



Original Research Article

Papillary thyroid carcinoma and its variants in tertiary care hospital at rural area

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ABSTRACT

Papillary thyroid carcinomas constitute more than 70% of thyroid malignancies. While the most common variants are conventional and follicular, uncommon variants such as oncocytic, diffuse sclerosing etc are also observed. The most common etiological factor is radiation, but genetic susceptibility and other factors can also contribute to the development of papillary thyroid carcinoma (PTC).

Aims and Objectives: The aim of our study was to analyze different variants of papillary thyroid carcinoma at the Kamineni Institute of Medical Sciences, Narketpally. In the Nalgonda district, thyroid carcinoma constituted 1% and 2% of all incident cancers among males and females, respectively.

Materials and Methods: Our data base included a total of 356 patients (non neoplastic 219 and neoplastic 137). Consecutive cases of papillary thyroid carcinoma admitted to the Kamineni institute of medical sciences were 52 (9 males and 43 females) over a period of four years.

Results: The diagnosis of thyroid cancer was confirmed by fine needle aspiration cytology in most (88%) of the cases. There was a female preponderance (9 males and 43 females). The primary modality of treatment was surgery with total thyroidectomy being performed in 82%, while the rest underwent hemithyroidectomy. The papillary carcinomas were sub- categorized based on the pattern. Most of the cases were conventional type [61.52%] followed by follicular variant PTC [21.2%], encapsulated [9.6%] and one each case of oncocytic type, Sclerosing variant, tall cell variant, PTC with anaplastic changes [1.92%] each.

Conclusion: The purpose of this study was to review and compare the various histopathological patterns of PTC with those of classical PTC. Different variants or histological patterns may co-exist in the same tumor. High dietary intake of iodine was the most significant risk factor for the etiology of papillary thyroid carcinoma in our study.

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1. Introduction

For the past few decades there has been an increasing incidence of PTC worldwide. Papillary thyroid carcinoma (PTC) is the most common type of malignant thyroid tumor constituting more than 70% of thyroid malignancies.^{1,2} PTC constitutes 50% – 90% of differentiated follicular derived thyroid cancers world-wide. It is generally seen

in areas having iodine-sufficient or iodine-excess diets. Dietary iodine concentration has been found to influence the incidence and morphology of this disease. Thus there are significant geographic variations, but this wide variability may also be attributed to variations in sampling techniques.

According to GLOBOCAN - 2008 the estimated age standardized annual incidence for thyroid carcinoma is 1 to 2.9 cases per 100,000 men and 3.4 to 9.1 cases per 100,000 women with lower figures being from developing countries and higher figures from developed countries. The

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incidence of thyroid carcinoma has steadily increased in most countries over the past 2 decades, predominantly attributable to an increase in papillary carcinoma. The increase is partly due to liberal use of criteria for diagnosis of papillary carcinoma and increased detection of small tumors by imaging techniques. According to the surveillance, epidemiology and end result study the 10 year survival rates of major thyroid carcinomas are papillary carcinoma [98%], follicular carcinoma [92%], medullary carcinoma [80%] and undifferentiated carcinoma [13%]. Papillary carcinoma can affect any age group, with female predominance.

Previous irradiation to head and neck, radiation exposure from nuclear accidents or atomic bomb s are the most important etiological factors for development of Papillary Thyroid Carcinoma. It is assumed that the radiation must have damaged the thyroid follicles, and the TSH stimulation of the damaged follicles lead to the development of neoplasm. However the genetic predisposition to such mutations should also be considered. Hashimoto’s thyroiditis increases the risk of papillary carcinoma. Some syndromes are also predisposed to the development of papillary carcinoma.

According to a long term follow up study from the Mayo clinic, the cancer related mortality is only 6.5%.³ A study was conducted to correlate the fine needle aspiration and histopathologic findings and to study the histopathologic variants of papillary carcinoma. Many morphological variants of papillary thyroid carcinoma have been described and their behaviors have been characterized.⁴

2. Materials and Methods

The present study was conducted at Kamineni Institute of Medical Sciences, Narketpally for a period of three year from July 2013 to June 2016. Detailed medical history was obtained and complete physical examination was performed on all patients before surgery. All patients underwent complete radiological examination comprising chest radiography, cervical ultrasonography and fine needle aspiration of thyroid nodules or cervical adenopathy at the time of admission. Depending on the cytological results and extent of the lesions, surgeries were performed. Age and sex incidence of disease presentation, distribution of cases and various clinicopathologic presentations have been analyzed.

3. Results

In a four year prospective study from Jan 2013 to Dec 2016 we received 356 thyroid specimens, which included both non-neoplastic and neoplastic lesions (Table 1). The neoplastic lesions were further classified as benign and malignant lesions (Table 2). The malignant lesions predominantly include papillary carcinomas (81.25%) followed by follicular (14.06%) and medullary carcinomas

(4.69%) (Table 3). In this study our discussion mainly focuses on variants of papillary carcinoma encountered in our institution.

FNAC was done in all the cases. Proper history was obtained and thorough examination was performed and data with respect to size, consistency, lymphadenopathy and other related symptoms were recorded at the time of the procedure. The cases were reported after thorough screening of slides with correlation to clinical details. The post operative specimens were collected and routine histopathologic processing was done. Multiple sections were given from all specimens. The cytological and histopathologic diagnoses were compared.

In our study most of the papillary thyroid carcinoma cases were female (82.7%) and most of the patients were in age group between 21-30yrs (42.3%) followed by 31-40yrs (21.2%). The papillary carcinomas were sub- categorized based on the pattern. Most of the cases were conventional type [61.52%] followed by follicular variant PTC [21.2%], encapsulated [9.6%] and one each case of oncocytic type, Sclerosing variant, tall cell variant, PTC with anaplastic changes [1.92%] each.

Papillary Thyroid carcinoma (Figure 1A) was diagnosed in 78.8% of cases from FNAC. PTC was diagnosed by the presence of nuclear inclusions (Figure 1B), nuclear grooves and small papillary structures(Figure 2A). On histopathologic screening papillary carcinoma was confirmed by nuclear ground glass appearance (clearing), nuclear grooves, papillary structures (Figure 2B) and psammoma bodies (Figure 2C & D)

In histology lymph node metastasis was seen in 5 cases (9.6%) (50% in other series)⁵⁻⁷ Cystic changes we re associated in 5 cases (9.6%), multicentric foci were seen in 3 cases (5.8%), psammoma bodies were seen in 32.7 % (17 cases), 40% in other series^{5,6,8} nuclear groove was seen in 38.5% (20 cases). Ground glass appearance (Nuclear clearing) and papillary structure formation was seen in all cases. Hashimoto’s thyroiditis was associated with 7.7% (4 cases) of papillary thyroid carcinoma and goiter in 3.8% (2) of cases.

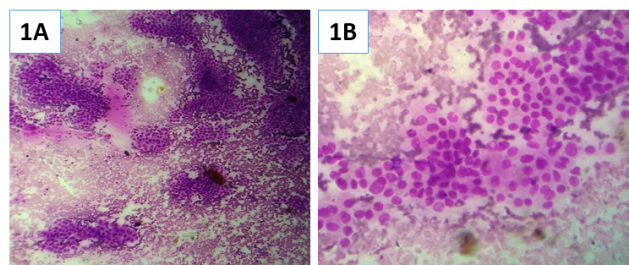
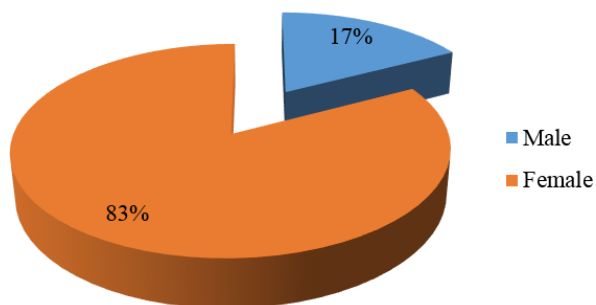


Fig. 1: **1A:** Photomicrograph of FNAC of papillary carcinoma of thyroid; **1B:** Intra nuclear inclusions

Total cases in 4 year study June 2013 to December 2016 is 356

Gender distribution



Graph 1: Gender distribution

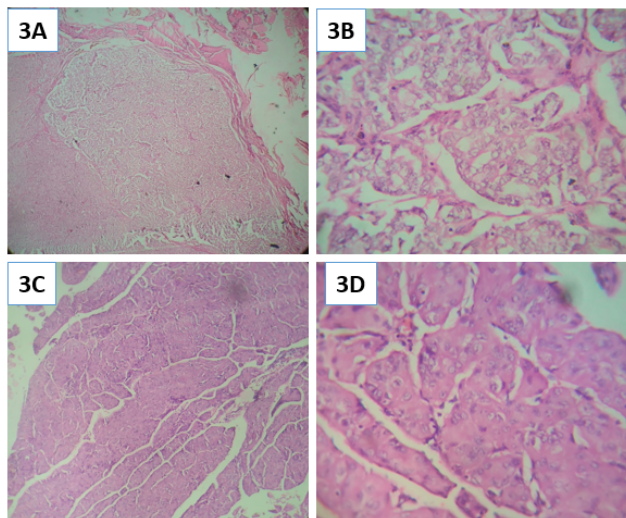


Fig. 3: **3A:** Photomicrograph of histopathological picture of papillary carcinoma of thyroid with follicular variant showing capsule(10x); **3B:** nuclear clearing(40x); **3C:** with hurthle cell change (10x); **3D:** abundant eosinophiliccytoplasm(40x)

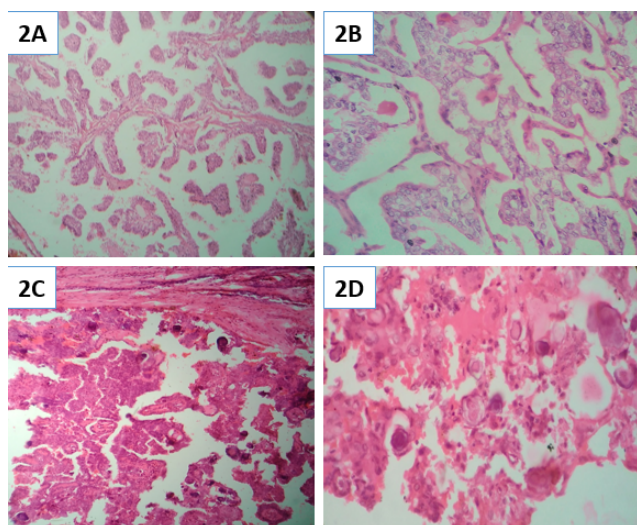


Fig. 2: **2A & 2B:** Photomicrograph of histopathological picture of papillary carcinoma of thyroid –Papillary structures with fibrovascular core and Psamomma Bodies (10x); **2C & 2D:** Psamomma bodies (40x)

Table 1: Distribution of thyroid lesions

	No of cases	Percentage (%)
1. Non-neoplastic	219	61.2%
2. Neoplastic	137	38.8%
Total	356	100%

Table 2: Distribution of neoplastic thyroid lesions

	No of cases	Percentage (%)
1. Benign	73	53.3%
2. Malignant	64	46.7%
Total	137	100%

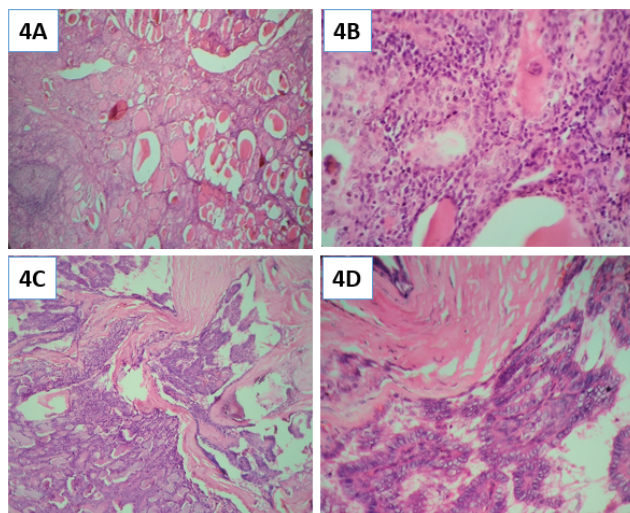


Fig. 4: **4A:** Photomicrograph of histopathological picture of papillary carcinoma of thyroid with Hashimoto's thyroiditis showing lymphatic follicle (10x); **4B:** lymphocytes(40x); **4C:** with Sclerosing variant (10x); **4D:** Nuclear clearing (40x)

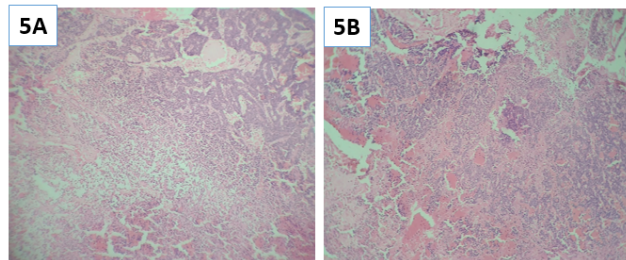


Fig. 5: **5A & 5B:** Photomicrograph of histopathological picture of papillary carcinoma of thyroid with secondaries

Table 3: Distribution of malignant thyroid lesions

	No of cases	Percentage (%)
1. Papillary	52	81.25%
2. Follicular	9	14.06%
3. Medullary	3	4.69%
Total	64	100

Table 4: Types of papillary carcinoma in our study

Type	Number of cases (52)
1. Conventional	32
2. Encapsulated	5
3. FVPTC	11
4. Oncocytic PTC	1
5. Sclerosing variant of PTC	1
6. Tall cell variant	1
7. PTC with Anaplastic change	1

Table 5: Sex wise distribution

Gender	No of cases
1. Male	9
2. Female	43
Total	52

Table 6: Age wise distribution of Papillary carcinoma of thyroid

Age	Number of cases
<10Yrs	1
11-20	5
21-30	22
31-40	11
41-50	7
51-60	5
61-70	1
>70	0
Total	52

4. Discussion

In our four year study from Jan 2013 to Dec 2016 we received 356 thyroid specimens which included both non-neoplastic and neoplastic lesions (Table 1). The neoplastic lesions were further classified as benign and malignant (Table 2). The malignant lesion predominantly included papillary carcinoma [81.25%] followed by follicular [14.06%] and medullary carcinoma [4.69%] (Table 3). In our study we are discussing on the variants of papillary carcinoma encountered in our institute over a three year duration.

The conventional PTC was seen in 32 cases [61.52%]. The microscopy showed complex papillary structure with thin fibrovascular cores (Figure 2A). The papillae are lined by cuboidal cells. The nuclear features were seen in all cases, 2 cases showed lymph node metastasis, 3 cases of classical PTC were associated with Hashimoto's thyroiditis

(Figure 4A&B). Five [9.6%] cases showed marked cystic change on both macroscopic and microscopic observation. Goitre was co-existent with 2 cases [3.8%], 14 cases out of 32 showed psammoma bodies [43.85%]. All multifocal PTC were of conventional type.

The follicular variant papillary carcinomas were predominantly characterized by follicular architecture (Figure 3A) with nuclear features (Figure 3B) of papillary carcinoma (one case of follicular variant papillary thyroid carcinoma was associated with Hashimoto's thyroiditis). Two cases out of eleven [18.21%] showed Psammoma bodies and nuclear groove was seen in 3 cases. Five cases out of eleven were diagnosed as FVPTC on FNAC and confirmed on histopathology. Lymph node metastasis (Figure 5A&B) was seen in 3 cases of FVPTC. The prognosis of the tumors is similar to the typical PTC. An exception is the diffuse or multinodular follicular variant which has aggressive behavior.⁹

In encapsulated variant the PTC was well encapsulated by thin capsule. The cells were arranged in small papillary structures the nuclear features were seen in all cases. Two cases showed nuclear groove. None of these variants showed lymph node metastasis or psammoma bodies. This variant constitutes 4 to 14% of all papillary carcinoma, the patients tends to be younger with lower rate of lymph node metastasis (12-38%). The prognosis is excellent with all patients remaining disease free after treatment.

The oncocytic variant (1 case) showed sheets of larger cohesive cells with abundant eosinophilic and granular cytoplasm (Figure 3D). The nuclear clearing (Orphan Annie eye nuclei) was seen in >60% of tumor cells. No psammoma bodies were seen. This was focal stromal fibrosis.

One case of Tall cell variant was seen with classical papillary architecture but lined by tall cells with abundant eosinophilic cytoplasm and nuclear features that of PTC. This was first described in 1976 by Hawk and Hazard as an aggressive variant of PTC, it represents 3.8%-10.4% of PTC. To consider TCVPC there must be 30-50% tall cells in the tumor.¹⁰

One case of diffuse sclerosing variant (Figure 4C) of PTC on histology showed dense fibrous areas with areas of conventional PTC, there were collections of lymphocytic aggregates in background. Multiple psammoma bodies were seen.

One case of Conventional PTC showed foci of poorly differentiated tumor cells. The cells were large pleomorphic with irregular hyperchromatic nuclei and abundant eosinophilic cytoplasm. This was given as PTC with anaplastic differentiation. In a study by Albores Sarivedra *et al.*, consisting of 109 anaplastic carcinomas, 46.8% of cases were coexistent with PTC.¹¹

In a similar study conducted by Muhammad Muzaffar *et al.*, on 82 cases of PTC, conventional PTC was

most common 70.7% followed by follicular variant (13), columnar cell type (6), tall cell variant (3) and each case of encapsulated and occult. Lymph node metastasis was seen in 15.5% and psammoma bodies were seen in 34% cases.¹²

5. Conclusion

In our study we conclude that the papillary carcinoma of thyroid was most common malignancy of the thyroid gland with female predominance. The youngest patient was 9 year female and oldest patient was 67 yrs male. On FNAC papillary carcinoma diagnosis had a sensitivity of 79%. On histopathology conventional type of PT.

6. Source of funding

None.

7. Conflict of interest

None.

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