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Original Research Article

# Histopathological assessment of non-neoplastic thyroid lesions - A cross-sectional study

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ABSTRACT

**Introduction:** Thyroid lesions usually present as mass lesions or in association with hypo or hyper thyroidism. FNAC has certain limitations like adequacy of specimen and interpretation of cytology, as the sampling of the lesion can be variable and not always representative. Hence, specific diagnosis can be arrived at only after a histopathological examination.
**Objectives:** The present study was undertaken to describe histopathology patterns, frequency, age and sex distribution of non-neoplastic thyroid gland lesions in the southwest region of Maharashtra to aid clinicians in appropriate treatment and prognosis.
**Materials and Methods:** This was a cross-sectional study of 110 non-neoplastic thyroid specimens received at the department of Pathology, D.Y. Patil Medical College, Kolhapur, between October 2018 to September 2020.
**Results:** The frequency of non-neoplastic thyroid lesions was found to be 2% of all surgical specimens. Most commonly encountered specimens were of Hemithyroidectomy (31.8%) Female predominance with F:M ratio of 2.5:1 was seen. Most of the lesions occurred in the $4^{th}$ decade. Out of the 110 cases, most common lesions were hyperplastic (74.5%), followed by inflammatory lesions (21.8%) and congenital lesions (3.7%). Evaluation of any thyroid specimen should be thorough through complete histopathological examination.
**Conclusion:** Histopathological evaluation of any enlarged thyroid should be thorough to arrive at a definite diagnosis.



## 1. Introduction

Thyroid gland is a vital gland essential for proper growth and development of nervous system and body.[1–3] Diseases of the thyroid gland include a vast array of genetic, inflammatory, developmental, immunologic & neoplastic disorders. The incidence and microscopy of thyroid lesions is shown to vary with factors like geographical region, age, gender, nutrition and environment.[1] Thyroid lesions usually present as mass lesions or in association with hypo or hyper thyroidism. Different methods used to diagnose thyroid nodules include clinical evaluation, thyroid function tests and ultrasonography. However, these methods are not considered strong for evaluation thyroid nodules.[4] Final and accurate diagnosis useful for treatment and prognosis is based on FNAC or histopathological examination of thyroid nodules. FNAC is an established investigation in cases of thyroid lesions, in spite of many advantages, it has certain limitations like adequacy of specimen and interpretation of cytology, as the sampling of the lesion can be variable and not always representative.[5] Thus, specific diagnosis can be arrived at only after a histopathological examination. The present study is undertaken to describe patterns, frequency, age and sex distribution of non-neoplastic thyroid gland lesions in the southwest Maharashtra.

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## 2. Materials and Methods

The present cross-sectional study was conducted in the department of Pathology, D Y Patil Medical College, Kolhapur, over a period of two years between October 2018 to September 2020. This study included 110 non-neoplastic thyroid specimens presented to department during the study period. The clinical details such as age, sex, presenting complaints, location and clinical diagnosis were noted from the request forms sent along with the specimens. Neoplastic lesions of thyroid and lesions of supporting tissue were excluded from the study. Large specimens were sectioned serially at 1cm thickness and fixed in buffered formalin for 12 hours. After fixation, gross features were noted and the bits were given from the representative areas. After processing tissue sections prepared and stained with hematoxylin and eosin. Then light microscopy study was done and detailed microscopic findings were noted.For statistical analysis, data was tabulated in Microsoft excel and percentages were calculated.

## 3. Results

The present study includes 110 cases of non-neoplastic thyroid lesions received as surgical specimens in department of Pathology between October 2018 to September 2020. Non -neoplastic thyroid lesions comprised 2% of all surgical specimens received in the histopathology section. Females preponderance was noted in the study with a female to male ratio of 2.5 to 1. The major proportion of cases of non-neoplastic thyroid lesions were noted in the $4^{th}$ decade (37.2%), followed by $5^{th}$ decade (27 cases, 24.5%). The youngest case was 4-years-old, while the oldest was 68-years-old. The most frequently encountered specimen was hemithyroidectomy (31.8%), followed by lobectomy (29.1%), total thyroidectomy (20%), subtotal thyroidectomy 17 cases (15.5%), excision of cyst 3 cases (2.7%), enucleation of nodule 1 case (0.9%). Out of total 110 cases of thyroid lesions, 74.5% were hyperplastic lesions of thyroid, and 21.8% were inflammatory lesions and 3.7% were congenital lesions of the thyroid.

hows the frequency distribution of non-neoplastic lesion by type of lesion. Goitre was the most common lesion in the present study, accounting for 82 cases (74.5%), out of which multinodular goitre comprised 53 cases (48.2%), followed by colloid goitre with 29 cases (26.4%). Among the inflammatory lesions, lymphocytic thyroiditis was found in majority accounting for 12 cases (10.9%), followed by Hashimoto's thyroiditis with 10 cases (9.1%).

Congenital lesions: One thyroglossal cystwas noted from each of the $1^{st}$, $2^{nd}$, and $3^{rd}$ decades. Youngest case was a 4-year-old male, and oldest case was a 42-year-old male. Female: Male ratio was 1:2**.** All three cases presented as midline swellings. The cyst size differed from 1 to 2 cm in maximum dimension. cystic in consistency with serous fluid drained out.On microscopy, two of the cysts were lined by ciliated respiratory epithelium and one of the cysts was lined by simple squamous epithelium. The cyst was is fibro collagenous. None of the cysts showed thyroid follicles in the cyst wall (Figure 1).Dyshormonogenetic goitre case was a 16-year-old female.Specimen was of size 10x8x6 cms, nodular in appearance, soft to firm in consistency, tan brown in colour. Cut-surface appeared nodular, haemorrhage and fibrosis were noted.On microscopy, sections studied showed multiple hyperplastic nodules separated by fibrous septae (Figure 2). The nodules were composed of extremely cellular follicles, microfollicular and trabecular pattern with minimal colloid. The cells lining the follicles showed cytologic atypia with hyperchromasia, nuclear enlargement, and few mitotic figures. Haemorrhagic focus was also seen.

**Table 1:** Distribution of non-neoplastic thyroid lesions (N=110)

| Type of lesion | Number | Number | % |
|---|---|---|---|
| Congenital | Thyroglossal duct cyst | 3 | 2.7 |
| Hyperplastic | Dyshormonogenetic goitre | 1 | 0.9 |
| | Colloid goitre | 29 | 26.4 |
| | Multinodular goitre | 53 | 48.2 |
| Inflammatory | Lymphocytic thyroiditis | 12 | 10.9 |
| | Hashimoto's thyroiditis | 10 | 9.1 |
| | Granulomatous thyroiditis | 2 | 1.8 |

Inflammatory thyroiditis: In lymphocytic thyroiditis, female predominance was seen with F:M ratio of 1.4:1. Age distribution ranged from 30 to 54 years of age with an average of 42.1 years. Majority of the specimens were of total thyroidectomy (66.7%), followed by hemithyroidectomy (16.7%), subtotal thyroidectomy and lobectomy (8.3% each). Grossly,Size of specimens varied from 5.5 to 10 cm in largest diameter. All cases showed diffuse enlargement of the thyroid, with soft to firm consistency. Cut-sections had tan to brown appearance. Microscopic appearance showed thyroid follicles of varying sizes, lined by flattened to cuboidal epithelium containing abundant to scanty colloid. Most of the follicles appeared atrophic. Focal areas of Hurtle cell metaplasia were noted in all cases with diffuse and dense infiltration of lymphocytes with or without geminal centers forming lymphoid follicles. Secondary changes like haemorrhage and fibrosis was seen. In Hashimoto's thyroiditis Female: Male ratio was 2.3:1.Age distribution ranges from 36 to 54 years of age with an average of 43.2 years. Total thyroidectomy was done in 50% of the cases, followed by subtotal thyroidectomy (30%), hemithyroidectomy (20%)**.** Grossly**,** specimens varied from 5 to 10 cm in size with firm consistency. Cut section showed homogenous tan

to brown appearance.Microscopy showed destruction and atrophy of follicles with diffuse to dense lymphocytic infiltration without germinal centres forming lymphoid follicles, follicles showed abundant to scanty colloid. Dense Hurtle cell metaplasia was noted in all cases replacing normal parenchyma (Figure 3). Secondary changes like fibrosis and haemorrhage were also noted. Two cases of granulomatous thyroiditis were of 30 and 58 years of age respectively. Total thyroidectomy specimen size varied from 5 to 9 cm is largest dimension. Firm in consistency, brown to tan in colour. Cut-section was solid and nodular. Microscopy showed atrophy and destruction of follicles with diffuse, dense and aggregates of lymphocytes, along with giant cells, neutrophils, plasma cells, foamy histocytes, epithelioid histiocytes, forming non-caseating granulomas in a nodular fashion. Dense fibrosis was noted replacing normal thyroid architecture. Secondary changes like haemorrhage and fibrosis were also noted. ZN staining was done and was negative for acid fast bacilli.

Hyperplastic: Highest number of cases were observed in $4^{th}$ decade. The youngest case was 22 years old and the oldest was 68 years of age, the average age of this study was 40 years. There was female predominance and female to male ratio was 3.3:1. Specimen ranged from 2 to 12 cm in maximum dimension. External surface showed congestion. Single nodules were seen in 15 cases, multiple nodules (Figure 5) were seen in 53 cases and diffuse enlargement was seen in 14 cases. Cut-surface showed homogenous, nodular or cystic appearance with gelatinous brown appearance. Secondary changes like cystic degeneration, hemorrhage, fibrosis and calcification were noted. Microscopically, all cases of goitre showed nodules composed of follicles of varying sizes line by cuboidal to flattened epithelium with abundant colloid and separated by fibrous septa (Figure 6). Areas of cystic degeneration, hemorrhage, Sanderson pollster, calcification and fibrosis and other features were noted as the secondary changes in varying proportions. There was local accumulation of eosinophils in goiter, which is thought to be related to the presence of both lymphocytes in the thyroid and circulating antibody, suggesting that the lymphocyte-derived eosinophil chemotactic factor might be involved in this accumulation (Figure 7).[6]In our study we received few dual lesions with dual pathology, one case of colloid goitre with lymphocytic thyroiditis (0.9%), one case of lymphocytic thyroiditis with papillary carcinoma (0.9%) (Figure 4), 4 cases of Multinodular goitre with lymphocytic thyroiditis (3.6%), 1 case of multinodular goitre with follicular adenoma (0.9%).

## 4. Discussion

Thyroid gland lesions are one of the most common disorders of the endocrine system. It is easily palpable and even visible in slender patients because of its anatomical location.

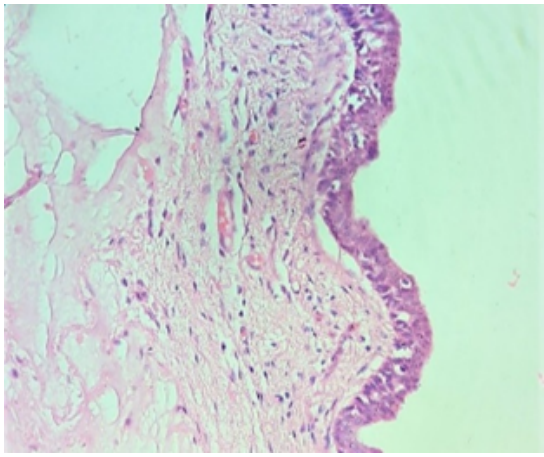

**Fig. 1:** Thyroglossal duct cyst -Photomicrograph from H & E stained section shows cystwall lined by respiratory epithelium

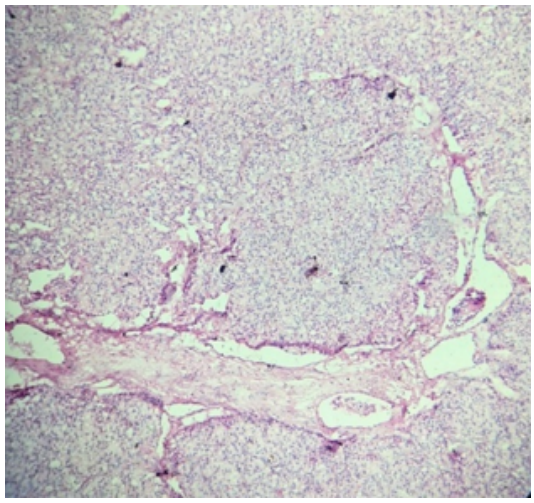

**Fig. 2:** Dyshormonogenetic goiter- Photomicrograph from H & E stained sectionshows the cellular nodule composed of microfollicles

Any change in size can be easily noticed and investigated. Thyroid gland lesions have been studied and reported in many areas of the world and is of great importance for proper treatment. In 2 years of study duration, 110 non-neoplastic thyroid specimens were encountered. The occurrence of non-neoplastic thyroid lesions was 2% of all surgical biopsies. Studies have shown that the incidence of thyroid disease varies all over the world in different geographical areas and different races, this is mainly due to difference in the iodine content in the soil worldwide. Almost $1/3^{rd}$ of the world population lives in iodine deficiency areas. Goitre is endemic in areas where the iodine content is <50 $\mu$g, and if daily intake falls <25 $\mu$g, congenital hypothyroidism is seen. The prevalence of goitre in areas of severe iodine deficiency can be as high as 80%. Populations which are at risk are usually remote and live in

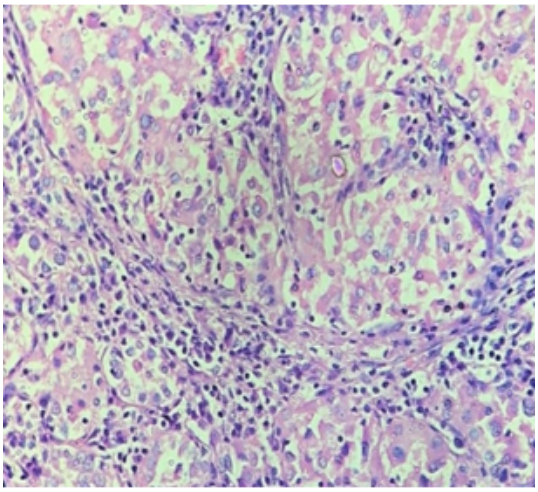

**Fig. 3:** Hashimoto'sthyroiditis – Photomicrograph showing extensive Hurtle cell metaplasia.

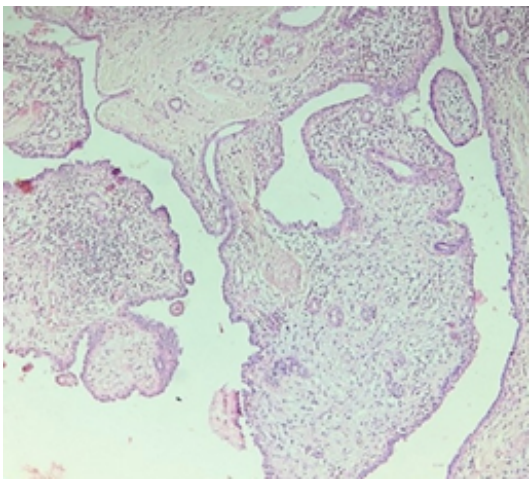

**Fig. 4:** Photomicrograph of H& E stainedsection from Lymphocytic thyroiditis with Papillary carcinoma

**Fig. 5:** Multinodulargoiter- Gross morphology shows multiple nodules onexternal surface and on cut surface.

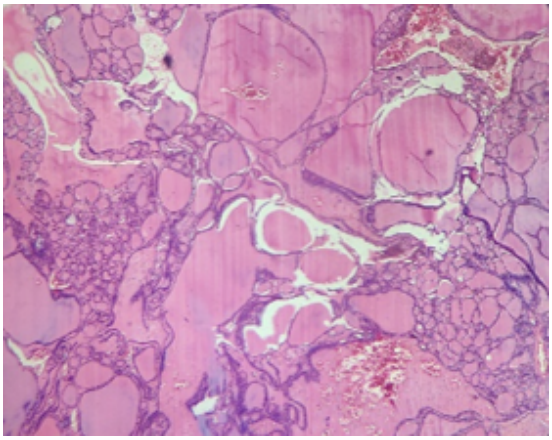

**Fig. 6:** Photomicrographof H & E stained section from multinodular goiter is showing hyperplastic nodule with varying sizefollicles.

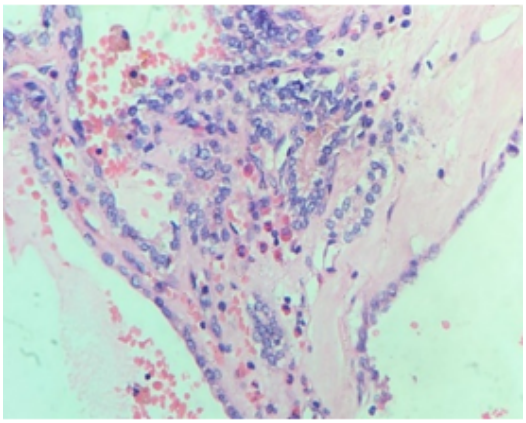

**Fig. 7:** Photomicrograph of H & E stained section, arrowshows Eosinophilsin Multinodular goitre.

mountainous areas in South-east Asia, Latin America and Central Africa.[7–11]

In our study, females formed the majority of cases, out of 110 cases 72% of lesions are seen in females and 28 % of lesions are seen in males, thus there is female predominance with female to male ratio 2.5:1. This is concordant to most of the other studies conducted around the world.[8,12–16] The female predominance is due to the presence of estrogen receptors in the thyroid tissue[17] and also linked to autoimmunity which is more commonly found in women than men. Female predominance is noticed more in studies conducted around coastal regions, such as Kerala,[12] Newcastle,[14] Bangladesh[16] and Dublin,[15] it may be due to the difference in iodine content in coastal and non-coastal regions. The age group ranged from 4 to 68 years; the mean age is 40 years in the present study. The most common age group was 4th decade and comprises 37.3% of the cases (41 cases), followed by 5th decade (27 cases, 24.5%), the least number of cases were observed

in $2^{nd}$ and $1^{st}$ decade with 2 case (1.9%) and 1 case (0.9%) respectively, therefore we can conclude that the most common age group for non-neoplastic thyroid lesions is between the $4^{th}$ and $5^{th}$ decade. This is similar to Dash et al.,[11] Neemawat et al.,[18] Solomon et al.,[10] Ramesh et al.,[19] studies.

Hemithyroidectomy and lobectomy was the most commonly performed surgery for benign thyroid lesions followed by total thyroidectomy. These findings are similar to other studies like Watkinson 2010,[20] and Gautam et al.,[21] studies. The reasons for the divergent views in the surgical approach are due to varying spectrum of histological and biological behavior of thyroid lesions.

Hyperplastic thyroid lesions (Goitres) constituted majority of lesions in studies of Brazil, Korea, Saudi Arabia, New castle followed by inflammatory lesions and congenital lesions.[7,13,14,22] Whereas study conducted in Nigeria by Solomon et al.,[10] in hyperplastic lesions were most common followed by congenital lesions and then inflammatory lesions. Among the hyperplastic lesions, the studies conducted in India showed prevalence of MNG more than colloid goitre similar to our study.[11,12,18,23] All the international studies also showed prevalence of MNG similar to our study.[7,14,22] except Albasri et al. of Saudi Arabia[13] where colloid goitre was more prevalent. These differences are due to disparity in the terminology and classification of lesions in various studies. Few authors use clinical terminology and other authors use histomorphology and pathogenetic classification. Hence, it is difficult to correlate the study with other authors. In this study, there were few dual lesions, diagnosis of such lesions can only be arrived after thorough histopathological examination and can be overseen by other non-invasive techniques. Similar to our study some cases of goitre were associated with Lymphocytic or Hashimoto' thyroiditis.[24] Surgical excision and histopathological evaluation are crucial to establish diagnosis. It will be of great value for clinicians for further therapy and prognosis.

Among the inflammatory lesions, Hashimoto's thyroiditis was most common in majority of the studies within India and globally. In our study lymphocytic thyroiditis was more common than Hashimoto's thyroiditis, similar to studies conducted by Sheela et al.,[12] Park et al,[22] Bisi et al.,[7] (Kerala, Korea and Brazil). Most of the studies showed Thyroglossal cyst as most common congenital thyroid lesion which is concordant to our present study.

## 5. Conclusion

The information provided by the present study may be considered as the baseline data of the non-neoplastic thyroid lesions occurring in south west Maharashtra. Hyperplastic lesions formed the bulk of non-neoplastic lesions, emphasising that goitrous thyroid swelling is a common problem in this region. Female predominance was seen in our study and the most common age affected was in the $4^{th}$ decade of life. Although clinical examination and non-invasive diagnostic techniques may provide the clinician a provisional diagnosis, often the ultimate answer depends on the histopathological examination of the excised tissue. Any of the thyroid disease can manifest as a thyroid nodule, therefore histopathological evaluation of any enlarged thyroid should be thorough to arrive at a definite diagnosis.

## 6. Conflicts of Interest

All contributing authors declare no conflicts of interest.

## 7. Source of Funding

None.

## References

1. Kumar V, Abbas A, Aster J. Endocrine system. In: Robbins & Cotran Pathologic Basis of Disease, 9th Edn. Philadelphia, Saunders; 2005. p. 1156–226.
2. Lewis EB. Anatomy of thyroid gland. In: Werner and Ingbar's The Thyroid, A fundamental and clinical text. In: 7th Edn. Philadelphia: Lippincott-Raven Press; 2001. p. 43–55.
3. G W. The Thyroid gland. In: Review of Medical Physiology. 22nd Edn.. vol. 22. San Francisco: McGraw-HillCo; 2005. p. 317–32.
4. Delellis RA. Tumors of the thyroid and parathyroid. World Heal Organ Classif tumors Pathol Genet tumors Endocr organs; 2004. p. 49–134.
5. Bhargava S, Bansal R, Elhence P, Pandey S, Makkar N. Cyto-Histological Correlation of Thyroid Lesions with Estrogen and Progesterone Receptor Status on Neoplastic Lesions. *J Clin Diagn Res*. 2012;6(5):811–5.
6. Cohen S, Rose NR, Brown RC. The appearance of eosinophils during the development of experimental autoimmune thyroiditis in the guinea pig. *Clin Immunol Immunopathol*. 1974;2(2):256–65. doi:10.1016/0090-1229(74)90043-9.
7. Bisi H, Fernandes VSO, Rosalinda Y, Camargo AD, Filho AL, Ruggeri GB, et al. Neoplastic and Non-Neoplastic Thyroid Lesions in Surgical Material: Historical Review of Five Decades in São Paulo, Brazil. *Tumori J*. 1995;81(1):63–6. doi:10.1177/030089169508100115.
8. Tsegaye B, Ergete W. Histopathologic pattern of thyroid disease. *East Afr Med J*. 2004;80(10):525–8. doi:10.4314/eamj.v80i10.8755.
9. Darwish AH, Sindi KAA, and JEK. Pattern of Thyroid Diseases - A Histopathological Study. *Bahrain Med Bull*. 2006;28(4):4–9.
10. Solomon R, Iliyasu Y, Mohammed A. Histopathological pattern of thyroid lesions in Kano, Nigeria: A 10-year retrospective review (2002-2011). *Niger J Basic Clin Sci*. 2002;12:55.
11. Dash M, Chandrashekhar KPA, Raghu K, Kethireddy S. Histopathological Study of Neoplastic and Non-Neoplastic Thyroid Lesions: an Institutional Experience of 2 Years. *J Evol Med Dent Sci*. 2016;5(73):5348–51. doi:10.14260/jemds/2016/1213.
12. Sheela KM, Sreedevi AR. Histopathological analysis of thyroid lesions: an institutional experience. *Int J Adv Med*. 2018;5(5):1217–21.
13. Albasri A, Sawaf Z, Hussainy AS, Alhujaily A. Histopathological Patterns of Thyroid Disease in Al-Madinah Region of Saudi Arabia. *Asian Pac J Cancer Prev*. 2014;15(14):5565–70. doi:10.7314/apjcp.2014.15.14.5565.
14. Tabaqchali MA, Hanson JM, Johnson SJ, Wadehra V, Lennard T, Proud G, et al. Thyroid aspiration cytology in Newcastle: A six year cytology/histology correlation study. *Ann R Coll Surg Engl*. 2000;82(3):149–55.

15. Chukudebelu O, Dias A, Timo C. Changing trends in Thyroidectomy. *Ir Med J*. 2012;105(6):167–9.
16. Rahman M, Biswas M, Siddika S. Histomorphological Pattern of Thyroid Lesion. *Dinajmc Org*. 2013;6(2):134–40.
17. Krukowski ZH. The thyroid gland and the thyroglossal tract. Baily Love's Short Pract Surgery . In: 24th Edn. London Arnold; 2004. p. 776–804.
18. Neemawat K, Nag BP, Yadav ML, Sharma K. Study of histopathological spectrum of thyroidectomy specimens and their correlation with age and gender. *J Scientific Innovative Res*. 2019;8:1–3.
19. Ramesh VL, Sr. Study of Distribution of Thyroid Lesions in a Hospital. *Int J Sci Res [Internet]*. 2014;3(12):2441–3.
20. Watkinson JC. Fifteen years' experience in thyroid surgery. *Ann R Coll Surg Engl*. 2010;92(7):541–7. doi:10.1308/003588410x12699663905230.
21. Gautam H, Kumar V, Kanaujia S, Maurya D, Singh S. Clinico-cytoradiological correlation of thyroid surgery in patients with thyroid nodule. *Ann Indian Acad Otorhinolaryngol Head Neck Surg*. 2017;1(2):17–23. doi:10.4103/aiao.aiao_7_17.
22. Park SH, Suh EH, Chi JG. A histopathologic study on 1,095 surgically resected thyroid specimens. *Jpn J Clin Oncol*. 1988;18(4):297–302.
23. Prabha V, Bhuvaneswari M. A Study of Histopathological Spectrum of Thyroid lesions. *Int J Sci Study* . 2019;7(1):1–4.
24. Rosai J, Carcangiu M, Washington RG, Undefined D, Institute AF. Atlas of Tumor Pathology: Tumors of the Thyroid Gland. In: and others, editor. Third Series - Fascicle 5. vol. 5. fascicle: Atlas of Tumor Pathology. Third series; 1990.

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