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Prevalence of Unsuspected Thyroid Lesions: A Histologic Study of Thyroid Gland at Autopsy

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Abstract

Introduction: Patients without clinical history of thyroid disease can harbour unsuspected thyroid lesions. The study of the gland at autopsy has been described as the gold standard in the determination of the true prevalence of thyroid lesion. This study was conducted to determine the prevalence and frequency of different thyroid lesions in our environment.

Methods: This is a prospective study of 150 consecutive autopsies of patients with no clinical history of thyroid disease between July 2016 and June2017. The Haematoxylin and Eosin sections of the dissected thyroid gland were examined under light microscopy. The data analysed using IBM SPSS version 20 are presented using tables, pie chart and figures. Test of statistical significance was set at p value < 0.5.

Results: There were 88 males and 62 females with a male to female ratio of 1.4:1 with age range of 18 and 80 years. The prevalence of thyroid lesion in the study was 39.3% (59/150). Nodular hyperplasia was most common lesion with prevalence of 24.7% (37/150) followed by follicular adenoma (10.0%) while lymphocytic thyroiditis had the least prevalence (4.6%). No thyroid malignancy was seen. There females have more thyroid lesions than the males (71.6% vs 45.2%).

Conclusion: There is relatively high prevalence of unsuspected thyroid lesion in our environment with the female gender more commonly affected. There is therefore need to increase awareness and institute thyroid screening tests to reduce the thyroid lesion in our environment.

Keywords: adenoma, follicular, thyroiditis, lymphocytic, nodular hyperplasia

Introduction

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The thyroid gland is a butterfly shaped organ that is located below and anterior to the laryngx. It has two bulky lateral lobes connected by a relatively thin isthmus [1]. Thyroid pathology is the second most common endocrine disorders in Nigeria [2]. People with thyroid pathology may present with thyroid enlargement, which can be diffuse or nodular.

Several post-mortem studies on the thyroid gland have been carried out in United States of

America (USA) and these studies have provided the gold standard in determining the true prevalence of thyroid lesions [3]. Schlesinger et al evaluated autopsy specimen from three teaching hospitals in Boston (Massachusetts) area and noted the prevalence of 82 thyroid lesion per 1000 specimen [4].

Thyroiditis was classified by Fabrinzio to comprise of acute thyroiditis, subacute thyroiditis, chronic thyroiditis, post-partum or silent thyroiditis and Riedel thyroiditis [5]. In 2010, the prevalence rate of thyroiditis in Ibadan, South-western region of Nigeria was found to be 9.3% in 107 autopsy cases [7]. In Zambia, an autopsy based study of thyroid gland in HIV infected adults showed a high prevalence rate of thyrioditis which was 21.0% of all cases [6]. Avetisian et al in Ukraine identified 3 cases (4.9%) of follicular adenoma in an autopsy study of 162 thyroid glands while Fleishman *et al* in Russia recorded a prevalence rate of 2.4% of 420 autopsy cases [8,9].

Thyroid carcinoma is a major cause of death among endocrine cancers [10]. Thyroid cancer is a relatively rare neoplasm worldwide accounting for approximately 1.0 -5.0% of all cancers in females and less than 2.0% in males [11]. The prevalence of thyroid carcinoma has been reported to range from 1.0% to 35.6% in different systematic autopsy series. This incidence is much higher than that of clinically evident carcinomas of the thyroid. Katulanda *et al* study of 248 autopsy cases in Sri Lanka revealed a prevalence rate of 10.4%. [12]Other autopsy based study in Greece, Ukraine and Italy reveal rates of 7.0%, 11.7% and 6.5% [11,13,14].

This study was conducted to determine the prevalence and frequency of different thyroid lesions with unsuspected thyroid lesion in our environment.

Material and Methods

This was a prospective study of unsuspected thyroid lesions following post-mortem examination of 150 individuals who had no clinical history of thyroid disease. These examinations were performed at the Department of Pathology and Forensic Medicine, Lagos State University Teaching Hospital (LASUTH) between July 29th, 2016 and June 30th 2017. LASUTH is a tertiary institution located in Ikeja, in Lagos, South-West Nigeria. It provides specialised medical services such as post-mortem examination to the state. The Department performed a total of 3775 autopsy cases in a 5 year period (2012-2016) with an average of 755 cases per year.

Approval to perform this study was obtained from the Health Research and Ethical Committee of LASUTH. Approval to perform this study was obtained from the Health Research and Ethical Committee of LASUTH.

The thyroid glands of subjects were examined and removed as a whole by performing gross and fine standard neck dissection. The gland was separated from its bed and cleaned from non-thyroid tissue. The glands were then sectioned in the coronal plane at 2.0mm to 3.0mm intervals. Selected sections were taken and placed in labelled fenestrated cassettes for fixation. The specimens were preserved in containers filled with 10% neutral buffered formalin to fix (1:10) for 6-12hours. The tissue sections were routinely processed using an automated tissue processor. The prepared slides were stained with haematoxylin and Eosin. These slides were examined under a light microscope.

The data collected in this study was analysed using the Statistical Package for Social Science (SPSS IBM) version 20. Continuous variables were analysed using descriptive statistics (mean and range). Percentage and proportions were determined for all other categorical variables. Tables, bar chart and histogram were used where applicable. Pearson's Chi square or Fischer exact (X2) was used to test association between categorical variables. Statistical significance was taken as p value < 0.05.

Results

Table 1: Showing Gender and Age of Subjects

PARAMETER	NUMBER	PERCENTAGE (%)
GENDER		
Female	62	41.3
Male	88	58.7
Total	150	100.0
AGE CATEGORY (years)		
≤30	10	6.7
31-50	58	38.7
51-70	59	39.3
>70	23	15.3
Total	150	100.0

One hundred and fifty (150) subjects were seen in this study which comprise of 88 (58.7%) males and 62 (41.3%) females with male to female ratio of 1.4:1. The mean age for this study was 53.44 ± 15.7 years while the minimum and maximum age was 18 and 80 years respectively, (Table 1). The study shows age categories of <30 years, 31-50 years, 51- 70 year and >70 years. Table 1 groups the subjects based on age category and gender. The highest number of subjects 59 (39.3%) was recorded for age category 51-70 years. This was followed by 58 subjects (38.7%) seen in age group 31–50 years while the least number of subjects was recorded for the ≤ 30 years age category. There were more males than females in this study 59 subjects (39.3%) had evidence of thyroid lesions while 91subjects (60.7%) had no lesion.

Figure 1 shows a pie chart representing the proportion of subjects with and without thyroid lesions. The types of thyroid lesion observed in this study include; nodular hyperplasia, lymphocytic thyroiditis and follicular adenoma. Figure 2 shows a Bar Chart with the types of thyroid lesions. Nodular hyperplasia represents the most common histologic diagnosis which accounted for 37 (24.7%), Follicular adenoma accounted for 15 (10.0%) and Lymphocytic thyroiditis accounted for 7 (4.6%).

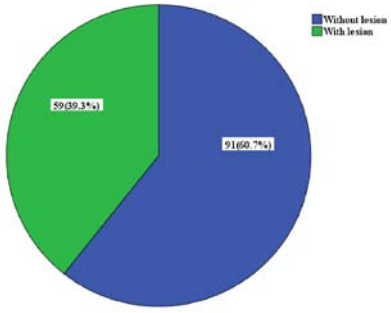


Figure 1: A Pie chart showing the Percentage of Thyroid gland with Lesion and those without lesions. 39.3% of the thyroid glands showed a thyroid lesion while the remaining 60.9% was without thvroid lesion

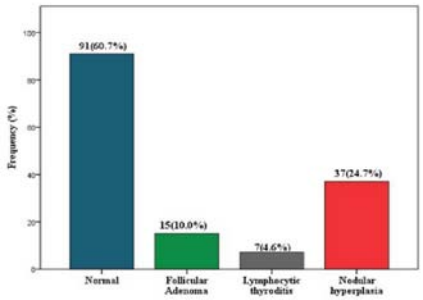


Figure2: The Bar Chart shows the types of thyroid lesions which include nodular hyperplasia, Follicular adenoma and Lymphocytic thyroiditis. Nodular hyperplasia represents the most common histologic diagnosis and it accounts for 37 (24.7%)

Table 2: Showing Relationship between the Thyroid Lesions and Gender

	Normal (n=91)	Follicular Adenoma (n=15)	Lymphocytic thyroiditis (n=7)	Nodular hyperplasia (n=37)	Total
Gender					
Male	63(71.6%)	3(3.4%)	2(2.3%)	20(22.7%)	88(100.0%)
Female	28(45.2%)	12(19.4%)	5(8.1%)	17(27.3%)	62(100.0%)

n =150, p-value= 0.001*, df = 3, Fischer's exact =16.376.

Table 3: Showing Relationship between Thyroid Lesions and the Age-Group

	Age Category (Years)			
Histologic findings	**≤30**	**31 – 50**	**51 - 70**	**Above 70**
Normal	7 (70.0%)	40 (69.0%)	30 (50.8%)	14 (60.9%)
Nodular Hyperplasia	2 (20.0%)	11 (19.0%)	18 (30.5%)	6 (26.1%)
Follicular Adenoma	1 (10.0%)	4 (6.9%)	8 (13.6%)	2 (8.7%)
Lymphocytic thyroiditis	0 (0.0%)	3 (5.1%)	3 (5.1%)	1 (4.3%)
Total	10 (100.0%)	58 (100.0%)	59 (100.0%)	23 (100.0%)

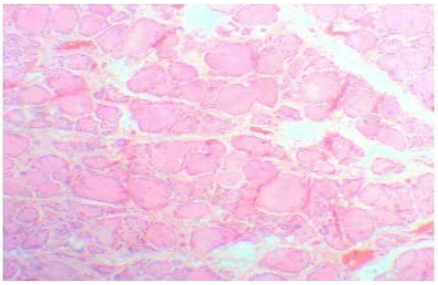
n=150, p =0.808, df =9, Fischer exact =5.298

Table 2 shows the relationship between the thyroid lesions and gender. The male gender tends to have less of thyroid lesions when compared with the females with 71.6% and 45.2% normal thyroid in the two genders respectively. This is statistically significant with p value of 0.001(Table 2).

Table 3 shows the relationship between thyroid lesion and the age groups. Nodular hyperplasia is the most common thyroid lesion in all age groups. The highest frequency of nodular hyperplasia 18 (13.6%) was reported in the age group 51-70. Age group 51 – 70 years has the highest number of thyroid lesions in the study (Table 3). There was no statistical significance between age and thyroid lesion.

Figures 3: A Photomicrograph of normal Thyroid tissue in a 35 years old male. The histology shows fairly uniform thyroid follicles which are lined by cuboidal epithelium. The follicular lumen contains eosinophilic colloid material. (Haematoxylin and eosin x40)

Figure 4: A Photomicrograph showing Nodular Hyperplasia in 45 year old female. There are different sized Thyroid follicles which are lined by cuboidal epithelium and contain colloid (Haematoxylin and Eosin x40). The insert on the bottom right shows the Nodular Hyperplasia at a higher magnification (Haematoxylin and eosin x 100).



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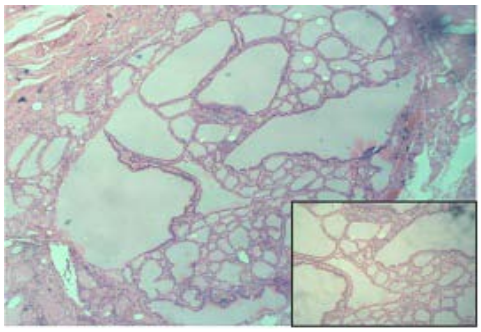

Figure 4: A Photomicrograph showing Nodular Hyperplasia in 45 year old female. There are different sized Thyroid follicles which are lined by cuboidal epithelium and contain colloid. (Haematoxylin and Eosin x40). The insert on the bottom right shows the Nodular Hyperplasia at a higher magnification. (Haematoxylin and eosin x 100).

Figure 5A**:** A Photomicrograph of Lymphocytic Thyroiditis in a 30 year old Female. The histology shows aggregates of Lymphocytes and plasma cells within the Thyroid parenchyma with focal destruction of thyroid follicles (Haematoxylin and Eosin x40).

Figure 5B**:** A Photomicrograph of Lymphocytic Thyroiditis in a 30 year old Female. The histology shows aggregates of Lymphocytes within the Thyroid parenchyma with focal destruction of thyroid follicles (Haematoxylin and Eosin x100).

Figure 6: A Photomicrograph showing Follicular Adenoma in a 48 year old male. The nodules consist of small sized follicles within the Thyroid gland (Haematoylin and Eosin x 40). The insert on the bottom left shows microfollicular pattern in the Follicular Adenoma (Haematoxylin and eosin x100).

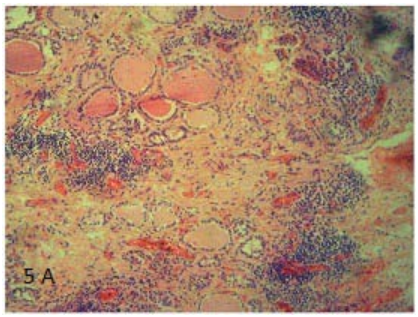

Figure 5A: A Photomicrograph of Lymphocytic Thyroiditis in a 30 year old Female. The histology shows aggregates of Lymphocytes and plasma cells within the Thyroid parenchyma with focal destruction of thyroid follicles. (Haematoxylin and Eosin x40)

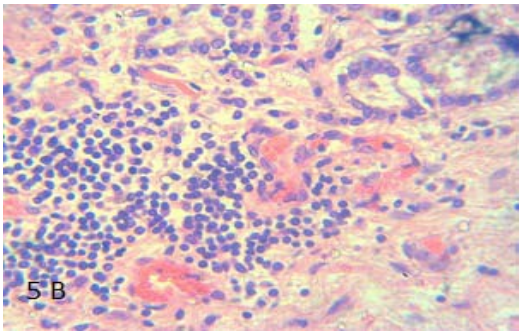

Figure 5B: A Photomicrograph of Lymphocytic Thyroiditis in a 30 year old Female. The histology shows aggregates of Lymphocytes within the Thyroid parenchyma with focal destruction of thyroid follicles (Haematoxylin and Eosin x100).

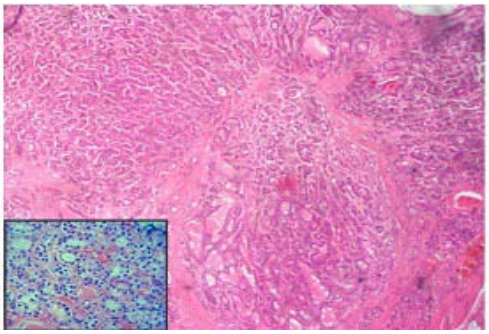

Figure 6: A Photomicrograph showing Follicular Adenoma in a 48 year old male. The nodules consist of small sized follicles within the Thyroid gland (Haematoylin and Eosin x 40). The insert on the bottom left shows microfollicular pattern in the Follicular Adenoma (Haematoxylin and eosin x100).

Discussion

This was a one year prospective autopsy study of 150 adult thyroid glands. The ages of the subjects in this study range from 18 years and 80 years. There were 88 male subjects and 62 females with a male to female ratio of 1.4:1. The glands were examined for any thyroid lesion and 59 glands were identified with lesions such as

nodular hyperplasia, lymphocytic thyroiditis and follicular adenoma.

Thus, the prevalence rate of thyroid lesion in this study was 39.3% (59/150). In Ibadan, an autopsy based study conducted by Onwukamuche *et al* reported a rate of 9.3%. They however focused only on a specific thyroid lesion; Lymphocytic thyroiditis [6]. The prevalence rate reported in Zambia by Muwowo *et al* was 21.0% which also focused only on the types of thyroiditis observed in HIV infected adults at autopsy [7]. The prevalence rate in Sri Lanka was 56.7% which is closely related to the frequencies of 40.7% and 42.1% reported by Petrova et al in their study of latent thyroid pathology in Ukraine and Mitseolu et al in Epirus Greece respectively [8,12,17]. The rate of 39.3% in this study is lower than the rate of 57.0% reported by Bisi *et al* in Brazil [18]. A Chilean study by Arellano *et al* reported a frequency of 20.0% which was lower than the rate of 39.3% reported in this study [19]. This lower rate was likely due to the authors' method of taking one section per thyroid lobe with attendant consequence of missing the lesions in the unsectioned parts.

The age group 51-70 years in this study accounted for 49.1% (29 / 59) of all thyroid pathologies, this age group is younger than the Neuhold *et al* study which showed the age group 71-90 years accounted for 54.4% of thyroid lesions [20].In both studies, nodular hyperplasia was the most common lesions within the age groups. Chrisoula *et al* in their autopsy study of thyroid gland also showed an age group (60-90 years) accounting for 61.0% of the lesion [13]. Thyroid carcinoma was however the predominant pathology seen with a frequency of 61.0% of glands with lesions [13]. However, there was no significant statistical difference between thyroid lesions and age groups in this study, a finding similar to findings in other studies [13, 18, 19].

This study showed that 54.8% (34 / 62) of females and 28.4% (25 / 88) of males had thyroid lesions with a female to male ratio of subjects with lesions being 1.4:1. The female preponderance of subjects with thyroid lesions in this study is similar to findings of Muwowo *et al* in Zambia who reported 65.0% of female population with thyroid lesions which was higher than 50.0% seen in the male population with thyroid lesions [7]. The relationship between the gender and thyroid lesions was found to be statistically significant in both studies [7].The preponderance of females with thyroid lesions was not only documented in autopsy studies but also in several surgical biopsy studies in Nigeria and other parts of the world [20,21,22,23]. This female predilection was explained by Lu *et al* in their review of estrogen and thyroid disease, where they concluded that the hormone can regulate the function of nearly all immunocytes subset which will contribute to the development of autoimmune thyroid disease [24]. The direct action of estrogen via its estrogen receptor subtype (ER alpha) on thyroid tissue also contributed to the development of thyroid goitre, nodule and cancer [25].

Nodular hyperplasia accounted for 24.7% (37/150) of all the glands examined with a frequency of 62.7% (37 /59) among glands with lesions. The frequency of 62.7% of nodular hyperplasia amongst glands with lesions in this study is in consonant with surgical biopsy studies in Enugu and Kano which recorded frequencies of 63.2% and 68.0% respectively [26, 27]. This figure (62.7%) is higher than 50.9% and 58.9% of glands with lesions reported by Arellano et al and Lang et al in their study in Chile and Germany respectively [28,29]. The lower frequency of nodular hyperplasia in Chile and Germany may be due to geographic differences.

Follicular adenoma in this study had a frequency of 10.0% of the glands. The 10.0% of follicular adenoma in this study concurs with the rate between 10.0% and 21.0% of follicular adenoma seen in surgical pathology studies in Lagos, Ile-Ife, Kano, Kenya and USA [20, 21, 22, 29, 30].

However, the rate in this study was higher than the frequencies of 3.0%, 4.3% and 7.5% reported by Silverberg et al, Bisi *et al* and Lang et al in USA, Brazil and Germany respectively [18, 28, 31]. This variation can be attributed to differences in the frequency of goitre in different regions as follicular adenoma is significantly higher in endemic goitrous regions [4,21] .

Lymphocytic thyroiditis is the only type of thyroiditis seen in this study with a frequency of 4.6% (7 / 150) of the total glands examined. The frequencies of Lymphocytic thyroiditis in surgical pathologic study in Nigeria range between 0.9% and 3.8% of the total sample which is lower than the rate of 4.6% in this autopsy based study.[20,21,22] This may be because the gland usually appears normal on thyroid examination in patients who most times are asymptomatic, and thus biopsy is rarely performed which may account for the lower frequencies seen at surgical biopsy studies.[5] The rate of 4.6% seen in this study is however lower than the frequency of 21.0% reported by Katulanda *et al* in their study on the prevalence of incidental thyroid pathology in India [12]. The reason for the higher rate is however unclear, nevertheless lymphocytic thyroiditis has been associated with environmental factors such as viral infection, trauma, chemical or radiation exposure [5]. The rate in this study also correlates with similar frequencies of 5.3%, 5.7% and 6.4% of total autopsy cases as reported by Lang *et al*, Gulden *et al* and Mortensen et al in Germany, Turkey and USA respectively [28, 32, 33].

Thyroid carcinoma was not diagnosed in this study. The rate of thyroid carcinoma in surgical biopsies study in Nigeria varying between 7.0% and 14.0% [20,21,22,27]. At autopsy the prevalence of thyroid carcinoma is much lower with frequencies of 0.5% and 0.7% reported by Sobrinho *et al* in Portugal and Hazard et al reported in USA [34,35]. However, occult thyroid carcinoma has been documented to range between 2.1% and 6.2% in different geographic regions [18,19,31,32,28,33]. This may likely be due to the genetic susceptibility of subjects to environmental carcinogens.

Conclusion

The study has shown that 39.3% of thyroid glands had unsuspected thyroid lesions. The lesions are Nodular hyperplasia, Lymphocytic thyroiditis and Follicular adenoma. It was found that nodular hyperplasia was the most common of all the thyroid lesions, which was closely followed by follicular adenoma and then lymphocytic thyroiditis. Thyroid carcinoma was not seen during the study period. Thyroid lesions were seen in all the age groups studied and the peak age for thyroid lesions in this study was 51-70 year age group. This study also showed that females have higher unsuspected thyroid lesions than the males.

Recommendation

There should be a Government policy on secondary preventive measures for thyroid disease which must include thyroid screening in asymptomatic normal peoples. There should also be regular public enlightenment campaign on anterior neck examination either by palpation or via ultrasound technique for early detection of thyroid nodule.

Conflict Of Interest

Nil

Authors Contribution

Of conceived the study, carried out the literature search, designed the study, performed the analysis, interpreted the result and prepared the draft manuscript. FF participated in the study design and analysis. He also interpreted the result and editing the final manuscript. SS was involved in literature search. EF was involved in study design and editing of final draft for intellectual content. All authors read and approved the final manuscript for submission.

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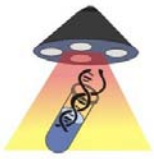

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