Journal of Medical and Biomedical Sciences (2013) 2(1): 1-7

ORIGINAL ARTICLE

Thyroid Disorders in Accra, Ghana: A Retrospective Histopathological Study at the Korle-Bu Teaching Hospital

E. M. Der[1], S. E. Quayson[1], J. N. Clegg-Lamptey[2], E. K. Wiredu[1], R. K. D. Ephraim[3] and R. K. Gyasi[1]

[1]Department of Pathology, [2]Department of Surgery, University of Ghana Medical School, Korle-Bu Teaching Hospital, Accra, Ghana; [3]Medical Laboratory Division, Department of Laboratory Technology, University of Cape Coast, Cape Coast, Ghana

There is a scarcity of data on thyroid disorders in Ghana. This retrospective study examined the spectrum and incidence of thyroid disorders by reviewing all thyroid disorders reported in the Department of Pathology, Korle-Bu Teaching Hospital (KBTH) between 2004 and 2010. Data was collected on the clinical and histological characteristics of all thyroid disorders reported during the study. 1300 (3.7%) cases were reported, representing an annual incidence of 185.7 cases. The ages ranged from 1-86 years with a mean of 41.5 (SD=13.9). Most [353 (27.4%)] of the cases were between 30-39 years group. Majority, 1141(87.8%) were females. The top eight common thyroid diseases were; non-toxic multinodular goitre 1002(77.5%), follicular adenoma 86(6.6%), diffuse toxic goitre 42 (3.2%), papillary thyroid carcinoma 40(3.1%), thyroglossal duct cyst 35(2.7%), Hashimoto's thyroiditis 28(2.2%), lymphocytic thyroiditis 22(1.7%) and follicular carcinoma 17(1.3%). Sixty-six (43.4%) of the neoplastic thyroid disorders were malignant with a prevalence of 0.18 among thyroid samples and annual incidence of 9.40 cases. The commonest thyroid cancer was papillary carcinoma 40(60.6 %), with a mean age of 38.3 SD=16.1 years, majority, 34 (82.9%), were women. A wide spectrum of thyroid disorders exists in Ghana, with an annual incidence of 185.7 cases. The commonest malignant thyroid disorder was papillary carcinoma, though iodine deficiency is endemic in Ghana and on this basis; one would have expected follicular carcinoma to be the commonest thyroid cancer in Ghana.

Journal of Medical and Biomedical Sciences (2013) 2(1), 1-7

Keywords*:* Multinodular; Goitre; Papillary; Follicular; Adenoma, Ghana

INTRODUCTION

Thyroid disorders vary according to the geographic location, environmental factors, major radionuclear events, factors affecting the onset and persistence of iodine-deficiency as well as iodine excess in diet and the population studied (Gheriani, 2006). The prevalence of thyroid disorders has been found to increase linearly with age (Mariotti *et al.*, 1995), and virtually all thyroid diseases are common in women, who commonly present with palpable anterior neck swelling (Tunbridge *et al.*, 1977; Vander *et al.*, 1968).

Correspondence: *Dr. Der Muonir Edmund, Department of Pathology, University of Ghana Medical School, P.O Box 77, Korle-Bu, Accra, Ghana, E-mail :- maadelle@yahoo.com, Tel: +233 208709807*

Disorders of the thyroid gland are grouped into hyperplasia, neoplasia, thyroiditis and developmental (Hedinger *et al.*, 1989; Rosai *et al.*, 1992). Studies outside Ghana have identified non-toxic multinodular goitre as the commonest thyroid disorder especially amongst females (Ogbera and Kuku, 2011; Santaniello *et al.*, 2012). Follicular adenoma is found in most studies to be the most common neoplastic thyroid tumour (Meissner and Warren, 1969). Data on the frequency of thyroid malignancies is not conclusive. Some studies in Africa have found papillary carcinoma to be the commonest thyroid malignancy (Baloch and LiVolsi, 2002; Thomas and Ogunbiyi, 1995) whilst others discovered follicular carcinoma to the commonest (Edino *et al.*, 2010;

Kalk *et al.*, 1997; Rahman *et al.*, 2010).

Recent studies have established that iodization of food and water resulted in a reduction in the incidence of follicular neoplasms and anaplastic cancers whilst cases of papillary cancers, medullary cancers, primary thyroid lymphomas and lymphocytic thyroiditis are on the increase (Harach and Ceballos, 2008). Among the known inflammatory thyroid disorders, Hashimoto's thyroiditis has been identified as the commonest especially in females (Okayasu *et al.*, 1994). Although thyroid disorders are numbered among the common endocrine disorders in Africa (Ogbera and Kuku, 2011), the spectrum and prevalence of thyroid diseases have not been studied in Ghana. The objective of this study was to determine the spectrum and prevalence of thyroid disorders using retrospective histopathological data from the Department of Pathology Korle-Bu Teaching Hospital.

MATERIALS AND METHODS

Study Site and study design

All data were gathered from the Department of Pathology, affiliated to the University of Ghana Medical School, and the largest in the country, Ghana, which reports between 5,000 and 8,000 histological cases in a year. This Department receives surgical specimens from Korle-Bu Teaching Hospital, the largest referral hospital in Ghana; as well as cases within the Accra Metropolis, neighboring towns and Districts, and other regions such as the Central, Western Eastern and Volta regions of Ghana. Although this retrospective study was a single-institution experience, a sample that will allow for evaluation of the clinical and histological characteristics of thyroid disorders in Ghana was used.

Sampling techniques and sample size

All the histopathology request forms and slides of confirmed thyroid disorders received in the Department of Pathology from January 2004 through December 2010 were reviewed independently by two pathologists, for clinical characteristics like age, main complaint and duration as well as histological features. A total of 1300 thyroid cases were reviewed during the study period. Branchial pouch anomalies, epidermoid cyst and all poorly fixed specimens were excluded in the study.

Classification of thyroid disorders

In this study, thyroid disorders were classified into four main categories: developmental- thyroglossal duct cyst and heterotopic thyroid tissue. Hyperplasia: sub-classified into non-toxic multinodular goitre, Grave's disease (diffuse toxic goitre) and dyshormonogenetic goitre, based on their presumed mechanism of production, morphologic features and clinical manifestations. Neoplasia: traditionally divided into: benign follicular adenoma and carcinomas (papillary, follicular, insular, medullary and anaplastic). Thyroiditis was divided into autoimmune (Hashimoto's thyroiditis and Lymphocytic thyroiditis) and non-autoimmune (Granulomatous and Acute thyroiditis).

Statistical analysis

The data were entered into a computerized spreadsheet and analyzed using SPSS software (Version 18). Frequency distributions and descriptive statistics were calculated for each variable.

RESULTS

Table 1 shows the clinico-pathological characteristics of the study population. During the period of study (2004-2010), a total of 1300 (3.7%) thyroid specimens were reported in our institution, giving an annual incidence of 185.7 cases. Most [618 (47.6%)] were total thyroidectomy specimens, with 427 (32.8%) subtotal thyroidectomies. The ages of patients diagnosed with thyroid disorders ranged from 1 year to 86 years, with mean age of 41.5 (SD=14.0). Most (27.4%) of the study population were young and in the 30-39 years age group (Table 1). In all 1152 (89.6%) of study participants were below 60 years with 134 (10.4%) being 60 years and above. The ages of 14 participants were not available. Majority [1141 (87.8%)] of the study participants were females. All 1300 (100%) patients, presented with neck swelling. A total of 84 (6.5%) patients had additional complains, majority [65 (77.4%)] were toxic symptoms (palpitation, tremors) (Table 1). Three hundred and seventy-one (28.5%),

of the cases had stated duration at the time of diagnosis, of which 85(22.9%) reported within seven to twelve months of noticing the swelling. The most frequently diagnosed group of thyroid disorders were the hyperplasias, 1043(81.1%) followed by neoplasms 153 (11.9%) (Table 1). The top eight common thyroid diseases were; non-toxic multinodular goitre 1002 (77.7%), follicular adenoma 86(6.9%), diffuse toxic goitre 42(3.2), papillary thyroid carcinoma 40(3.1%), thyroglossal duct cyst 35(2.7%), Hashimoto's thyroiditis 28(2.2%), lymphocytic thyroiditis 22(1.7%) and follicular carcinoma 17(1.3%) (Table 3).

Of the 1044 cases of hyperplasia, 1002(96.0%) were non-toxic multinodular goitre with mean age 42.5 SD=13.2, most [282(28.1%)] were within the 30-39 year group. Majority [900(89.7%)] were women (Table1). All the patients presented with anterior neck swelling with degenerative changes (haemorrhage, fibrosis, cystic changes, cholesterol cleft and dystrophic calcifications). Of the 292 (29.1%) cases of non-toxic multinodular goitres who had stated duration at presentation, many 65 (22.3%) reported within seven to twelve months of noticing the swelling.

The ages of the 153(11.9%) patients diagnosed with neoplastic thyroid diseases ranged from 17 to 86 years, with a mean age of 40.6 years [SD=14.6] many [38 (24.8%)] were within the 30-39 age group. Majority 123(80.4%) of the patients were females. Of those with stated duration at presentation most [12 (24.0%)], of reported within seven to

Table1: Clinico-pathological characteristics of the study population

1. Age distribution of all thyroid disorders of thyroid cases

Range: 1-86 years; **Mean age**: 41.5 **SD**: 13.9

Age groups (years)	**Frequency (n)**	**Percentage(%)**
1-9	11	0.9
10-19	33	2.7
20-29	199	15.5
30-39	353	27.4
40-49	330	25.7
50-59	224	17.4
60 and above	103	10.5
Total	1286	100.0

2. **Gender characteristics of the study population**

Female: 1141(87.8%) **Male:** 159(12.2%)

3. **Major Clinical Presentation of Study Population**: Anterior Neck Swelling: 1300(100.0%)

4. **Additional Complains** (N=84)

Toxic symptoms 65(77.4%) ii. Pressure symptoms 17(20.2%) iii. Other symptoms 2(2.4%)

5. Duration at Presentation (N=371)

Months	1-6	7-12	13-24	25-60,	61-120	>120
N/%	75(20.2)	85(22.9)	59(15.9%)	70(18.9)	45(17.1)	37(10.0)

6. Types of Surgical Specimens(1300)

Total Thyroidectomies	618(47.6%)
Subtotal Thyroidectomies	427(32.8%)
Left Lobectomies	117(9.0%)
Right Lobectomies	79(6.1)
Excision	48(3.7%)
Others	10(0.8%)
Total	1300(100.0%)

7. Major Groups of Thyroid Disorders

Hyperplasia 1044(81.1%), Neoplasia 153(11.1%), Thyroiditis 52(4.0%), Developmental 38(3.0%)

Table 2: Demographic characteristics of the major thyroid disorders

Groups	Range	Peak age	Mean	Male (n/%)	Female n/%)
Hyperplasia (n = 1044)					
NTMG	14-85	30-39	42.5	102(10.3%)	900(89.7%)
DTG	20-59	40-49	39.3	2(4.8%)	40(95.2%)
Neoplasia (n = 152)					
Follicular adenoma	18-85	30-39	38.8	12(14.0%)	74(86.0%)
Papillary carcinoma	17-72	20-29	38.3	7(17.5%)	33(82.5%)
Follicular carcinoma	17-86	50-59	52.1	8(47.1%)	9(52.9%)
Medullary carcinoma	35-51	40-49	44.2	3(60.0%)	2(40.0%)
Others	20-69	30-39	40.1	2(50.0%)	2(50.0%)
Thyroiditis (n = 52)					
Hashimoto's	21-69	30-39	43.3	1(3.6%)	27(96.4%)
Lymphocytic	21-64	30-39	39.9	2(13.0%)	20(87.0%)
Others (2/3.8%)					
Developmental (n = 38)					
Thyroglossal duct cyst	1-60	20-29	21.1	17(48.6%)	18(51.4%)
Simple thyroid cyst (3/8.0%)					

Table 3: Demographic characteristics of the first eight common thyroid diseases

Disease	Number N (%)	Peak age (yrs)	Mean (yrs)	Male N (%)	Female N (%)
Non-toxic Multinodular Goitre	1002(77.9)	30-39	42.4	102(10.3)	900(89.7)
Follicular Adenoma	86(6.7)	30-39	38.8	12(14.0)	74(86.0)
Diffuse Toxic Goitre	42(3.2)	40-49	39.3	2(4.8)	40(95.2)
Papillary carcinoma	40(3.1%)	20-29	38.3	7(17.5)	33(82.5)
Thyroglossal Duct Cyst	35(2.7%)	20-29	21.1	17(48.6)	18(51.4)
Hashimoto's Thyroiditis	28(2.2%)	30-39	43.3	1(3.6%)	27(96.4%)
Lymphocytic Thyroiditis	22(1.7%0	30-39	39.8	2(9.1%)	20(90.9%)
Follicular carcinoma	17(1.3%)	50-59	52.1	8(47.5%)	9(52.9%)

twelve months. Benign follicular adenoma was the commonest [86(57.0%)] histologic subtype of the neoplastic thyroid disorders, with mean age of 38.8 (SD= 13.2). About 30% [25(29.1%] were within 30-39 age group. Of the 38(2.9%), of developmental lesion in this study, majority 35(98.5%) were thyroglossal duct cysts, with mean age of 21.1 years SD= 16.6, many were within the peak age group of 20-29 years (Table 2).

The major demographic characteristics of the major disorders are shown in Table 2. A total of 66 (43.4%) of the neoplastic thyroid disorders were malignant. The prevalence of thyroid malignancies in this study was 0.18, whiles the annual incidence was found to be 9.40 cases. The commonest thyroid cancer was papillary carcinoma [40(60.6 %)], followed by follicular carcinoma 18(27.3%) (Table 2). The ages of patients diagnosed with papillary carcinoma (Classic, 33 and follicular variant, 7) ranged from 17 -72 years with a mean of 38.3, SD=16.3 years, many [12 (30.0%)] were in the 20-29 year age group. Majority [34 (82.9%)], were women, who presented within 2 years after noticing the swelling. Patients with follicular carcinoma 17 (11.3%) (Classic, 15 and Hurthle cell carcinoma, 2)

ranged in ages from 17-86 years, with a mean age of 52.1, SD=15.6. Many 7(41.2%) were within 50-59 age group. There were 9(52.9%) females and 8 (47.1%) males. Three (33.3%) out of nine reported within 6 months of noticing the swelling. There were five cases of medullary thyroid carcinomas, mean age 44.2 SD=6.6 years, with majority 3(60.0%) were within the peak age group of 40-49 years. Majority 4 (80.0) were males.

A total of 52(4.0%) of the study population were diagnosed with thyroiditis, the ages ranged from 21-69 years, with mean age of 41.5 SD=12.8 years. Majority 48(92.3) were females. The commonest 28 (54.95) thyroiditis in this study was Hashimoto's thyroiditis with mean age of 43.3 SD=13.5 years, many 11(39.3%) were in the peak age group of 30-39 years. Almost all 27(96.4%) were females (Table 2). Of the 9(32.1%) patients with additional symptoms, 6 (66.7%) were toxic.

DISCUSSION

Abnormal function of the thyroid is known to have several public health implications. This study used retrospective histopathological data from the pathology department of the KBTH to describe the spectrum, prevalence and incidence of thyroid disorders. An annual incidence of 185.7 thyroid disease cases was reported in this study within the seven year period (2004-2010) that the study was conducted.

An increased prevalence of thyroid diseases has been reported in the aged (Brent, 2010). The relatively younger age of participants at diagnosis in this study is inconsistent with the findings of several studies (Cooper, 2004; Mariotti and Cambuli, 2007; Surks *et al.*, 2004). Non-toxic multinodular, follicular adenoma, diffuse toxic goitre, papillary carcinoma, thyroglossal duct cyst, Hashimotto's thyroiditis, lymphocytic thyroiditis and follicular carcinoma were the predominant thyroid disorders observed among cases reported in this study. This study confirmed the several reports of high prevalence of thyroid disorders among women (Tunbridge *et al.*, 1977; Vander *et al.*, 1968). Several studies have reported that non toxic thyroid nodules are a frequent occurrence in clinical practice and that advanced age and female gender are notable risk factors (Gharib, 1997; Leech *et al.*, 1928; Rojeski and Gharib, 1985; Tunbridge *et al.*, 1977). In this study, majority of the females with nodular goitre were relatively younger (Table 1). Iodine deficiency, which is endemic in Ghana, has been linked with the pathogenesis of multinodular goitre. Our findings are similar to studies conducted in iodine deficient regions in other parts of the World (Ogbera and Kuku, 2011; Santaniello *et al.*, 2012). One other observation in this study is that all the non-toxic multinodular goitres showed secondary changes which shows that thyroid disorders in Ghana are usually chronic.

Studies have shown that follicular adenoma is the commonest benign neoplastic thyroid disorder reported in females and second to non-toxic multinodular goitre (Meissner and Warren, 1969). Our findings confirm these reports.

Papillary carcinoma and follicular carcinoma were the commonest thyroid malignancies reported in this study. Some studies have identified papillary thyroid carcinoma as the most common thyroid cancer (Baloch and LiVolsi, 2002; Thomas and Ogunbiyi, 1995), whiles others identified follicular carcinoma to be the most common (Kalk *et al.*, 1997; Rahman *et al.*, 2010). These findings however, were with reference to the geographic location, major radioactive fall-outs and the iodine status of the population studied. Our findings, are in agreement with those studies that identified papillary carcinoma as the commonest thyroid cancer. The introduction of iodization of food and water has led to a decline in the incidence of follicular and anaplastic neoplasms, whilst papillary cancers, medullary cancers, primary thyroid lymphomas and lymphocytic thyroiditis are on the increase (Harach and Ceballos, 2008). However, this programme which has been ongoing for the last seventeen (17) years cannot be used as the basis for the high number of papillary carcinoma since there is no report to that effect.

Iodine deficiency is endemic in Ghana and it will thus be appropriate to suggest that follicular carcinoma should be the commonest thyroid malignan-

cy, knowing the link that exists between iodine deficiency and follicular lesions. However, this wasn't the case in this study. In view of this, we recommend a before and after study on the spectrum of thyroid malignancies in Ghana. This will enable a proper evaluation of thyroid malignancies in Ghana.

In this study follicular carcinoma was diagnosed in relatively older patients in contrast to publications that have associated papillary thyroid cancinoma with the elderly (Lin *et al.*, 2004; Schlumberger, 1998). Furthermore, both papillary and follicular cancers showed female predominance, however we observed that follicular carcinoma was relatively common in males. On the contrary, almost all of the five cases of medullary carcinomas were males whose ages were similar to the mean age of the study participants.

The commonest thyroiditis in this study was Hashimoto's thyroiditis with a peak age group of 30-39 years and mean age 43.3 years and tended to be more prevalent in females. This is consistent with reports in other studies with the exception of age for which participants in this study with Hashimoto's thyroiditis were younger than the age reported by Contran *et al.,* (1994). Similarly, chronic lymphocytic thyroiditis had a peak age and gender distribution similar to that of Hashimotos's thyroiditis, but study participants with the condition were relatively younger.

CONCLUSION

A wide spectrum of thyroid disorders exists in Ghana, with an annual incidence of 185.7 cases. The commonest thyroid cancer in our study is papillary thyroid carcinoma, contrary to the fact iodine deficiency is endemic in Ghana and on this basis, one would have expected follicular to be the commonest thyroid cancer in Ghana**.** A population based study of the prevalence of thyroid diseases in Ghana is strongly indicated. Secondly, a retrospective study which will enable a proper evaluation of thyroid malignancies in Ghana with regards to the national iodization program (before and after) is further recommended.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to the technical staff, of the histology unit of the Department. We also in special way thank colleague residents and specialists in the department for their support.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

Baloch, Z, LiVolsi, V (2002) *Pathology of thyroid gland.* Churchill Livingstone: New York.

Brent, GA (2010) Environmental exposures and autoimmune thyroid disease. *Thyroid* **20** (7)**:** 755-761.

Cooper, DS (2004) Thyroid disease in the oldest old: the exception to the rule. *JAMA* **292** (21)**:** 2651-2654.

Cotran, RS, Kumar, V, Robins, SI, . (eds) (1994) *Pathological bases of disease.* W. B.Saunders Company: Philadelphia.

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

Gharib, H (1997) Changing concepts in the diagnosis and management of thyroid nodules. *Endocrinol Metab Clin North Am* **26**(4)**:** 777 -800.

Gheriani, H (2006) Update on epidemiology classification, and management of thyroid cancer. *Libyan J Med* **1**(1)**:** 83-95.

Harach, HR, Ceballos, GA (2008) Thyroid cancer, thyroiditis and dietary iodine: a review based on the Salta, Argentina model. *Endocr Pathol* **19**(4)**:** 209-220.

Hedinger, C, Williams, ED, Sobin, LH (1989) The WHO histological classification of thyroid tumors: a commentary on the second edition. *Cancer* **63**(5)**:** 908-911.

Kalk, WJ, Sitas, F, Patterson, AC (1997) Thyroid cancer in South Africa--an indicator of regional iodine deficiency. *S Afr Med J* **87** (6)**:** 735-738.

Leech, JV, Smith, LW, Clute, HM (1928) Aberrant Thyroid Glands. *Am J Pathol* **4**(5)**:** 481-492 487.

Lin, X, Fischer, AH, Ryu, KY, Cho, JY, Sferra, TJ, Kloos, RT, Mazzaferri, EL, Jhiang, SM (2004) Application of the Cre/loxP system to enhance thyroid-targeted expression of sodium/iodide symporter. *J Clin Endocrinol Metab* **89**(5)**:** 2344-2350.

Mariotti, S, Cambuli, VM (2007) Cardiovascular risk in elderly hypothyroid patients. *Thyroid* **17** (11)**:** 1067-1073.

Mariotti, S, Franceschi, C, Cossarizza, A, Pinchera, A (1995) The aging thyroid. *Endocr Rev* **16**(6)**:** 686-715.

Meissner, W, Warren, S (1969) *Tumors of the thyroid gland*. Armed Forces Institute of Pathology: Washington, DC.

Ogbera, AO, Kuku, SF (2011) Epidemiology of thyroid diseases in Africa. *Indian J Endocrinol Metab* **15**(Suppl 2)**:** S82-88.

Okayasu, I, Hara, Y, Nakamura, K, Rose, NR (1994) Racial and age-related differences in incidence and severity of focal autoimmune thyroiditis. *Am J Clin Pathol* **101**(6)**:** 698-702.

Rahman, GA, Abdulkadir, AY, Braimoh, KT, Inikori, AR (2010) Thyroid cancers amongst goiter population in a Nigerian tertiary hospital: surgical and radiographic perspective. *Niger J Med* **19**(4)**:** 432-435.

Rojeski, MT, Gharib, H (1985) Nodular thyroid disease. Evaluation and management. *N Engl J Med* **313**(7)**:** 428-436.

Rosai, J, Carcangiu, M, DeLellis, R (eds) (1992) *Tumors of the Thyroid Gland*. Armed Forces Institute of Pathology,: Washington, D.C.

Santaniello, B, Lombardo, I, Niccolardi, ME, Armonino, R (2012) Non toxic goiter in the adult population of Genoa: 10 years of experience. *J Prev Med Hyg* **53**(1)**:** 5-7.

Schlumberger, MJ (1998) Papillary and follicular thyroid carcinoma. *N Engl J Med* **338**(5)**:** 297-306.

Surks, MI, Ortiz, E, Daniels, GH, Sawin, CT, Col, NF, Cobin, RH, Franklyn, JA, Hershman, JM, Burman, KD, Denke, MA, Gorman, C, Cooper, RS, Weissman, NJ (2004) Subclinical thyroid disease: scientific review and guidelines for diagnosis and management. *JAMA* **291**(2)**:** 228-238.

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

Tunbridge, WM, Evered, DC, Hall, R, Appleton, D, Brewis, M, Clark, F, Evans, JG, Young, E, Bird, T, Smith, PA (1977) The spectrum of thyroid disease in a community: the Whickham survey. *Clin Endocrinol (Oxf)* **7**(6)**:** 481-493.

Vander, JB, Gaston, EA, Dawber, TR (1968) The significance of nontoxic thyroid nodules. Final report of a 15-year study of the incidence of thyroid malignancy. *Ann Intern Med* **69**(3)**:** 537-540.

ISSN 2026-6294