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Histopathological Patterns of Thyroid Neoplasms in Ibadan Nigeria: A Twenty Year Retrospective Study

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Authors' contributions

This work was carried out in collaboration between all authors. Author OOA conceptualization and writing of first draft; author BMD, writing of manuscripts, statistical analysis and literature searches; author EEA, supervision of study; author AOO supervision of study. All authors read and approved the final manuscript.

Research article

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ABSTRACT

Background: The thyroid gland is an endocrine organ which has an important function in regulation of physiological functions of normal body metabolism. Thyroid neoplasms are usually presented with palpable solitary or multiple nodules. This retrospective study aimed at describing the histopathological patterns of various thyroid neoplasms at the Pathology Department, University College Hospital (UCH), Ibadan between 1987 and 2006.

Methods: We reviewed 174 cases with thyroidectomy and diagnosed thyroid neoplasm. We evaluated heamatoxilin and eosin stained slides retrieved from the records of the department and the population based cancer registry and where necessary the paraffin blocks were recut and stained. The World Health Organization Histological Classification of Thyroid tumour (2004) was used in this study.

Results: A total 74,202 biopsies were received in the department over the study period. 1,207 cases were thyroidectomy specimens constituting 1.6% of all biopsies in the study period. 174 cases (14.4%) were thyroid gland neoplasms 122 (70.1%) of which were

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females and 52 of which (29.9%) were males. The ratio of female to male is 2.3:1. Seventy six (43.7%) cases were benign and 98 (56.3%) cases were malignant. Follicular adenoma accounted for 89.5% of benign thyroid neoplasms which makes a peak in the 5th decade. Papillary carcinoma was the most common malignant thyroid neoplasm in this study with a peak in the 3rd decade.

Conclusion: This study showed that thyroid neoplasms were showing female predominance. The most common benign neoplasm was follicular adenoma and the malignant neoplasm was papillary carcinoma.

Keywords: Thyroid gland; Ibadan; neoplasms; age; gender; benign; malignant.

1. INTRODUCTION

Thyroid neoplasms, when clinically apparent, are usually presented as solitary or multiple nodules, which are discretely palpable within an otherwise normal thyroid gland [1]. The estimated incidence of solitary palpable nodules in the adult population of the United States is about 2-4%, although it is significantly higher in endemic goitrous regions [1]. Single nodules are about four times more common in women than men [2]. The incidence of thyroid nodules increases throughout life [3].

The overwhelming majority of solitary nodules of the thyroid prove to be benign lesion such as follicular adenomas which account for 90% of cases¹. Carcinomas, by contrast, are rare, accounting for well under 1% of solitary thyroid nodules and representing about 15, 000 new cancer cases each year in the United States [1].

Several clinical criteria may provide a clue to the nature of a given thyroid nodule and these include: Solitary nodules, in general, are more likely to be neoplastic than multiple nodules. Nodules in younger patients and males are more likely to be neoplastic than older patients and females respectively; and a history of radiation treatment to the head and neck region is associated with an increased incidence of thyroid malignancy [1,2].

Our study aimed at describing the histopathological patterns of various thyroid neoplasms seen at the department of Histopathology of the University College Hospital, Ibadan from 1987-2006.

2. MATERIALS AND METHODS

The study was a retrospective review of all thyroid neoplasms histologically diagnosed in the Department of Pathology, University College Hospital (UCH), Ibadan Nigeria, over a period of twenty years from January 1987 to December 2006. The cases were identified from the available records in the Surgical Daybooks of the Department of Pathology during the study period. The department of Pathology UCH, receives histopathological consultation mostly from medical centres located with the southwestern region of Nigeria and occasionally from other parts of the country.

Hematoxylin and eosin stained slides of all cases were retrieved, reviewed and classified histologically according to the 2004 WHO classification [4]. Data regarding the age, gender and incidental findings were retrieved from the histopathology request form of each case. Cases which lacked any of the demographic data were excluded. Data were entered into a

Microsoft Excel data sheet and statistical analysis was done using the SPSS program version 17. The means were compared using the t-test and non continuous variables were compared using the chi square test.

3. RESULTS

3.1 General Findings

During the study period, 74,202 surgical specimens were revealed to our laboratory. Of these 1207 cases, (1.6%) were thyroid gland specimens and 174 (14.4%) of the thyroid specimens were neoplastic. Seventy-six (43.7%) of the thyroid neoplasms were benign and ninety-eight (56.3%) cases were malignant. The ratio of the benign thyroid neoplasms to malignant ones was 1:1.3.

3.2 Sex Distribution

The patients with thyroid neoplasms comprised 122 females (70.1%) and 52 males (29.9%), and the ratio of females to males was 2.3:1 (Table 1). Sixty of benign thyroid neoplasms were female (78.9%), sixteen (21.1%) of which were male and the ratio of female to male was 3.7:1.

Sixty-two (63.3%) of malignant thyroid neoplasms were female, thirty-six (36.7%) of which were male and the ratio of female to male was 1.7:1.

There was a significantly greater proportion of male patients with malignant neoplasms as compared to female patients ($\chi^2 = 5.02$, df (degrees of freedom) = 1, $p = 0.025$). Table 1 shows the gender distribution of patients with benign and malignant thyroid neoplasms.

Table 1. Gender distribution of patients with specific benign and malignant thyroid neoplasms

Histological Types	Female	Male	Total	%
A. Benign Neoplasms				
Follicular adenoma	55	13	68	39.1
Neurofibroma	1	2	3	1.7
Mature teratoma	2	1	3	1.7
Hurthle cell adenoma	2	0	2	1.1
B. Malignant Neoplasms				
Papillary carcinoma	30	11	41	23.6
Follicular carcinoma	19	13	32	18.4
Medullary carcinoma	4	2	6	3.4
Undifferentiated carcinoma	1	3	4	2.3
Squamous cell carcinoma	2	2	4	2.3
Hurthle cell carcinoma	3	3	6	3.4
Non-Hodgkin lymphoma	0	2	2	1.1
Malignant peripheral nerve sheath tumour	1	0	1	0.6
Metastatic neoplasms	2	0	2	1.1
Total	122	52	174	100

3.3 Age Distribution

Thyroid neoplasms affected individuals from all age groups ranging from 5 months to 77 years of age. Of the 174 cases of thyroid neoplasms, the majority occurred between the ages of 30-39 years, with a mean age of 39 ± 16.3 years. Table 2

Table 2. The distribution of benign and malignant thyroid neoplasms according to age

Histological variants	Age group (years)								Total
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	
Benign neoplasms									
Follicular adenoma	1	6	10	20	22	6	2	1	68
Neurofibroma	0	2	1	0	0	0	0	0	3
Mature teratoma	2	1	0	0	0	0	0	0	3
Hurthle cell adenoma	0	0	0	1	0	1	0	0	2
Malignant Neoplasms									
Papillary carcinoma	0	3	12	8	1	7	8	2	41
Follicular carcinoma	1	0	7	4	5	6	4	5	32
Medullary carcinoma	0	0	0	2	2	2	0	0	6
Squamous cell carcinoma	0	0	0	1	0	2	0	1	4
Undifferentiated carcinoma	0	0	1	0	2	1	0	0	4
Secondary tumour	0	0	0	1	1	0	0	0	2
Lymphoma	0	1	0	1	0	0	0	0	2
Hurthle cell carcinoma	0	0	1	1	0	4	0	0	6
Malignant peripheral nerve sheath tumour	0	0	0	0	0	1	0	0	1
Total	4	13	32	39	33	30	14	9	174

Benign thyroid neoplasms had a peak occurrence between the ages of 30-39 years, while malignant thyroid neoplasms displayed bimodal peak occurrences between the ages of 20-29 years and 50-59 years, as shown in Figure 2. The mean age of the patients with benign thyroid neoplasms $35\text{yrs} \pm 13.44$ was significantly less than that of the mean age of the patients with malignant thyroid neoplasms $42\text{yrs} \pm 17.45$ ($t = -2.792$, $df = 172$, $p = 0.006$).

Benign thyroid neoplasms made a peak between the ages 30-39 years (mean 35 ± 11.61) in males, 40-49 years (mean 35 ± 19.73) in females. However, the mean age of female patients was not significantly greater than that of male patients ($t = 1.620$, $df = 172$, $p = 0.094$). Malignant thyroid neoplasms peak between the ages of 50-59 years in males, 30-39 years in females ($t = 1.620$, $df = 172$, $p = 0.094$). (Figure 2)

3.4 Benign Thyroid Neoplasms

Follicular adenoma constitutes 89.5% of benign neoplasms. The peak occurrence was between ages 40-49 years and rarely occurs between ages 0-9 years and 70-79 years. The other variants of the benign thyroid neoplasms were Hurthle cell adenoma (2.5%), mature teratoma (4%), and neurofibroma (4%) (Table 1).

3.5 Malignant Thyroid Neoplasms

The malignant thyroid neoplasms seen in our study were papillary carcinoma (41.8%), follicular carcinoma (32.7%) and medullary carcinoma (6.1%). All of these variants show female predominance with a male to female ratio of 1:1.5-2.7 (Figure 1).

6.1% of the malignant thyroid neoplasms were Hurthle cell carcinoma (male:female ratio was 1:1).

The others were undifferentiated carcinoma (4.1%), malignant peripheral nerve sheath tumour (2%); squamous cell carcinoma, primary lymphoma, and metastatic tumours constituting 4.1% each of the cases.

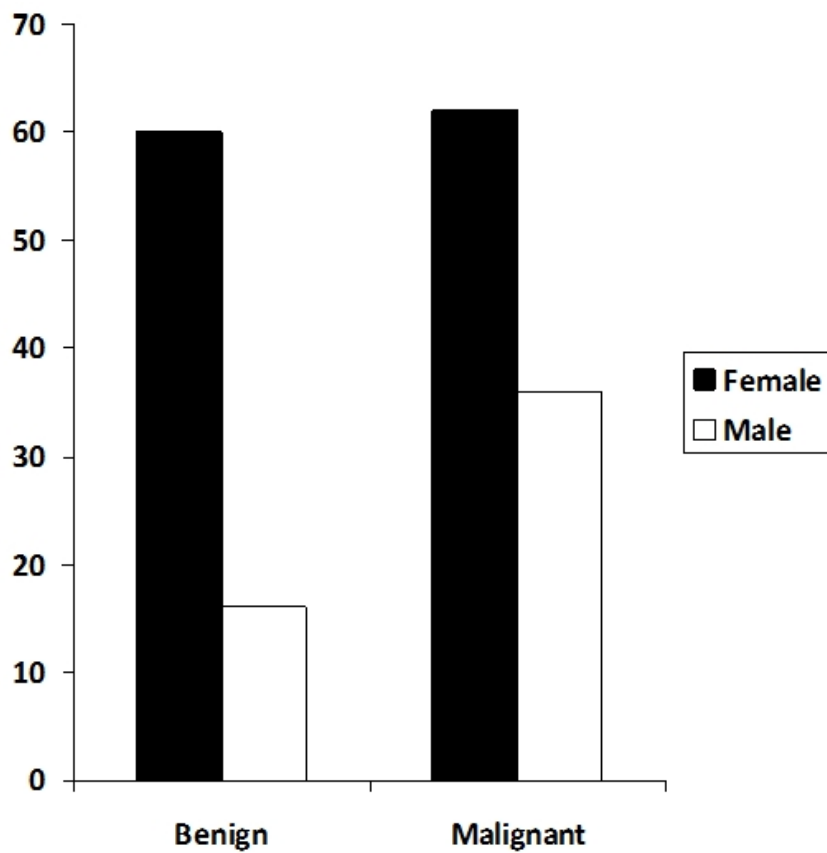


Figure 1. The distribution of benign and malignant thyroid neoplasms according to gender

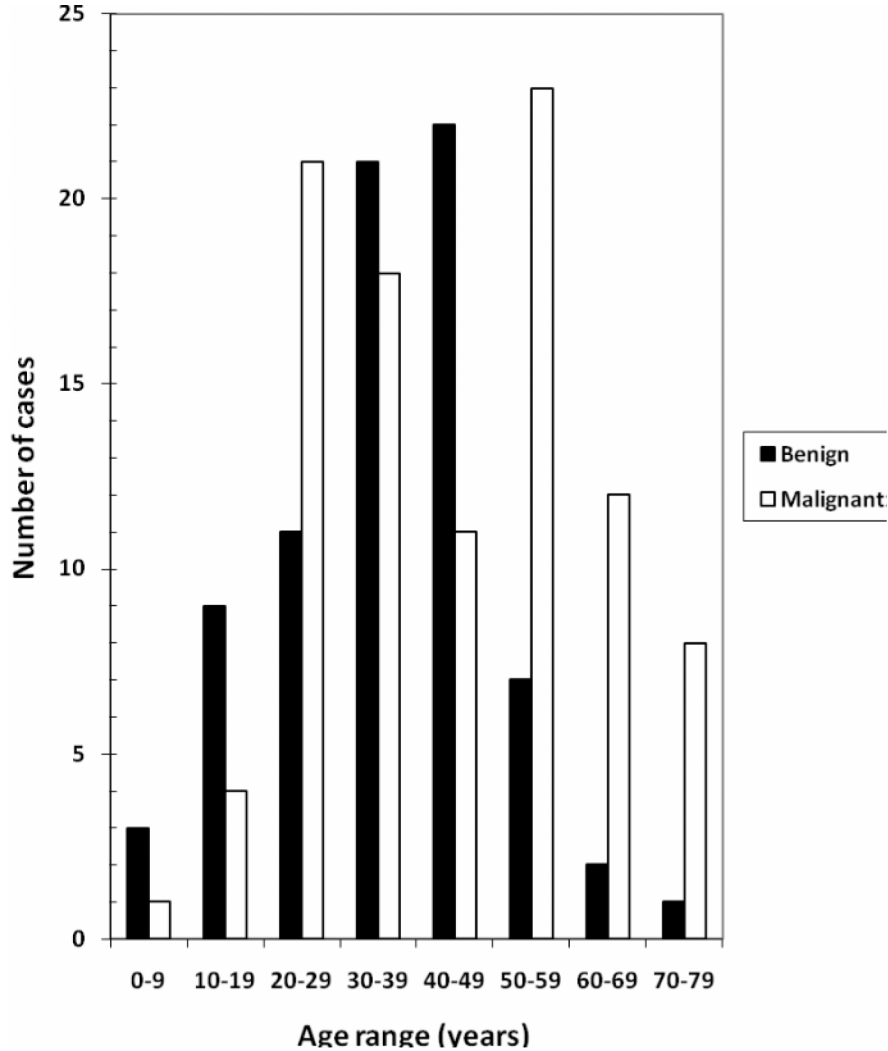


Figure 2. Age distribution of patients with benign and malignant thyroid neoplasm

4. DISCUSSION

In the current study malignant thyroid neoplasms predominated, accounting for 56.3% while benign thyroid neoplasms accounted for 43.7%. Unlike majority of other studies which shows predominance of benign neoplasms.

In this study thyroid neoplasms were more common in females (70.1%) than males (29.1%) with the ratio of 2.3:1. This finding is compatible with the literature [5,6].

In this study the most common benign thyroid neoplasm is follicular adenoma (89.5%). It is more common in females than males (female to male ratio of 4.6:1). The highest incidence is in the fifth decade. Earlier studies in Nigeria by Adeniji et al. [5] in Ilorin were in support of this study. Follicular adenoma was reported as the predominant benign thyroid neoplasm, and was found to be more common in females with peak age incidence in the fifth decade of

life. Studies by Anidi et al. [6] in Enugu, Gitau [7] in Kenya and Bashier et al. [8] in Khartoum, Sudan, reported similar findings. The peak age incidences in Anidi and Gitau studies were respectively in the fourth and third decade of life.

Neurofibroma (3.9%), mature teratoma (3.9%) and Hurthle cell adenoma (2.5%) are very rare benign thyroid neoplasms. The exceedingly rare occurrence of other benign thyroid neoplasms is attested to by the fact that the other Nigerian and African studies cited did not report these entities [5,6,7,8].

This study has clearly shown the predominance of papillary carcinoma among malignant thyroid neoplasms accounting for 41.8%. It is more common in females and the peak age incidence is in the third decade of life. In agreement with this study Anidi et al. [6] in Enugu reported papillary carcinoma to be most common malignant thyroid neoplasm (41.9%) followed by follicular carcinoma (35.5%), with both showing female predominance. Ersumo et al. [9] in Addis Ababa reported papillary carcinoma as the most common thyroid malignancy with a female predominance in agreement with our study. In the United States, papillary carcinoma is the most common malignant thyroid neoplasm accounting for 75 to 85% of cases, followed by follicular carcinoma (5%) [1].

In this study, follicular carcinoma is the second most common malignant thyroid neoplasms with the percentage of 32%. It is also more common in females and have highest incidence in the fifth decade.

In Thomas and Ogunbiyi's study [10] papillary carcinoma is the most common malignant thyroid neoplasm (45.3%), followed by follicular carcinoma (44.5%) with both showing female predominance and peak age incidences of papillary and follicular carcinomas were in the fifth and seventh decades respectively. This contrasts the findings of peak incidence in the third and fifth decades respectively in our study. The study of Malandzi et al. [11] in Durban, South Africa showed racial differences in the proportions of thyroid neoplasms. Papillary carcinoma (57%) was the most common thyroid malignancy among Indians living in South Africa while follicular carcinoma (68%) was the most common thyroid malignancy among black Africans in South Africa. This implies that racial and genetic factors may play an important role in the aetiopathogenesis of thyroid neoplasms.

In 1973, Olurin et al. [12] from Ibadan found follicular carcinoma (60%) to be more common than papillary carcinoma (18%). It therefore appears that there has been a temporal variation in the relative frequency of the two major forms of thyroid neoplasms derived from follicular epithelial cells. This may be related to increasing iodination of diet, which results in reduced incidence of colloid goitre and follicular carcinoma, with increased incidence of papillary carcinoma. A second major contributing factor may be the recognition that the diagnosis of papillary carcinoma is mainly by nuclear features rather than architectural disposition into branching papillary fronds.

In contrast to most other studies, Adeniji et al. [5] in Ilorin, Nkaza [13] in Cameroun and Omran [14] in Khartoum Sudan, all reported that follicular carcinoma seemed to be the most common malignant thyroid neoplasm, citing figures of 73%, 70% 42%, respectively. These findings can be explained by either a wider prevalence of iodine deficiency in these regions, or partly by the missed diagnosis of the follicular variant of papillary carcinoma in earlier classifications of thyroid carcinoma, as stated above.

Other histological types of malignant thyroid neoplasms were not common in this study. Medullary carcinoma and anaplastic carcinoma accounted for 5.1% and 4.4% of cases respectively in the study of Thomas and Ogunbiyi [10], which is comparable with the findings in the present study. Three cases of thyroid neoplasm in the very young were found in our study (less than 10 years). Although thyroid neoplasm can occur in all ages, it is an extremely rare finding. Exposure to radiation, family history of chronic goitre and thyroid cancer have been implicated in paediatric thyroid tumour [15,16]. The lung is the primary site of all the secondary tumours in our study. This is the most common site for metastasis to thyroid gland [17,18]. In this study, the two cases of relatively rare undifferentiated carcinomas were found in the young adults although these are generally believed to occur in middle aged and elderly patients. When this happens, prognosis is unfavourable as metastasis occurs very early [15,16].

The female predominance of thyroid carcinoma in adults has been correlated with the expression of oestrogen receptors on neoplastic epithelium. In contrast to adults, in childhood and late adult life male and female frequency is equal [1]. However, this study showed female predominance in all ages.

5. CONCLUSION

This study shows that thyroid neoplasm affects all ages. Thyroid neoplasms are predominantly seen in females, and the most common type is papillary carcinoma, which has the highest incidence in the third decade. The higher incidence of follicular carcinoma in some of other studies cited might be partly ascribed to the less comprehensive criteria for diagnosis of papillary carcinoma and partly to the higher incidence of follicular carcinoma in iodine deficient regions. With the widespread introduction of dietary iodine supplementation, the incidence of follicular carcinoma will most probably decline and the papillary carcinoma will become more prevalent.

CONSENT

Not applicable.

ETHICAL APPROVAL

Ethical approval was obtained from the University of Ibadan/University College Hospital (UI/UCH) ethical review board before the commencement of this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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