

Epidemiological and Clinical Characteristics of Thyroid Cancer Patients in a Tertiary Care Center

Deepak Kumar Kachhap¹, Mrityunjay Mundu², Swaroop Sanat Sahu³

¹Junior Resident (Academic), Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

²Additional professor and Guide, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

³Junior Resident (Academic), Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

Received: 03-01-2025 / Revised: 21-02-2025 / Accepted: 23-03-2025

Corresponding Author: Dr. Deepak Kumar Kachhap

Conflict of interest: Nil

Abstract:

Background: Thyroid carcinoma is the most common endocrine malignancy, with rising incidence worldwide, particularly in developing regions due to improved detection and awareness. Understanding the clinical profile of these patients is essential to tailor early diagnosis and management strategies.

Aim: To analyze the clinical profile of thyroid carcinoma cases presenting to a tertiary care hospital in eastern India, focusing on demographic patterns, symptomatology, histological types, risk factors, and modes of diagnosis.

Methods: This prospective observational study was conducted over a period of 24 months in the Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi. A total of 120 patients diagnosed with thyroid carcinoma through cytological or histopathological confirmation were enrolled. Detailed clinical histories, physical examinations, imaging studies, fine-needle aspiration cytology (FNAC), and histopathological examinations were used to assess the clinical profile. Data were analyzed statistically using appropriate methods.

Results: Out of 120 patients, 82 (68.3%) were female and 38 (31.7%) were male, with a female-to-male ratio of 2.2:1. The most common age group affected was 31–40 years (36.7%). Papillary carcinoma was the most frequent histological subtype (72.5%), followed by follicular (15.8%), medullary (7.5%), and anaplastic carcinoma (4.2%). The most common presenting symptom was a painless anterior neck swelling (90.8%), followed by dysphagia (20.8%) and hoarseness of voice (15.0%). Cervical lymphadenopathy was found in 32.5% of cases, and distant metastasis was noted in 6.7%. Ultrasound and FNAC had high sensitivity for initial diagnosis. A positive family history of thyroid disorders was reported in 11.7% of patients.

Conclusion: Thyroid carcinoma predominantly affects middle-aged females, with papillary carcinoma being the most common subtype. Most patients present with a painless neck swelling, highlighting the importance of early clinical evaluation and use of FNAC and imaging in diagnosis. Public awareness and timely intervention can significantly improve outcomes.

Keywords: Thyroid carcinoma, Papillary thyroid cancer, Clinical profile, Neck swelling, Histopathology, FNAC, Tertiary care, India.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Thyroid carcinoma represents the most prevalent malignancy of the endocrine system and accounts for approximately 1% of all newly diagnosed cancers globally. Over the past few decades, the incidence of thyroid cancer has been steadily increasing worldwide, a trend attributed largely to improved diagnostic imaging and heightened awareness among healthcare providers and patients [1]. Although thyroid cancer encompasses a heterogeneous group of tumors with distinct biological behaviors, the majority are well-differentiated carcinomas—namely,

papillary, and follicular types—that generally carry a favorable prognosis.

India has witnessed a similar upward trend in the incidence of thyroid malignancies, particularly in urban and semi-urban populations [2]. In many developing regions, however, diagnosis often occurs at a more advanced stage due to delayed presentation and limited access to specialized healthcare services. This underscores the importance of regional data on the clinical profile of thyroid cancer, which can inform early detection efforts, enhance diagnostic

accuracy, and ultimately improve patient outcomes [3].

Thyroid carcinomas often present insidiously, most commonly as a solitary, painless neck swelling. In some cases, compressive symptoms such as dysphagia, dyspnea, or hoarseness of voice may occur due to local invasion. Cervical lymphadenopathy and distant metastasis—most frequently to the lungs and bones—can be observed in more aggressive variants [4]. Risk factors include radiation exposure (especially during childhood), female sex, family history of thyroid malignancy, iodine deficiency or excess, and pre-existing benign thyroid disorders like multinodular goiter.

Histologically, thyroid carcinomas are categorized into several types: papillary carcinoma (the most common), follicular carcinoma, medullary carcinoma (arising from parafollicular C cells), poorly differentiated carcinoma, and the highly aggressive anaplastic carcinoma [5]. Diagnostic modalities include high-resolution ultrasonography, fine-needle aspiration cytology (FNAC), thyroid function tests, radionuclide scanning, and histopathological examination post-thyroidectomy.

Despite the availability of these tools, many patients in resource-limited settings still present with advanced disease. This scenario reinforces the need for targeted epidemiological studies to delineate local patterns of disease presentation, risk profiles, and outcomes [6].

This study aims to comprehensively evaluate the clinical profile of patients diagnosed with thyroid carcinoma at a tertiary care hospital in eastern India. By focusing on demographic data, presenting symptoms, risk factors, histological subtypes, and diagnostic modalities, we aim to provide insights that could enhance early detection and guide clinical decision-making in similar settings.

Methods

This prospective observational study was conducted in the Department of General Surgery at Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, over a period of 24 months. The study aimed to evaluate the clinical profile of patients diagnosed with thyroid carcinoma attending this tertiary care hospital.

A total of 120 patients with confirmed thyroid carcinoma were included in the study. Patients were enrolled based on histopathological or cytological confirmation of thyroid malignancy. Inclusion criteria comprised all patients aged above 18 years, of either sex, with newly diagnosed primary thyroid carcinoma. Patients with secondary metastases to the thyroid, recurrent thyroid malignancy, or those with incomplete medical records were excluded.

Each patient underwent a detailed clinical evaluation, including thorough history-taking and physical examination. History included the duration of symptoms, presence of neck swelling, compressive symptoms (such as dysphagia, dyspnea, or hoarseness of voice), history of radiation exposure, familial thyroid disease, previous thyroid disorders, and associated systemic symptoms such as weight loss or fatigue. Demographic data including age, sex, and residence (urban or rural) were also recorded.

Clinical examination focused on assessing the characteristics of the thyroid swelling (size, location, mobility, consistency), presence of cervical lymphadenopathy, and any signs suggestive of local invasion or distant metastasis.

All patients underwent routine laboratory investigations including thyroid function tests (T3, T4, TSH). High-resolution neck ultrasonography was performed in all cases to evaluate thyroid nodules and cervical lymph nodes. Fine-needle aspiration cytology (FNAC) was done under ultrasound guidance in all patients to establish a preoperative cytological diagnosis. For patients with suspicion of malignancy on FNAC, a total or near-total thyroidectomy was performed, and excised specimens were subjected to histopathological examination for confirmation and typing of the carcinoma.

Additional imaging, such as computed tomography (CT) of the neck and chest or whole-body scans, was performed in selected patients to assess tumor extension and detect distant metastasis, particularly in cases of advanced disease or aggressive histological variants. Postoperative staging was done according to the AJCC TNM classification (8th edition).

Data collected were entered in Microsoft Excel and analyzed using SPSS version 25.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Categorical variables were compared using the Chi-square test, while continuous variables were analyzed using the Student's t-test or Mann-Whitney U test where appropriate. A p-value <0.05 was considered statistically significant.

This methodology was aimed at capturing the full clinical spectrum of thyroid carcinoma in the local population, including demographic trends, symptomatology, diagnostic patterns, histological diversity, and initial staging at presentation.

Results

A total of 120 patients diagnosed with thyroid carcinoma were included in the study. The majority of patients were female, with papillary carcinoma being the most common histological variant. The most frequent presenting complaint was a painless anterior neck swelling. The data below illustrates the demographic profile, clinical features, histological

types, staging, and diagnostic modalities used in these cases.

Table 1: Age and Sex Distribution of Patients with Thyroid Carcinoma

Age Group (Years)	Male (n=38)	Female (n=82)	Total (n=120)	Percentage (%)
18–20	2	4	6	5.0
21–30	6	18	24	20.0
31–40	10	34	44	36.7
41–50	8	14	22	18.3
51–60	7	8	15	12.5
>60	5	4	9	7.5

Table 2: Geographic Distribution of Patients

Residence	Number of Patients	Percentage (%)
Urban	44	36.7
Rural	76	63.3

Table 3: Presenting Symptoms in Thyroid Carcinoma Cases

Symptom	Number of Patients	Percentage (%)
Painless neck swelling	109	90.8
Dysphagia	25	20.8
Hoarseness of voice	18	15.0
Painful swelling	10	8.3
Dyspnea	9	7.5
Weight loss	6	5.0

Table 4: Ultrasonography Findings in Thyroid Malignancies

USG Finding	Number of Patients	Percentage (%)
Hypoechoic nodule	78	65.0
Microcalcifications	42	35.0
Irregular margins	60	50.0
Cervical lymphadenopathy	39	32.5
Suspicious vascularity	42	35.0

Table 5: FNAC-Based Bethesda Classification of Thyroid Nodules

Bethesda Category	Number of Patients	Percentage (%)
Category IV (Suspicious)	14	11.7
Category V (Likely Malignant)	24	20.0
Category VI (Malignant)	82	68.3

Table 6: Histopathological Variants of Thyroid Carcinoma

Histological Type	Number of Patients	Percentage (%)
Papillary carcinoma	87	72.5
Follicular carcinoma	19	15.8
Medullary carcinoma	9	7.5
Anaplastic carcinoma	5	4.2

Table 7: Associated Thyroid Conditions in Study Population

Associated Condition	Number of Patients	Percentage (%)
Multinodular goiter	21	17.5
Hashimoto's thyroiditis	7	5.8
Grave's disease	3	2.5
None	89	74.2

Table 8: Family History of Thyroid Disease

Family History	Number of Patients	Percentage (%)
Present	14	11.7
Absent	106	88.3

Table 9: TNM Staging at Initial Presentation

Stage	Number of Patients	Percentage (%)
Stage I	42	35.0
Stage II	38	31.7
Stage III	25	20.8
Stage IV	15	12.5

Table 10: Pattern of Metastasis in Thyroid Carcinoma

Type of Metastasis	Number of Patients	Percentage (%)
Cervical lymph nodes	39	32.5
Distant (lung/bone)	8	6.7
No metastasis	73	60.8

Discussion

Thyroid carcinoma, though a relatively rare malignancy in the spectrum of all cancers, stands out as the most common endocrine malignancy. The findings from this prospective observational study offer valuable insights into the clinical profile, presentation, diagnostic approaches, and treatment patterns among patients diagnosed with thyroid cancer in a tertiary care setting in eastern India [7].

The present study revealed a marked female preponderance (female-to-male ratio of 2.2:1), which is consistent with global and Indian epidemiological data. Estrogen receptor expression in thyroid tissue and hormonal influences are believed to contribute to this gender disparity. The peak incidence was observed in the 31–40 years age group, aligning with the common age range for papillary and follicular thyroid cancers. This supports the view that thyroid cancer predominantly affects younger to middle-aged adults, particularly women [8].

In terms of geographic distribution, a significant majority (63.3%) of patients came from rural areas. This could reflect a lack of awareness, delayed health-seeking behavior, and limited access to diagnostic facilities in rural populations, resulting in more patients presenting to tertiary centers only when symptoms become evident or advanced [9].

Painless anterior neck swelling was the most common presenting complaint (90.8%), highlighting the often-indolent nature of thyroid carcinoma in its early stages. This clinical presentation corresponds with the natural history of papillary carcinoma—the most common histological subtype in this study (72.5%). Other symptoms like dysphagia, hoarseness, and dyspnea were more prevalent in patients with locally advanced disease, indicating compression or invasion of adjacent structures [10].

Ultrasonography played a pivotal role in the initial assessment. Hypoechoic nodules, irregular margins, microcalcifications, and cervical lymphadenopathy were key suspicious features identified. These findings further emphasize the value of high-resolution ultrasound as a first-line, non-invasive diagnostic tool in thyroid nodule evaluation [11].

Fine-needle aspiration cytology (FNAC) demonstrated high diagnostic accuracy, with 92.5% of patients falling under Bethesda categories V and VI. This supports the continued use of FNAC as the gold standard for preoperative cytological evaluation. A notable 11.7% of patients were categorized as Bethesda IV (suspicious for follicular neoplasm), which often necessitates histopathological confirmation due to overlapping features with benign lesions [12].

Histopathologically, papillary carcinoma dominated, followed by follicular and medullary subtypes. Anaplastic carcinoma was relatively rare (4.2%) but remains significant due to its aggressive nature and poor prognosis. The histological distribution aligns well with global trends, where papillary carcinoma accounts for approximately 80–85% of thyroid cancers [13].

Interestingly, 17.5% of patients had a background of multinodular goiter, and 5.8% had Hashimoto's thyroiditis. The coexistence of these conditions with carcinoma highlights the need for vigilant monitoring of long-standing thyroid disorders for potential malignant transformation, particularly in endemic goiter regions like eastern India.

A positive family history of thyroid disease was present in 11.7% of cases. This suggests a potential genetic predisposition in a subset of patients and reinforces the need for targeted surveillance in high-risk families [14].

Staging revealed that a majority of patients were in Stage I or II at presentation, although 33.3% were in Stage III or IV, with cervical lymph node metastasis observed in 32.5% of patients and distant metastasis in 6.7%. These figures indicate that while early-stage disease is common, a substantial number still present with advanced or metastatic disease, possibly due to delays in diagnosis [15].

Thyroid function tests revealed that most patients were euthyroid, consistent with the nature of most thyroid cancers being non-functional. However, 15% had subclinical or overt hypothyroidism, often associated with underlying autoimmune thyroiditis or post-surgical hypothyroidism. Total thyroidectomy was the most common surgical procedure (70%), in accordance with current guidelines favoring complete gland removal in malignant cases to minimize recurrence and facilitate radioactive iodine therapy. Near-total thyroidectomy and lobectomy were performed in selected cases based on tumor size, histology, and stage [16].

Overall, the clinical profile observed in this study mirrors established patterns but also underscores unique regional challenges such as delayed presentation, rural dominance, and coexistence with endemic goiters. Early detection, routine use of ultrasonography and FNAC, and awareness about risk factors like family history and pre-existing thyroid disorders are key to improving outcomes. Furthermore, standardized surgical approaches and postoperative follow-up are vital in reducing recurrence and mortality associated with thyroid carcinoma.

These findings not only enhance our understanding of thyroid cancer in a tertiary care context but also call for more focused community-level screening and awareness programs, especially in rural settings, to facilitate early diagnosis and treatment.

Conclusion

This prospective observational study highlights the comprehensive clinical profile of thyroid carcinoma cases attending a tertiary care hospital in eastern India. The results reinforce the well-established epidemiological trend of a higher prevalence among females, particularly in the younger to middle-aged population, with papillary carcinoma being the most frequent histological variant. Painless anterior neck swelling emerged as the most common presenting symptom, often leading to further evaluation with ultrasonography and FNAC—both of which proved indispensable for early diagnosis.

A significant portion of the study population originated from rural areas, underscoring disparities in healthcare access and delayed presentation. While the majority of patients were diagnosed at an early stage, a notable fraction still presented with advanced disease, cervical lymphadenopathy, or distant metastasis, suggesting the need for enhanced

community-based screening and awareness programs.

Total thyroidectomy was the most commonly employed surgical approach, reflecting adherence to current management guidelines aimed at reducing recurrence and facilitating postoperative radioactive iodine therapy. Although thyroid function was preserved in most cases, the presence of hypothyroidism in a subset highlights the importance of postoperative hormonal monitoring.

In summary, the study emphasizes the importance of a high index of suspicion in evaluating thyroid swellings, especially in regions with endemic goiter or limited diagnostic facilities. Regular use of FNAC and ultrasonography, timely referral, and proper surgical management can significantly improve prognosis. The findings from this study may serve as a valuable reference for clinicians, healthcare planners, and public health authorities aiming to enhance the early detection and effective management of thyroid cancer in similar healthcare settings.

References

1. Lam AK, Saremi N. Cribriform-morular variant of papillary thyroid carcinoma: a distinctive type of thyroid cancer. *Endocr Relat Cancer*. 2017 Apr;24(4):R109-R121. doi: 10.1530/ERC-17-0014. PMID: 28314770.
2. Samà MT, Grosso E, Mele C, Laurora S, Monzeglio O, Marzullo P, Boldorini R, Aluffi Valletti P, Aimaretti G, Scatolini M, Pagano L. Molecular characterisation and clinical correlation of papillary thyroid microcarcinoma. *Endocrine*. 2021 Jan;71(1):149-157. doi: 10.1007/s12020-020-02380-8. Epub 2020 Jul 3. PMID: 32621051.
3. Pillai S, Gopalan V, Smith RA, Lam AK. Diffuse sclerosing variant of papillary thyroid carcinoma--an update of its clinicopathological features and molecular biology. *Crit Rev Oncol Hematol*. 2015 Apr;94(1):64-73. doi: 10.1016/j.critrevonc.2014.12.001. Epub 2014 Dec 18. PMID: 25577570.
4. Rosignolo F, Memeo L, Monzani F, Colarossi C, Pecce V, Verrienti A, Durante C, Grani G, Lamartina L, Forte S, Martinetti D, Giuffrida D, Russo D, Basolo F, Filetti S, Sponziello M. MicroRNA-based molecular classification of papillary thyroid carcinoma. *Int J Oncol*. 2017 May;50(5):1767-1777. doi: 10.3892/ijo.2017.3960. Epub 2017 Apr 7. PMID: 28393181.
5. Syed MI, Stewart M, Syed S, Dahill S, Adams C, McLellan DR, Clark LJ. Squamous cell carcinoma of the thyroid gland: primary or secondary disease? *J Laryngol Otol*. 2011 Jan;125(1):3-9. doi:

- 10.1017/S0022215110002070. Epub 2010 Oct 18. PMID: 20950510.
6. Ajani MA, Omenai SA, Nwadiokwu JI, Salami AA. Histopathological profile of childhood thyroid carcinoma in Ibadan, Southwestern Nigeria. *Malawi Med J.* 2020 Dec;32(4):213-217. doi: 10.4314/mmj.v32i4.6. PMID: 34457206; PMCID: PMC8364793.
 7. Vatsyayan A, Mandlik D, Patel P, Patel P, Sharma N, Joshipura A, Patel M, Odedra P, Dubbal JC, Shah DS, Kanhere SA, Sanghvi KJ, Patel K. Metastasis of squamous cell carcinoma of the head and neck to the thyroid: a single institution's experience with a review of relevant publications. *Br J Oral Maxillofac Surg.* 2019 Sep;57(7):609-615. doi: 10.1016/j.bjoms.2019.05.012. Epub 2019 Jun 10. PMID: 31196573.
 8. Heilmann AM, Subbiah V, Wang K, Sun JX, Elvin JA, Chmielecki J, Sherman SI, Murthy R, Busaidy NL, Subbiah I, Yelensky R, Nangia C, Vergilio JA, Khan SA, Erlich RL, Lipson D, Ross JS, Miller VA, Shah MH, Ali SM, Stephens PJ. Comprehensive Genomic Profiling of Clinically Advanced Medullary Thyroid Carcinoma. *Oncology.* 2016;90(6):339-46. doi: 10.1159/000445978. Epub 2016 May 21. PMID: 27207748; PMCID: PMC4909575.
 9. Chiappa C, Rovera F, Rausei S, Del Ferraro S, Fachinetti A, Lavazza M, Marchionini V, Arlanti V, Tanda ML, Piantanida E, Kim HY, Anuwong A, Dionigi G. Breast cancer and thyroid diseases: analysis of 867 consecutive cases. *J Endocrinol Invest.* 2017 Feb;40(2):179-184. doi: 10.1007/s40618-016-0543-4. Epub 2016 Sep 13. PMID: 27624298.
 10. Ríos Moreno MJ, Galera-Ruiz H, De Miguel M, López MI, Illanes M, Galera-Davidson H. Immunohistochemical profile of solid cell nest of thyroid gland. *Endocr Pathol.* 2011 Mar;22(1):35-9. doi: 10.1007/s12022-010-9145-4. PMID: 21234707; PMCID: PMC3052464.
 11. Borges AKDM, Ferreira JD, Koifman S, Koifman RJ. Thyroid cancer in Brazil: a descriptive study of cases held on hospital-based cancer registries, 2000-2016. *Epidemiol Serv Saude.* 2020;29(4):e2019503. English, Portuguese. doi: 10.5123/s1679-49742020000400012. Epub 2020 Aug 19. PMID: 32844888.
 12. Chu YH, Dias-Santagata D, Farahani AA, Boyraz B, Faquin WC, Nosé V, Sadow PM. Clinicopathologic and molecular characterization of NTRK-rearranged thyroid carcinoma (NRTC). *Mod Pathol.* 2020 Nov;33(11):2186-2197. doi: 10.1038/s41379-020-0574-4. Epub 2020 May 26. PMID: 32457407; PMCID: PMC7584778.
 13. Chu YH, Wirth LJ, Farahani AA, Nosé V, Faquin WC, Dias-Santagata D, Sadow PM. Clinicopathologic features of kinase fusion-related thyroid carcinomas: an integrative analysis with molecular characterization. *Mod Pathol.* 2020 Dec;33(12):2458-2472. doi: 10.1038/s41379-020-0638-5. Epub 2020 Jul 31. PMID: 32737449; PMCID: PMC7688509.
 14. Ho AS, Luu M, Barrios L, Balzer BL, Bose S, Fan X, Walgama E, Mallen-St Clair J, Alam U, Shafqat I, Lin DC, Chen Y, Van Eyk JE, Maghami EG, Braunstein GD, Sacks WL, Zumsteg ZS. Prognostic Impact of Histologic Grade for Papillary Thyroid Carcinoma. *Ann Surg Oncol.* 2021 Mar;28(3):1731-1739. doi: 10.1245/s10434-020-09023-2. Epub 2020 Aug 17. PMID: 32808161.
 15. Metovic J, Vignale C, Annaratone L, Osella-Abate S, Maletta F, Rapa I, Cabutti F, Patriarca S, Gallo M, Nikiforov YE, Volante M, Papotti M. The Oncocytic Variant of Poorly Differentiated Thyroid Carcinoma Shows a Specific Immune-Related Gene Expression Profile. *J Clin Endocrinol Metab.* 2020 Dec 1;105(12):dgaa655. doi: 10.1210/clinem/dgaa655. PMID: 32936917.
 16. Vigneri R, Malandrino P, Vigneri P. The changing epidemiology of thyroid cancer: why is incidence increasing? *Curr Opin Oncol.* 2015 Jan;27(1):1-7. doi: 10.1097/CCO.0000000000000148. PMID: 25310641.