



**ORIGINAL RESEARCH PAPER**

**General Surgery**

**THE INCIDENCE OF CARCINOMA THYROID - A CLINICO PATHOLOGICAL CORRELATION**

**KEY WORDS:** Age and sex incidence, FNAC picture, Management strategies and follow-up, Radio-iodine treatment, Thyroglobulin assay, Well-differentiated Thyroid carcinoma.

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**ABSTRACT**

**BACKGROUND :** Thyroid cancer is the most common endocrine malignancy, accounting for ~2.1% of all cancer diagnoses worldwide, with ~77% of these diagnoses occurring in women. Approximately 90% of all thyroid cancers are differentiated, meaning that they arise from thyroid follicular cells and are generally iodine-avid (that is, able to take up iodine). Papillary thyroid carcinoma (PTC) is the most common histological type of differentiated thyroid cancer, followed by follicular thyroid carcinoma. Worldwide trends in thyroid cancer incidence have been largely driven by an increase in PTC as opposed to other major histological types. Thyroid malignancies are divided into Well-differentiated Carcinomas of which papillary carcinomas (80%), follicular carcinomas (10%), modularly thyroid carcinomas (5-10%) are the most common types, and Undifferentiated anaplastic carcinomas are less (1-2%). Primary thyroid lymphomas and primary thyroid sarcomas are rare. The recent rise in incidence of thyroid swellings is also recorded in India and may be traced to the increased patient awareness and also due to increased specificity of the investigations. The availability of trained pathologist in the interpretation of the cytology picture has contributed to a sensitivity of the diagnosis especially for malignancies of thyroid gland. **METHODS :** A prospective study was conducted at Coimbatore medical college hospital, Coimbatore. The study period is from June 2019 to December 2019. The Study sample constituted 100 patients. **RESULTS :** There is an increase in the incidence of Carcinoma thyroid cases by about 0.6%. There is a shift in Age distribution to a younger age in our study to 37yrs. Malignant neck node presentation has been observed in 5.35% of patients.

**I. INTRODUCTION**

Thyroid carcinoma most commonly presents as a painless, palpable, solitary thyroid nodule. The clinical presentation usually presents as a solitary nodule in either of the lobes. Any recent rapid increase in size, hard or fixed mass is a suspicious. A lateral neck swelling as a cervical lymph node metastasis may occasionally be the only clinical presentation. Onset of pressure symptoms like hoarseness of voice or dysphagia may suggest malignant infiltration to involve Recurrent Laryngeal Nerve or esophagus. This is especially important to be identified in longstanding swellings of thyroid with endemic or multinodular goitre. A thorough clinical examination, assessment of thyroid function by Thyroid function tests will give a preliminary idea of the possible pathology. The introduction in the 1980s and the subsequent widespread use of ultrasonography and fine-needle aspiration biopsy, along with increased use of diagnostic imaging modalities, such as CT, MRI and PET, has led to increased detection of small thyroid nodules and diagnosis of thyroid cancer at an early stage. Ultrasound study of neck performed by 6Hz probe gives an idea about the site, size, cystic or solid consistency of the nodule and can give a complete assessment of even the non-palpable thyroid gland and the possible presence of lymph node enlargement. Presence of a hard nodule or a lateral neck node is to be followed up by Contrast enhanced Computed tomography of Neck for a better evaluation. Fine Needle Aspiration Cytology is the main stay of pathological assessment. It has a limitation of inability to differentiate between follicular adenoma or Carcinoma. Apart from this FNAC is 75% specific and 96% sensitive for the diagnosis of Well Differentiated Carcinoma of Thyroid Gland. There has been a standardisation of FNAC picture by adoption of BETHESDA SYSTEM in 2009. This system classifies the thyroid malignancies basing on the number of cells per High power field with features suggestive of Malignancy.

There are 6 types as follows:

- Thy 1 – Non diagnostic / unequivocal
- Thy 2 – Benign
- Thy 3 – Atypia / follicular lesion of undetermined significance
- Thy 4 – Follicular neoplasm / suspicious Follicular Neoplasm

- Thy 5 – Suspicious malignancy
- Thy 6 – Malignancy.

After investigations Patient is treated by Total thyroidectomy and central neck node dissection for all high risk Papillary Carcinomas, and medullary carcinomas. Follicular neoplasm is dealt by hemithyroidectomy and is followed up with completion thyroidectomy if the histopathology report proves invasive carcinoma. Anaplastic carcinoma is managed by radioiodine ablative therapy and isthmusectomy with tracheostomy is done only in acute respiratory obstruction with stridor. Estimation of thyroglobulin as a tumor marker and as a baseline serum marker is important to know the prognosis and also to choose the radioiodine dose for postoperative follow up.

**II. MATERIAL AND METHODS**

This prospective study was carried out on patients of department of general surgery at Coimbatore medical college hospital, Coimbatore, from June 2019 to December 2019, a total of 100 subject were for this study.

**Study design:** prospective observational study.  
**Study location:** department of general surgery at Coimbatore medical college hospital, Coimbatore, Tamilnadu.

**Study duration:** June 2019 to December 2019.  
**Sample size :** 100 patients.

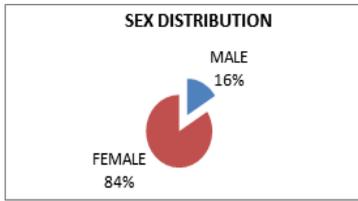
- Inclusion criteria:**
1. Patients with thyroid carcinoma
  2. Either sex
  3. Aged ≥ 18 years

- Exclusion criteria:**
1. Positive cytology with HPE proved no carcinoma
  2. Patients absconded from treatment and follow up

**III. RESULTS**

Total thyroid carcinomas admitted in Coimbatore medical college- 100  
Incidence of thyroid carcinoma – 1.44%.

Age incidence – 30-50yrs (50%), mean age group: 37.5 yrs.  
 Figure 1: Sex incidence: Female preponderance has been observed. (5:1)  
 Male : 16cases, Female: 84cases



**Clinical Presentation:**

**Thyroid swelling** – Palpable neck mass– 92%, solitary nodule 36, Multi nodular goitre , 56. Thyromegaly with lymph node – 24 Isolated neck mass ie, Lymph node - 5

**Size of thyroid swelling** - < 4cm –38%, > 4cms – 33% (right >left)

Duration of swelling – 3-6mth-1yr {mean duration – 9.9mths}  
 Symptomatology— Dysphagia – 6%, Dyspnoea – 4%, Toxic symptoms – 2%, Hoarseness of voice – 3%

Investigations: IDL – 2 unilateral palsy, x ray neck – tracheal deviations : 29, soft tissue Calcifications -13

Ultra sound Neck –Multinodular goitre- 56% (56cases), Lymph nodes-24% (24 cases) Calcified mass-17% (17cases)

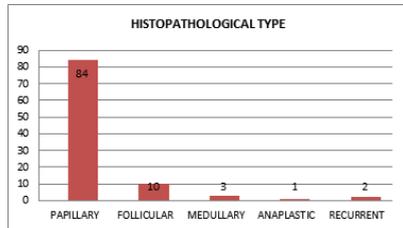
Histological Sub-variants In Papillary Carcinoma: were: Classical, Hurthle cell, Insular types.

(Tall cell, columnar and diffuse sclerosing variants were not registered in our institute.)

**Figure:2**

Incidence of various Histopathological Types of Well-Differentiated Carcinoma:

Papillary type were 84, Follicular type were 10, Medullary carcinoma- 3 cases and 1 Anaplastic variety.



**Table: 1 Incidence of Sub –Types of Papillary Ca. Thyroid**

| HPE                      | FREQUENCY | PERCENTAGE |
|--------------------------|-----------|------------|
| CLASSICAL PTC            | 61        | 61%        |
| FOLLICULAR VARIANT       | 12        | 12%        |
| PAPILLARY MICROCARCINOMA | 7         | 7%         |
| ENCAPSULATED VARIANT     | 2         | 2%         |
| TRABECULAR VARIANT       | 1         | 1%         |
| HISTIOCYTIC VARIANT      | 1         | 1%         |

**TABLE 2 Incidence of Sub-Types of Follicular and Other Carcinomas**

| HPE                                    | FREQUENCY | PERCENTAGE |
|--|-----------|------------|
| CLASSICAL FTC                          | 7         | 7%         |
| HURTHLE CELL VARIANT                   | 1         | 1%         |
| INSULAR CARCINOMA                      | 1         | 1%         |
| FTC MINIMALLY INVASIVE                 | 1         | 1%         |
| MTC                                    | 3         | 3%         |
| ATC                                    | 1         | 1%         |
| RECURRENT CARCINOMA (TX) Level v nodes | 2         | 2%         |

**Table: 3 Management of Carcinoma Thyroid in Present Study**

| SURGERY   | FREQ UENCY | PERCEN TAGE |
|---|------------|-------------|
| TOTAL THYROIDECTOMY   | 43         | 43%         |
| Hemi Thyroidectomy & SubTotal Thyroidectomy , later done COMPLETION THYROIDECTOMY | 27         | 27%         |
| TT + Functional Neck Dissection   | 9          | 9%          |
| TT+ Central Node Dissn. + FND   | 7          | 7%          |
| TT + CND  | 5          | 5%          |
| NTT   | 3          | 3%          |
| TT+ BILATERAL FND   | 3          | 3%          |
| TT + Modified Radical Neck Dissn. II  | 3          | 3%          |

**PROGNOSIS**

Prognosis stratification was adapted by Thyroglobulin estimation rather than the difficult AGES, AMES and MACIS scoring which are operator and pathologist opinion based.

A cut off Tg level > 1.3 ng/ml represents a simple indication for further investigations after total thyroidectomy in the absence of anti TG antibody measurement.

(Gr I – low risk - <1.3 ng/ml - suppressive T3/ low dose RAI therapy

Gr II - high risk - > 1.3 ng/ml - high dose RAI therapy)

There is a significant correlation between Gr II and residual disease or recurrence.

All patients were sent Thyroglobulin estimation on first week of postoperative period and follow up estimation done after 6 weeks post-operatively.

**Table-4: PROGNOSIS By Estimation of Thyroglobulin assay:**

Gr I – low risk - <1.3 ng/ml - suppressive T3/ low dose RAI therapy

Gr II - high risk - > 1.3 ng/ml - high dose RAI therapy

|                    |   |                                  |  |
|--------------------|---|----------------------------------|--|
| Very low risk –40% | <1.3ng/ml in Stage 1&2                  |                                  | Kept on suppressive Eltroxine .—100mcg/day |
| Low risk – 43%     | >1.3ng/ml                               | Stage 3,4 Low dose RAI ablation. |  |
| High risk – 17%    | Anaplastic Ca., Cervical LN Metastasis. |                                  | High dose RAI ablation.                    |

**Comparison With Other Studies:**

Table-5- Incidence

In ICMR (NCRP) 2016 it was 0.8% ,in

SEER group (USA) 2018 it was 1.4 -2.22%

in our study it is 1.44% of all malignancies.

NCRP (SEER) 2018 sex ratio was M:F= 1:2 ,in our study it is 1:5

Clinical Staging In NCRP-SEER 2018: Stage 1-68%, Regional metastasis-25%, Distant metastasis-4%,

In our study the statistics showed Stage:1 78.%, Regional Metastasis:16%, Distant Metastasis:2%. Table 7: Comparison of incidence of Carcinomas with other studies:

| Type of Malignancy | NCRP (2016) | SEER (2018) | Present study |
|--------------------|-------------|-------------|---------------|
| PTC                | 53.2%       | 85%         | 84%           |
| FTC                | 18.8%       | 9%          | 10%           |
| MTC                | 4.3%        | 1.4%        | 3%            |
| ATC                | 3.3%        | 1.6%        | 1%            |

**Table-6- FNAC and Biopsy correlation:**

Sensitivity in our study is 75%, Specificity-88%, Positive predictive value is 75%

| FNAC                      | NCRP (Mumbai cancer registry) 2010 | Jan f Silverman et al.,, 2009 | Present study |
|---------------------------|------------------------------------|-------------------------------|---------------|
| SENSITIVITY               | 95%                                | 93%                           | 75%           |
| SPECIFICITY               | 86%                                | 96.5%                         | 88%           |
| Positive Predictive Value | 79%                                | 88.9%                         | 75%           |
| NPV                       | 92%                                | 96.5%                         | 88%           |

**Table: 7: Surgeries Performed were :**

| SURGERY                               | GULL EAMONDIGUE ET AL (2009) | PRESENT STUDY |
|---------------------------------------|------------------------------|---------------|
| TOTAL THYROIDECTOMY                   | 57%                          | 70%           |
| COMPLETION THYROIDECTOMY (HT+STT+NTT) | 24%                          | 30%           |
| NECK DISSECTIONS                      | 18%                          | 27%           |

**IV. DISCUSSION**

The Incidental Thyroid Findings Committee of the American College of Radiology convened in 2013 to provide consensus recommendations for the radiological handling of thyroid nodules detected incidentally in imaging studies of the neck. The guidelines include decision trees that health-care providers can follow according to the method by which the nodule was detected and other prognostic factors, including age and life expectancy of the patient, nodule size and presence or absence of suspicious features in the nodule. The purpose of these guidelines was to reduce the proportion of patients with incidentally-detected nodules who undergo further workup, including surveillance, repeat biopsy and diagnostic surgery.

The ATA practice guidelines released earlier this year<sup>98</sup> differ significantly from the previous version in 2009 , seeming now to acknowledge the problem of overdiagnosis and overtreatment of a disease that is typically indolent, where treatment-related morbidity might not be justified by a survival benefit. The new guidelines recommend a more cautious approach to diagnostic evaluation and treatment of thyroid nodules and patients with differentiated thyroid cancer. This approach includes a higher threshold for fine-needle aspiration biopsy to begin the diagnostic work-up of a thyroid nodule, in which both nodule size and index of radiologic suspicion are taken into account (for instance, the nodule should be ≥ 1 cm for high and intermediate suspicion, ≥ 1.5 cm for low suspicion, and ≥ 2 cm for very low suspicion), consideration for less extensive surgery (thyroid lobectomy versus total thyroidectomy) and reduced use of radioactive iodine with a lower dose of 131I for the purpose of ablation of low-risk differentiated thyroid cancers. For the first time, the guidelines discuss active surveillance management as a safe and effective alternative to immediate surgical resection in properly selected patients with PTMC. This development was in response to studies suggesting a very low likelihood of progression in patients having low-risk, asymptomatic PTMC, particularly in older patients (≥60 years).

In patients for whom surgery is indicated, the guidelines support consideration of ipsilateral thyroid lobectomy as an alternative to total thyroidectomy for low-risk differentiated thyroid cancers. Regarding radioactive iodine ablation, the guidelines advocate less frequent use and, if indicated, use of lower doses. Molecular testing was discussed as an adjunct to ultrasound-guided fine needle aspiration biopsy to potentially better triage the risk of malignancy in the setting of cytologically indeterminate thyroid nodules, thereby

potentially reducing the need for diagnostic surgery with its attendant morbidity. Next-generation sequencing using multigene panels was also discussed for its ability to predict tumour aggressiveness. In determining the course of treatment, the guidelines emphasize the importance of patient preference and patient-centred decision making so that patients understand and can balance the potential risks and benefits of each diagnostic and treatment option.

The ATA clinical practice guidelines also address future research needs to further improve risk stratification for treatment decisions and clinical management. These needs include research that identifies prognostic factors that could be incorporated into the American Joint Committee on Cancer/Union for International Cancer Control (AJCC/UICC) TNM (tumour, node, metastasis) staging system. For instance, current AJCC/UICC TNM staging classifies young patients with PTC (that is, those aged <45 years) with cervical lymph node metastases as having stage I PTC, with no recognition that nodal metastases seem to be associated with reduced survival. Thus, an improved understanding is needed regarding groups of patients that might be undertreated as a result of the current staging system and recommended guidelines.

The more cautious management of thyroid cancers, as advocated in the recent guidelines, might already be reflected in a recent reduction in the rate of increase of thyroid cancer incidence (delay-adjusted) among white women between 2009 and 2012 (REF. 17). Conversely, with more cautious management of thyroid nodules and cancer treatment, some small, seemingly indolent cancers might progress rapidly, as size and stage at diagnosis are not always perfectly predictive of aggressive behaviour. If patients with seemingly lower-risk thyroid cancer are treated less aggressively now and in the future compared with the recent past, we might begin to see subtle declines in relative survival rates and increases in thyroid cancer mortality. Monitoring trends in thyroid cancer incidence and mortality before and after the implementation of the latest ATA guidelines will be important.

A 2016 publication proposed a change to the terminology used when describing the noninvasive encapsulated follicular variant of PTC that seems to have a low risk of adverse outcomes. The investigators suggested reclassifying this subgroup of tumours as “noninvasive follicular thyroid neoplasm with papillary-like nuclear features,” or NIFTP, and estimated that implementation of the nomenclature change could result in a modest reduction in thyroid cancer incidence.

**V. CONCLUSIONS**

- Change in incidence: INCREASED by 0.6%.
- Shift in age distribution: 37yrs. {50yrs in seer 2006–2010}
- Isolated positive neck node presentation: 6% {20.5% in previous statistics.}
- Newer HP variants reported during present study:

  - Micro PTC
  - Increased
  - Histiocytic-oncocytic PTC- 1
  - Trabecular variant - 1
  - Insular variant FTC - 1

**PROPOSALS**

- Early diagnosis should include thorough clinical and ultrasound examination of neck.
- Patients with new nodule or change in size of previous nodule should have Medical consultation at the earliest possible.
- Ultra Sound guided FNAC of thyroid is preferable to avoid false negatives.
- BETHESDA SYSTEM is to be followed to categorise thyroid malignancies.

- Meticulous technique in the performance of total thyroidectomy and neck dissections is to be followed.
- Risk stratification in immediate post operative period by Tg estimation and RAI uptake is mandatory.
- Regional lab facilities and radiotherapy units attached to teaching hospitals is the need of the hour.
- Multidisciplinary team is important for the changing scenario for achieving best results for the patients. It should ideally consist of Surgeon, Endocrinologist, Pathologist, Radiologist and Radiation oncologist with nuclear medicine training.

**REFERENCES**

1. Ferlay, J. et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11. World Health Organization [http://globocan.iarc.fr/Pages/summary\\_table\\_pop\\_prev\\_sel.aspx](http://globocan.iarc.fr/Pages/summary_table_pop_prev_sel.aspx) (2013).
2. Ron, E. & Schneider, A. B. in *Cancer Epidemiology and Prevention* (eds Schottenfeld, D. & Fraumeni, J. F. Jr) 975–994 (Oxford University Press, 2006).
3. Kilfoy, B. A. et al. International patterns and trends in thyroid cancer incidence, 1973–2002. *Cancer Causes Control* 20, 525–531 (2009).
4. M. P. Curado, B. Edwards, H. R. Shin et al., *Cancer Incidence in Five Continents*, vol. 9 of IARC Scientific Publications, No. 160, IARC, Lyon, France, 2007.
5. B. A. Kilfoy, T. Zheng, T. R. Holford et al., "International patterns and trends in thyroid cancer incidence, 1973–2002," *Cancer Causes and Control*, vol. 20, no. 5, pp. 525–531, 2009. [View at Publisher](#)
6. [View at Google Scholar](#) [View at Scopus](#)
7. Jemal, R. Siegel, J. Xu, and E. Ward, "Cancer statistics, 2010," *CA: A Cancer Journal for Clinicians*, vol. 60, no. 5, pp. 277–300, 2010. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
8. Aschebrook-Kilfoy, E. L. Kaplan, B. C. Chiu, P. Angelos, and R. H. Grogan, "The acceleration in papillary thyroid cancer incidence rates is similar among racial and ethnic groups in the United States," *Annals of Surgical Oncology*, 2013. [View at Publisher](#) [View at Google Scholar](#)
9. L. Enewold, K. Zhu, E. Ron et al., "Rising thyroid cancer incidence in the United States by demographic and tumor characteristics, 1980–2005," *Cancer Epidemiology Biomarkers and Prevention*, vol. 18, no. 3, pp. 784–791, 2009. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
10. Kent, W. D. et al. Increased incidence of differentiated thyroid carcinoma and detection of subclinical disease. *CMAJ* 177, 1357–1361 (2007).
11. L. Houlden, R. L. George, and P. A. Groome, "Increased incidence of differentiated thyroid carcinoma and detection of subclinical disease," *Canadian Medical Association Journal*, vol. 177, no. 11, pp. 1357–1361, 2007. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
12. L. Davies and H. C. Welch, "Increasing incidence of thyroid cancer in the United States, 1973–2002," *Journal of the American Medical Association*, vol. 295, no. 18, pp. 2164–2167, 2006. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
13. S. Grodzki, T. Brown, S. Sidhu et al., "Increasing incidence of thyroid cancer is due to increased pathologic detection," *Surgery*, vol. 144, no. 6, pp. 1038–1043, 2008. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#).
14. Rego-Iraeta, L. F. Pérez-Méndez, B. Mantinan, and R. V. Garcia-Mayor, "Time trends for thyroid cancer in northwestern Spain: true rise in the incidence of micro and larger forms of papillary thyroid carcinoma," *Thyroid*, vol. 19, no. 4, pp. 333–340, 2009. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
15. Y. Chen, A. Jemal, and E. M. Ward, "Increasing incidence of differentiated thyroid cancer in the United States, 1988–2005," *Cancer*, vol. 115, no. 16, pp. 3801–3807, 2009. [View at Publisher](#) [View at Google Scholar](#) [View at Scopus](#)
16. Role of thyroid ultrasound in the diagnostic evaluation of thyroid nodules. Rago T1, Vitti P.
17. Ultrasound of thyroid nodules. Desser TS1, Kamaya A. *Neuroimaging Clin N Am*. 2008 Aug; 18(3):463-78. vii. doi: 10.1016/j.nic.2008.03.005