

# Clinico-Pathological Parameter in Thyroid Carcinoma Subtypes

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**Abstract:** **Background:** Thyroid carcinomas have a diversity of histologic subtypes and variants. However, the relation between tumor architecture and prognosis are still lacking in spite of thorough investigation. The aim of this study was to evaluate the prognostic value of subclassification, focusing on subtypes and variants, and to determine its relation to different clinicopathological features in patients with thyroid cancer. **Method:** This retrospective study of a total number of 184 patients with thyroid cancer cases diagnosed in the time period from 2003 until 2020 in the archive of the pathology department of the faculty of medicine, University of Benghazi with the medical reports from the oncology department in Benghazi Medical Center. Subsequently, correlations between age, sex, grading and the tumour stag were investigated. **Results:** A total of 184 samples were analysed. Among all studied cases, females formed 76.1% with a female to male ratio of 7: 2. The age of the studied cases ranged between 14-95 years old. The mean age of patients with thyroid malignancy was 40.5 years old. The percentage of patients  $\geq 40$  years was 51%, while patients  $< 40$  years formed 49%. Microscopic examination of thyroid carcinomas revealed different types, including thyroid carcinoma and papillary carcinoma. Papillary carcinoma was found to be the most common type of thyroid malignancies among the studied patients affecting 89 (48.4%) patients. Among the 89 patients, 76 were females (85.4%) and 13 were males (14.6 %). The other carcinoma cases were follicular variant of papillary carcinoma (29.3%) 47 female and 7 male, Anaplastic carcinoma (17.4%) 24 females and 8 males. Follicular carcinoma (4.9%) most of them are female. In this study, patients with stage II malignancy were the most common 83 (45%), followed by grade III malignancy were 69 patients (38%). The least common was grade I malignancy which accounted only for 32 patients (17%). **Conclusion:** The current study showed that the thyroid carcinoma affected the median age group with the median being 39.7 years with female predominance gender. Papillary thyroid carcinoma was the most common than the other subtypes (48.37%). About (45%) of patients with histological grading II, and 38% of cases presented with stage IV. There appears to be an increased trend of thyroid carcinoma diagnosis which is being reported at an advanced stage in our region, justifying the usefulness of the histological staging and grading of thyroid carcinomas.

**Keywords:** Colloid goiter, Hashimoto thyroiditis, Follicular adenoma, Papillary thyroid carcinoma.

## 1. Introduction

Thyroid cancer is a relatively rare malignancy representing only 1.5% of all cancer types. However, it is the most common endocrine cancer, accounting for 92% of all endocrine tumours. Long-standing goiter (more than 5 years) is regarded as the one of the strongest risk factors for developing thyroid cancer. (Samad)<sup>1</sup>

Papillary carcinoma is the most common thyroid cancer followed by follicular, medullary, anaplastic and lymphoma. Papillary thyroid carcinoma (PTC) could be a major differentiated adenocarcinoma which comprises 90% of thyroid cancers and appears papillary proliferation pathologically (Gimm)<sup>2</sup>. Most cases have great prognosis, but roughly 10% of PTC patients undergo recurrences such as lymph node recurrence and lung metastasis. Follicular thyroid carcinoma (FTC) represents 5-15% of thyroid cancers with follicular differentiation but no papillary nuclear characteristics. Moreover, the Hürthle cell carcinoma (oxyphilic cell carcinoma) is assumed to be a variation of FTC but its prognosis is thought to be worse than usual FTC. Medullary thyroid carcinoma (MTC) arises from thyroid parafollicular (C) cells. The disease-specific mortality represents approximately 40% thyroid cancer deaths, only  $< 2\%$  of thyroid cancers. On other hand, the Anaplastic carcinoma (ATC) is extremely aggressive undifferentiated tumor, with nearly 100% (Wenter)<sup>3</sup>

Thyroid cancer is reported to be female predominant while male patients have more aggressive behaviors and worse prognosis than females (Gupta)<sup>4</sup>.

Regarding how to improve discrimination of thyroid carcinoma into a prognostically different subtypes based on pathologic characteristics such as cell types, with tumor staging based on key features such as tumor size, lymph node metastasis, and distant metastasis which are all known to be associated with aggressiveness in other tumors (Wong)<sup>5</sup>. The objective of this study is to evaluate the different histopathological patterns of thyroid cancer in surgically resected specimens and their frequency in relation to age and sex of patients. The objective also involved conducting comparisons of the prognostic value between different subtypes based on tumor staging and grading.

## 2. Materials and Methods

We conducted a retrospective study using the clinical and histopathological data that were retrieved from the medical archives. The data involved 184 patients who underwent thyroidectomy the pathology department of the faculty of medicine, University of Benghazi with the medical reports from the oncology department in Benghazi Medical Center. Data regarding background variables include, gender, age at histologic diagnosis, grading, and staging were obtained from pathology reports.

Specimens were fixed in 10% formalin and paraffin processed. Tissue sections were 3-5 μm thick. The sections were stained with hematoxylin and eosin. Quantitative variables such as age are expressed as mean value. Whereas, qualitative variables like histopathological diagnosis are presented by frequencies and percentages. The tumor staging was done using the TNM stage system, which is one of the strongest prognostic factors for expecting survival of the patients. This system takes into account tumor size, lymph node involvement and metastasis. The histological grading was done for the studied cases and it provides an additional strong prognostic factor.

### 3. Result

A total of 184 samples were studied. There were 44 (23.9%) male and 140 (76.1%) females, giving a female: male ratio of 7: 2 (Figure 1). The age of the studied cases ranged between 14-95 years old. The mean age of patients with thyroid malignancy was 40.5 years. The number of patients ≥40 years was 51%, and the number of patients <40 years was 49% (Figure 2).

Microscopic examination revealed that papillary carcinoma is the most common type of thyroid malignancy. The number of cases include 89 (48.4%) patients divided as 76 female (85.4%) and 13 male (14.6%). The other carcinoma cases were follicular variant of papillary carcinoma (29.3%) 47 female and 7 male, Anaplastic carcinoma (17.4%) 24 females and 8 males. Follicular carcinoma (4.9%) most of them are female as depicted in table 1. Mean age according to histopathological types was as the following, (i) papillary carcinoma 36.72 years old, with predominance among females, (ii) Follicular variant of papillary 77.92 years old, and (iii) Anaplastic carcinoma 43.9 years old. The least histological pattern of thyroid carcinoma was Follicular carcinoma 37.57 (Figure 3).

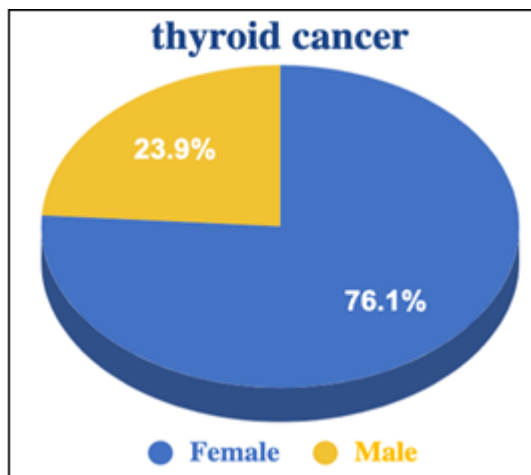


Figure 1: Distribution of thyroid carcinoma based on gender

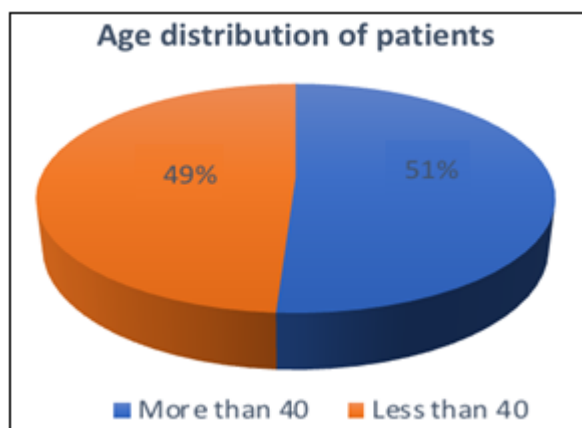


Figure 2: Age distribution of studied cases

Table 1: Types of thyroid carcinoma in present study

S. No	Histopathology diagnosis	Number	Frequency %
1	Papillary carcinoma	89	48.40%
2	Follicular carcinoma	9	4.90%
3	Anaplastic carcinoma	32	17.40%
2	Follicular variant of papillary carcinoma	54	29.30%

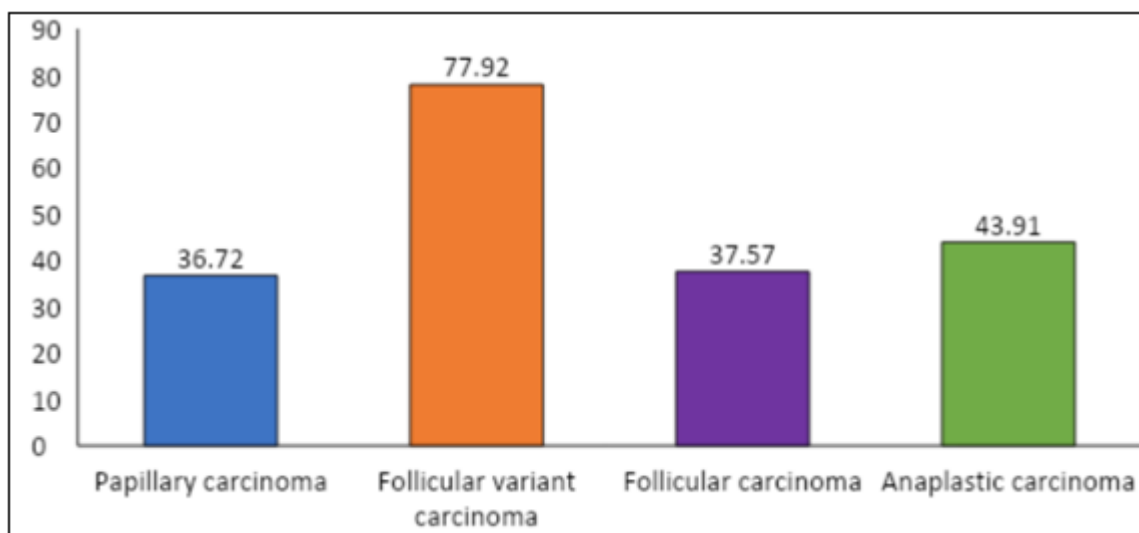
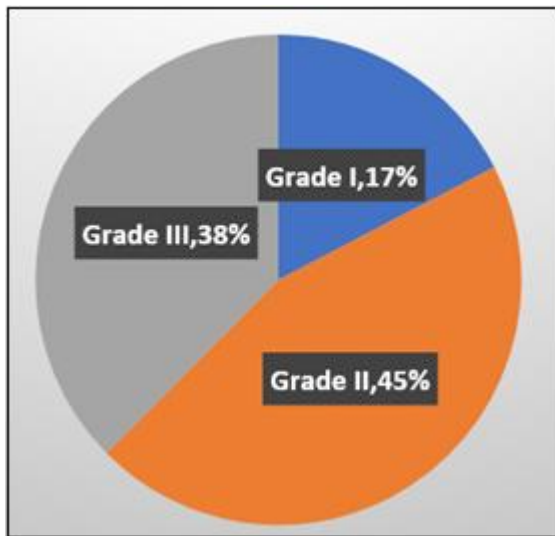
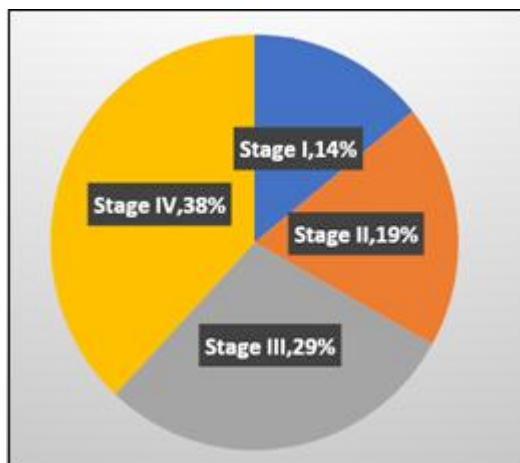


Figure 3: Correlation of Mean of age with different histopathological patterns



**Figure 4:** Distribution of histological grade of different histopathological type of thyroid cancer



**Figure 5:** Stage of tumor of different histopathological type of thyroid cancer

#### 4. Discussion

Thyroid gland lesions are common and occur worldwide. The incidence and histopathological pattern of thyroid diseases show geographical and regional variations related to age, sex, dietary and environmental factors (Solomon 2015)<sup>6</sup>. At an old age, thyroid cancer is usually diagnosed at an advanced stage, especially in females. Similar results have been found in Chen et al., 2009<sup>(7)</sup>

For this study, the 184 cases were studied by detailed history and histopathological examinations which showed that the mean age of patients at presentation was 40.5 years. There were 76.1% female cases and 23.9% male cases in our study with a female: male ratio of 7: 2. Similar results have been found in the studies conducted by Gupta A et al., 2013<sup>(4)</sup>. The mean age of patients with thyroid malignancy was 40.5 years with the median age about 39 years this is similar to previous study done by Alkaff et al., 2020<sup>(8)</sup>. Were the average age at time of diagnosis of thyroid carcinoma patients are typically in their mid-fifties.

Our study showed that papillary carcinoma was the most common thyroid malignancy (48.4%) with female

predominance as seen in previous studies of Wang et al., 2013<sup>(9)</sup>. Followed by Follicular variant of papillary carcinoma (29.3%), Anaplastic carcinoma (17.4%), and Follicular carcinoma (4.9%), which is approximately resemble the other study Cavalheiro, B. G., et al 2016<sup>(10)</sup>.

This result was found also in our study but we compared it to another study conducted by Lin et al.2005<sup>(11)</sup>. The percentage of thyroid malignancy in each age group revealed two peaks in both genders, namely in patients aged 20 to 29 years and in elderly patients (over 65 years old). The peak age for thyroid malignancy in both genders was 41 to 60 years (male) and 21 to 40 years (female). The highest ratio of malignancy occurred in the elderly group (37.2%) receiving surgical treatment. In young patients (below 19 years) the percentage of malignancy was not greater than for the whole age group (20.2% vs.25.6%). Anaplastic and metastatic cancers affecting the thyroid were the main subjects in the age group. (Lin)<sup>11</sup>

Regarding the grade of thyroid carcinoma in this study; the most common grade is grade II (45%), which comparable with other study carried out by Ernaga Lorea, A., et al 2018<sup>(12)</sup>.

Other parameters of advanced disease and aggressiveness in thyroid carcinoma, we looked into the staging of studied cases of thyroid carcinoma at the time of diagnosis and features like tumor size, capsular and lympho-vascular invasion, in the histopathology reports. Our studied cases were diagnosed in an advanced stage (stage IV) in contrast to the findings from recent studies from Olson, E., 2013<sup>(13)</sup>.

Our results showed that the percentage of patients presented in stage III and stage IV more than the percentage of cases in stage I-II, which led to increased rate of recurrence and decreased survival of the patients.

#### 5. Conclusion

The present study shows that the thyroid carcinoma affects the middle age group with the median age 39, the thyroid cancer affects females (76.1%) more than the male (23.9%) giving a female: male ratio of 7: 2. Papillary carcinoma and Follicular variants of papillary carcinoma were generally more frequent than the rest of the histological types. Approximately the half of cases with grade II (45%), and (38%) of cases presented with stage IV. The association parameters of aggressiveness with an unfavorable behavior, suggesting the role of the histopathological diagnosis, grading and staging of thyroid carcinomas. Admittedly, supplementary studies on cohorts and more heterogeneous population, are necessary to validate and extend our results

#### 6. Limitation and Recommendations

The recorded data in some patients was not completed and the data of 2017 was missed in BMC. There is a need to build resources through high quality centers to collect data before surgery and after surgery to cover the state of primary tumor and postoperative recurrence, metastasis and survival. Immunohistochemical study using diagnosis.

## 7. Acknowledgment

We thank Oncology Hospital and BMC Hospital as well as the Arab Medical University in the Pathology Department.

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