

Histopathological Study of Patterns of Thyroid Lesions in A Tertiary Care Centre in Central India

Priyamvada Singh¹, Manal Ashraf Ali², Farah Jalaly³, Aizaz Fatima⁴

¹3rd year PG Resident, Department of Pathology, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

²Professor, Department of Pathology, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

³Professor and Head, Department of Pathology, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

⁴Senior Resident, Department of Pathology, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

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Corresponding author: Dr. Manal Ashraf Ali

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Abstract

Background: Diseases of the thyroid gland are one of the most common endocrine disorders in humans. A significant burden of these disorders exists in India with about 42 million people suffering from thyroid disorders. The incidence and pattern of thyroid lesions depend on various factors which include sex, age, ethnic and geographical patterns. Majority of thyroid lesions are non-neoplastic or benign lesions. The aim of the present study was to determine various histomorphological patterns of thyroidectomy specimens along with their frequency and relationship with age and sex of the patient.

Methods: This prospective study was conducted in the department of Pathology, Chirayu Medical College and Hospitals, Bhopal for a period of 18 months. The study included 70 thyroidectomy specimens received in the Department of Pathology, CMCH for histopathological analysis. Gross and histopathological analysis of the specimens was done and noted. The data was analyzed by standard statistical methods.

Results: The commonest of the benign lesions was Thyroid Follicular Nodular Disease followed by Follicular Adenoma and Hashimoto's thyroiditis. Most common malignant lesion was Papillary Carcinoma Thyroid followed by Follicular Carcinoma Thyroid. Age group of patients ranged from 16 to 73 years. The study showed a female predominance of 90%.

Conclusions: The occurrence of thyroid diseases varies according to gender, age groups, and ethnicity. The study showed a female predominance. Peak age of incidence of thyroid lesions was between 51 and 60 years, however no age group was spared. Most common lesion was Thyroid Follicular Nodular Disease and most common malignant lesion was Papillary Carcinoma Thyroid. Radiological examination is helpful but histopathological examination remains the mainstay for definite diagnosis and management of thyroid neoplasms. The importance of awareness, self-examination and clinical suspicion cannot be over emphasized.

Keywords: Thyroid Follicular Nodular Disease, Follicular adenoma, Papillary Carcinoma Thyroid, Thyroid lesions.

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Introduction

The thyroid gland is the largest of all endocrine organs, with a noteworthy potential for growth and expansion.[1] The gland produces thyroid hormones, triiodothyronine (T3) and thyroxine (T4), which are required for metabolic processes, protein synthesis, healthy development, and brain maturation during the fetal stage and the first few years of life.[2]

The main disorders of the thyroid gland occur when it is either overactive (hyperthyroidism) or underactive (hypothyroidism). Diseases due to altered parenchymal function and anatomical abnormalities of this gland are among the commonest endocrine disorders in humans.[1] According to various studies, about 42 million people in India suffer from it.[2]

India has completed the transition from iodine deficient to iodine replete status. It is believed that iodine supplementation may cause a spike in autoimmune thyroid dysfunction and hypothyroidism by making the thyroid gland more susceptible to damage by its own immune system.[3]

Thyroid disease is universally seen more in females, but varies with geography. According to the data, in Madhya Pradesh 1,087 per 100,000 women suffer from thyroid disorders as compared to Kerala which has the highest incidence rate of 8,696 per 100,000 women. It was also found that the risk of having thyroid disorders is related to socioeconomic status and increases from poorest to richest.[3]

The thyroid lesions may present with a diffuse pattern or as nodules. Diffuse thyroid lesions are associated with conditions involving the entire gland, like hyperplasia and thyroiditis. Nodular lesions consist of those conditions that produce a well-defined nodule. They can be due to non-neoplastic hyperplasia or benign and malignant tumors.[4]

The functional status, Fine Needle Aspiration Cytology and Core needle biopsies play a prominent role in the screening of thyroid lesions. However, histology remains the gold standard which helps in measuring the outcomes of cytology and in deciding the management of the patient.[5,6,7]

Material And Methods

The study was conducted in Chirayu Medical college and Hospital, Department of Pathology. 70 specimens were received in the Department of pathology over a period of 18 months (from Jan 2021 to July 2022) for histopathological examination.

Inclusion criteria:

1. All Thyroidectomy specimens received in the department of Pathology, CMCH for histopathological analysis.

Exclusion criteria:

1. Thyroid specimens of patients not willing to give consent.
2. Pre prepared slides received for histopathological reporting.

The specimens of right and left hemi thyroidectomy, and total thyroidectomy with modified neck dissection were received for histopathological examination.

The specimens were fixed in 10% formalin for 24 - 48 hours. Gross features were noted. Representative sections were taken and after processing the tissue, routine staining was carried out with hematoxylin and eosin (H&E) stain.

Results

A prospective study of the histopathological analysis of thyroid lesions was conducted in the Department of Pathology of Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh for a period of eighteen months from January 2021 to July 2022.

The youngest patient was 16 years old and oldest patient was 73 years old with a mean

age of 45 years. Majority of cases (20 out of 70, 29%) were seen between the age group of 51-60 years. Thyroid Follicular Nodular Disease represented 32% of all cases and 67% of the benign cases.

Maximum cases of Thyroid Follicular Nodular Disease (9 out of 28, 32%) were found between the age of 51-60 years, while those of Follicular Adenoma (2 out of 5, 40%) were found between 41-50 years. Maximum cases of malignancies (14 out of 28, 50%) were found in the age group of 31-50. (Refer table no. 1 and 2). Among total 70 cases, 63 patients were female (90%) and 7 patients were male (10%) with a Female to Male ratio of 9:1.

Among 8 non neoplastic lesions, 6 (75%) cases were female and the remaining 2 (25%) cases were male. Among 34 benign neoplastic lesions 33 (97%) cases were female and one case (3%) was male. Among 28 Malignant neoplastic lesions 24 (86%) cases were female and 4 (14%) cases were male.

Out of 41 cases of benign thyroid lesions, 18 (44%) were Total Thyroidectomy specimens, followed by 14 (34%) cases of right hemithyroidectomy and 7 (17%) cases of left hemithyroidectomy.

Out of 28 cases of malignant thyroid lesions, 24 (86%) were of Total thyroidectomy while 4 (14%) were those of Right hemithyroidectomy. No case of Left hemi-thyroidectomy was seen.

Among the 42 benign thyroid lesions 28 (67%) cases were reported as Thyroid Follicular Nodular Disease, 5 (12%) as Follicular Adenoma, 3 (7%) cases of Hashimoto's thyroiditis and 1 (2%) case each of Hyalinizing Trabecular tumour, dystrophic calcification and thyroglossal duct cyst were noted. 2 (5%) cases were reported as normal thyroid.

Out of 27 cases of malignant thyroid lesions, 20 (74%) were diagnosed as Papillary thyroid carcinoma, 2 (7.4%) cases of NIFTP (Non-Invasive Follicular Thyroid Neoplasm with papillary like nuclear features), 2 (7.4%) cases of Angio invasive Follicular thyroid carcinoma, 1 (3.7%) case each of Hurthle cell carcinoma, Medullary carcinoma and Poorly differentiated carcinoma and 1 (3.7%) case of metastatic deposits of squamous cell carcinoma of buccal mucosa.

Majority of the cases of Papillary carcinoma thyroid were stage 1 at the time of surgery (52.63%), followed by stage 2 (42.1%). Maximum cases were Unifocal (63.15%). The adjacent thyroid parenchyma was normal in majority of cases (84.12%), while Hashimoto's thyroiditis and multinodular goitre were seen in few cases. Thin capsule is seen in 84.2% cases with capsular invasion in 68.42% of the cases. Vascular invasion was seen in 21.05% of the cases and extrathyroidal extension and distant metastasis in 5.26% of the cases.

Table 1: Distribution of benign thyroid lesions

Benign – Distribution of Lesions	No of cases	Percentage
Dystrophic Calcification	1	2%
Follicular Adenoma	5	14%
Hashimoto's Thyroiditis	3	7%
Hyalinizing trabecular tumour	1	2%
Normal thyroid	1	2%
Normal thyroid (Adjacent to dermoid cyst)	1	2%
Surgery related changes	1	2%
Thyroglossal duct cyst	1	2%
Thyroid follicular Nodular disease	28	67%
Total	42	100%

Table 2: Distribution of malignant thyroid lesions

Distribution of malignant thyroid lesions	No. of cases	%
Classical PTC	6	21.7
Encapsulated FVPTC	2	7.1
Tall cell variant of PTC	1	3.5
Hurthle Cell Variant of PTC	1	3.5
Infiltrative FVPTC	10	36
NIFTP	2	7.1
Follicular Carcinoma (Angio invasive)	2	7.1
Hurthle Cell Carcinoma	1	3.5
Invasion by squamous cell carcinoma of buccal mucosa	1	3.5
Poorly differentiated Carcinoma	1	3.5
Medullary carcinoma	1	3.5
Grand Total	28	100%

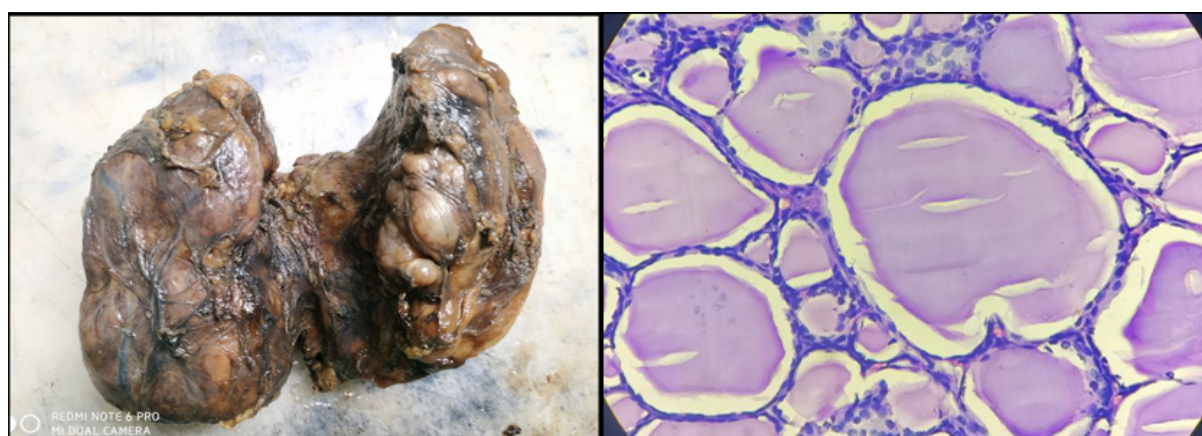
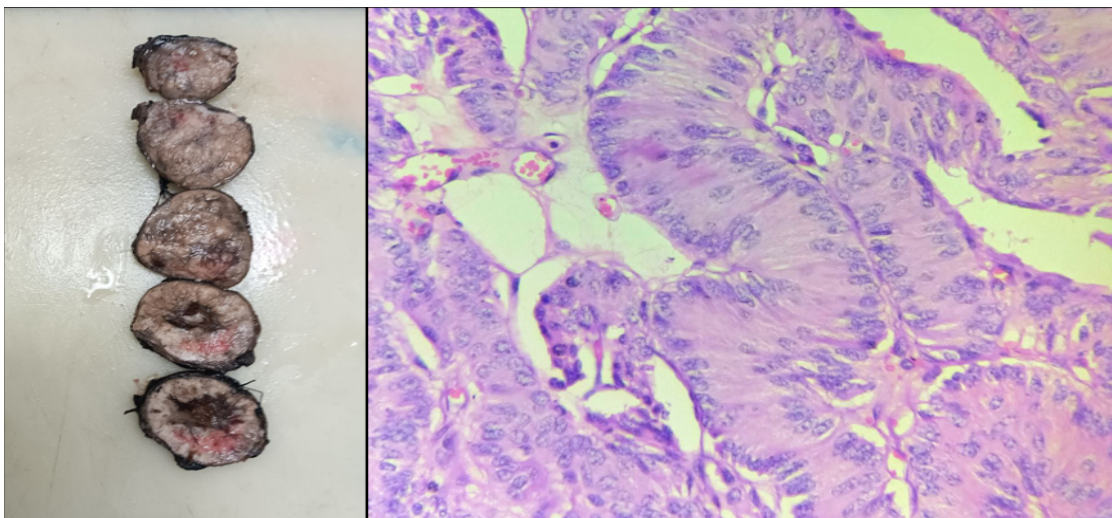


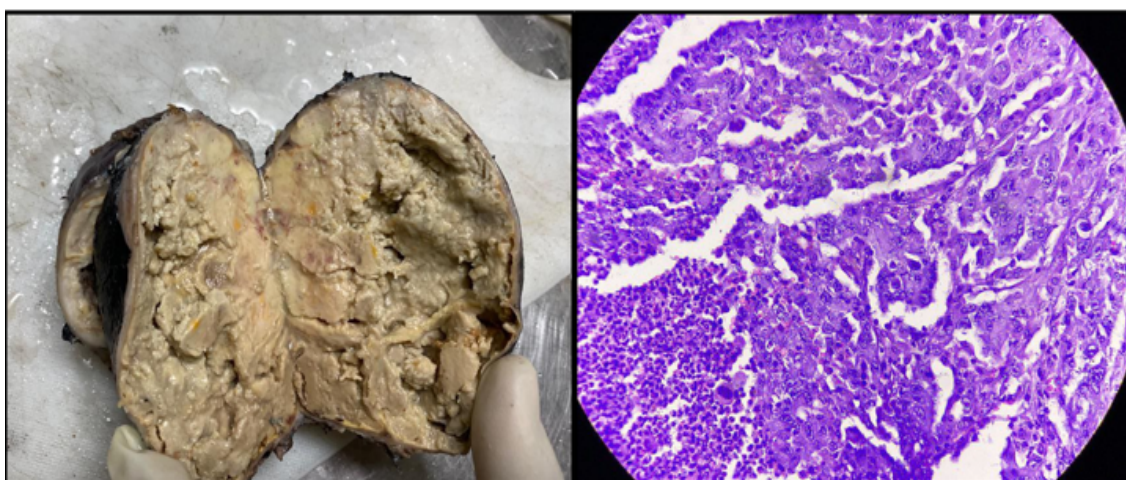
Figure 1 and 2: Thyroid follicular nodular disease – Total thyroidectomy specimen. H&E (40X) Thyroid follicular nodular disease showing variable sized colloid filled follicles.



Figure 3 and 4: Cut surface of right lobe of thyroid showing a large cystic area with papillary excrescences. H&E (40X) Tumour cells arranged in papillary architecture with fibrovascular cores and showing Papillary like nuclear features.



**Figure 5 and 6: Serial Sectioning of Right hemithyroidectomy specimen. H&E (40X)
Tall cell variant of PTC showing tumour cells arranged in tram track appearance.**



**Figure 7 and 8: Total Thyroidectomy specimen showing extensive necrosis. H&E (40X)
Poorly Differentiated Carcinoma thyroid showing cells with high N:C ratio, moderate amphophilic cytoplasm, hyperchromatic nucleus, and prominent nucleoli with adjacent areas of necrosis.**

Discussion

The occurrence of thyroid diseases varies according to gender, age groups, and ethnicity. Thyroid diseases are seen all over the world with varying frequency and their incidence depending on iodine deficiency and other environmental factors. Thyroid disorders are more common in women than in men. Solitary nodules are about 4 times more common in women than in men and this incidence increases throughout life. 70 thyroidectomy specimens were received in our study and the tissues were analysed for histopathological examination.

Thyroid diseases have historically been known primarily to affect the female sex. In our study female representation was 90% of all cases. Similar female representations are found in study carried out by K.F. Magdalene et al[13]. The Female: Male ratio was lower in other studies like those done by Haque WS et al[14] and Naresh Gurbani et al[15] and even more female predominance is found in study done by K. Prathipa et al[12].

In the present study the commonest age group presenting with thyroid disorders were 51-60 years while studies carried out by Indhuja Bharathidhasan et al[11], Dr

Sreedevi A R et al[8], K. Prathipa et al[12] found age incidence to be commonest between 30- 40 years and K.F. Magdalene et al[13] found commonest age group between 41 to 50 years of age. Mean age in our study was 45 years which is similar to the study done by K.F. Magdalene et al[13].

In present study benign lesions accounts for 42 cases and malignant lesions accounts for 28 cases. The ratio between benign and malignant thyroid lesions in this study are 1.5:1. The incidence of benign neoplasms was lower and malignancies were higher in our study compared with that reported by Indhuja Bharathidhasan et al[11]. This may be attributed to the fact that ours is a tertiary care centre with oncology unit. Increased screening through ultrasonography and detection of occult carcinomas with the help of guided fine needle aspiration cytology have also led to the early detection of malignancies.

Among the benign lesions found in this study, Thyroid Follicular Nodular Disease comprised the majority, which agrees with other studies done by Indhuja Bharathidhasan et al[11], K.F. Magdalene et al[13] and K. Prathipa et al[12] etc. Iodine deficiency and genetic factors are the two most important environmental factors that influence development of Thyroid follicular nodular disease.

Follicular adenoma was the second most common benign lesion comprising of total 7% of the cases, which is like the studies done by Dr Sreedevi A R et al[8] and K. Prathipa et al[12] etc.

Hashimoto's thyroiditis comprised 4% of the cases which resonated with the studies of Indhuja Bharathidhasan et al[11] and Naresh Gurbani et al[15] however this was less than the incidences described in the studies done by K. Prathipa et al[12] and K.F. Magdalene et al[13].

Commonest malignant neoplasm in our study was papillary carcinoma thyroid which concurred with the studies of Indhuja Bharathidhasan et al[11], Dr Sreedevi A R

et al[8] and Haque WS et al[14]. In the current study PTC accounted for about 29% of the total cases and 71% of all the malignant cases. Similar high percentage of PTC is also seen in studies done by K.F. Magdalene et al[13], K. Prathipa et al[12] and Naresh Gurbani et al[15].

In our study out of 20 cases of Papillary carcinoma thyroid, 6 (30%) cases were classical papillary variant and 12 (60%) were follicular variant and 1 case each was of tall cell and hurthle cell variant. The cases of Follicular variant of papillary carcinoma thyroid were higher than the studies done by Almukhtar ZK[16] and Anupama Raj K[17] in which Classic PTC is the most common variant (40.1% and 70% respectively).

Majority of the cases of Papillary carcinoma thyroid (90%) were stage 1 or stage 2 at the time of surgery like the conclusions of Almukhtar ZK et al[16] (98%). 63% cases were unifocal in our study which is comparable to 69% unifocal cases in the study done by Almukhtar ZK et al[16]. Capsular invasion was seen in 68% of the cases which is much higher than the 17% cases of capsular invasion seen in the study done by Almukhtar ZK et al[16]. Vascular invasion was seen in 21.05% of the cases and extrathyroidal extension and distant metastasis in 5.26% of the cases in our study and these are comparable with the 28% cases of vascular invasion, 10% cases of extrathyroidal extension and 7% cases of distant metastasis in the study done by Almukhtar ZK et al[16].

In the current study the second most common type of malignancy was Follicular Thyroid Carcinoma (7%) which is like the studies done by Dr Sreedevi A R et al[8], K. Prathipa et al[12] and Indhuja Bharathidhasan et al[11]. There was total 2 cases and both were Angio-invasive, showing vascular invasion. None of these showed distant metastasis at the time of presentation.

One case of Medullary carcinoma thyroid of a 36 years old female was seen with classical features.

One case of Poorly differentiated carcinoma with extensive necrosis, giant cells and few areas of follicular differentiation was seen in a 64 years old male. One case of Hurthle cell carcinoma was also noted in 43 years old female.

Conclusion

The present study resonated with the historical fact that thyroid diseases primarily affect the female sex both in benign and malignant lesions. It reveals that the prevalent form of thyroid diseases is Thyroid Follicular Nodular Disease. Papillary carcinoma is the commonest malignancy of thyroid gland which also predominantly affects females. Total thyroidectomy is the commonest type of surgery done in cases of thyroid lesions. Peak age of incidence of thyroid lesions was found to be between 4th and 5th decade. Benign lesions outnumber the malignant lesions but as observed in the present study, increasing incidence of malignant cases raises an alarm. Hence, screening females for neck swellings will be beneficial in management of patients and early detection can change the treatment regimen. Higher incidence of papillary carcinoma insists the need for people awareness program and preventive measures. This study provides current hospital based epidemiological data on age at presentation, gender distribution and commonest histopathological variants of thyroid lesions in a tertiary care hospital in central India.

References

1. Rosai J., Tallini G. Rosai and Ackerman's surgical pathology. 11th

ed. New York: Mosby Elsevier; c2018; 278–279.

2. Singh, S.K., Aditi, A. & Gupta, J. Spatial clustering and meso-scale correlates of thyroid disorder among women in India: evidence from the National Family Health Survey (2015–16). J Public Health (Berl.) 2021.
3. India National Family Health Survey NFHS-5 (2019–21) Status of Goitre or Thyroid Disorders in India/8th February 2022/5.
4. Stacey E. Mills. Sternberg's diagnostic surgical pathology. 6th ed. Joel K. Greenson, Jason L. Hornick, Teri A. Longacre, Victor E. Reuter. Wolters Kluwer. 2015; 1467.
5. Boerner, Scott L., Asa, Sylvia L. Biopsy interpretation of the thyroid. 2nd ed. Wolters Kluwer; 2017. 10-69p.
6. Fischer S, Asa SL. Application of immunohistochemistry to thyroid neoplasms. Arch Pathol Lab Med. 2008;132(3):359–372.
7. Filie AC, Asa SL, Geisinger KR, et al. Utilization of ancillary studies in thyroid fine needle aspirates: a synopsis of the National Cancer Institute Thyroid Fine Needle Aspiration State of the Science Conference. Diagn Cytopathol. 2008;36(6):438–441.
8. Sreedevi AR, Sheela KM. Histopathological spectrum of non-neoplastic and neoplastic lesions of thyroid- a 2-year study in a tertiary care teaching hospital. J Med Sci Clin Res. 2018;6(6):145-149.
9. Ramesh VL, Ramu S. Study of distribution of Thyroid lesions in a hospital. Int J Sci Res. 2014;3(12):541-545.
10. Beigh A, Amin J, Junaid S. Histopathological study of thyroid neoplastic lesions in a tertiary care hospital – A 5-year study. Int J Cont Med Rea. 2018;5(4): D4-D7.
11. Bharathidhasan I, Goneppanavar M, Dhaka RS. Changing trends in the incidence of thyroid lesions in coastal

- regions of south India. *Int J Health Sci Res.* 2015; 5(6):134-141.
12. K. Prathipa, P.S. Vamitha. A Study on Histomorphological Patterns of Thyroid Lesions – An Experience of a Rural Tertiary Care Centre. DOI: <https://dx.doi.org/10.18535/jmscr/v8i1.154>
 13. K.F. Magdalene, Jose Swetha, Navya Narayanan, B Sumangala. Histopathological study of thyroid lesions in a tertiary care center in coastal belt of South India. *Trop J Path Micro* 2017;3(1):77-83.
 14. Haque WS et al. Histomorphologic spectrum of thyroid lesions in surgically treated thyroid specimens. *BIRDEM Med J* 2020; 10(1): 54-59.
 15. Naresh Gurbani, Prince Lokwani, Rajneesh Berdia. To Study the Histopathological Forms of Thyroid Lesions Observed in Tertiary Care Hospital. *IJCRR* DOI: <http://dx.doi.org/10.31782/IJCRR.2020.121423>
 16. Almukhtar ZK. Histopathological Types of Papillary Thyroid Carcinoma: Clinicopathologic Study. *Open Access Maced J Med Sci.* 2022 Jan 09; 10(A):79-83.
 17. Anupama Raj K, Benzy Paul, KA Aisabi. Histopathological spectrum of papillary carcinoma thyroid– a 4-year retrospective analysis. *Trop J Path Micro* 2018;4(2):220-225.
 18. Christopher D.M. Fletcher. Diagnostic histopathology of tumours. 5th ed. Philadelphia, Elsevier; c2021; 1269-71.
 19. Padmom L, Beena D, Sapru K. Histopathological spectrum of thyroid lesions- a two-year study. *J. Evolution Med. Dent. Sci.* 2020;9(07):418-421,
 20. Histopathological study of neoplastic lesions of thyroid in a tertiary care centre – RIMS, Raichur. *Indian J Pathol Oncol.* 2020;7(1):113-117.
 21. Beigh A, Amin J, Junaid S, et al. Histopathological study of thyroid neoplastic lesions in a tertiary care hospital - a 5-year study. *International Journal of Contemporary Medical Research.* 2018;5 (4): D4-D7.
 22. Salami BA, Odusan O, Ebili HO, et al. Spectrum and prevalence of thyroid diseases seen at a tertiary health facility in Sagamu, South-West Nigeria. *Niger Postgrad Med J.* 2016;23 (3):137-40.
 23. Siddique MA, Islam MS, Kabir A, Mondol MTI, Alam MR, Awual SMA, Sarker UK, Afrin A, Kashem MA. Pattern of Thyroid Swelling – A Histopathological Study. *Sir Salimullah Med Coll J.* 2022; 30: 75-82.
 24. Ravindran HK. Papillary carcinoma thyroid – Histological subtypes and clinical significance. *J Head Neck Physicians Surg.* 2022; 10:30-5.
 25. Baloch, Z.W., Asa, S.L., Barletta, J.A. et al. Overview of the 2022 WHO Classification of Thyroid Neoplasms. *Endocr Pathol.* 2022; 33: 27–63.