

ORIGINAL ARTICLE

Histopathological Characteristics and Incidence of Thyroid Carcinoma in a Tertiary Care Hospital of Pakistan - A retrospective study

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ABSTRACT

Background: Thyroid cancer is the most frequently occurring cancer of endocrine organs. From the past few decades, the prevalence of thyroid carcinoma is increasing generally and this has aroused the great public concern. Papillary thyroid carcinoma is primarily responsible for this high prevalence. The cases of other types of thyroid malignancies have remained stable over time.

Aim: To analyze our institution-based trends in histopathological characteristics and incidence of thyroid carcinoma.

Study Design: Retrospective study

Place and duration: Pathology Department of Rai Medical College, Sargodha, from July 2017 to June 2022.

Methodology: This study comprised of 56 cases of thyroid neoplasm diagnosed on biopsy. The main histologic types of thyroid carcinoma include papillary, follicular, medullary and anaplastic.

Results: Of 374 thyroid lesions reviewed, 56 cases were malignant. Among these, PTC constituted about 43(76.78%) cases. There were 6(10.71%) cases of follicular ca followed by 5(8.92%) cases of medullary and 1(1.78%) case of anaplastic carcinoma.

Practical implication: Unfortunately, the frequency of thyroid cancer in Pakistan is on the increase and the incidence of thyroid cancer in our country is difficult to measure due to the limitations of epidemiological statistics. Information regarding the geographic distribution of thyroid cancer is of great value for formulating epidemiologic hypothesis and for understanding the concepts of its risk factors. Such info is also valuable for making worldwide comparisons.

Conclusion: Thyroid cancer was six times more frequent in females (female-to-male ratio 6:1). Most cases of PTC, follicular carcinoma and medullary carcinoma were in patients in the fourth decade of life then in third and fifth decade. However, anaplastic carcinoma was seen between 60 to 69 years of age.

Keywords: Thyroid Neoplasms, Thyroid Cancer, Papillary, Thyroid Carcinoma, Anaplastic

INTRODUCTION

Thyroid cancer is somewhat infrequent, almost 1% of all malignancies combined. However, it is the most frequently occurring cancer (up to 88%) of endocrine organs¹. From the past few decades, the prevalence of thyroid carcinoma is increasing generally and this has aroused the great public concern². With the average increase in the incidence by 6.2% per annum, thyroid carcinoma is the 5th most common tumor diagnosed in females^{3,4}.

Papillary thyroid carcinoma (PTC) is primarily responsible for this high prevalence⁵. The cases of other types of thyroid malignancies have remained stable over time. PTC represents approximately 90% of all cases of thyroid cancers. As per a survey of 2017, thyroid carcinoma included 4.4% follicular carcinoma, 1.5% medullary carcinoma, and <1% cases of anaplastic carcinoma^{3,4}.

The exact cause of thyroid cancer is not clear, however there are a few predisposing factors. Irradiation of head and neck region especially in childhood is a well-known risk factor, primarily for the papillary carcinoma. There is high incidence of follicular carcinoma in areas which are known to have iodine deficient⁶.

The population based statistics of thyroid carcinoma and its related risk factors are limited in our population.⁷ In Pakistan thyroid carcinoma constitute almost 1.2% of all malignancies, from which 57 to 89% cases are of PTC. The female to male ratio in Pakistan ranges between 2.5 to 4:1⁸. Unfortunately, the frequency of thyroid cancer in Pakistan is on the increase but the incidence of thyroid cancer in our country is difficult to measure due to the limitations of epidemiological statistics. Information regarding the geographic distribution of thyroid cancer is of great value for formulating epidemiologic hypothesis and for understanding the concepts of its

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risk factors. Such info is also valuable for making worldwide comparisons⁶.

The aim of this study is to analyze our institution-based trends in histopathological characteristics and incidence of thyroid carcinoma.

MATERIALS & METHODS

After IRB approval this retrospective study was conducted in Pathology Department of Rai Medical College, Sargodha, from July 2017 to June 2022. This study comprised of 56 cases of thyroid neoplasm diagnosed on biopsy. Sample size of 56 patients was calculated at 5% margin of error and 95% confidence interval by using WHO sample size calculator version. All thyroidectomy cases proven to have thyroid cancer on histopathology were included in the study. Graves' disease, goiter or benign disorders diagnosed on biopsy were excluded. The history and other relevant data such as sex and age were obtained from the hospital record. The specimens were collected from Rai Medical Complex and RMC Teaching Hospital, Sargodha and were kept in 10% formalin. After gross examination, the sections were taken from 2 to 3 areas and then it was processed and stained. The slides were studied under the microscope for histomorphological findings. The main histologic types of thyroid carcinoma include papillary, follicular, medullary and anaplastic. Statistical analysis was accomplished using SPSS version 20 and categorical variables were summarized as percentages and frequency.

RESULTS

Over the course of 5 years, of 374 thyroid lesions reviewed, 56 cases were malignant. Among these, PTC constituted about

43(76.78%) cases. There were 6(10.71%) cases of follicular carcinoma followed by 5(8.92%) cases of medullary and 1(1.78%) case of anaplastic carcinoma (Table 1) (Figure 1).

Table 1: Histological pattern of different thyroid neoplasm

Histology	n	%age
Papillary carcinoma	43	76.78
Follicular carcinoma	6	10.71
Medullary carcinoma	5	8.92
Anaplastic carcinoma	1	1.78

Of 43PTC, 26(60.46%) cases were follicular variant of papillary thyroid carcinoma followed by 14 (32.55%) cases of classic

Table 2: Age-wise distribution of patients with thyroid carcinoma

Histological Type	<20 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	Mean age
Papillary carcinoma	1	2	15	19	5	1	39.9
Follicular carcinoma	Nil	Nil	1	3	1	1	49.7
Medullary carcinoma	Nil	1	1	2	1	Nil	41.5
Anaplastic carcinoma	Nil	Nil	Nil	Nil	Nil	1	61
Secondary tumors	Nil	Nil	Nil	Nil	1	Nil	54

DISCUSSION

Thyroid carcinoma is the most frequently occurring cancer of endocrine organs⁹. Non-epithelial tumors and lymphomas of the thyroid are extremely rare^{10,11}. High incidence of thyroid tumors has been perceived in different areas of the world. Cases of PTC are mostly responsible for the high frequency (around 90%); the incidence of other types of thyroid tumors has remained comparatively consistent over time¹².

In current study we found PTC as the frequently occurring malignant tumor (76.78%). In USA, a study reported a similar frequency of PTC (about 80–85%). PTC can occur at any age. Most tumors of PTC are detected in the 30-50 years of life. Females are diagnosed more frequently than males (ratio: 2.1:4:1)¹³. In Pakistan, about 70% people with thyroid cancer have PTC¹⁴. A study conducted in Karachi reported that among thyroid carcinomas PTC is the most frequent ranging from 69-71%¹⁵. Clinic-pathological characteristics of thyroid carcinoma was studied in East India and found that PTC consists of 63.15% of a total of 42 patients¹⁶. In a retrospective study conducted in Karachi, frequency of PTC was 90.2% among thyroid tumors reported over a period of 5 years¹⁷. PTC is prevalent in almost all age groups, though it displayed a higher occurrence among 31 and 50 years. Amongst elders, follicular and anaplastic carcinomas are most frequent¹⁸.

The incidence of follicular carcinoma in this study was 10.71% (6 cases) which is in agreement with a local study in which the incidence of follicular carcinomas was ranging from 11.6-13%¹⁵. However, a comparatively low frequency 2% and 4.4% was reported by Bukhari and Rossi and a high frequency (23.68%) was documented by Shah^{12,16,17}. Follicular carcinoma is usually associated with distant metastases and advanced disease due to vascular and capsular invasion¹⁹.

The current study exhibited 8.9% cases of medullary carcinoma, this frequency is higher than other studies where prevalence of medullary carcinoma was 5.26%, 4.5% and 1.5%^{12,16,17}. In our study, the mean age of patients with medullary thyroid carcinoma was 41.5 years, which is almost the same to previous studies where the mean age was 42.88 and 42.07 years, while one study showed higher age (mean 50 years)^{20,21,22}.

We reported a single case of anaplastic carcinoma (1.78%) that is in agreement with a similar research which reported 2% and <1% cases of anaplastic carcinoma.^{12,18} A previous study documented 5.26% cases of anaplastic carcinoma, this high incidence might be due to a comparatively less number of cases studied.¹⁶ Higher incidence of anaplastic carcinoma were seen in 40–49 years of age with a mean of 49 years which is similar to a study of Girardi who found a mean age of 48.14 years¹⁸.

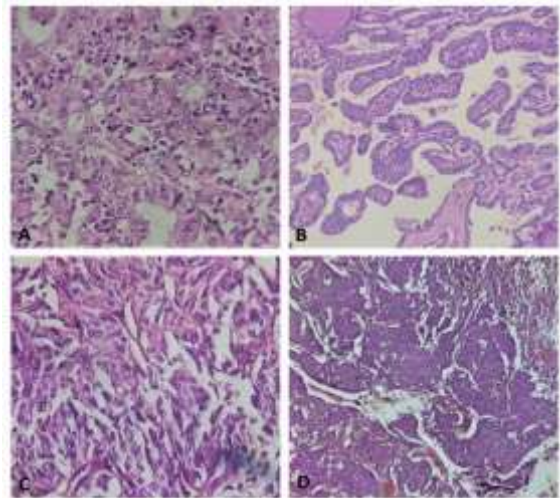
Our study showed a predominance of females (85.71%) in all carcinomas (14.28%) with a female-to-male ratio of 6:1. A same

papillary carcinoma and 3(6.97%) cases of encapsulated follicular variant of papillary carcinoma. Out of follicular carcinoma, 2(33.33%) were Hurthle cell variant and 4(66.66%) were classical follicular histology.

Median age of diagnosis was 49 years with youngest of 18 years and oldest of 64 years [Table 2]. Females were 48(85.71%) and 8 (14.28%) cases were males. It was six times more frequent in females with a female-to-male ratio 6:1. Majority cases of papillary, follicular and medullary carcinoma were in fourth decade followed by the third and fifth decades of life (Table 2). Though, anaplastic carcinoma was seen between 60 to 69 years of age.

ratio was found by a research of Shah where 42 patients go through surgery and average age of diagnosis for thyroid tumors was 39 years¹⁶. In a study by Bukhari, females patients were 82.4% and males were 17.6% with a ratio of 4.7:1. Majority of the cases were in 4th decade which was followed by the 3rd and 2nd decade¹⁷. A similar study showed 79.6% cases of thyroid carcinoma in women with a 1:3.9 male-to-female ratio¹⁸.

Figure 1: Photomicrograph of: A, Follicular variant of papillary thyroid carcinoma showing follicular architecture but papillary cytology characterized by nuclear overlapping, nuclear enlargement, nuclear grooves, chromatin clearing and nuclear membrane irregularity. B, Classic papillary carcinoma revealing complex, branching, randomly oriented papillae with fibrovascular cores. C, Medullary carcinoma composed of polygonal to spindle cells arranged in lobules, sheets and cords. D, Anaplastic carcinoma with sarcomatoid morphology. (H&E stain x 1000)



CONCLUSIONS

Thyroid cancer was six times more frequent in females (female-to-male ratio 6:1). Most cases of PTC, follicular carcinoma and medullary carcinoma were in patients in the fourth decade of life then in third and fifth decade. However, anaplastic carcinoma was seen between 60 to 69 years of age.

Limitations of study: This study comprised of resected lesions of thyroid tissue diagnosed on microscopy as malignant. FNAC specimens were not considered. Due to a single research center and small sample size, the data was not prototypal of the whole population.

Conflict of Interest & Disclaimer: No conflict of interest & No disclaimer

Contribution of authors: **NK:** Topic selection, article writing, histological diagnosis results, discussion, conclusion, **BA:** Final review of article, data collection, reference, **MKA:** Review & checking of manuscript, data analysis, **AIM:** Performance of gross examination, H&E staining, **NA:** Data Analysis, discussion
Conflict of interest: Nil

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