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Trends in Thyroid Malignancies in Accra Ghana: A Retrospective Histopathological Review in the Department of Pathology (1994-2013), Korle-Bu Teaching Hospital

Der EM[*1,2], Tettey Y[2], Gyasi RK[2], and Wiredu EK[2]

[1]Department of Pathology, School of Medicine and Health Sciences of the University for Development Studies, Tamale-Ghana
[2]Department of Pathology, School of Biomedical Sciences; College of Health, University of Ghana, Korle-Bu Accra-Ghana

[*]**Corresponding author:** Der EM, Department of Pathology, School of Medicine and Health Sciences of the University for Development Studies, PO Box 1883, Tamale-Ghana, Department of Pathology, School of Biomedical Sciences; College of Health, University of Ghana, PO Box 77, Korle-Bu Accra-Ghana, Tel: +233208709807, E-mail: maadelle@yahoo.com

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Abstract

Background: Malignancies of the thyroid gland are common in certain parts of the world. In Ghana there are no available data on the trends and gender characteristics of thyroid malignancies (TMs). The aim of this retrospective study was to determine the trends and gender characteristics of TMs in the Department of Pathology.

Material and methods: This was a retrospective review of all thyroid cases reported from January 1994 to December 2013. Data was analysed using SPSS software version 23.0 Chicago. Fisher's exact test was used to compute association between variables.

Results: Approximately 6.8% of all thyroid specimens received in our institution were malignant. There was a gradual decline in the relative proportions of TMs over the 20-year period of review. The commonest TM in this study was papillary thyroid carcinoma (PTC). The mean age of females diagnosed with TMs was 40.7 years (SD ±16.7), compared to 43.0 years (SD±15.5) for males. TMs were common in females younger than 40.0 years compared to their male counterparts (51.0% versus 42.0%; P=0.025). Systemic disease at diagnosis was common in males than females (8.7% versus 4.6%, P=0.042). The commonest TM diagnosed in females was PTC {90 (59.6%); P=0.004}, while in males it was follicular thyroid carcinoma (FTC) {30 (43.5%); P=0.094}.

Conclusion: The current study found a decline in the relative proportions of TMs over the period of review. TMs were common in young females compared to their male counterparts. A significant number of the study population had metastatic disease at diagnosis.

Keywords: Thyroid malignancies; Trends; Gender characteristics; Ghana

Introduction

Malignancies of the thyroid gland are relatively rare neoplasms worldwide, accounting for approximately 1-5% of all cancers in females and less than 2% in males [1]. Emerging evidence across the globe have shown an association between iodine intake and thyroid malignancies [2,3]. Ghana is among the world's top six countries with iodine deficiency [4,5] and hence the introduction of the national iodization program in 1996 [6-9]. Similarly, ionizing radiation has historically been linked to thyroid cancer particularly papillary thyroid carcinoma [10,11]. There is no published data implicating the atomic nuclear reactor in Ghana, nor any published literature reports that workers of the two radiotherapy centres in Ghana have developed thyroid cancers due to exposure to radiations. Published data on thyroid cancers in Ghana, particularly the incidence and trends, are limited compared to other African countries [12]. The aim of this retrospective study was to determine the trends and gender characteristics of thyroid malignancies using data from the Department of Pathology, Korle-Bu Teaching Hospital (KBTH), Accra, Ghana.

Material and Methods

Study Design and Site

This was a retrospective review of all reported thyroid gland cases in the Department of Pathology of KBTH from January

1994 to December 2013. This is the largest and oldest Pathology unit in the country which is also located in the biggest referral hospital in Ghana.

Data Collection and Analysis

All the histologically confirmed thyroid malignancies from 1st January 1994 to 31st December 2013 in the department were reviewed. Congo red was employed to confirm three cases of medullary thyroid carcinomas that we had difficulty in arriving at the definitive diagnosis based of the H&E stains. Data were collected on: age at diagnosis, sex, nature and duration of the presenting complaint, type of surgical specimen and the histological subtypes of thyroid malignancies, as well as vascular invasion and lymph nodal involvement by malignant cells. Data were entered into a statistical data base (SPSS software version 23.0 Chicago). Descriptive statistics were computed for the ages (mean, range, standard deviation) of all patients included in the study. Results were presented as bar chart for all continuous variables, while pie charts were used for categorical variables. The proportions of thyroid specimens that contained malignancy and the spectrum were evaluated for each year. Annual trends in the relative proportions of thyroid malignancies over the period 1994-2013 was determined. Comparisons between the gender characteristics of thyroid malignancies were made using Fisher exact test.

Inclusion Criteria

The eligibility criterion is thyroid malignancy only.

Exclusion Criteria

All cases with incomplete records were excluded.

Results

Trends in Thyroid Malignancies (TMs) Over the Period 1994-2013

From 1st January 1994 to 31st December 2013, a total of 126,796 surgical specimens were received in our institution, of which 3,226 (2.5%) were thyroid samples. A total of 220 (6.8%) thyroid malignancies (TMs) were diagnosed in the thyroid samples. Thyroid malignancies were commonly diagnosed in total thyroidectomies 93 (42.3%), followed by 69 (31.4%) lobectomies {Right=32(46.4%, Left=37 (53.6%)} (Figure 1).

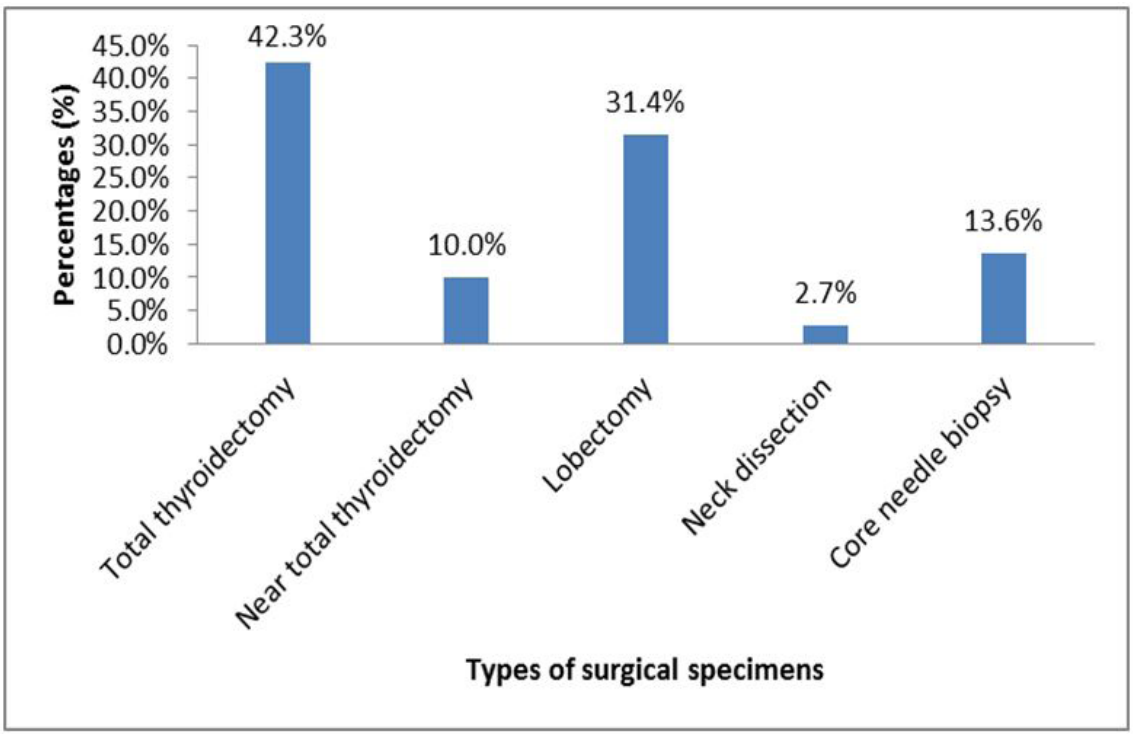

Figure 1: Types of surgical specimens in which thyroid malignancies were diagnosed

There was a gradual decline in the relative proportions of thyroid malignancies diagnosed in our institution over the 20-year period of study (Figure 2, and Table 1). For instance, within the first half (1994-2003) of the review period, there was a relative rise of 0.22% in the relative proportions of TMs diagnosed in our institution, compared to a relative declined of 0.32% in the second part (2004-2013) of the study (Table 2).

Year	Total thyroid specimens (TTS)	Total number of thyroid malignancies (TTM)	Relative proportions (TTM/TTS)X100%
1994	91	8	8.8
1995	59	6	10.2
1996	75	6	8.0
1997	81	8	9.9
1998	111	4	3.6
1999	136	6	4.4
2000	161	11	6.8
2001	159	12	7.5
2002	164	8	4.9
2003	166	18	10.8
2004	200	10	5.0
2005	202	17	8.4
2006	147	4	2.7
2007	174	11	6.3
2008	236	15	6.4
2009	215	17	7.9
2010	206	12	5.8
2011	190	14	7.3
2012	213	18	8.5
2013	240	15	6.3

Table 1: Thyroid malignancies diagnosed during the period 1994-2013 in the department

Age group (years)	Female n/%	Males n/%	P-value
≤19	8 (5.3)	4 (5.8)	1.000
20-29	38 (25.2)	11(15.9)	0.162
30-39	31 (20.5)	14 (20.3)	1.000
40-49	25 (16.6)	14 (20.3)	0.569
50-59	25 (16.6)	17 (24.0)	0.200
60-69	24 (15.9)	9 (13.0)	0.432
Total	151(100.0)	69 (100.0)	0.0001
Age≤40	77(51.0)	29(42.0)	
Age>40	74 (49.0)	40 (58.0)	0.246

***P<0.05=statistically significant**

Table 2: Age group distribution of females and males diagnosed with thyroid malignancies

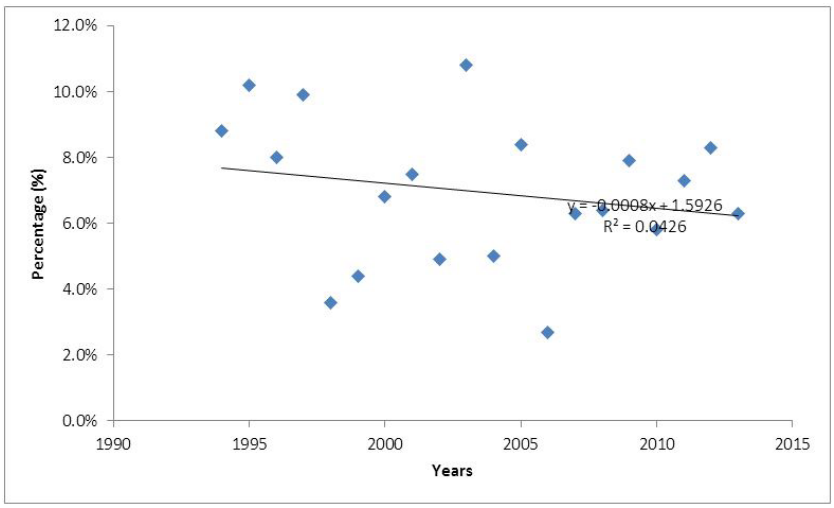

Figure 2: Trends in relative proportions of thyroid malignancies diagnosed from 1994-2013

Papillary carcinomas (PTC) was the commonest TM 116 (52.7%) during the period of review (Table 3). Majority of the malignancies were commonly diagnosed in females 151 (68.6%; P<0.001), with female to male ratio of approximately 2:1.

	Female (n/%)	Males (n/%)	P-value
Symptoms			
a. Neck swelling	145 (96.0)	63(91.3)	0.200
Whole gland	94(64.8)	38(60.3)	
Lt lobe	26(17.9)	16(25.4)	
Rt lobe	19(13.1)	6(9.5)	
Isthmus	1(0.7)	0(0.00	
Pyramidal lobe	1(0.7)	0(0.0)	
Lymph node	4(2.8)	3(4.8)	
b. Metastatic disease	6 (4.0)	6(8.7)	0.200
Brain and dura	1	2	
Bone pain	2	2	
Pathological fracture (femur)	1	1	
Fore head mass	1	0	
Supraglottic mass	1	0	
Right shoulder mass	0	1	
Duration of symptoms and signs (years)			
Total number stated	94	45	0.763
≤2	33 (35.1)	22 (48,9)	
≥3	61 (64.9)	23(51.1)	0.140
Histological subtypes of thyroid malignancies			
Papillary	90 (59.6%)	26 (37.7%)	0.004
Follicular	47 (31.1%)	30 (43.5%)	0.094
Medullary	11 (7.3%)	11 (15.9%)	0.055
Anaplastic	3 (2.0%)	2 (2.9%)	0.650
Total	151 (100.0)	69 (100.0)	<0.000

Table 3: Clinicopathological features of thyroid malignancies diagnosed in males and females

A total of 29 (13.2%) of the TMs showed vascular invasion.There were 36 (16.4%) patients who had positive lymph nodes at the time of histological diagnosis. The great majority had single nodal involvement (Figure 3).

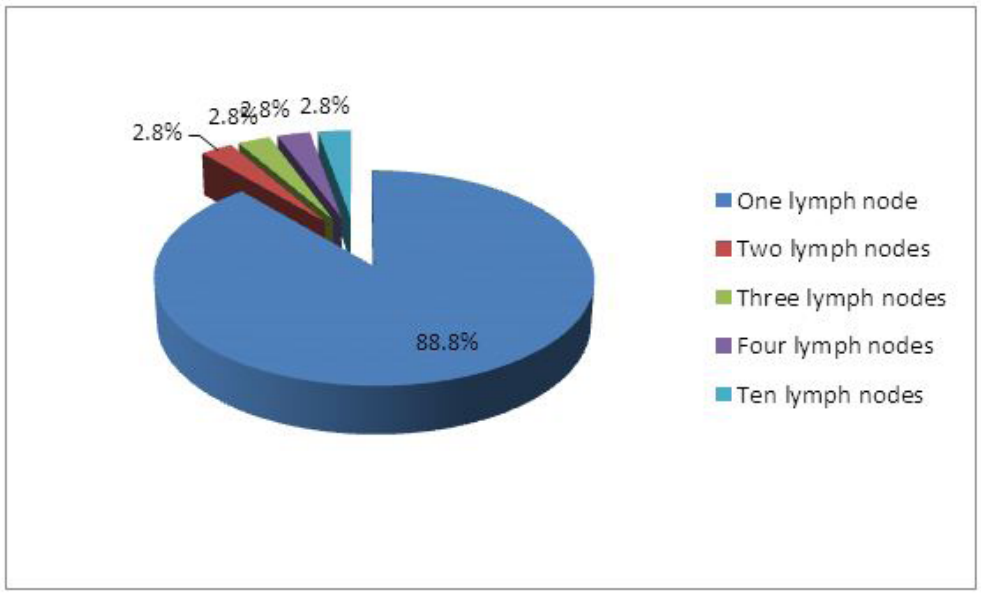

Figure 3: Nodal involvement by TMs

Comparing the clinico-pathological characteristics of females and males with thyroid malignancies (TMs).

Age Characteristics

The ages of the 151 women diagnosed with TMs ranged from 10 to 88 years, with a mean age of 40.7 years (SD±16.7), compared to an age range of 11-78 years and a mean age of 43.0 years (SD±15.5) for the 69 males with the disease. The modal age group was 20-29 years for the females compared to 50-59 years for the males (Table 2). Approximately 51.0% of the females compared to 42.0% of the males were aged 40 years or younger (P=0.246) (Table 3). The common clinical presentation of TMs in both females and males was a palpable anterior neck swelling (96.1% versus 91.3%, P=0.200). Approximately 4.6% females and 8.7% males presented with metastatic disease at diagnosis (P=0.200) (Table 3).

Ninety-four (62.3%) females compared to 45 (65.2%) males had stated the duration of their symptoms at presentation (P=0.763). Approximately, 61 (64.9%) of the female and 23 (51.1%) of the males presented to a health facility with symptoms of thyroid malignancies several years after the onset of the disease (P=0.140) (Table 3).

The commonest TM diagnosed in females was papillary thyroid carcinoma {90 (59.6%) females versus 26 (37.7%) males; P=0.004)}. However, the commonest TM for the males was follicular thyroid carcinoma {30 (43.5%) males versus 47 (31.1%) females; P=0.094} (Table 3).

Discussion

The current study found that 6.8% of all thyroid specimens received during the 20-year period of review were malignant. The incidence of TMs vary globally, according to the method of evaluation, the population studied, dietary iodine (iodine content) in the population studied and the effects of ionizing radiation on the thyroid (including side effects of radiotherapy) [10-16]. For instance, clinically, the prevalence of thyroid malignancies is estimated to be approximately 2.5 cases per 1,000 patients [15]. Similarly, the incidence of occult thyroid cancer (TC) reported in previous autopsy studies across the world [13,14] ranged from 0.01% in USA [11] to 35.6% in Finland [17]. Again in surgically excised cold nodules, the frequency of TMs has been reported to range from 1.5-38%, much higher than those reported in clinical studies [15]. The low incidence of thyroid malignancies in this current study however supports a previous study by Vanderlaan that reported that the low incidence rates of thyroid cancers in Africa [13].

There was a gradual decline in the relative proportions of TMs over the 20-year period of review. This differs from studies over the past 4 decades that reported a rising trend of the disease in both females and males [19,20]. There are reports of a rapid rise between 1973-2002 in some European countries, the United States of America and some parts of China [18-23]. However, the trend in the current study conducted in Accra, Ghana, is in keeping with studies in Sweden and Midwest of the United States of America that reported a decrease in the incidence rates of TMs in both males and females [20,24].

The commonest histological subtype of TM in this study was PTC. There is endemicity of iodine deficiency in Ghana, and the expectation was that FTC which is historically linked to iodine deficiency would have been the predominance TM in Ghana. It is difficult to attribute the predominant of PTC in this study to any known cause, but the fact that this study was conducted in the southern part of the country located along the coast where there is high intake of iodine rich sea foods may be suggestive. However, the current finding supports previous histological and clinical studies in Ghana [25,26] Nigeria [27] and other parts of Africa [28] that found PTC to be the predominant type of TM, but differs from some studies in other parts of West Africa [29-32] South Africa [33,34] and North Africa [35] that reported the commonest TM as FTC in iodine deficient regions of the world.

The majority of the malignancies were diagnosed in young females than their male counterparts with significant positive association (P<0.004). For an unknown reason, thyroid malignancies are commoner in females [32-34].The predominance of TMs in relatively younger females in this current study is thus in accordance with reports of previous reports on the gender characteristic of TMs in Africa [32-37].

In this current study, patients with TMs commonly presented with palpable neck swellings of long duration associated with distant spread, suggestive of a neglected disease. For instance 4.6% females and 8.7% males presented with metastatic disease such as bone pain, pathological fractures and brain involvements. The clinicopathological features of patients with confirmed diagnosis of TMs in this review study are similar to those of studies that found patients with TCs to present with nodular neck swelling [38-40]. The duration at diagnosis of thyroid malignancies in this study ranged from months to more than 20-years. However, many of the patients presented within 1 year of noticing the swelling (22.3%). There are no documented reasons for the late presentation of thyroid cancer in Ghana. This may be related to ignorance, but also the relatively expensive cost of medical care, which in most instances is borne directly by the patient, and thus thyroid nodules and goiters are often left uninvestigated until they become symptomatic (i.e., patients either develop obstructive symptoms, or develop hyperfunction), enlarge rapidly, or cause considerable cosmetic disfigurement. This is compounded by the misconception among some health care professionals that multinodular goiters are caused by iodine insufficiency and usually remain benign, and are therefore incapable of neoplastic transformation.

Conclusion

The current study found a decline in the relative proportions of TMs over the period of review. TMs were common in young females compared to their male counterparts. A significant number of the study population had metastatic disease at diagnosis.

Ethical Clearance

We had permission to gather and publish (participate) by the Head of Department of pathology, School of Biomedical Sciences, College of Health Sciences, University of Ghana, Legon. This is so for it was retrospective study.

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