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Papillary Thyroid Carcinoma: A 1.5-Years Clinicopathological Study in a tertiary care Centre of Tripura

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Abstract

Background: Papillary thyroid carcinoma (PTC) is the most common malignant tumour of the thyroid gland and its incidence has been rising worldwide, partly due to improved detection of thyroid nodules. Regional clinicopathological data from Northeast India, parricularly of Tripura, are still limited.

Aim: To determine the proportion of PTC and discuss clinicopathological profile of papillary thyroid carcinoma, diagnosed and managed at tertiary care centre in Tripura over a period of 1.5 years.

Materials and Methods: This was a hospital-based, cross-sectional, descriptive study of 45 patients who underwent thyroid surgery for clinically detected thyroid swellings. Data on age, sex, residence, presenting complaint, nodularity, final histopathological diagnosis, PTC variant, coexistent thyroiditis and type of surgery performed were recorded and analysed. Data were analysed using chi-square test and Student's t-test, with $p<0.05$ considered statistically significant.

Results: Of 45 patients (mean age 42.1 ± 10.2 years, range 24–64 years; 42 female, 3 male), papillary thyroid carcinoma was confirmed on final histopathology in 10 patients, a proportion of 22.2%. Colloid goitre was the single most common lesion overall (18/45, 40.0%). Among the PTC cases, the classical variant predominated (6/10, 60.0%) followed by the follicular variant (4/10, 40.0%). PTC was significantly more frequent among urban residents than rural residents (9/10 PTC cases were urban vs 17/35 non-PTC cases; $p = 0.029$); no significant difference was found for age ($p = 0.851$), sex ($p = 0.539$) or nodularity ($p = 1.000$) between the PTC and non-PTC groups. Total thyroidectomy was performed in half of the PTC cases (5/10, 50.0%). Coexistent lymphocytic (Hashimoto-pattern) thyroiditis was noted in 8/45 (17.8%) specimens, all within the benign group.

Conclusion: Papillary thyroid carcinoma accounted for approximately one-fifth of surgically treated thyroid lesions in this Tripura-based cohort, with a female preponderance and predominance of the classical variant, broadly consistent with other Indian series. The urban clustering of PTC observed merits confirmation in larger, prospective, multicentric studies incorporating preoperative FNAC/Bethesda correlation and detailed staging parameters.

1. INTRODUCTION

Thyroid nodules are among the commonest endocrine surgical problems encountered in clinical practice,

with a clinically detectable prevalence of 4–7% in the general population and an even higher prevalence on high-resolution ultrasonography. The overwhelming majority of these nodules are benign; however, a small but clinically important proportion harbour malignancy, of which papillary thyroid carcinoma (PTC) is by far the most common histological subtype, accounting for approximately 80–85% of all thyroid cancers worldwide (1,2).

Over the past three decades, the global incidence of thyroid cancer, driven predominantly by PTC, has risen markedly, a trend attributed both to a genuine increase in disease occurrence and to increased detection through the widespread use of high-resolution neck ultrasonography and fine needle aspiration cytology (FNAC) (1,3). Thyroid cancer is now projected among the more commonly diagnosed cancers globally, with a pronounced female preponderance (2,3).

PTC characteristically presents as a slow-growing, painless neck swelling and may be solitary or arise within a multinodular gland. Diagnosis conventionally follows a triple-assessment pathway comprising clinical examination, ultrasonography (often reported using the Thyroid Imaging Reporting and Data System, TI-RADS) and FNAC reported according to the Bethesda System for Reporting Thyroid Cytopathology, with histopathological examination of the resected specimen remaining the gold standard for definitive diagnosis (4,5). Several histological variants of PTC are recognised, of which the classical and follicular variants are the most frequently encountered, and variant type has been shown to influence clinical behaviour and prognosis (2,6).

An association between chronic lymphocytic (Hashimoto's) thyroiditis and PTC has been described in the literature, with pooled analyses reporting an increased odds of PTC in the presence of Hashimoto's thyroiditis, although the exact biological basis of this association remains incompletely understood and findings across studies are not uniform (7,8).

India, including its Northeastern states, is characterised by regional variation in iodine nutrition status, healthcare access and diagnostic practice, all of which may influence the local pattern of thyroid disease. Published clinicopathological data on PTC from Northeast India, and specifically from Tripura, remain sparse compared to data from other regions of the country (9,10). Given that management decisions (extent of thyroidectomy, need for completion surgery, and follow-up protocol) are directly influenced by the local burden and pattern of malignancy among operated thyroid swellings, institution-specific clinicopathological data are of direct clinical relevance to otolaryngology, general surgery and endocrine surgery practice. This study was therefore undertaken to describe the proportion and clinicopathological profile of PTC among patients operated for thyroid lesions at a tertiary care centre in Tripura over a period of 1.5 years.

2. AIMS AND OBJECTIVES

Aim

To study the proportion and clinicopathological profile of papillary thyroid carcinoma among patients with thyroid lesions undergoing surgery at a tertiary care centre in Tripura.

Objectives

1. To determine the proportion of papillary thyroid carcinoma among patients undergoing thyroid surgery for clinically evident thyroid swellings.
2. To describe the age, sex and residence (urban/rural) distribution of patients with PTC and to compare these with patients with non-PTC thyroid lesions.

3. To study the histopathological spectrum of thyroid lesions and the distribution of histological variants of PTC in the study population.
4. To document the type of surgical procedure performed for PTC and non-PTC thyroid lesions and the frequency of coexistent lymphocytic (Hashimoto-pattern) thyroiditis.

3. MATERIALS AND METHODS

Study design and setting: This was a hospital-based, cross-sectional, descriptive clinicopathological study conducted in the Department of Otorhinolaryngology – Head & Neck Surgery of a tertiary care teaching institute in Tripura over a period of one and a half (1.5) years [March 2025-August 2026].

Study population: All patients who presented with a clinically evident thyroid swelling and subsequently underwent thyroid surgery (hemithyroidectomy, subtotal thyroidectomy or total thyroidectomy) during the study period and had complete demographic and final histopathological data available were included in the analysis. A total of 45 such patients constituted the final study sample.

Inclusion criteria: Patients of any age and either sex presenting with a clinically detectable thyroid swelling who underwent surgical excision (hemithyroidectomy/subtotal/total thyroidectomy) with histopathological confirmation of the final diagnosis.

Exclusion criteria: Patients managed conservatively without surgery, those with incomplete demographic or histopathological records, and recurrent thyroid surgery cases were excluded.

Data collection: For each patient, the following variables were recorded on a pre-designed proforma: age, sex, residence (urban/rural), presenting complaint (site/laterality of swelling), nature of the swelling (solitary nodule versus multinodular goitre), final histopathological diagnosis of the resected specimen, presence and variant of papillary carcinoma where applicable, coexistent lymphocytic (Hashimoto-pattern) thyroiditis, other histopathological findings, and the type of surgical procedure performed. All histopathological diagnoses were based on the examination of formalin-fixed, paraffin-embedded, haematoxylin and eosin–stained sections reported by the institutional Department of Pathology.

Statistical analysis: Data were entered and analysed using standard statistical software. Continuous variables (age) are presented as mean ± standard deviation and were compared between PTC and non-PTC groups using the independent-samples Student's t-test. Categorical variables (sex, residence, nodularity) are presented as frequencies and percentages and were compared using the chi-square test. A p-value < 0.05 was considered statistically significant.

Ethical considerations: The study was conducted after obtaining clearance from the Institutional Ethics Committee. Patient confidentiality was maintained throughout data collection and analysis.

4. RESULTS

A total of 45 patients who underwent thyroid surgery for clinically evident thyroid swellings during the 1.5-year study period were included in the analysis. The mean age of the study population was 42.1 ± 10.2 years (range 24–64 years). There was a marked female preponderance, with 42 (93.3%) female and 3 (6.7%) male patients (approximate female:male ratio of 14:1). Twenty-six patients (57.8%) were from an urban background and 19 (42.2%) from a rural background. Most patients presented with a solitary thyroid nodule (38/45, 84.4%), while 7 (15.6%) had multinodular goitre. The commonest presenting complaint was a right-sided neck swelling (16/45, 35.6%), followed by anterior (14/45, 31.1%), left-sided (12/45, 26.7%) and bilateral (3/45, 6.7%) neck swellings (Table 1, Figure 1).

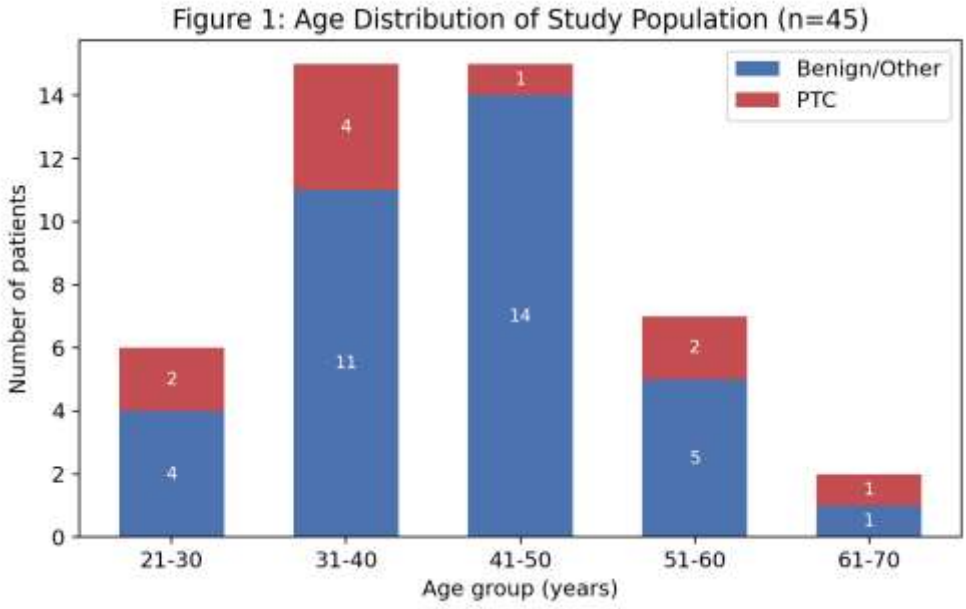


Figure 1: Age distribution of the study population, stratified by PTC vs benign/other diagnosis (n = 45)

Variable	Category	n (%)
Age (years)	Mean ± SD (range)	42.1 ± 10.2 (24–64)
Sex	Male	3 (6.7%)
	Female	42 (93.3%)
Residence	Urban	26 (57.8%)
	Rural	19 (42.2%)
Nature of swelling	Solitary nodule	38 (84.4%)
	Multinodular goitre	7 (15.6%)
Presenting complaint	Right-sided neck swelling	16 (35.6%)
	Anterior neck swelling	14 (31.1%)
	Left-sided neck swelling	12 (26.7%)
	Bilateral neck swelling	3 (6.7%)

Table 1: Demographic and clinical profile of the study population (n = 45)

On final histopathological examination of the resected specimens, colloid goitre was the single most common diagnosis, accounting for 18/45 cases (40.0%), followed by papillary thyroid carcinoma in 10/45

cases (22.2%). Colloid cyst accounted for 4/45 cases (8.9%). The remaining diagnoses — multinodular goitre, follicular nodular disease, follicular adenoma, lymphocytic thyroiditis (as the primary diagnosis) and macrofollicular adenoma — accounted for 2 cases each (4.4% each), while colloid nodule, multifollicular adenoma and papillary thyroid hyperplasia accounted for 1 case each (2.2% each). Overall, benign or non-neoplastic lesions accounted for 35/45 cases (77.8%), while PTC accounted for the remaining 10/45 cases (22.2%) (Figure 2).

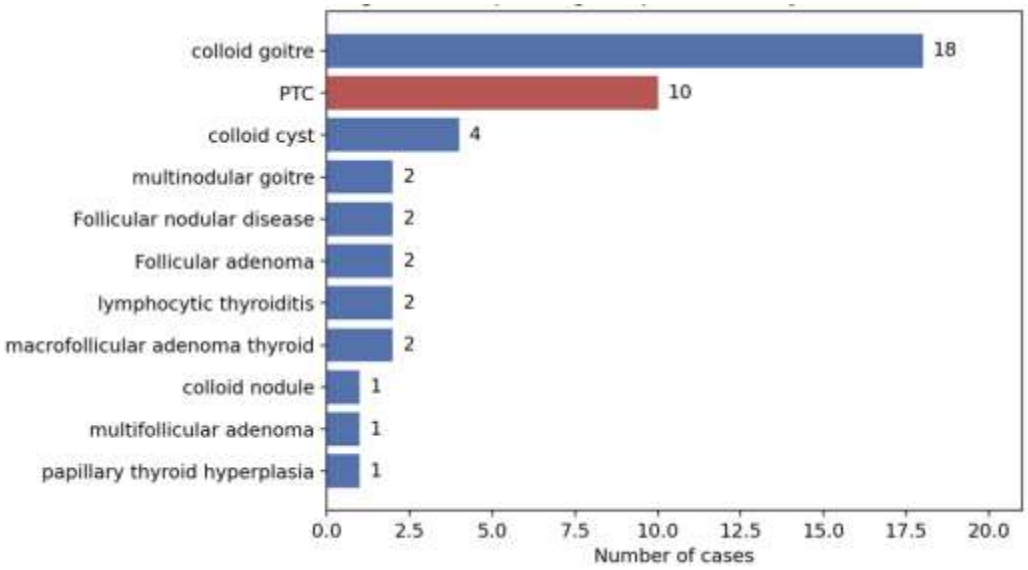


Figure 2: Histopathological spectrum of thyroid lesions (n = 45)

On comparing patients with PTC (n = 10) to those with non-PTC thyroid lesions (n = 35), the mean age was comparable between the two groups (42.8 ± 13.2 years vs 41.9 ± 9.4 years respectively; p = 0.851). Female sex was similarly predominant in both groups (90.0% in PTC vs 94.3% in non-PTC; p = 0.539), and nodularity did not differ significantly between groups (solitary nodule in 90.0% of PTC vs 82.9% of non-PTC cases; p = 1.000). Urban residence, however, was significantly more frequent among patients with PTC (9/10, 90.0%) than among those with non-PTC lesions (17/35, 48.6%); this difference was statistically significant (p = 0.029) (Table 2, Figure 3).

Variable	PTC (n=10)	Non-PTC (n=35)	p-value
Age, years, mean ± SD	42.8 ± 13.2	41.9 ± 9.4	0.851
Female sex	9 (90.0%)	33 (94.3%)	0.539
Urban residence	9 (90.0%)	17 (48.6%)	0.029*
Solitary nodule	9 (90.0%)	29 (82.9%)	1.000

Table 2: Comparison of demographic and clinical variables between PTC and non-PTC groups

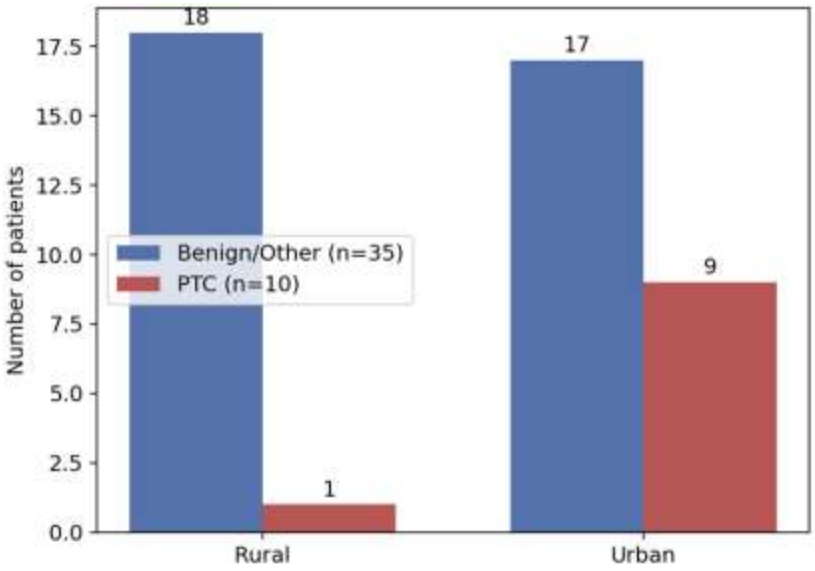


Figure 3: Residence (urban/rural) distribution by histopathological outcome

Among the 10 confirmed cases of PTC, the classical variant was the most common, seen in 6 cases (60.0%), while the follicular variant was seen in 4 cases (40.0%). No other variants (tall cell, columnar cell, diffuse sclerosing, etc.) were identified in this series (Figure 4).

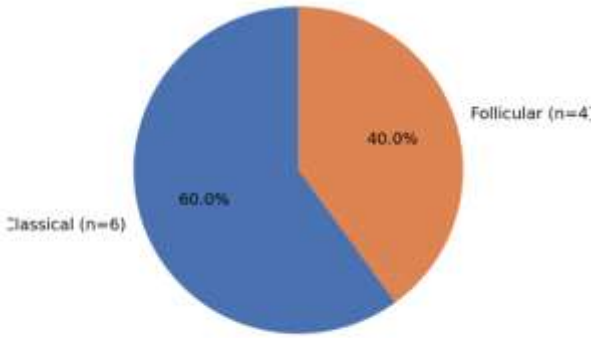


Figure 4: Distribution of PTC histological variants (n = 10)

Regarding surgical management, total thyroidectomy was the procedure of choice in exactly half of the PTC cases (5/10, 50.0%), while right and left hemithyroidectomy were performed in 3 (30.0%) and 2 (20.0%) PTC cases respectively — the latter presumably representing cases where malignancy was confirmed only on final histopathology after a hemithyroidectomy performed for a clinically benign-appearing nodule, which later went on for completion thyroidectomy. Among the non-PTC group, hemithyroidectomy (right or left) was the predominant procedure, performed in 30/35 cases (85.7%), with total thyroidectomy performed in 4 (11.4%) and subtotal thyroidectomy in 1 (2.9%) case. Across the whole cohort, left hemithyroidectomy (18/45, 40.0%) and right hemithyroidectomy (17/45, 37.8%) were the two most frequently performed procedures overall, followed by total thyroidectomy (9/45, 20.0%) (Table 3).

Surgery performed	PTC (n=10)	Non-PTC (n=35)	Overall (n=45)
Total thyroidectomy	5 (50.0%)	4 (11.4%)	9 (20.0%)
Right hemithyroidectomy	3 (30.0%)	14 (40.0%)	17 (37.8%)
Left hemithyroidectomy	2 (20.0%)	16 (45.7%)	18 (40.0%)
Subtotal thyroidectomy	0 (0.0%)	1 (2.9%)	1 (2.2%)

Table 3: Type of surgical procedure performed, PTC vs non-PTC groups

Coexistent lymphocytic (Hashimoto-pattern) thyroiditis was reported as an associated histopathological finding in 8/45 specimens overall (17.8%); all 8 of these were within the benign/non-PTC group (8/35, 22.9%), and none of the 10 confirmed PTC specimens in this series showed a coexistent histological diagnosis of lymphocytic thyroiditis.

5. DISCUSSION

In the present series of 45 patients operated for clinically evident thyroid swellings at a tertiary care centre in Tripura, papillary thyroid carcinoma was confirmed on final histopathology in 22.2% of cases. This proportion is comparable to, though on the higher side of, the wide range of 5–25% reported for malignancy among surgically treated thyroid swellings in various Indian and international tertiary-care series, reflecting differences in referral pattern, selection criteria for surgery, and the proportion of cases operated primarily for a clinically or cytologically suspicious nodule rather than for cosmetic or compressive symptoms alone (9,11,12). It should be noted that this figure represents the proportion of PTC among all operated thyroid lesions in this cohort, and is not directly comparable to series that report the proportion of PTC only among histologically confirmed malignant thyroid tumours — for instance, an East Indian tertiary-care series by Shah et al. reported papillary carcinoma comprising 63.15% of malignant thyroid neoplasms specifically, a figure calculated on a different denominator (9).

Papillary thyroid carcinoma showed a marked female preponderance in this series (female:male ratio of 9:1 within the PTC group), consistent with the well-documented worldwide female predominance of thyroid cancer, which has been attributed to hormonal, reproductive and possibly autoimmune factors (2,3). The mean age of patients with PTC in this study (42.8 ± 13.2 years) is also concordant with global epidemiological data showing peak incidence of thyroid cancer, including PTC, in the fourth and fifth decades of life (2,3).

Colloid goitre was the single most common histopathological diagnosis overall (40.0%), reaffirming that benign colloid/nodular disease remains the predominant cause of surgically treated thyroid swellings in this region, as has been reported from other parts of India and from other iodine-replete or marginally iodine-sufficient regions (9,10). This underscores the continuing importance of an evidence-based triple-assessment approach — clinical evaluation, ultrasonography and FNAC — in the preoperative work-up of thyroid nodules, to appropriately triage patients for surgery and to select the extent of surgery required (4,5).

Among the histological variants of PTC identified in this study, the classical variant predominated (60.0%), followed by the follicular variant (40.0%). This distribution is broadly consistent with other

Indian clinicopathological series in which the classical variant is typically the most frequently encountered subtype, although the relative proportion of the follicular variant in the present series is somewhat higher than in several larger published cohorts (6,11,12). Given the small number of PTC cases in this series (n = 10), this finding should be interpreted with caution; a recent 38-year population-based Australian study has additionally documented an evolving, declining trend in follicular-variant PTC incidence in recent years related in part to changes in WHO diagnostic classification, a consideration that may be relevant to how variant proportions are interpreted across studies performed in different eras (3).

A notable finding in this study was the significantly higher proportion of urban residents among patients with PTC compared with those with non-PTC lesions (90.0% vs 48.6%; p = 0.029). While this could reflect a genuine urban-rural difference in disease occurrence, it is more likely, in the authors' view, to reflect differential access to diagnostic services — urban patients may have greater access to ultrasonography, FNAC and tertiary-care referral, leading to earlier detection of small or subclinical PTCs, a phenomenon that has been proposed as a contributor to the observed global rise in PTC incidence in the diagnostic-detection literature (1,3,13). Given the small sample size, particularly the very small number of PTC cases from a rural background (n = 1) in this cohort, this finding warrants cautious interpretation and confirmation in a larger, adequately powered study before any causal inference regarding urban-rural risk can be drawn.

Coexistent lymphocytic (Hashimoto-pattern) thyroiditis was identified in 17.8% of the overall cohort, but was not observed in any of the 10 PTC specimens in this series. This is at variance with a substantial body of literature, including a pooled meta-analysis of 27 studies reporting a significantly increased risk of PTC in the presence of Hashimoto's thyroiditis (pooled OR 2.12, 95% CI 1.78–2.52) (7), and other analyses suggesting that PTC coexisting with Hashimoto's thyroiditis may in fact carry a more favourable clinicopathological profile with reduced rates of nodal metastasis and extrathyroidal extension (8,14). The absence of a demonstrable association in the present series is most plausibly explained by the very small number of PTC cases (n = 10), which limits the statistical power to detect any true association, and possibly also by under-recognition or under-reporting of focal lymphocytic infiltration when it is not the primary diagnostic focus of the histopathology report. This finding should therefore not be interpreted as evidence against the HT–PTC association reported in the wider literature, but rather highlights the need for a larger, prospectively designed study with systematic assessment of thyroiditis in every specimen.

Regarding the extent of surgery, total thyroidectomy was performed in half of the PTC cases in this series, while hemithyroidectomy — later converted to completion thyroidectomy. This pattern is consistent with a management approach in which the extent of thyroid surgery is tailored to preoperative suspicion of malignancy and intraoperative/final histopathological findings, as is standard practice in most Indian tertiary-care centres (5,9).

6. CONCLUSION

Papillary thyroid carcinoma accounted for approximately one-fifth (22.2%) of thyroid lesions surgically treated at this tertiary care centre in Tripura over an 1.5-year period, making it the single most common malignant diagnosis and the second most common histopathological diagnosis overall after colloid goitre. PTC in this cohort showed a marked female preponderance, a mean age at presentation in the fifth decade of life, and predominance of the classical histological variant over the follicular variant. A significantly higher proportion of PTC cases were from an urban background compared with non-PTC cases, a finding that may reflect differential healthcare access and detection rather than a true difference in disease risk,

and which requires confirmation in larger studies. These institution-specific findings add to the limited existing clinicopathological data on thyroid malignancy from Northeast India and may help inform local clinical decision-making regarding the threshold for surgery and extent of thyroidectomy in patients presenting with thyroid swellings. Larger, prospective, multicentric studies from this region incorporating complete preoperative biochemical, radiological (TI-RADS) and cytological (Bethesda) data, along with detailed pathological staging parameters, are recommended to build on these preliminary findings.

Limitations

This study has several limitations that merit consideration. First, the sample size (n = 45, with only 10 PTC cases) is small, limiting the statistical power of subgroup comparisons and the precision of the reported proportions and p-values; the significant association observed between urban residence and PTC, in particular, should be interpreted with caution and confirmed in larger studies. Second, this is a single-centre study, and the findings may not be generalisable to the wider population of Tripura or Northeast India. Third, several clinically important variables that are typically part of a comprehensive clinicopathological work-up — namely duration of symptoms, thyroid function tests (TSH, T3, T4), ultrasonographic TI-RADS category and suspicious sonographic features, preoperative FNAC/Bethesda cytological category — were not analysed for this study.

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