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Histomorphological Spectrum of Benign Thyroid Lesions: A 6-Year Retrospective Analysis from Ebonyi State, Nigeria

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Abstract **Original Research**

Background: Benign thyroid lesions exhibit diverse histomorphological features reflecting a range of non-neoplastic and neoplastic processes. They are far more common than malignant thyroid disease; yet regional histopathological data from South-East Nigeria remain limited. This study analyses the histomorphological spectrum of benign thyroid lesions diagnosed over a six-year period in Abakaliki, Ebonyi State, with attention to age- and sex-specific patterns and their year-on-year trends.

Methods: This retrospective, descriptive, analytical study reviewed 148 benign thyroid specimens identified from 12,850 surgical specimens processed in the Department of Anatomic Pathology, Alex-Ekwueme Federal University Teaching Hospital, Abakaliki, between January 2016 and December 2021. Haematoxylin- and eosin-stained slides were independently reviewed by two histopathologists; special stains or immunohistochemistry were used where indicated. Patient age, sex, and final diagnosis were extracted for each case. Chi-square tests were used to assess associations between age group and lesion category and between sex and diagnosis.

Results: Benign thyroid lesions accounted for 148/12,850 (1.15%) of all surgical specimens received over the study period. Females predominated (123/148, 83.1%), giving a female-to-male ratio of 4.9:1. Patient age ranged from 5 to 69 years (mean 35.9 ± 11.3 years), with the 41–50-year (32.4%) and 31–40-year (29.7%) groups most affected. Multinodular goitre was the most frequent diagnosis (62/148, 41.9%), followed by simple colloid goitre (41/148, 27.7%); goitre of any type accounted for 110/148 (74.3%) of all lesions. Age group was significantly associated with lesion category (goitrous versus non-goitrous lesions; $\chi^2 = 35.3$, df = 6, $p < 0.001$), with goitres disproportionately concentrated in patients aged 21–50 years, while thyroglossal cysts and Graves' disease showed a different age distribution. Case volume rose steadily over the study period, from 16 cases in 2016 to 36 cases in 2021.

Conclusion: Multinodular and simple colloid goitre remain the predominant benign thyroid lesions in this environment, disproportionately affecting women in their reproductive and working years. The significant association between age group and lesion category suggests that age-targeted case-finding could improve early detection, while the sustained rise in caseload over the study period highlights a growing burden with implications for local histopathology service planning.

Keywords: Benign thyroid lesions, Multinodular goitre, Goitre, Ebonyi State, Histomorphology, Nigeria.

INTRODUCTION

Benign thyroid lesions are discrete, non-cancerous growths within the thyroid gland that are radiologically distinct from the surrounding parenchyma.[1] The majority of thyroid nodules are benign, accounting for up to 95% of all thyroid nodules,[2] and their incidence rises with age. Thyroid disease is reported to be the second most common endocrine disorder after diabetes mellitus,[3] and is a significant contributor to global morbidity, particularly in iodine-deficient regions. Benign thyroid lesions, including goitres, thyroiditis, and benign neoplasms such as follicular adenoma, are far more common than their malignant counterparts and account for the majority of thyroid surgeries.[4]

The thyroid gland, situated in the anterior neck, secretes three hormones, triiodothyronine (T3), tetraiodothyronine (T4), and calcitonin, that regulate metabolism, growth, and development.[5] Thyroid hormone secretion is mediated by thyroid-stimulating hormone from the anterior pituitary gland. Thyroid pathology ranges from small, harmless goitres to life-threatening carcinoma, and clinical manifestations of dysfunction include fatigue, lethargy, cold intolerance, slurred speech and cognitive impairment, and hair loss.[6] Thyroid disorders are relatively common across the African continent, and the global incidence of thyroid disease continues to rise, partly reflecting wider use of diagnostic techniques such as ultrasound and palpation. Among thyroid diseases, benign nodules are the most common, with reported population prevalence ranging from 20–70%.[7] In Nigeria, benign thyroid disease is relatively common, with non-toxic goitre being the most frequently encountered condition, alongside thyroid adenomas and thyroiditis.[8] Some nodules remain asymptomatic, while others cause noticeable enlargement, leading to compressive symptoms or cosmetic concern.

The pathogenesis of non-toxic goitre, the most common benign thyroid lesion in most Nigerian series, including the present one, is closely tied to iodine nutrition. Chronic dietary iodine insufficiency reduces thyroid hormone synthesis, leading to a compensatory pituitary thyroid-stimulating hormone drive and follicular cell hyperplasia; over time, repeated cycles of hyperplasia and involution produce the heterogeneous nodularity characteristic of multinodular goitre. Environmental goitrogens are naturally occurring substances in staple foods such as cassava, which contain cyanogenic glycosides capable of interfering with thyroidal iodine uptake, and have also been implicated as contributors to goitre endemicity in several Nigerian communities, compounding the effect of marginal iodine intake. This dietary and environmental context is relevant to interpreting the very high proportion of goitrous lesions (74.3%) observed in the present series.

Nigerian studies have shown wide regional variation in the prevalence and pattern of thyroid lesions, reflecting factors such as iodine deficiency, environmental goitrogens, and socio-demographic differences. Data on thyroid disease from African countries remain comparatively limited despite a reported upsurge in cases since the 1970s,[9] and robust data from South-East Nigeria, particularly Ebonyi State, are lacking.

The marked female predominance consistently reported in benign thyroid disease, including in the present series, is not fully explained by iodine nutrition alone and is thought to have a hormonal and immunological basis. Oestrogen receptors are expressed in thyroid follicular tissue and can modulate glandular growth and function, while autoimmune thyroid conditions such as Hashimoto thyroiditis and Graves' disease encountered in this series are 4 to 15 fold more common in women. This disparity has been linked to X-chromosome-related immune tolerance genes and to the relative balance of prenatal androgen and oestrogen exposure. This sex-hormone-mediated susceptibility, layered on top of the population-level effect of iodine nutrition, likely accounts for much of the female

preponderance observed across the benign thyroid lesion spectrum, including both goitrous and autoimmune/inflammatory categories.

Classification of thyroid pathology has evolved substantially in recent years. The fifth edition of the World Health Organization Classification of Endocrine and Neuroendocrine Tumours, published in 2022, introduced the unifying term "thyroid follicular nodular disease" to describe the heterogeneous group of non-neoplastic and clonal follicular proliferations that clinically present as multinodular goitre, and renamed "Hürthle cell" lesions as "oncocytic" lesions to better reflect their cytogenesis. These terminological updates are increasingly used in contemporary histopathology reporting and are referenced in this study's discussion of lesion categorisation, including the single oncocytic (Hürthle cell) adenoma identified in this series.

Alex-Ekwueme Federal University Teaching Hospital, located in Abakaliki, the capital of Ebonyi State, is a tertiary public hospital serving a large catchment population. This study reviews the histomorphological spectrum of benign thyroid lesions diagnosed at this centre over a six-year period, with attention to age- and sex-specific patterns and temporal trends that may inform local screening and referral practice.

MATERIALS AND METHODS

This was a descriptive, retrospective analytical study conducted in the Department of Anatomic Pathology, Alex-Ekwueme Federal University Teaching Hospital, Abakaliki. All thyroid specimens received in the department between January 1, 2016, and December 31, 2021 (a six-year period) were reviewed. Patient bio-data were retrieved from the departmental daily register and supplemented with data from the institutional database. Archived slides were retrieved and reviewed; where necessary, new sections were cut from archived paraffin blocks. Specimens were obtained from thyroidectomies, lumpectomies, and trucut biopsies, routinely processed and stained with haematoxylin and eosin. Special stains, immunohistochemistry, and molecular studies were used where the haematoxylin- and eosin-stained sections alone were insufficient for a definitive diagnosis. Samples with insufficient clinical history or with lost slides and/or blocks were excluded.

All slides were independently reviewed by two histopathologists, and diagnoses were made according to standard histopathological criteria. Patient age, sex, and final diagnosis were recorded for each case. Descriptive statistics (frequencies, percentages, mean ± standard deviation) were used to summarise demographic and diagnostic data. The chi-square test was used to assess the association between age group and lesion category (goitrous versus non-goitrous lesions) and between sex and diagnostic category; a p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 148 benign thyroid specimens were identified among 12,850 surgical specimens processed by the department during the six-year study period, representing 1.15% of all surgical specimens received. Of these, 123 (83.1%) were female and 25 (16.9%) were male, giving a female-to-male ratio of 4.9:1 (Figure 1). Patient age ranged from 5 to 69 years, with a mean of 35.9 ± 11.3 years. The most affected age groups were 41–50 years (32.4%) and 31–40 years (29.7%) (Table 1, Figure 2, Figure 3).

Table 1: Age and Sex Distribution of Benign Thyroid Lesions (N = 148)

Age Group (years)	Male	Female	Total	%
1–10	2	1	3	2.0

Age Group (years)	Male	Female	Total	%
11–20	1	12	13	8.8
21–30	7	26	33	22.3
31–40	8	36	44	29.7
41–50	7	41	48	32.4
51–60	0	6	6	4.1
61–70	0	1	1	0.7
Total	25	123	148	100.0

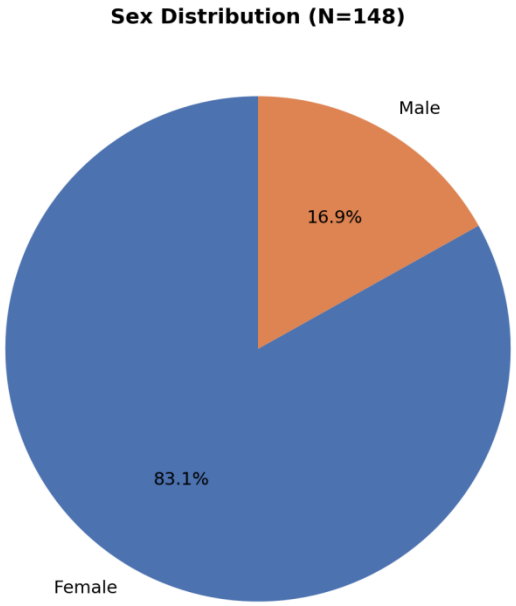

Figure 1. Sex distribution of benign thyroid lesions (N=148).

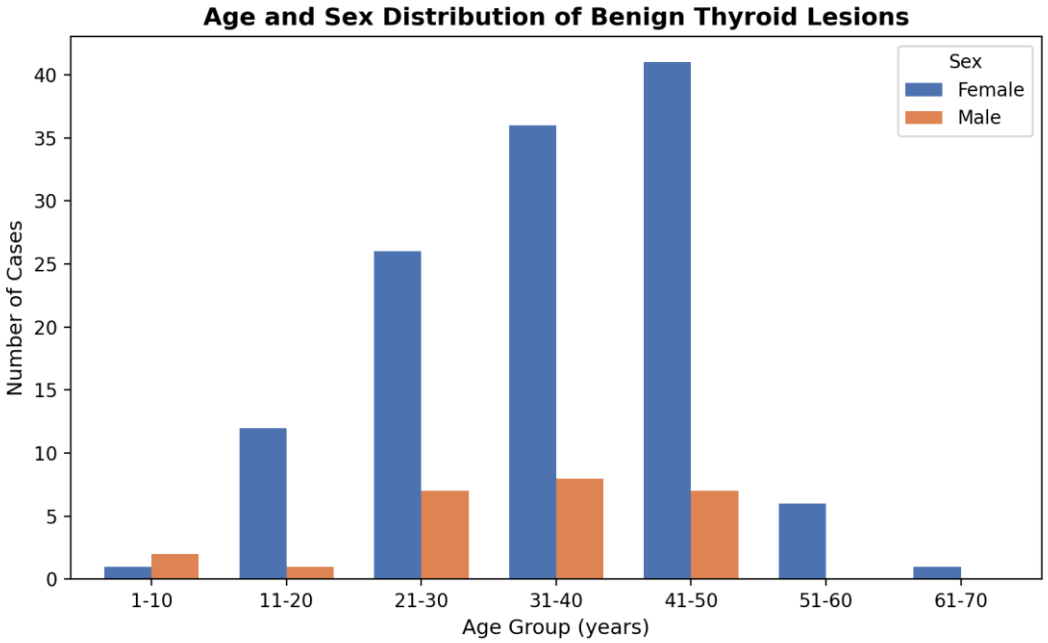

Figure 2. Age and sex distribution of benign thyroid lesions.

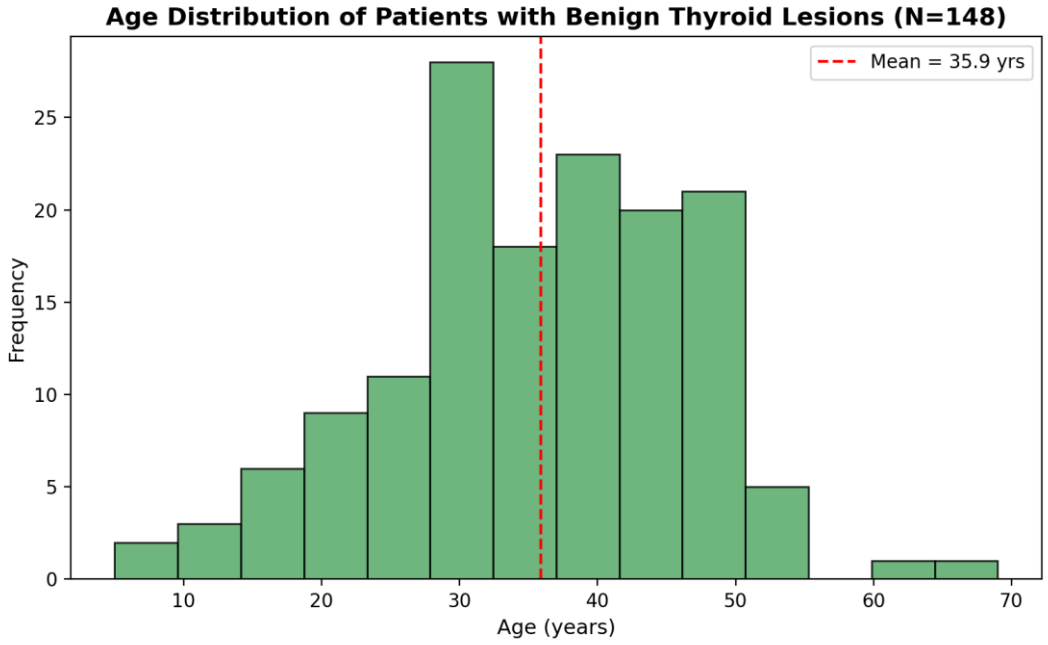

Figure 3. Age distribution histogram of patients with benign thyroid lesions.

Multinodular goitre was the most frequent diagnosis, accounting for 62/148 cases (41.9%), followed by simple colloid goitre (41/148, 27.7%). Together, goitrous lesions (simple colloid, multinodular, and simple diffuse goitre) accounted for 110/148 cases (74.3%) of the benign thyroid lesion spectrum. Thyroglossal cyst (13/148, 8.8%) and toxic hyperplasia/Graves' disease (10/148, 6.8%) were the

next most frequent diagnoses. A single case each of cystic thyroid disease and Hürthle cell (oncocytic) adenoma was recorded (Table 2, Figures 4 and 5).

Table 2: Sex Distribution by Histological Diagnosis (N = 148)

Diagnosis	Male	Female	Total	%
Multinodular goitre	7	55	62	41.9
Simple colloid goitre	13	28	41	27.7
Thyroglossal cyst	3	10	13	8.8
Toxic hyperplasia (Graves' disease)	0	10	10	6.8
Hashimoto thyroiditis	1	6	7	4.7
Simple diffuse goitre	1	6	7	4.7
Riedel thyroiditis	0	6	6	4.1
Cystic thyroid disease	0	1	1	0.7
Hürthle cell (oncocytic) adenoma	0	1	1	0.7
Total	25	123	148	100.0

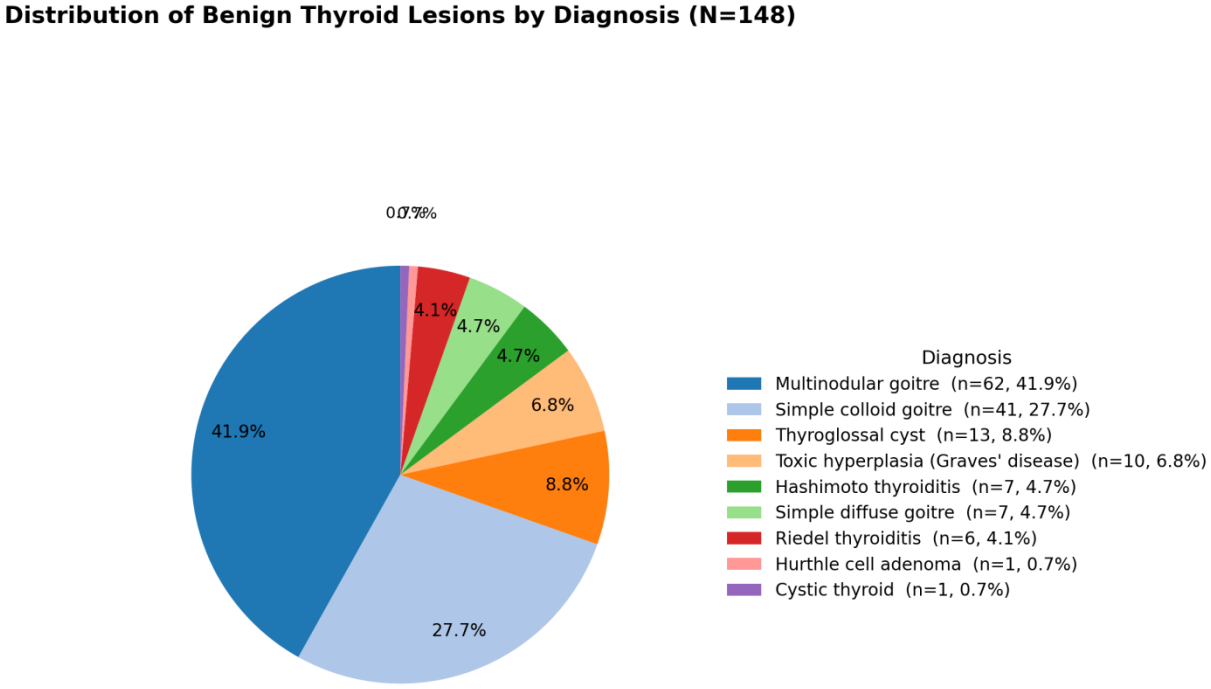

Figure 4. Proportional distribution of benign thyroid lesions by diagnosis.

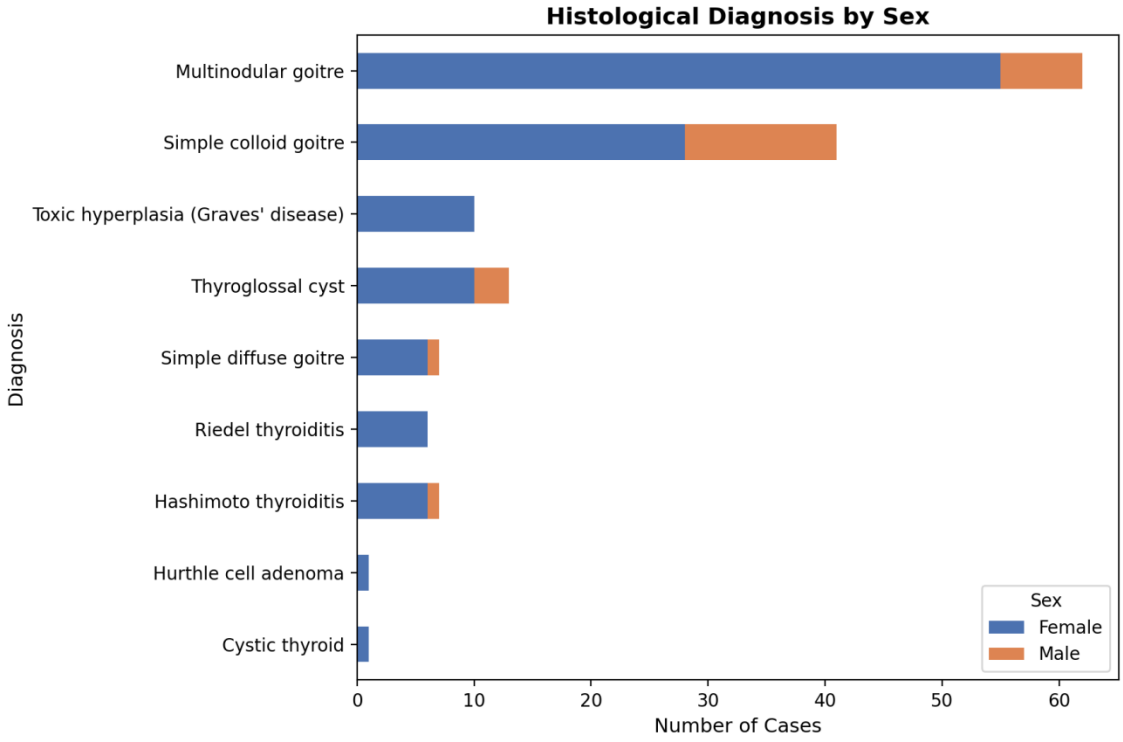

Figure 5. Histological diagnosis stratified by sex.

Case volume increased steadily over the study period, from 16 cases in 2016 to 36 cases in 2021 (Table 3, Figure 6), an overall 2.25-fold increase across the six years reviewed.

Table 3: Yearly Distribution of Benign Thyroid Lesions (2016–2021)

Year	Number of Cases	%
2016	16	10.8
2017	21	14.2
2018	21	14.2
2019	23	15.5
2020	31	20.9
2021	36	24.3
Total	148	100.0

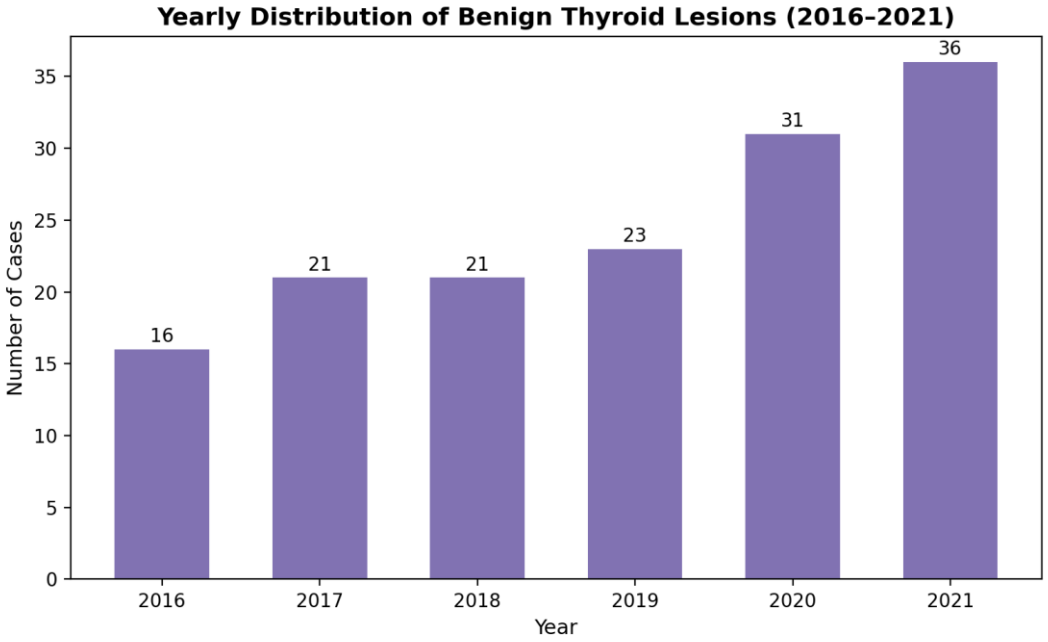

Figure 6. Yearly distribution of benign thyroid lesions, 2016–2021.

Age group was significantly associated with the lesion category: goitrous lesions (simple colloid, multinodular, and simple diffuse goitre, combined) were disproportionately concentrated in the 21–50-year age range (100/110 goitre cases, 90.9%), whereas thyroglossal cyst, Graves' disease, and thyroiditis cases showed a broader and comparatively younger or older age distribution (χ^2 =

35.3, df = 6, $p < 0.001$). No statistically significant association was found between sex and diagnostic category among lesions with adequate cell counts ($\chi^2 = 11.3$, df = 6, $p = 0.078$), indicating that, while females predominated overall, the relative proportions of specific lesion types did not differ significantly by sex.

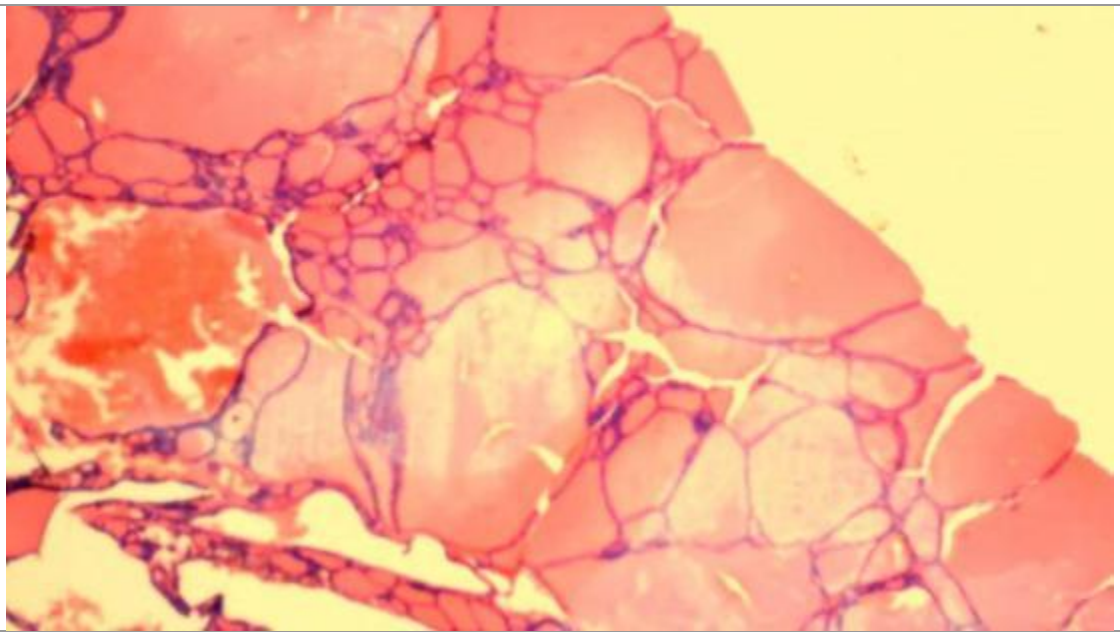

Figure 7. Photomicrograph of a multinodular goiter (H&E).

Embedded histopathology report of one of the diagnosed 62 multinodular goiter cases in Figure 7 above: The tissue architecture reveals characteristic macrofollicles lined by flattened epithelium, containing varying amounts of colloid, and separated by thin fibrous septa, reflecting the characteristic morphological features of a hyperplastic but quiescent nodule. The surrounding stroma appears unremarkable, lacking significant inflammatory infiltrates or signs of malignancy, thereby confirming the benign nature of the observed pathological changes within the thyroid tissue sample. These histological findings are consistent with a diagnosis of benign multinodular goiter, which is frequently associated with iodine deficiency or long-standing hormonal imbalances rather than neoplastic processes. Furthermore, the absence of capsular invasion or vascular involvement further supports the benign clinical classification, necessitating no further aggressive surgical intervention or oncological staging at this time. Routine follow-up via ultrasound and periodic monitoring of thyroid function tests are recommended to assess any future changes in nodular size or patient symptoms, ensuring timely clinical management should the condition progress or present new diagnostic indicators.

DISCUSSION

The prevalence of benign thyroid lesions among all surgical specimens in this study (1.15%) is broadly comparable to, though somewhat lower than, figures reported from some other Nigerian centres, and higher than figures reported from others, consistent with previously described regional variation in thyroid disease burden across the country. This variation likely reflects differences in dietary iodine

intake, environmental goitrogen exposure, including cyanogenic glycoside-containing staples such as cassava, widely consumed in this region, and healthcare-seeking behavior, rather than any single unifying cause. Ebonyi State lies within a broader South-Eastern Nigerian belt where population-level iodine and goitrogen data remain sparse; the present findings add histopathological evidence to what is otherwise a thin regional literature base.

A marked female predominance was observed in this study (83.1%; female-to-male ratio 4.9:1), consistent with the pattern reported by most other studies from Nigeria and elsewhere in Africa, as well as from other parts of the world. This predominance is unlikely to be explained by iodine nutrition alone, since dietary exposure is not obviously sex-differentiated within households. A more complete explanation likely combines two mechanisms operating together: first, oestrogen-receptor-mediated modulation of thyroid follicular growth, which may sensitise female thyroid tissue to the same goitrogenic and TSH-driven stimuli that affect both sexes; and second, a well-documented female bias in autoimmune thyroid disease specifically, with Hashimoto thyroiditis reported to be 10 to 15 fold more common in women than in men. This effect has been linked to X-chromosome-linked immune-regulatory genes and to the relative balance of prenatal androgen versus oestrogen exposure. Both mechanisms are relevant to this series, which included not only goitrous lesions but also Hashimoto thyroiditis, Graves' disease, and Riedel thyroiditis, all conditions with an autoimmune or presumed autoimmune basis and all female-predominant in this cohort. The age distribution observed, with peak involvement in the fourth and fifth decades of life, also mirrors the pattern reported from most Nigerian centres and is consistent with the timing of peak reproductive-hormone activity in women, lending further support to a hormonally mediated contribution to lesion development and detection in this age range.

Multinodular goitre was the most frequent lesion in this series (41.9%), followed by simple colloid goitre (27.7%), consistent with reports from several other Nigerian centres where goitrous lesions similarly predominate. Under the 2022 WHO classification framework, both entities fall within the unifying category of thyroid follicular nodular disease, reflecting current understanding that simple and multinodular goitre represent a continuum of the same underlying hyperplastic-involutional process rather than biologically distinct entities; this reframing is a useful lens through which to interpret the very high combined goitre burden (74.3%) in this cohort. This study additionally found a statistically significant association between age group and lesion category, with goitrous lesions disproportionately concentrated among patients aged 21–50 years, while thyroglossal cysts, Graves' disease, and thyroiditis showed a distinct age pattern. This finding adds an analytical dimension beyond simple frequency reporting and suggests that age-targeted screening or case-finding strategies focused on adults of reproductive and working age, in whom goitrous disease is disproportionately concentrated, may improve early detection of thyroid enlargement in this population, with potential downstream benefit for timely referral and management planning.

Thyroglossal cyst accounted for 13/148 cases (8.8%) in this series, occurring predominantly in children and young adults, consistent with the recognised bimodal age distribution of this developmental lesion described in the wider literature, where cases cluster both in the first decade of life and again in the third decade, reflecting its origin as a persistent remnant of the thyroglossal duct that may present at any point in life but is most frequently detected either in childhood or in early adulthood.

A comparatively higher proportion of Riedel thyroiditis was observed in this series (6/148, 4.1%) than would be expected from the wider literature, where Riedel thyroiditis is considered an exceedingly rare fibrosing disease, with reported incidence figures on the order of approximately one case per 100,000 population and accounting for well under 1% of thyroidectomy specimens in large international series. The relatively high proportion identified here may reflect a genuine referral or diagnostic pattern specific to this centre, possible over-inclusion of fibrosing variants of Hashimoto thyroiditis misclassified as Riedel thyroiditis based

on morphology alone (a recognised diagnostic pitfall given their histological overlap), or a true regional clustering that would merit further immunohistochemical characterisation, for example with IgG4 staining, given the increasingly recognised association between Riedel thyroiditis and IgG4-related disease. This is an area where the present study's descriptive design cannot fully resolve the underlying explanation, and represents a specific, testable direction for future work at this centre.

A single case of Hürthle cell (oncocytic) adenoma, a benign follicular-patterned neoplasm, was recorded in this series. Although rare in this dataset, its presence indicates that neoplastic lesions, while uncommon, do occur within this population and should not be overlooked in routine histopathological practice; this is lower than the frequency of benign neoplastic lesions reported from some other Nigerian centres, such as Ile-Ife, where follicular adenoma was comparatively more common. This difference may reflect regional variation in diet, iodine intake, or case mix rather than a true absence of neoplastic thyroid disease in this environment.

Case volume rose steadily over the six-year study period, more than doubling from 16 cases in 2016 to 36 cases in 2021. This trend may reflect a genuine rise in thyroid disease burden, but could equally reflect improved diagnostic uptake, greater public awareness, or increased utilisation of histopathology services over time; distinguishing between these possibilities would require population-level incidence data, which were not available for this study. Nonetheless, the sustained increase in caseload has practical implications for local histopathology and endocrine surgery service planning in this region, including laboratory staffing, reagent and consumable procurement, and surgical theatre capacity for thyroidectomy.

This study has limitations inherent to its retrospective, single-centre design, including reliance on archival records and the absence of long-term clinical follow-up, radiological correlation, or molecular/immunohistochemical characterisation for cases such as the unexpectedly frequent Riedel thyroiditis diagnoses. Prospective, multi-centre studies incorporating clinical outcome data, ultrasound correlation, and, where relevant, IgG4 immunostaining would help to further clarify both the diagnostic accuracy and the public health impact of these findings.

CONCLUSION

Multinodular and simple colloid goitre remain the predominant benign thyroid lesions encountered in this environment, disproportionately affecting women in their reproductive and working years; this pattern is best explained by the combined effects of iodine and goitrogen exposure at the population level and oestrogen-related modulation of thyroid growth at the individual level. The significant association between the age group and lesion category suggests that age-targeted case-finding, particularly among adults aged 21–50 years, could improve early detection of goitrous disease, while the sustained rise in caseload over the study period highlights a growing burden with direct implications for local histopathology and endocrine service planning. The comparatively high proportion of Riedel thyroiditis identified warrants focused follow-up study, ideally incorporating immunohistochemical characterisation. Continued surveillance of thyroid disease trends in this region is recommended to guide resource allocation and, where appropriate, targeted screening initiatives.

DECLARATIONS

Ethical Considerations

This was a retrospective, analytical review of archival tissue blocks, slides, and departmental records; as such, it did not involve direct patient contact, additional tissue sampling, or any change to patient management, and no formal ethics approval number was issued for the study. The work was conducted with the permission of the Department of Anatomic Pathology, Alex-Ekwueme Federal University Teaching Hospital, Abakaliki, in line with the institution's policy on retrospective archival record and slide review, and it adhered to the ethical

principles of the 1964 Helsinki Declaration and its later amendments. All patient data were anonymised prior to analysis, and no identifying information is reported in this manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Author Contributions

Different co-authors contributed at different stages, starting from conception, design, data collection, histopathological review, and statistical analysis to drafting of the manuscript, to critical revision for final submission, and approval. All authors have read and agreed to the published version of the manuscript.

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REFERENCES

1. Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016 Jan;26(1):1-133.

2. Thyroid Nodules: When to Worry. Johns Hopkins Medicine [Internet]. Available from: https://www.hopkinsmedicine.org/health/conditions-and-diseases/thyroid-nodules-when-to-worry

3. Ojule AC, Osotimehin BO. Maternal and neonatal thyroid status in Saki, Nigeria. Afr J Med Med Sci. 1998;27(1-2):57-61.

4. Ogbera AO, Fasanmade O, Adediran O. Pattern of thyroid disorders in the southwestern region of Nigeria. Ethn Dis. 2007;17(2):327-330.

5. In brief: How does the thyroid gland work? [Internet]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279388/

6. Stone MB, Wallace RB, editors. Medicare Coverage of Routine Screening for Thyroid Dysfunction. Chapter 2: Pathophysiology and Diagnosis of Thyroid Disease. Washington (DC): National Academies of Sciences, Engineering, and Medicine; 2003.

7. Li X, Chen Z, Wu L, Tu P, Mo Z, Xing M. Prevalence of thyroid nodule and relationship with physiological and psychosocial factors among adults in Zhejiang Province, China: a baseline survey of a cohort study. BMC Public Health. 2024;24(1):1-11.

8. Abdulkareem FB, Banjo AA, Elesha SO. Histological review of thyroid lesions: A 13-year retrospective study (1989-2001). Niger Postgrad Med J. 2005 Sep;12(3):210-214.

9. Raphael S, Mohammed AZ, Iliyasu Y. Histological pattern of thyroid gland neoplasms in Kano, Northern Nigeria. Niger J Med. 2015;24(1):5-11.

10. Salami BA, Odusan O, Ebili HO, Akintola PA. Spectrum and prevalence of thyroid diseases seen at a tertiary health facility in Sagamu, South-West Nigeria. Niger Postgrad Med J. 2016;23(3):137-140.

11. Nzegwu M, Ezumw E, Njeze G, Olushina D, Ogochukwu A. A histological update of thyroid lesions in Enugu, Nigeria: A 5-year retrospective study. Asian Exp Biol Sci. 2010;1(2):430-433.

12. Nggada HA, Ojo OS, Adelusola KO. A histopathological analysis of thyroid diseases in Ile-Ife, Nigeria: A review of 274 cases. Niger Postgrad Med J. 2008 Mar;15(1):47-51.

13. Šafránek J, Třeška V, Skalický T, Špidlen V, Doležal J, Kubačková D, et al. Thyroid carcinoma, ten-years file. Rozhl Chir. 2016;95(11):394-397.

14. Sidibé EH. Thyroid diseases in sub-Saharan Africa. Sante. 2007;17(1):33-39.

15. Chereau N, Trésallet C, Noullet S, Godiris-Petit G, Tissier F, Leenhardt L, et al. Prognosis of papillary thyroid carcinoma in elderly patients after thyroid resection: A retrospective cohort analysis. Medicine (Baltimore). 2016 Nov;95(47):e5450.

16. Thomas JO, Ogunbiyi JO. Thyroid cancers in Ibadan, Nigeria. East Afr Med J. 1995 Apr;72(4):231-233.

17. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015 Mar;136(5):E359-386.

18. Edino ST, Mohammed AZ, Ochicha O, Malami SA, Yakubu AA. Thyroid cancers in nodular goiters in Kano, Nigeria. Niger J Clin Pract. 2010 Sep;13(3):298-300.

19. Ren W, Zhi K, Zhao L, Gao L. Presentations and management of thyroglossal duct cysts in children versus adults: a review of 106 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011;111(2):e1-e6.

20. Blanco VM, Páez CA, Victoria AM, Arango LG, Arrunategui AM, Escobar J, Martínez V, Guzmán GE. Riedel's thyroiditis: report of two cases and literature review. Case Rep Endocrinol. 2019;2019:5130106.

21. Święchowicz B, Kasielska-Trojan A, Manning JT, Antoszewski B. Can digit ratio (2D:4D) be indicative of predispositions to Autoimmune Thyroid Diseases in Women - Hashimoto thyroiditis and Graves' disease? Front Endocrinol (Lausanne). 2022;13:914471.

22. Jung CK, Bychkov A, Kakudo K. Update from the 2022 World Health Organization Classification of Thyroid Tumors: A Standardized Diagnostic Approach. Endocrinol Metab (Seoul). 2022;37(5):703-718.