---|---|---|
| Nontoxic Multinodular Goiter (MNG) | 18 (26.5%) | 50 (73.5%) | 0.043 |
| Nontoxic Solitary Thyroid Nodule | 3 (15.8%) | 16 (84.2%) | |
| Toxic Multinodular Goiter (MNG) | 1 (8.3%) | 11 (91.7%) | |
| Toxic Nodule | 1 (20.0%) | 4 (80.0%) | |
| Diffuse Toxic Goiter (Graves') | 0 (0%) | 4 (100%) | |

**Table 3: Correlation between ITC with pre- operative diagnosis**

For the 23 patients diagnosed with ITC, 19(82.6%) cases were papillary microcarcinomas (<1 cm), and 4(17.4%) cases were classic papillary carcinomas.

Among the 108 patients, 17 (15.7%) experienced postoperative complications. Transient hypocalcemia was the most common, affecting 11 patients, followed by

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temporary voice changes in 6 patients.

## DISCUSSION

Despite improvements in imaging, laboratory testing, and cytology, distinguishing benign from malignant thyroid nodules is still difficult in clinical practice. Thyroid carcinoma represents the predominant endocrine malignancy, constituting over 90% of endocrine cancers.Fifteen, sixteen Almost 85% of cases are PTC. PTC often exhibits an outstanding prognosis, with a 10-year survival rate over 95%.[10]

Papillary microcarcinoma, characterised as a neoplasm measuring less than 1 cm in diameter, is a specific subtype recognised for its indolent nature and minimal metastatic capability. It is the most commonly observed variant of incidental thyroid cancer (ITC).[11]

This study involved 108 patients undergoing surgery for presumed benign thyroid illness, predominantly female (80.6%) with a mean age of 44 years, indicative of the established higher prevalence of thyroid problems among women and middle-aged individuals. The majority of patients were under 45 years of age (71.3%), aligning with the usual demographic impacted by benign thyroid disorders.

The predominant preoperative diagnosis was nontoxic multinodular goitre (63%), succeeded by solitary thyroid nodules and other toxic thyroid disorders. The surgical approach primarily consisted of complete thyroidectomy (70.4%), indicating contemporary practice trends that prioritise extensive resection to reduce recurrence and for improved postoperative surveillance. Hemithyroidectomy, subtotal thyroidectomies, and near-total thyroidectomies were less frequent.

Despite preoperative clinical, imaging, and cytological evaluations indicating benign disease, histological analysis disclosed ITC in 21.3% of instances. This occurrence corresponds with existing research indicating ITC rates of 5-30% in patients undergoing surgery for benign thyroid conditions, highlighting the necessity of comprehensive pathological assessment. This was analogous to the rates reported by Smith et al.[12] (18.3%) and surpassed those identified by Lin et al.[13] (15.6%).

No significant differences were observed in ITC incidence relative to age or gender, suggesting these variables may not be robust predictors of incidental malignancy in this group. Thyroid functional status was strongly correlated with ITC; nontoxic individuals exhibited a greater prevalence (25.3%) compared to toxic patients (4.8%), indicating that hyperfunctioning thyroid nodules or goitres may present a reduced risk of containing cancer.

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This discovery supports previous research indicating that poisonous nodules are less prone to malignancy.

Subsequent study revealed that ITC was predominantly linked to nontoxic multinodular goitre (26.5%), indicating a statistically significant linkage, while no carcinomas were identified in individuals with diffuse toxic goitre. This indicates that patients with nontoxic multinodular goitre require enhanced monitoring and potentially a more assertive surgical intervention to mitigate the risk of hidden cancer.

The study conducted by Sulaiman TI et al.[14] identified ITC in 77 patients, representing 19.15% of the sample. The study observed 63 individuals with non-toxic multinodular goitre (15.6%), 12 patients with non-toxic solitary thyroid nodules (3%), and two patients (0.5%) with toxic multinodular goitre. Among 77 patients with ITC, 56 (72.7%) were under 45 years of age, while 21 (27.3%) were 45 years or older. In these categories, there were 15 male patients and 62 female patients.

In the ITC cases, papillary microcarcinoma (<1 cm) was the most prevalent (82.6%), followed by typical papillary carcinoma, aligning with the established preponderance of papillary histology in accidental thyroid malignancies and the generally favourable outcome associated with microcarcinomas. The considerable prevalence of bigger tumours may result from inadequate sampling of suspicious nodules or restricted FNAC precision in MNG contexts.

The study carried out by Othman AF et al.[15] involved 100 patients who underwent complete thyroidectomy. The female to male ratio was 6.14:1, with females numbering 86 and males 14, while ages varied from 19 to 69 years. The ITC was identified in 12 patients, constituting 12% of the study population. The prevalence of papillary carcinoma constituted 9% of all thyroid disorders and 75% of incidental thyroid cancer (ITC) (9/12). The incidence of follicular carcinoma was 1.4% of all thyroid disorders (three cases) and 16.66% of the ITC.

The study conducted by Faisal M et al.[16] revealed that the peak age incidence occurred in the fifth decade of life, involving 60 individuals. Incidental cancer was identified in 22 patients, constituting 10.4% of the total. The incidence of papillary carcinoma constituted 8.5% of all thyroid disorders and 81.8% of intrathyroidal carcinoma (18/22). Furthermore, the incidence of follicular carcinoma constituted 1.4% of all thyroid disorders (three instances) and 13.6% of ITC.

Postoperative problems were comparatively minimal, affecting 15.7% of patients.

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The most prevalent consequence was transient hypocalcaemia (10.2%), succeeded by temporary voice alterations (5.6%). The incidence of persistent nerve damage and hypocalcaemia was negligible, suggesting that the procedure was predominantly safe and well-accepted in this group.

Despite partial or lobectomy procedures being conventionally regarded for benign conditions, the necessity for hormone replacement treatment in as many as 50% of these individuals diminishes the presumed benefit of preserving thyroid function. Conversely, complete thyroidectomy offers a more conclusive resolution with tolerable complication rates.

## CONCLUSION

Multinodular thyroid disease presents a considerable risk for harboring incidental malignancy. Although multinodularity itself is not a direct risk factor for cancer, its presence complicates accurate preoperative assessment. Surgical treatment was generally safe, with low rates of permanent complications. These findings highlight the importance of histopathological examination to ensure appropriate management and follow-up.

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