

Incident of Thyroid Carcinomas and Other Pathologies with Age Correlation in Patients Presented with Palpable Thyroid Masses Undergoing Thyroidectomies

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ABSTRACT

Background: Thyroid cancer is the leading cause of death both in developing and developed countries. Patients present with enlarged thyroid. Radiology shows hot and cold nodules. Thyroidectomy or lobectomy is done to rule out malignancy. **Objective:** To determine the incidence of thyroid carcinomas and other pathologies in thyroidectomy specimen of different age group patients presenting with clinically enlarged thyroid. **Study Design:** This was a cross-sectional study. **Settings:** conducted in the Department of Histopathology, Foundation University Medical College (FUMC), Islamabad and Department of surgery, Fauji Foundation Hospital (FFH), Rawalpindi Pakistan. **Duration:** from Jan 2012 to March 2019. **Methodology:** All the thyroidectomies specimens send from Surgery department of FFH to Histopathology Department of FUMC during study period and fulfilling the pre-set criteria were included in the study. All the data and results were analyzed using SPSS version 17.0. **Results:** Out of 500 total patients, 89% (n=445) were diagnosed as having multinodular goiter, 2.6% (n=13) thyroiditis, 2.2% (n=11) follicular adenoma, 0.8% (n=4) Hurthle cell adenoma, 0.2%(n=1) hyalinizing trabacular adenoma and thyroid carcinomas. The carcinomas comprised 2.6%(n=13) papillary carcinoma, 0.8%(n=4) poorly differentiated carcinoma, 0.8%(n=4) anaplastic carcinoma, 0.6%(n=3) medullary carcinoma and 0.4%(n=2) follicular carcinoma. In 445 patients of multinodular goiter 158 patients were in the age range of 41-50 years, in 13 cases of thyroiditis 7 were in the age range of 31-40 years, in 11 cases of follicular adenoma 4 patients were in the age range of 31-40 years, in 4 cases of hurthle cell adenoma 3 patients were in the age range of 41-50 years, in 13 cases of papillary thyroid carcinoma 5 patients were in the age range of 31-40 years, in 4 cases of poorly differentiated carcinoma 2 patients were in the age range of 41-50 years and in 4 cases of anaplastic carcinoma 2 patients were in the age range of 61-70 years. **Conclusion:** The study concluded that thyroid carcinomas collectively constituted 5.20% of the study cases. Papillary carcinoma was the most frequent malignant neoplasm constituting 2.6 % and occurring mostly in the age range of 31-40 years, while anaplastic carcinoma comprised of 0.8% of malignant lesions occurring in the age range of 61-70 years. The most frequent cause of thyroid enlargement was multinodular goiter (89%) with majority of the patients in the age range of 41-50 years.

Keywords: *Thyroid swelling, Thyroid Carcinoma, Thyroiditis, Adenoma and Multinodular goiter.*

INTRODUCTION

Thyroid disease is common not only in Pakistan but also all over the world.¹ Factors associated with increased incidence depend upon iodine status, but also on advancing age, gender, ethnical group and geographical area.^{2,3} Its rising incidence is also associated with highest mortality rate annually as compared to all other endocrine cancers.⁴ Thyroid cancer is considered 16th most prevalent cancer globally that affect both developed

and underdeveloped countries equally.⁵ In Pakistan the overall incidence of thyroid carcinoma is 1.2% with papillary thyroid carcinoma comprising 69-71%, follicular thyroid carcinoma 11-13%, medullary thyroid carcinoma 3-5% and anaplastic thyroid carcinoma 1-2%.⁶ The exact diagnosis of thyroid lesion requires histopathology on thyroidectomy specimens⁷. Different modalities are employed for early detection of the lesions such as Ultrasound, thyroid scan and Fine Needle

Aspiration Cytology.⁷ Recommendations are that all thyroid nodules greater than 1cm in size must be evaluated thoroughly to rule out malignancy.⁸ Among general population, most of these nodules are benign and only 5-25% represents thyroid cancer.⁹ The various thyroid carcinomas derived from thyroid follicular epithelium include papillary carcinoma, follicular carcinoma, poorly differentiated carcinomas and anaplastic carcinoma, while medullary carcinoma arises from parafollicular / C cells.^{4,10} Follicular carcinoma shows vascular and capsular invasion due to which it is differentiated from follicular adenoma. Papillary thyroid carcinoma is a malignant tumor forming papillary and follicular structures. It has characteristic nuclear changes such as overlapping, crowding, grooving and clearing. It spreads via lymphatics to cervical lymph nodes. Medullary carcinoma can be familial or sporadic. Microscopically cells are either polygonal or fusiform with well-defined borders, cytoplasm is eosinophilic with occasional granules. A dense amorphous material i.e., amyloid deposition in stroma is a characteristic feature. Anaplastic carcinoma is most aggressive tumor occurring in older age group. Clinically it presents with rapid thyroid enlargement, dyspnea and dysphagia.⁷

The benign non neoplastic conditions include multinodular goiter, various types of thyroiditis including Hashimoto's thyroiditis, de Quervain thyroiditis, lymphocytic thyroiditis and palpation thyroiditis. The thyroid adenomas include follicular adenoma, Hurthle cell adenoma and hyalinizing trabecular adenoma.⁴ Colloid goiter (endemic goiter) is the enlargement of normal thyroid gland. It occurs due to iodine deficient diet especially in iodine deficient areas.⁷ Toxic multinodular goiter (multinodular goiter) is one of the causes of hyperthyroidism, after Grave's disease.⁶ Follicular adenoma is a benign tumor exhibiting follicular differentiation microscopically without vascular and capsular invasion.⁷

The aim of this study was to determine the incidence of thyroid cancer and its correlation with different age groups.

METHODOLOGY

Study Design: Cross-sectional study.

Settings: This study was conducted in the Department of Histopathology, Foundation University Medical College, Islamabad campus and Department of surgery, Fauji Foundation Hospital, Rawalpindi Pakistan.

Duration: From Jan 2012 to Mar 2019.

Sample Technique: Non-probability consecutive sampling.

Sample Size: 500 patients.

Inclusion Criteria: All properly fixed thyroidectomy specimens of any age and sex.

Exclusion Criteria: Autolyzed and poorly fixed thyroidectomy specimen.

Data Collection Procedure: After approval from Ethical Research Committee (ERC) of FUMC, all the thyroidectomies specimens received in the Histopathology Department during study period and fulfilling the pre-set criteria were included in the study. Patient's data was recorded on predesigned proforma. These specimens were fixed in 10% neutral buffered formalin followed by grossing, processing and paraffin embedding. The slides were manually stained with Haematoxylin and Eosin by an experienced lab technician. Microscopic evaluation was initially done by the postgraduate trainee and later on confirmed by two consultant histopathologists.

RESULTS

A total of 500 patients were included according to the inclusion criteria of the study. Frequency of various pathologies in thyroidectomy specimens was analyzed which included 89% multinodular goiter, 2.6% thyroiditis, 2.2% follicular adenoma, 0.8% Hurthle cell adenoma, 0.2% hyalinizing trabecular adenoma and thyroid carcinomas including 2.6% papillary carcinoma, 0.8% poorly differentiated carcinoma, 0.8% anaplastic carcinoma, 0.6% medullary carcinoma and 0.4% follicular carcinoma as shown in table 1.

Table 1: Frequency and percentage of various thyroid diseases (n=500)

Nature of lesion	Diseases	Frequency of individual lesion	Percentage (%) of individual lesion	Overall Frequency & Percentage
Malignant	Papillary carcinoma (PTC)	13	2.6	26/500 5.2 %
	Poorly differentiated carcinoma	4	0.8	
	Anaplastic carcinoma	4	0.8	
	Medullary carcinoma (MTC)	3	0.6	
	Follicular carcinoma (FC)	2	0.4	
Benign	Multinodular goiter (MNG)	445	89	474/500 94.8%
	Thyroiditis	13	2.6	
	Follicular adenoma (FA)	11	2.2	
	Hurthle cell adenoma (HCA)	4	0.8	
	Hyalinizing trabecular tumor (HTT)	1	0.2	
Total		500	100	

Out of 445 patients of multinodular goiter 158 patients were in the age range of 41-50 years, seven of 13 cases of thyroiditis were in the age range of 31-40 years, 4 of 11 cases of follicular adenoma 4 patients were in the age range of 31-40 years, in 4 cases of hurthle cell adenoma 3 patients were in the age range of 41-50 years, in 13 cases

of papillary thyroid carcinoma 5 patients were in the age range of 31-40 years, in 4 cases of poorly differentiated carcinoma 2 patients were in the age range of 41-50 years and in 4 cases of anaplastic carcinoma 2 patients were in the age range of 61-70 years as shown in table 2

Table 2: Age wise distribution of thyroid lesions (n=500)

Histological diagnosis	n	Percentage	Less than 20 years	21-30 years	31-40 years	41-50 years	51-60 years	61-70 years
MNG	445	89	24	60	95	158	76	32
Thyroiditis	13	2.6		3	7		3	
PTC	13	2.6		1	5	3	2	2
FA	11	2.2	1	3	4	2	1	
HCA	4	0.8		1		3		
Poorly differentiated carcinoma	4	0.8				2	1	1
Anaplastic carcinoma	4	0.8				1	1	2
MTC	3	0.6			1		1	1
FC	2	0.4		1		1		
HTT	1	0.2				1		

MNG: Multinodular goiter, PTC: Papillary thyroid carcinoma, FA: Follicular adenoma, HCA: Hurthle cell adenoma, MTC: Medullary carcinoma, FC: Follicular carcinoma, HTT: Hyalinizing trabecular tumor

Figure 1: Papillary thyroid carcinoma (H&E, 10x, top) showing papillary structures with psammoma bodies, (H&E, 40x, below) showing intranuclear inclusions (thick arrow) and grooves (thin arrow)

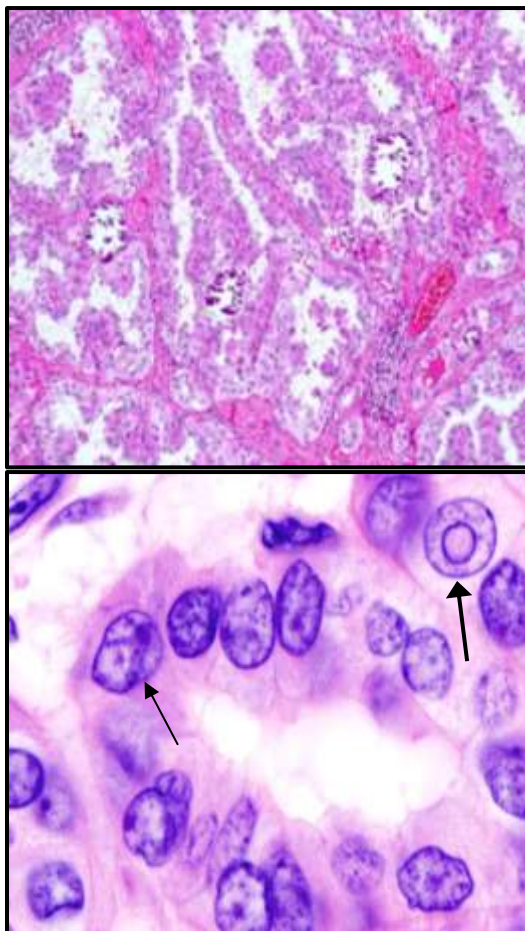
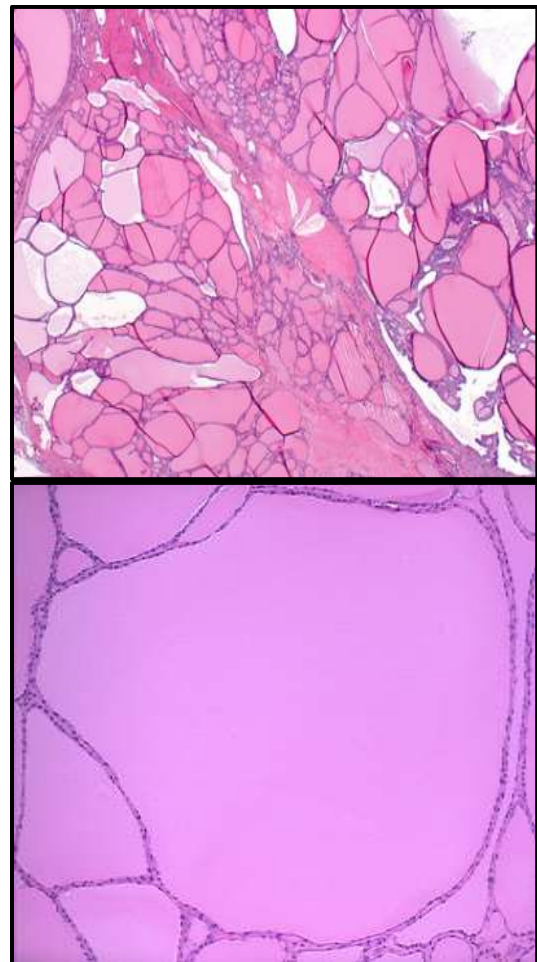


Figure 2: Multinodular goiter (H&E, 10x, top) showing variable sized thyroid follicles, (H&E, 40x, below) showing abundant colloid in the follicles



DISCUSSION

Thyroid diseases are the second most common endocrine disorders after diabetes mellitus worldwide. They are important because they affect all age groups and can be treated both medically and surgically. According to medical facts declared by WHO, 7% of the world population presented with clinically enlarged thyroid gland and majority of the patients were from developing countries. The most common cause of thyroid enlargement is iodine deficiency which is very common in the northern areas of Pakistan.

According to this study, non-neoplastic lesions of thyroid (94.80%) were far more in number than the neoplastic lesions (5.20%). This was consistent with previous national and international studies done by Ghafoor A *et al*¹¹ and Joseph E *et al*¹² respectively. The frequency of multinodular goiter in this study was 89% which was slightly more compared to the percentage shown by an Indian study which gave a value of 74%.¹³ Thyroiditis was the second most common non neoplastic thyroid lesion after multinodular goiter; this finding was consistent with the study done by Joseph E *et al*.¹² Follicular adenomas constituted 2.2% in our study while a study done in Al Madina region of Saudi Arabia gave a percentage of 1.7.² Hurthle cell adenoma comprised of 0.8% of cases in this study while the value provided by the above mentioned Saudi study was 0.6%. The percentages of both types of adenomas were slightly on the lower side in the Saudi study as compared to ours.

The overall frequency of thyroid malignancies in the current study was 5.20% which was lower than the figure provided by Qureshi IA *et al* who gave the overall frequency of 11% in their research article.¹⁴ The most frequent thyroid malignancy in this study was papillary carcinoma which was consistent with the studies done by Joseph E *et al*,¹¹ Albasri A *et al*² and Raheem N *et al*¹⁵ but the study conducted by Qureshi IA *et al*¹⁴ presented a lower value of papillary carcinoma (1%). Poorly differentiated carcinoma which has a worse prognosis than well differentiated thyroid carcinomas but better prognosis than anaplastic carcinoma constituted 0.8% of malignant lesions which is in concordance with a Japanese study published in year 2018.¹⁶ Anaplastic carcinoma constituted a value of 0.8 % in our study, similar figure was shown by a Chinese study data of year 2004 -2005 by Zhao L *et al*.¹⁷

When correlation of age with different thyroid pathologies was done, it was found that most of the thyroid diseases occur in the age range of 30-50 years, which was consistent with the conclusion derived from the study done by Salami BA *et al*.¹⁸ In this study maximum number of cases occurred in the age range of 41-50 years as was also shown by study done by Joseph E *et al*.¹² Papillary carcinoma in our series occurred mostly in the age range of 31- 60 years which is in concordance with the study done by Zhao Y *et al*.¹⁹ Carcinoma of old

age in present study was anaplastic carcinoma and 50% of the patients were in the age range of 61-70 years as was in a study done by Hussain SA *et al* which gave a mean age of 65 years.²⁰

CONCLUSION

The study concluded that the most frequent cause of thyroid enlargement was multinodular goiter (89%) occurring mostly in 41-50 years. Thyroid carcinomas collectively constituted 5.20%, with papillary carcinoma as the most frequent malignant neoplasm with maximum number of patients in the age range of 31-40 years while anaplastic carcinoma (0.8%) was the diagnosis of old age.

LIMITATIONS

The declaration of lesion as benign and malignant was solely done on morphological findings and no immunohistochemical stain was applied for the confirmation of diagnosis.

SUGGESTIONS / RECOMMENDATIONS

Thyroidectomy/lobectomy should be done in all those patients with thyroid scan showing cold nodules to rule out malignancy.

CONFLICT OF INTEREST / DISCLOSURE

There is no conflict of interest in this study.

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