Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 02, 2024

# HISTOPATHOLOGICAL SPECTRUM OF THYROID LESIONS IN TERTIARY CARE CENTER – A DESCRIPTIVE CROSS SECTIONAL STUDY

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Received Date: 18/12/2023 Acceptance Date: 20/01/2024 Published Date: 22/02/2024

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## Abstract

**Background:** Thyroid carcinoma closely resembles its benign counterpart in physical characteristics, measurable physiological parameters such as serum T3/T4 levels and ultrasound features. Therefore, the surgical excision of the nodule and its histological examination is important to differentiate between the more frequent benign and much less frequent malignant nodules. The highest incidence of thyroid lesions was seen between the 3rd and 4th decades of life with female preponderance. Colloid goiter was overall the most common lesion seen. Papillary carcinoma was the most common malignant lesion. Familiarity with the diverse morphology of neoplastic lesions of thyroid helps in providing quality care for patients as they have prognostic significance. Consequently, the diagnosis and management of thyroid lesions is dependent on both the clinician and pathologist for better patient care. Therefore, detailed histopathological analysis of thyroid lesions contributes significantly to the diagnosis, management and prognosis of the patient as small lesions in thyroid may present with dual pathology which can be picked up on detailed grossing and microscopic examination for accurate diagnosis and management.

**Keywords:** Thyroid gland, papillary carcinoma, colloid goiter, thyroid function tests, histopathology.

## Introduction

Thyroid lesions are common worldwide and are routinely encountered in clinical practice. Thyroid lesions may be developmental, inflammatory, hyperplastic or neoplastic.

Thyroid carcinoma closely resembles its benign counterpart in physical characteristics, measurable physiological parameters such as serum T3/T4 levels and ultrasound features. Therefore, the surgical excision of the nodule and its histological examination is important to differentiate between the more frequent benign and much less frequent malignant nodules.

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There are different diagnostic modalities used to evaluate and diagnose efficiently thyroid nodules. These include clinical examination, thyroid function tests (TFT), ultrasonography (USG), fine needle aspiration cytology (FNAC) and histopathological examination. However clinical assessment, TFT and USG have been poor parameters for assessing thyroid nodules.
Final diagnosis requires morphological examination of lesions and for this FNAC or histological examination becomes mandatory.
Despite many advantages, FNAC has certain limitations which include specimen adequacy, cytological interpretation, as the sampling is variable and not always representative, and lesions may be small in enlarged thyroid glands and may not be sampled by FNAC.
Hence, histopathological examination remains gold standard for diagnosis.

## Materials and Method

This was a prospective study of all the patients who presented with thyroid lesions in Department of Surgery, D. Y. Patil Hospital.
All clinical details, laboratory tests, FNAC in cases which were subjected for evaluation along with USG/CT/MRI Radiological investigations were included in the present study.
A total of 128 cases were studied over a span of two years from September 2017 to September 2019 were included in the study after clearance from Institutional Ethical Committee.

### Inclusion Criteria

All Thyroid resected specimens from surgery department for histopathological examination in the Department of Pathology, D. Y. Patil School of Medicine.

### Exclusion Criteria

Congenital anomalies including thyroglossal cysts were excluded from the study.

- The specimens were properly labelled, and their detailed gross examination was done followed by fixation in 10% formalin for 24 – 48 hours.
- Representative sections were taken.
- The tissue sections were processed for paraffin block preparation and sections of 4-5 μm thickness were taken which then underwent hematoxylin and eosin staining and studied under the microscope.

The data was compiled, and statistical analysis was done.
The present study was further compared with other similar studies.

## Results

The highest incidence of thyroid lesions was seen between the 3rd and 4th decades of life (78.91%) while the lowest was seen in 5th and 6th decade of life. (Table 1&2) (Figure 1 & 2)

**Table 1: Mean Age (yrs.) of the patients in benign and malignant thyroid lesions**

| | Benign lesions | Malignant lesions |
|---|---|---|
| N | 104 | 24 |
| Mean age | 42.44 | 40.25 |
| Standard deviation | 11.29 | 14.25 |
| 95% CI for the mean | 40.25 to 44.64 | 34.23 to 46.27 |

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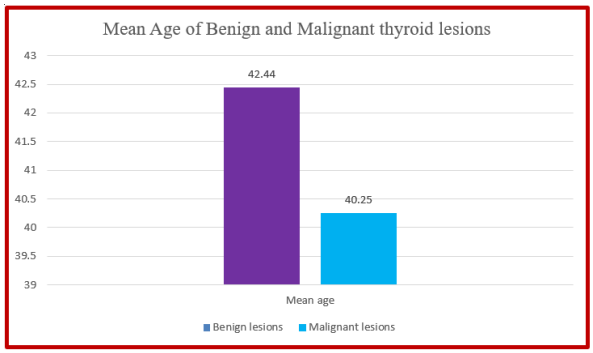


**Figure 1: Mean age of the patients in benign and malignant thyroid lesions (%)**

**Table 2: Age-wise prevalence of thyroid lesions**

| | **Benign (n=104)** | | **Malignant (n=24)** | | **Total (n=128)** | |
|---|---|---|---|---|---|---|
| | ***No.*** | ***%*** | ***No.*** | ***%*** | ***No.*** | ***%*** |
| <= 20 yrs. | 12 | 11.54% | 5 | 20.83% | 17 | 13.28% |
| 20 to <40 yrs. | 24 | 23.08% | 9 | 37.50% | 33 | 25.78% |
| 40 to <60 yrs. | 62 | 59.62% | 6 | 25.00% | 68 | 53.13% |
| >= 60 yrs. | 6 | 5.77% | 4 | 16.67% | 10 | 7.81% |
| Chi-square test | | | | | | |
| $\chi_2$ | 10.204 | | | | | |
| P | 0.0169 | | | | | |

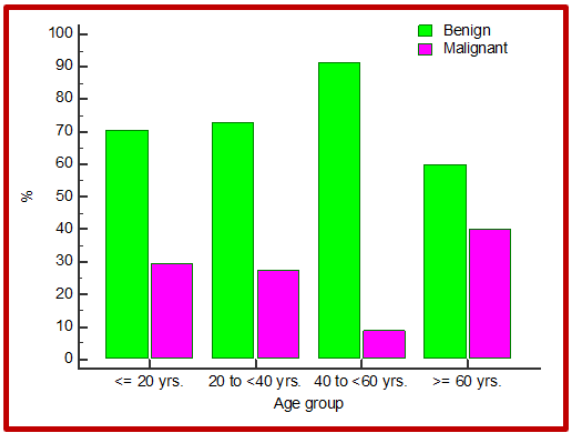


**Figure 2: Age distribution of the patients (%)**

Female to male ratio was found to be 1:5.5. (Table 3) (Figure 3.1 & 3.2)

**Table 3: Gender distribution of the patients in benign and malignant thyroid lesions**

| **Gender** | **Benign (n=104)** | **Malignant (n=24)** | **Total (n=128)** |
|---|---|---|---|
| | No. (%) | No. (%) | No. (%) |
| Male | 14 (77.8%) | 4 (22.2%) | 18 (14.1%) |
| Female | 90 (81.8%) | 20 (18.2%) | 110 (85.9%) |
| Total | 104 (81.2%) | 24 (18.8%) | 128 (100.0%) |
| Chi-square test | Benign vs Malignant | | |
| $\chi_2$ | 0.164 | | |
| P | 0.6851 | | |

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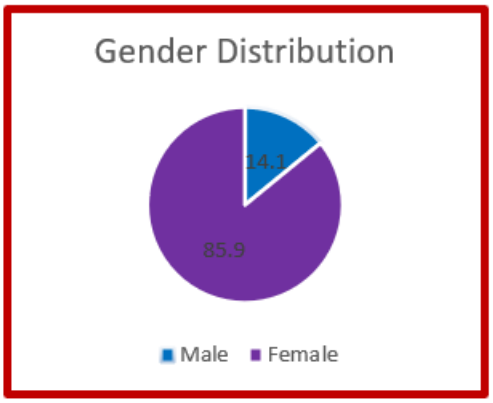


**Figure 3.1: Gender distribution of the patients in benign and malignant lesions (%)**

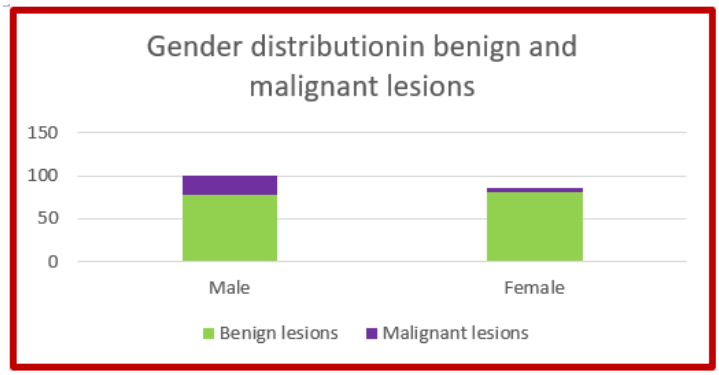


**Figure 3.2: Gender distribution (%) of the patients (stacked)**

Of the 128 thyroid specimens studied, 16 cases were non-neoplastic lesions and 88 and 24 were benign and malignant neoplastic thyroid lesions respectively. (Table 4) (Figure 4)

**Table 4: Benign thyroid lesions NIFTP – Non-invasive Follicular Thyroid Neoplasm with Papillary-Like Nuclear Features**

| | **No.** | **% of benign lesions (n=104)** | **% of total lesions (n=128)** |
|---|---|---|---|
| Colloid goitre | 35 | 33.65% | 26.92% |
| Multinodular colloid Goitre | 23 | 22.12% | 17.69% |
| Follicular Adenoma | 16 | 15.38% | 12.31% |
| Hashimoto's thyroiditis | 10 | 9.62% | 7.69% |
| Lymphocytic Thyroiditis | 6 | 5.77% | 4.62% |
| NIFTP | 6 | 5.77% | 4.62% |
| Adenomatoid Goitre | 3 | 2.88% | 2.31% |
| Hurthle Cell Adenoma | 2 | 1.92% | 1.54% |
| Hyalinizing Trabecular Tumor | 1 | 0.96% | 0.77% |
| Papillary Hyperplastic Nodule | 1 | 0.96% | 0.77% |
| Thyroid Hamartoma | 1 | 0.96% | 0.77% |
| | | | |

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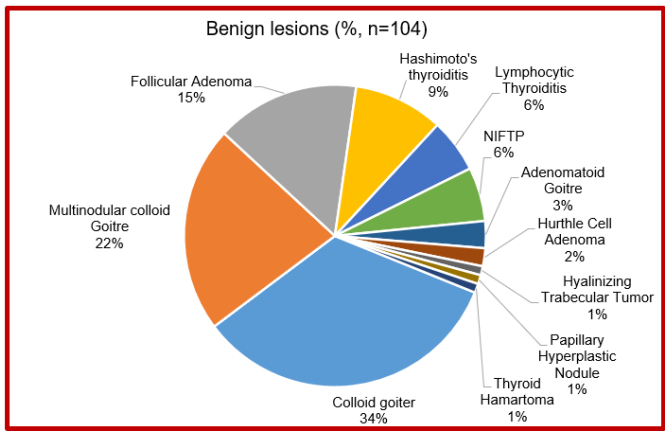


**Figure 4: Benign thyroid lesions (%, n=104)**

Colloid Goiter (26.92%) was the commonest lesion seen in the present study.
Among the non-neoplastic lesion of thyroid, Hashimoto's Thyroiditis was the most commonly occurring entity. (Table 4) (Figure 4)

Among the Neoplastic lesions of thyroid, Colloid goiter was the most commonly occurring entity followed by Multinodular goiter in benign category and Papillary Carcinoma of thyroid occurred most in malignant category. (Table 5) (Figure 5)

**Table 5: Malignant thyroid lesions**

| | **No.** | **% of malignant lesions (n=24)** | **% of total lesions (n=128)** |
|---|---|---|---|
| Papillary Carcinoma | 12 | 50.00% | 9.23% |
| Follicular variant of Papillary Ca (FVPTC) | 8 | 33.33% | 6.15% |
| Medullary Carcinoma | 1 | 4.17% | 0.77% |
| Poorly Diffrentiated Thyroid Carcinoma | 1 | 4.17% | 0.77% |
| Follicular Carcinoma | 1 | 4.17% | 0.77% |
| Follicular Tumor of Uncertain Malignant Potential (FTUMP) | 1 | 4.17% | 0.77% |

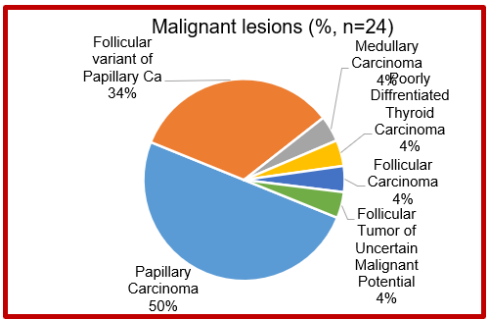


**Figure 5: Malignant thyroid lesions (%, n=24)**

T3 T4 and TSH values showed no association with occurrence of benign or malignant lesions and hence had no positive predictive value, (p value = 0. 3425, 0.4856 and 0.2215 respectively.)
Most of the lesions were found to be Euthyroid (93.8%). (Table 6)

**Table 6: Functional status of thyroid in 128 cases.**

| Thyroid function tests | No. of cases | Percent of cases |
|---|---|---|

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| | | |
|---|---|---|
| Euthyroid | 120 | 93.8% |
| Hypothyroid | 2 | 1.6% |
| Hyperthyroid | 6 | 4.6% |

**Table 7: Comparison of Age-wise distribution of Thyroid lesions**

| | **< 20 years (% of cases)** | **20 –39 years (% of cases)** | **40 – 59 years (% of cases)** | **> 60 years (% of cases)** |
|---|---|---|---|---|
| Singh P *et al.* [6] (2000) (n = 108) | 04 | 62.4 | 20 | 13.6 |
| Md R. Islam *et al.* [2] (2009) (n =118) | 3.3 | 81.3 | 15.4 | 00 |
| Aahana Gupta *et al.* [1] (2016) (n = 100) | 12 | 51 | 31 | 06 |
| A. Kumar et.al [7] (2017) (n=248) | 9.1 | 55.2 | 28.8 | 06.9 |
| Present Study (n = 128) | 13.28 | 25.78 | 53.13 | 7.81 |

**Table 8: Sex predilection of thyroid lesions**

| | **Female (%)** | **Male (%)** |
|---|---|---|
| Singh P *et al.* [6] (2000) (n = 92 ) | 82.4 | 17.6 |
| Md R. Islam *et al* [2] (2009) (n = 118 ) | 67.7 | 32.3 |
| Aahana Gupta *et al.* [1] (2016) (n = 100) | 77 | 23 |
| A. Kumar et.al [7] (2017) (n = 248 ) | 85.1 | 14.9 |
| Present Study (n = 128) | 85.9 | 14.1 |

**Table 9: Comparison of Histopathological spectrum of thyroid lesions**

| | **Benign (%)** | **Malignant (%)** |
|---|---|---|
| Singh P *et al.* [6] (2000) (n = 92 ) | 86.9 | 13.1 |
| Md R. Islam *et al.*[2] (2009) (n = 118 ) | 81.4 | 18.6 |
| Aahana Gupta *et al.*[1] (2016) (n = 100) | 72 | 28 |
| A. Kumar et.al[7] (2017) (n = 248 ) | 81.01 | 18.99 |
| Present Study (n = 128) | 81.2 | 18.8 |

**Table 10: Comparison of thyroid function test and thyroid lesions**

| **Thyroid hormone profile (in percentage)** | **Euthyroid** | **Hypothyroid** | **Hyperthyroid** |
|---|---|---|---|
| Godinho- Matos L *et al.*[8] (1992) (n = 144) | 88 | 3 | 9 |
| Md R. Islam *et al.*[2] (2009) (n = 118 ) | 100 | 00 | 00 |
| Aahana Gupta *et al.*[1] (2016) (n = 100) | 81 | 08 | 11 |

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| | | | |
|---|---|---|---|
| A. Kumar et.al[7] (2017) (n = 221 ) | 85.07 | 9.5 | 5.43 |
| Present Study | 93.8 | 1.6 | 4.6 |

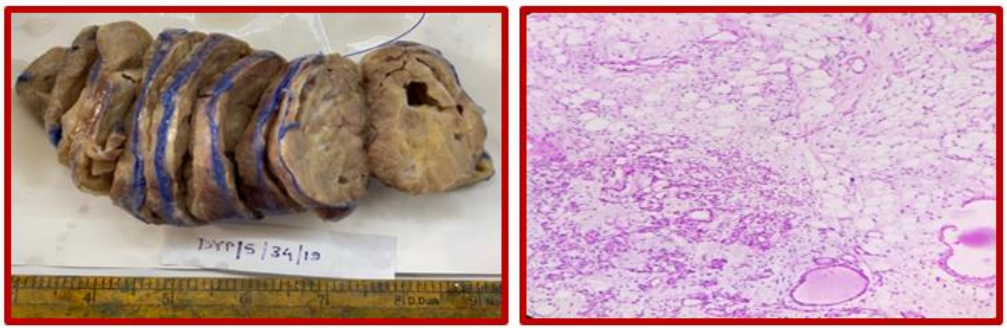


**Figure. 6: Thyroid Hamartoma A. Gross B. Microscopy**

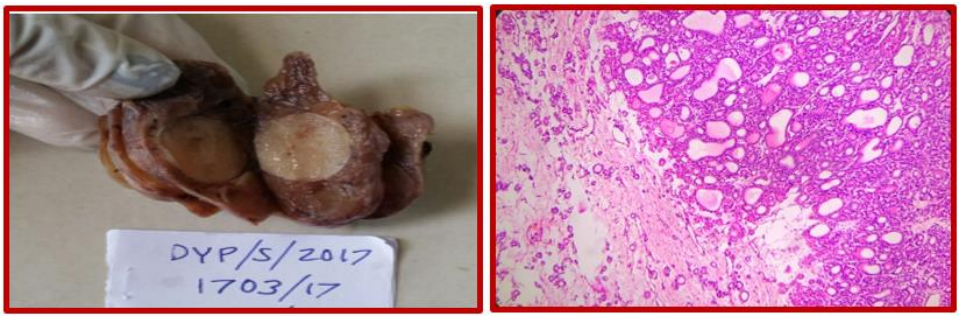


**Figure 7: Follicular Adenoma A. Gross B. Microscopy**

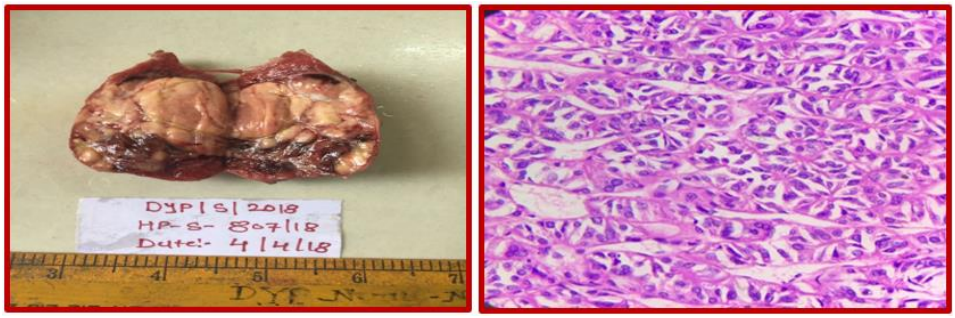


**Figure 8: Hyalinizing Trabecular Tumor A. Gross B. Microscopy**

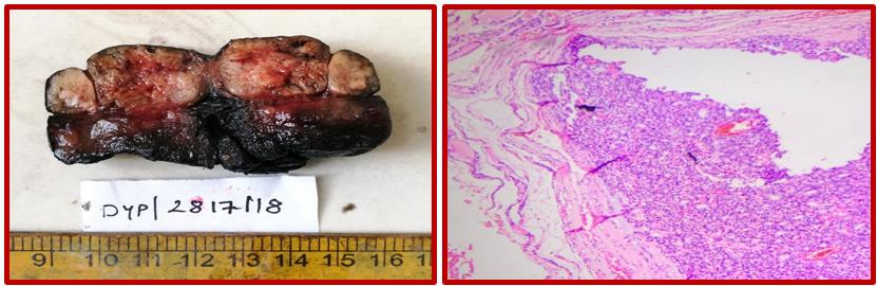


**Figure 9: Invasive Encapsulated Follicular Variant of Papillary Carcinoma A. Gross B. Microscopy**

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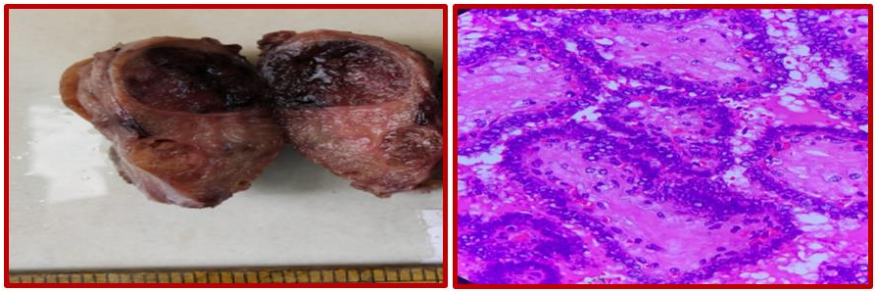

**Figure 10: Papillary Carcinoma A. Gross B. Microscopy**

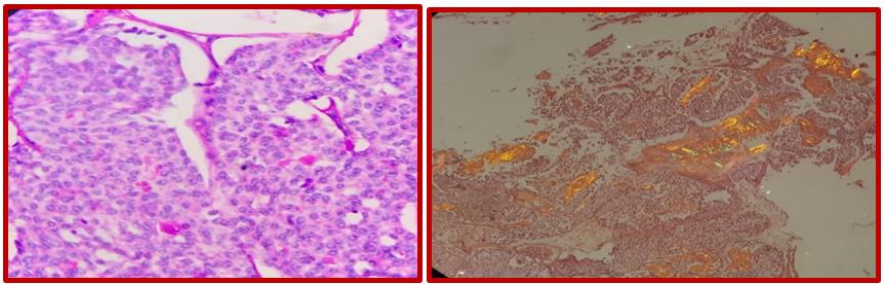

**Figure 11: Medullary Carcinoma microscopic pictures - A. H&E stain B. Congo Red Stain**

**Discussion**

In the present study, the highest incidence of thyroid lesions was seen between the 3rd and 4th decades of life (78.91%) while the lowest was seen in between 5th and 6th decade of life. (Table 7)

These findings compare favorably with the findings of Aahana Gupta *et al.*[(1)]. However, Md R. Islam *et al.*[(2)] found a higher incidence of cases in the 4th decade of life itself.

There is lower incidence of thyroid lesions in fifth and sixth decade of life in all studies including the present one and hence younger age group should be evaluated for thyroid lesions much more than older age group. (Table 8)

In this series, out of 128 patients, female (104) outnumbered the males with female-male ratio of 5.5:1. This female preponderance is reflected in all other studies also.

Studies done by Sangall G, *et al.* 2006[(3)], female:male was 4.21:1, Mandal S, *et al.*[(4)] female:male was 5:1. Kilopatric, *et al.*[(5)] found a female to male ratio of 4:1 in nonendemic area. It is due to fact that thyroid disorder is female prone owing to the presence of estrogen receptors in the thyroid tissue.

The present study compared favorably with all the studies when comparing the percentage of benign and malignant cases of thyroid. (Table 9)

Md R. Islam *et al.*[(2)] , Singh P *et al.*[(6)] and A. Kumar et.al[(7)] showed similar percentage of benign lesions while Aahana Gupta *et al.*[(1)] showed a slightly lesser benign lesions.

However, overall these figures indicate the higher frequency of occurrence of benign lesions of thyroid and the importance of histopathology in identifying them.

All cases of our study underwent thyroid hormone profile and found to be, Euthyroid 93.8%, Hyperthyroid 4.6% and 1.6% Hypothyroid. In the study by Godlnho-Matos L, *et al.* there were 144 cases out of them 88 cases were euthyroid, 9 cases were hyperthyroid and 3 cases were hypothyroid [(8)] (Table 10). Also, in a study by Kraiem Z *et al.* multinodular goiter can be associated with hyperfunction[(9)], but the patient is usually found to be euthyroid.

Hence, TFTs do not shed much light on the nature of the lesion and a thyroid mass should be evaluated even in case of normal thyroid profile.

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Most common non neoplastic thyroid lesion was colloid goitre (Nodular Hyperplasia) followed by multinodular Colloid goitre.
Most common malignant thyroid lesion seen in the present study was Papillary Carcinoma of thyroid (15.38%) including its follicular variant among all lesions occurring in thyroid. This is in accordance with a study done by Sherman SI *et al.*[10] and Jemal A *et al.*[11] which found Papillary Carcinoma as the most common malignant tumor of the thyroid gland in countries having iodine-sufficient or iodine-excess diets.[10]These common tumors tend to be biologically indolent and have an excellent prognosis (90% survival at 20 years) [10].
Rare cases like thyroid hamartoma and anaplastic carcinoma of thyroid, one each, were also reported and show the extremes of the spectrum.
All the facts and figures mentioned here may considerably vary from those of large series covering wide range of time, but still then, as the cases of this study are collected from a tertiary level hospital in our country, this study has some credentials in reflecting the facts regarding distribution and type of various thyroid lesions.

**Conclusion**

The incidence of diseases involving the thyroid gland has been increasing over the years. However, early diagnosis can assist in early treatment and have better outcomes.
The availability of newer diagnostic modalities has increased the detection rate of early presenting patients. However, clinical examination, thyroid function tests, radiological examination and fine needle aspiration cytology remain only provisional diagnostic modalities. Histopathology remains the gold standard not only for the confirmation of clinical diagnosis but also for planning the management and predicting the prognosis.
Histopathology holds a prime significance in malignant lesions not only to identify and grade the tumors but also to pick up lesions that are treated as benign, as there is an overlap in the clinical features of both.
A wide spectrum of diseases can be diagnosed on histopathology, as they may be too small to be detected on clinical presentation or radiology. Therefore, every resected specimen should be subjected to a detailed histopathological examination for a surgico-pathological correlation and to ensure proper management of the patient.
Our study highlights the fact that the thyroid is a site for more than one pathology and histopathologists should strive to identify and diagnose each of these lesions.
Grading and staging are important, and pathologists should ensure that they use standard criteria which clinicians can interpret correctly.
Familiarity with the diverse morphology of neoplastic lesions of thyroid helps in providing quality care for patients as they have prognostic significance. Consequently, the diagnosis and management of thyroid lesions is dependent on both the clinician and pathologist for better patient care.
Therefore, detailed histopathological analysis of thyroid lesions contributes significantly to the diagnosis, management and prognosis of the patient as small lesions in thyroid may present with dual pathology which can be picked up on detailed grossing and microscopic examination for accurate diagnosis and management.

**Acknowledgment- None.**
**Conflict of Interest - None**

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