ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE
DEPARTMENT OF PATHOLOGY

Title: Histopathologic patterns of thyroid cancer from September 2019 up to August 2024 in Tikur-Anbessa Specialized Hospital

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A STUDY PAPER AS PARTIAL FULFILLMENT FOR THE REQUIREMENT OF POSTGRADUATE DIPLOMA IN PATHOLOGY SUBMITTED TO TIKUR ANBESSA SPECIALIZED HOSPITAL, COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE AND DEPARTMENT OF PATHOLOGY, ADDIS ABABA, ETHIOPIA.

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ACRONYMS AND ABBREVIATIONS

ATC----------Anaplastic Thyroid Carcinoma

CA ----------Cancer

CC----------Columnar Cell

DHGTC----------Differentiated High-Grade Thyroid Carcinoma

DSPTC----------Diffuse Sclerosing Papillary Thyroid Carcinoma

F:M ----------Female to Male ratio

FTC---------- Follicular Thyroid Carcinoma

HNPTC----------Hobnail Papillary Thyroid Cancer

IEFVPTC----------Invasive Encapsulated Follicular Variant PTC

LN----------Lymph Node

MTC----------Medullary Thyroid Carcinoma

OCA----------Oncocytic Carcinoma

OCPTC----------Oncocytic Papillary Thyroid Carcinoma

PDTC----------Poorly Differentiated Thyroid Carcinoma

PTC----------Papillary Thyroid Carcinoma

SD----------Standard Deviations

SPSS----------Stastical Package for Social Science

TASH----------Tikur Anbesa Specialized Hospital

TCPTC----------Tall cell Papillary Thyroid Cancer

TC----------Thyroid Cancer

WHO----------World Health Organization

YRS----------Years

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ABSTRACT

Background: Thyroid cancer (TC) is the most common endocrine cancer globally, representing 1.5% of all cancers. The prevalence of thyroid cancer varies across different geographic areas. In Ethiopia, there are some studies and data on the prevalence of thyroid cancer and indicate that the prevalence of thyroid cancer is increasing, with papillary thyroid cancer being the predominant type, accounting for approximately 22% of all endocrine cancers and 85% of thyroid cancers. There are also regional variations in the distribution of different histologic subtypes. Understanding the histopathologic patterns of thyroid carcinoma is vital for accurate diagnosis, prognosis prediction, and the delivery of appropriate treatment options.

Objective: To describe the five-year histopathological patterns of thyroid cancer at Tikur Anbessa Specialized Hospital (TASH) over a period from September 2019 up to August 2024.

Method: Institution based retrospective quantitative descriptive statistical study done at the Department of Pathology at Tikur Anbessa Specialized Hospital between September 2019 and August 2024. Data was collected from all hard copies of thyroid cancer histopathology reports during this period. The data was cleaned and exported to SPSS version 26 for analysis.

Result: a total of 211 cases were analyzed and majority were females (74.8%) compared with males (25.2%) having F:M of 3:1. The mean age was 39.39 (SD=15.55). The commonest histopathologic pattern was PTC 142(67.3%) cases with mean age of 36.22 (SD=15.04) followed by FTC 21(10%) cases with mean age of 43.86 (SD=13.65). Only one case of DHGTC documented and was the least common histopathologic pattern (0.5%). ATC 4(1.9%) was the second least common, with mean age of 63(SD=8.9). From 205 of staged TC, majority of patients had pathologic Stage PT3 (42.6 %) cancer. About 44 cases had LN metastasis and majority of LN metastasis seen in PTC (37/44).

Conclusion: PTC is the most common histopathologic pattern of TC followed by FTC. DHGTC is the least common TC. Females affected more commonly than males. This result is in line with majority of local and international studies.

Keywords: Thyroid cancer, Histopathologic pattern, Pathology, Tikur Anbessa Specialized Hospital, Ethiopia.

1. INTRODUCTION

1.1 Background

Thyroid cancer (TC) is considered the most common endocrine cancer globally, representing only 1.5% of all cancers. About 586,202 cases of thyroid cancer were reported in 2020, making thyroid cancer the 10th most common cancer worldwide. The prevalence of thyroid cancer varies depending on different geographic areas. According to the World Health Organization (WHO), Western Pacific had the highest incidence of thyroid cancer, accounting for 47.6% of cases despite representing only 25.4% of the world's population (1,2).

In the U.S.A., thyroid cancer is estimated to be the 13th most commonly diagnosed cancer and the 6th most commonly diagnosed cancer among women. The incidence of thyroid cancer is approximately three-fold higher in women (22.8 per 100,000 per year from 2014 to 2018) than in men (8.0 per 100,000 per year). Thyroid cancer incidence increases from adolescence through middle age, peaking around 55 years in women and 65 years in men, and subsequently declining with older age. Thyroid cancer mortality is very low relative to incidence (approximately 0.5 deaths per 100,000 per year), with less evidence of a sex disparity (3).

Even though its prevalence has been increasing over the past few decades, including in Africa, the mortality rate has not significantly increased due to advanced and timely management of the disease. The detection of the disease at an early stage and advanced investigative modalities has contributed to the increasing incidence of cancer. The African region had the highest mortality rate, with a percentage of cases resulting in mortality at 11.25%, followed by the South-East Asia region at 7.01%, while the remaining regions had single-digit mortality rates (2,4).

In Ethiopia, there are limited studies and data on the prevalence of thyroid cancer. Despite this, the few existing studies show that the prevalence of thyroid cancer is increasing, with the predominant type being papillary thyroid cancer (PTC), which accounts for around 22% of all endocrine cancers and 85% of thyroid cancers, with regional variations in the distribution of different histologic subtypes. This finding is consistent with global trends, as PTC is the most common histologic type of thyroid cancer worldwide (5).

Ionizing radiation exposure in childhood is currently the most well-established modifiable risk factor for thyroid cancer, most commonly for papillary thyroid cancer (PTC). Insufficient dietary iodine is considered an important risk factor for follicular carcinoma. Other risk factors include obesity, diabetes, smoking, alcohol consumption, dietary iodine excess, and genetic factors. In thyroid cancers such as anaplastic carcinoma (CA) and medullary carcinoma (CA), the causative factors are not well known (3,6).

The majority of thyroid cancers (TC) are derived from the thyroid follicular epithelium, while the remaining carcinomas are derived from C-cells and rarely metastasize from other types of carcinomas, such as clear cell renal cell carcinoma. According to the updated WHO classification scheme of thyroid neoplasms, 5th edition, malignant thyroid follicular cell-derived neoplasms are divided into follicular thyroid carcinoma (FTC), invasive encapsulated follicular variant papillary carcinoma(IEFVPTC) , PTC, oncocytic carcinoma of the thyroid (OCA), high-grade follicular-derived carcinomas—including differentiated high-grade carcinoma (DHGTC) and poorly differentiated thyroid carcinoma (PDTC)—and anaplastic follicular cell–derived thyroid carcinoma (ATC). Medullary thyroid carcinoma (MTC) falls under the category of thyroid C-cell–derived carcinoma (7).

Among the histopathologic types of thyroid cancer (TC), papillary thyroid cancer (PTC) is the most common type and is also the most prevalent endocrine malignancy. It represents more than 90% of thyroid malignancies in children, with females being more affected than males. PTC can present in any age group, but the mean age of diagnosis is approximately 40–50 years. Among the histologic subtypes of PTC, the tall cell (TC), columnar cell (CC), and hobnail (HN) subtypes display aggressive clinicopathologic features (7,8).

Follicular thyroid carcinoma (FTC) is the second most common thyroid cancer, arising from follicular cells. It shares with papillary carcinoma the same predilection for females but occurs, on average, in patients who are a decade older. Oncocytic carcinoma (OCA) represents 5% of differentiated thyroid carcinoma in the USA and is composed predominantly (over 75%) of follicular cells exhibiting oncocytic features. The mean age at diagnosis is approaching 60 years, and it has a lower female-to-male ratio than that seen in FTC. OCA is more aggressive than FTC due to decreased efficacy of radioactive iodine treatment compared to FTC (7,8).

High-grade thyroid carcinomas are follicular cell-derived carcinomas with a prognosis intermediate between differentiated follicular cell-derived carcinomas and anaplastic thyroid carcinoma (ATC). This category includes poorly differentiated thyroid carcinoma (PDTC) and differentiated high-grade thyroid carcinoma (DHGTC). They represent less than 1% to 6.7% of all thyroid carcinomas and typically occur in adults over age 50. ATC is a highly aggressive thyroid malignancy composed of undifferentiated follicular cells, typically occurring in older patients and associated with poor outcomes. Medullary thyroid carcinoma (MTC) arises from thyroid parafollicular (C) cells and accounts for less than 2-3% of all thyroid cancers. Other rare malignant thyroid tumors include lymphomas, sarcomas, and metastatic carcinomas (6,7).

In conclusion, understanding the histopathologic patterns of thyroid carcinoma plays a vital role in accurate diagnosis, predicting the prognosis of the disease, and delivering appropriate treatment options

1.2 Statement of the problem

Currently, cases of thyroid cancer are becoming increasingly common among both young and elderly patients, presenting various pathological types and stages, which poses a substantial health burden on the community.

Recent advancements in diagnostic modalities, including advanced imaging techniques and comprehensive pathological examinations, have enabled the identification of many previously undetectable tumor types and stages.

Despite the increasing prevalence and early detection of thyroid cancer reported in international studies, there is a notable scarcity of research on the prevalence and histopathologic patterns of thyroid cancer in Ethiopia.

Pathological evaluations of thyroid specimens have become more thorough, as reporting guidelines have evolved to be more complex and complete with ongoing updates. Studying the histopathologic patterns of thyroid cancer holds significant clinical, diagnostic, and therapeutic implications.

1.3 Rationale of the Study

Understanding the recent patterns of thyroid cancer will aid in the accurate diagnosis and classification of malignant thyroid lesions, inform appropriate therapeutic approaches, and enhance prognosis predictions for patients. This study will contribute in several key ways:

• This research will facilitate the identification of various types of thyroid cancer and provide an updated overview of the current histopathologic patterns observed at Tikur Anbessa Specialized Hospital.

A thorough understanding of the histopathological patterns associated with thyroid cancer will improve diagnostic accuracy and inform effective treatment strategies for affected patients.

• The study will provide valuable information regarding the epidemiological characteristics of thyroid cancer, including age distribution, and sex ratios, which can aid in public health planning and resource allocation.

• This study will enhance the overall body of knowledge within the fields of oncology and pathology, supporting ongoing research and advancements in cancer care.

In summary, this study is crucial for improving our understanding of thyroid cancer in TASH Ethiopia and for informing clinical practices that can lead to better patient outcomes.

2. LITERATURE REVIEW

Numerous studies conducted worldwide have explored the histopathologic patterns of thyroid cancer. In Ethiopia, an institutional-based cross-sectional study at Tikur Anbessa Specialized Hospital (TASH) over a four-year period from 2013 to 2016 examined the histopathologic patterns of thyroid diseases. Among 187 patients who underwent biopsy, 42 (14.9%) were diagnosed with papillary thyroid carcinoma (PTC), 41 (14.5%) with follicular carcinoma, and 2 with medullary carcinoma. The findings indicated a higher prevalence of thyroid cancer in females compared to males, with a female-to-male ratio of 2.5:1 (10).

Another study conducted at TASH involved a five-year retrospective analysis of biopsy materials from 1994 to 1998, which included 64 patients with thyroid cancer. This analysis revealed that papillary carcinoma accounted for 49 cases (76.6%), followed by follicular carcinoma with 10 cases (15.6%), anaplastic carcinoma with 4 cases (6.3%), and medullary carcinoma with 1 case (1.5%). The study also noted that females were twice as likely to be affected as males, with a predominance of cases occurring in individuals aged 20-59 years (11).

Additionally, a cross-sectional retrospective study at Saint Paul's Hospital Millennium Medical College in Addis Ababa, conducted from 2018 to 2022, analyzed the histopathologic data of 212 malignant thyroid cancer cases. The results indicated that papillary carcinoma was the most prevalent type, comprising 126 cases (59.46%), followed by follicular carcinoma with 46 cases (21.7%), and medullary carcinoma with 16 cases (7.5%). Other types included Hurthle cell carcinoma (15 cases, 7.1%), poorly differentiated carcinoma (6 cases, 2.8%), and anaplastic carcinoma (3 cases, 1.4%). Among the papillary carcinomas, the conventional histologic variant was the most common subtype, accounting for 96 cases (76.2%), followed by the follicular variant with 20 cases (15%). The female-to-male ratio in this study was noted to be 3.1:1, with females presenting at an earlier age and having a lower mean age compared to males (44.71 years vs. 41.72 years) (12).

A retrospective study conducted in Gondar, Ethiopia, from 2010 to 2013 analyzed 846 patients with thyroid enlargement and found that 62 (7.3%) cases were confirmed to have malignancy. Among these cases, papillary thyroid carcinoma was the most common, accounting for 28 cases (45.2%), followed by follicular thyroid carcinoma with 18 cases (29%). Anaplastic carcinoma was identified in 8 patients (12.9%), while lymphoma and medullary thyroid carcinoma each accounted for 2 (3.2%) and 1 (1.6%) case, respectively. Additionally, metastasis to the thyroid was observed in 4 patients (6.2%), with two originating from the oropharyngeal area and the others being spindle cell carcinomas of unknown origin. The study reported a significant female predominance, with females constituting 77% of thyroid carcinoma cases. Older patients, particularly those over 60 years of age, exhibited a higher incidence of malignancy compared to younger age groups (13).

A five year cross-sectional retrospective study design on prevalence of thyroid cancer done in Jimma University Medical Center, South West Ethiopia in 2018 showed that the most common malignancy that was found was papillary carcinoma (PTC) accounting for 49.3% of malignant lesions followed by follicular neoplasms with 28 (31.4%) cases and the least common type of malignancy that was found was anaplastic carcinoma with 17 (19.1%) cases with F:M ratio of 3:1 .There was an increasing incidence of thyroid malignancy over the past 5 years of the study period (14).

Another retrospective study conducted in Jimma, Southwest Ethiopia, from 2015 to 2020 examined histopathologic patterns and cytologic correlations in 581 thyroid biopsies. This study found that 95 cases (16.3%) were diagnosed as thyroid cancers, with papillary thyroid cancer being the most prevalent at 69 cases (72.6%). Follicular cancer accounted for 14 cases (14.7%), Hurthle cell carcinoma for 6 cases (6.3%), medullary carcinoma for 3 cases (3.2%), poorly differentiated thyroid carcinoma for 2 cases (2.2%), and only one case (1%) of anaplastic thyroid carcinoma was identified. Most diagnoses occurred in the 20-49 age group, representing 71.6% of cases, with an average age of diagnosis at 34.8 years (15).

A retrospective facility–based study done in Sudan in patients with TC who were treated from January 2009 to December 2017 showed that from 139 patients with TC, the most common type of thyroid cancer was follicular carcinoma (41%), followed by papillary carcinoma (24%), then anaplastic carcinoma (20%). The mean age of the women was 56.3 years (SD ± 14.7), compared to 52.5 years (SD ± 16.6) for the men. The dominance of follicular type suggests that the majority of this population is iodine-deficient (16).

A systematic review and meta-analysis of data from Nigeria covering the period from 2000 to 2021 indicated that thyroid cancer was most common in individuals during their 4th and 5th decades of life, with a prevalence that was 3.5 times higher in females than males. The pooled proportions of thyroid cancers included papillary thyroid cancer (46%), follicular thyroid cancer (39%), medullary thyroid cancer (7%), and anaplastic thyroid cancer (5%) (4)

Additionally, a descriptive retrospective study in Nigeria from 2008 to 2018 analyzed 70 thyroid specimens and reported that follicular carcinoma was the most common type, accounting for 36 cases (51.4%). This was followed by papillary carcinoma with 23 cases (32.9%), medullary carcinoma with 4 cases (5.7%), and anaplastic carcinoma with 7 cases (8.6%). The study found that females represented a significant majority, comprising 75.7% of cases, resulting in a male-to-female ratio of 1:3.1. The mean age of patients with thyroid carcinoma was reported as 42.7 years, with an age range spanning from 13 to 80 years (17)

A 15-year histopathologic review of thyroid cancer in Nigeria, conducted from 2000 to 2014, analyzed 61 cases of thyroid carcinoma. The most common histologic type identified was papillary thyroid carcinoma (PTC), which accounted for 26 cases (42.6%). This was followed by follicular thyroid carcinoma with 23 cases (37.7%), medullary thyroid carcinoma (MTC) with 3 cases (4.9%), anaplastic carcinoma with 2 cases (3.3%), non-Hodgkin lymphoma with 1 case (1.6%), and metastatic squamous cell carcinoma with 2 cases (3.3%). Mixed carcinomas were noted in four instances, including three cases (4.9%) of mixed follicular and papillary carcinomas and one case (1.6%) of mixed papillary and anaplastic carcinoma. A significant majority of the cases were found in females, comprising 83.6% of the total, resulting in a female-to-male ratio of 5.1:1 (18).

In a retrospective review of histopathology reports from patients who underwent thyroidectomy for malignancy at Chris Hani Baragwanath Academic Hospital in South Africa between 2001 and 2017, a total of 143 thyroidectomies were performed for malignancy. Papillary thyroid cancer was the predominant type, accounting for 93 cases (65%). Other types included follicular cancer (24 cases or 16.8%), medullary cancer (14 cases or 9.8%), anaplastic cancer (4 cases or 2.8%), and other types, including sarcoma and lymphoma (8 cases or 5.8%). Notably, two-thirds of the patients were aged between 20 and 55 years (19).

A histopathological study conducted in Iraq in 2020 examined 42 cases of thyroid carcinoma and found that the highest incidence occurred in individuals aged between 41 and 55 years (42.8%), followed by those aged between 56 and 70 years (28.5%). The lowest incidence was observed in individuals aged 71 years or older (11.9%). The study also reported a higher prevalence of thyroid carcinoma in females (64.28%) compared to males (35.71%). Histopathological examination revealed that papillary carcinoma was the most common type, identified in 28 cases (66.6%), followed by follicular carcinomas in 9 cases (21.4%), and medullary carcinoma in 5 cases (11.9%) (20).

A population-based study conducted in Vietnam analyzed trends in the incidence of thyroid cancer from 1996 to 2015, utilizing data from the Ho Chi Minh City Cancer Registry. Out of 5,953 thyroid cancer cases, the male-to-female ratio was 1:4.5, with the highest incidence observed in individuals under 45 years of age. Both genders exhibited similar distributions in subtype incidences, with papillary thyroid cancer being the most frequently diagnosed subtype: 790 cases (73.3%) in men and 4,154 cases (85.2%) in women. Notably, there was a significant increase of 12.8-fold in the age-standardized incidence rate for this subtype. The incidences of follicular, medullary, and anaplastic thyroid cancers were very low, contributing only 96 cases (1.6%), 29 cases (0.5%), and 41 cases (0.7%), respectively. Overall, the age at diagnosis appeared to decrease gradually over the study period (21).

In a five-year histopathological study of thyroid neoplastic lesions conducted at a tertiary care hospital in Kashmir from 2013 to 2018, the peak incidence was found in the 20-29 age group, followed by a second peak in the 30-39 age group. Among 148 malignant thyroid lesions identified, papillary carcinoma was the most common, accounting for 126 cases (85.14%). Follicular carcinoma and medullary carcinoma comprised 14 cases (9.45%) and 8 cases (5.40%), respectively. Notably, no cases of anaplastic carcinoma were reported in this study (1).

A two-year hospital-based retrospective study in India from 2017 to 2018 examined the histopathological spectrum of thyroid lesions and identified 38 malignant cases. Among these, papillary carcinoma comprised 33 cases (57.8%), followed by the follicular variant of papillary carcinoma with 3 cases (7.9%). Follicular carcinoma and non-Hodgkin's lymphoma were each represented by one case (2.6%) (22)

Another retrospective observational study done in India in 2016 to study clinicopathological characteristics of thyroid carcinoma at a Tertiary Care Center on forty-two patients who underwent surgery for thyroid neoplasm showed that Papillary carcinoma consists of 63.15%, follicular carcinoma consists of 23.68%, and medullary carcinoma and anaplastic carcinoma each consist of 5.26% of malignant cases. It was 6 times more common in females (F:M - 6:1). Sixty seven percent of cases were stage I based on TNM staging. Out of them, lymph node metastases were seen in 17 patients (44.73%) (23).

3. OBJECTIVE

. 3.1 General objective

The study aims to describe the five-year histopathologic patterns of TC at TASH, covering the period from September 2019 to August 2024

3.2 Specific objectives

- ✓ To categorize and describe the various histomorphological patterns and pathologic stage of TC diagnosed at TASH over the five-year period.
- ✓ To identify and detail the histomorphological subtypes of papillary thyroid carcinoma, focusing on their characteristics and prevalence within the study population.
- ✓ To assess and analyze the sociodemographic characteristics (age, gender) of patients diagnosed with thyroid cancer at TASH during the study period.

4. METHODS

4.1. Study Area

The study was conducted in TASH in the Department of Pathology, Addis Ababa, Ethiopia. The hospital is the largest referral and teaching hospital in Ethiopia giving clinical services for patients coming from all over the country and is the leading medical academic institute in the country. It is the leading referral hospital to accept, diagnose and treat patients with thyroid cancer.

4.2 Study design and period

Institution based quantitative retrospective descriptive statistic study was applied in TASH, department of pathology between September 2019 up to August 2024.

4.3 Source population

All thyroid resection specimens submitted to pathology department of TASH over a five-year period from September 2019 to August 2024.

4.4 Study population

All thyroid resection specimens with a histopathologic diagnosis of thyroid cancer at department of pathology, TASH from September 2019 to August 2024, who met the inclusion criteria.

4.5. Eligibility Criteria

4.5.1. Inclusion Criteria

- Tissue samples obtained through biopsies or surgical resections
- Tissue samples with malignant thyroid lesions
- Availability of histopathological examination results with complete data
- Studies conducted within a specified time frame and location

4.5.2. Exclusion Criteria

- Tissue samples obtained through non-biopsy or non-surgical resection methods
- Incomplete or unavailable histopathological examination results
- Studies conducted outside of the specified time frame or location
- Histopathologic results with a diagnosis of recurrent thyroid cancer

4.6 Sample size determination

All patients fulfilling the criteria during the study period from September 2019 up to August 2024 were included.

4.7 Sampling procedure

All the hard copy of thyroid cancer histopathology reports from September 2019 up to August 2024 was reviewed from the archives of pathology department of TASH.

4.8. Data Collection

- The total number of patients with thyroid cancer was collected from pathology department of the hospital. The time frame of 5 years from September 2019 up to August 2024 was used for the research.
- Demographic variables such as age, sex, and histologic types, subtypes and pathologic stages of TC were collected from patient's biopsy report.

4.9. Study Variables

4.9.1 Independent Variables

- Age
- Sex

4.9.2 Dependent Variables

- Histopathologic patterns of TC
- Histopathology subtypes of PTC
- Pathologic stages

4.10 Data management

The information gathered from the study was entered into an excel spreadsheet and uploaded to SPSS 27 for analysis. Missing values, outliers, and other inconsistencies were removed from data. The data was cleaned up using frequency, sort, and list. The cleaned data was exported to SPSS version 27 for analysis and the data was interpreted in the format of frequencies and percentages.

4.11 Data Quality Assurance

To ensure data quality, a standardized questionnaire adapted from previous studies was employed. The questionnaire was written in English language only. The study's overall activities were carefully observed and followed by the primary investigator and supervisors. To improve recollection, information accuracy and result consistency, patients' data was taken from pathology department of TASH data base.

4.12 Ethical Consideration

A letter of approval was obtained from the Research and Ethics Committee of the Department of Pathology at TASH. Following this, a letter of cooperation was secured from the Head of the Pathology Department. Confidentiality was upheld by ensuring that all information is anonymized and accessible only to the researcher, thereby preventing disclosure to any unauthorized individuals

4.13 Dissemination of the Results

The results of the research study will be shared with Addis Ababa University, the School of Medicine, and the Department of Pathology. Furthermore, the findings will be presented in a seminar presentation to facilitate discussion and feedback. If feasible, the research will also be published in a peer-reviewed journal to ensure broad dissemination of the findings and contribute to the existing body of knowledge in the field.

5. RESULT

A total of 223 cases of thyroid cancer (TC) were collected for analysis and interpretation. Among these, 211 cases met the inclusion criteria and were prepared for data analysis. The results are depicted as follows. The remaining 12 cases were excluded from analysis due to 11 cases of recurrence and one case involving a core needle biopsy that did not meet the inclusion criteria

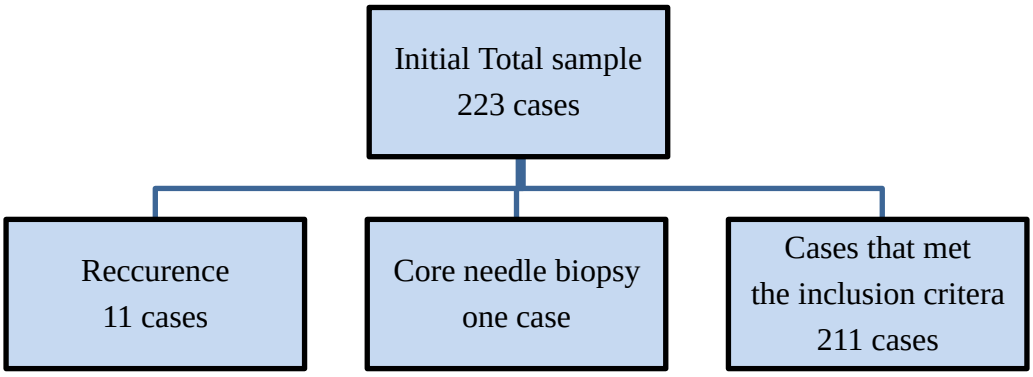

Fig 5.1: Chart showing cases that met inclusion and exclusion criteria.

During the 5-year study period, a total of 211 cases of TC were collected and evaluated based on histopathologic reports from the Department of Pathology at TASH. The following table presents the number of TC cases collected for each year of the study period.

Year (G.C)	Frequency (n)	Percent %
2019 (4 months)	9	4.3
2020 (12 months)	19	9.0
2021 (12 months)	31	14.7
2022 (12 months)	53	25.1
2023 (12 months)	60	28.4
2024 (8 months)	39	18.5
TOTAL	211	100

Table 5.1: Proportion of TC submitted over 5 years from Sept 2019- Aug 2024 at TASH.

Out of the 211 cases of thyroid cancer, 157 (74.8%) were females and 53 (25.2%) were males, resulting in a female-to-male ratio of 3:1.

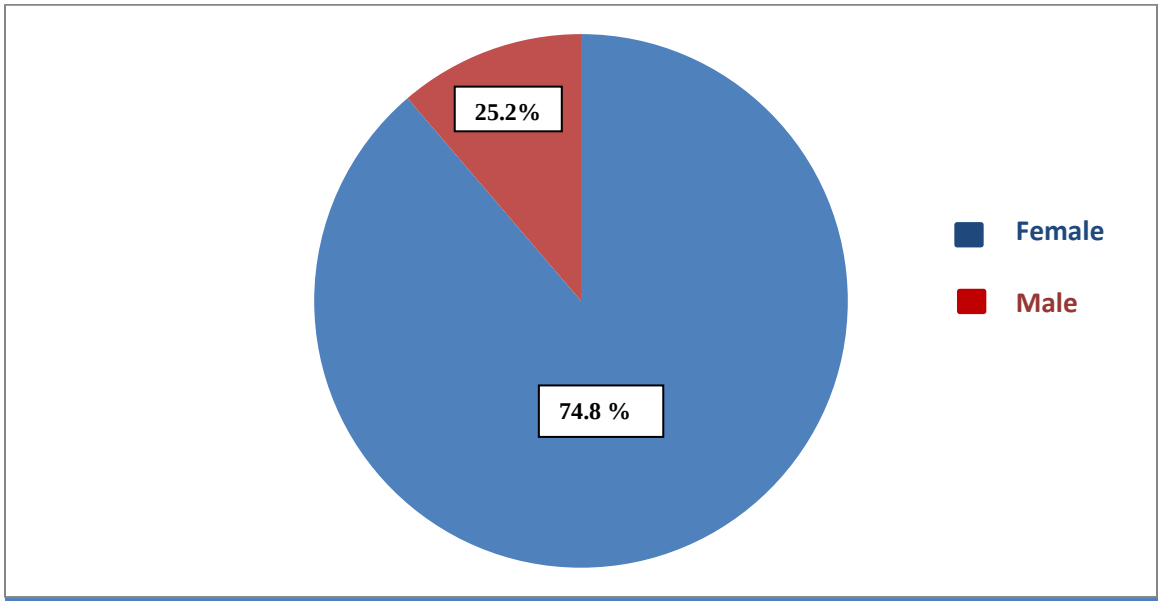

Fig 5.2: Pie chart showing sex proportion of TC.

The youngest patient diagnosed with thyroid cancer was a 3-year-old female, while the oldest was an 82-year-old male. Both cases were classified as PTC. The mean age of diagnosis was 39.39 years, with a standard deviation of 15.5 years.

	Maximum	Minimum	Mean	SD	Frequency(n)
Age in yrs.	82	3	39.39	15.5	211

Table5.2: Distribution frequency of age of patients.

The highest incidence of thyroid cancer was observed in the third decade of life (ages 20-29), accounting for 24.6% of cases, while the lowest incidence occurred in the ninth decade (ages 80-89), representing only 0.5% of cases. This distribution highlights a significant prevalence of thyroid cancer among younger adults, with a marked decline in cases as age increases beyond the 6th decade

Age range (In yrs.)	Female (n)	Male (n)	Total n (%)
≤10	1	1	2 (0.9)
11-20	12	8	20 (9.5)
21-30	36	16	52 (24.6)
31-40	38	4	42 (19.9)
41-50	33	10	43 (20.4)
51-60	28	7	35 (16.6)
61-70	9	3	12(5.7)
71-80	0	4	4 (1.9)
≥ 81	0	1	1 (0.5)
Total	157	54	211(100)

Table 5.3: Distribution of TC in relation to age ranges of patients.

The data indicates a clear gender disparity in the incidence of thyroid cancer across various age groups, with females consistently outnumbering males in most age ranges. Notably, the age range of 21 to 60 years exhibits the highest number of thyroid cancer cases. Among females older than 70 years, there were no recorded cases of TC.

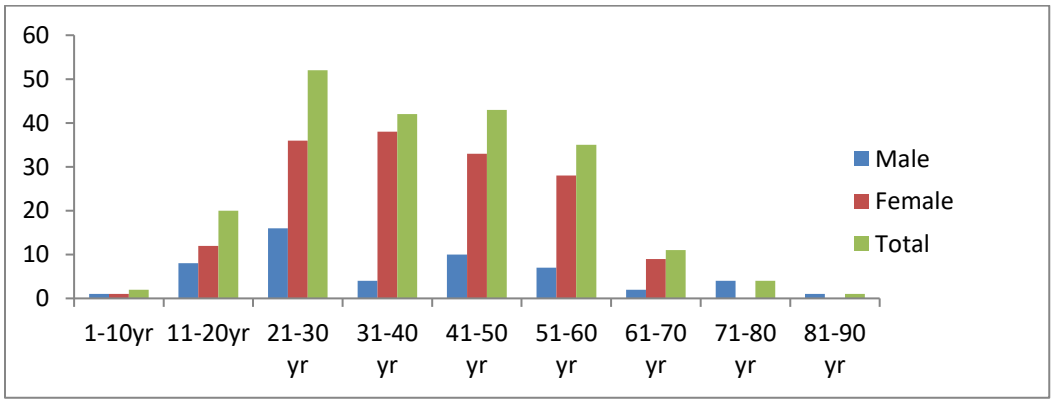

Figure 5.3: A bar showing the distribution of TC in relation to age range and sex

The data on histologic patterns of thyroid cancer reveals a predominant occurrence of PTC, which accounted for 142 (67.3%) cases. Following PTC, FTC was observed in 21 cases, making up 10% of the total cases. PDTC was diagnosed in 13 cases, accounting for 6.2%. The least common histologic pattern noted was DHGPTC, with only one patient (0.5 %).

Histopathologic pattern	Frequency (n)	Percent (%)	Female (n)	Male (n)	Mean age (SD)
PTC	142	67.3	107	35	36.2 (15.04)
FTC	21	10	16	5	43.86 (13.65)
PDTC	13	6.2	10	3	48.77 9.37)
OCA	12	5.7	6	6	50.08 (18.91)
IEFVPTC	10	4.7	8	2	41.5 (14.75)
MTC	8	3.8	6	2	37.5 (13.55)
ATC	4	1.9	3	1	63 (8.9)
DHGPTC	1	0.5	1	0	-
Total	211	100	157	54	-

Table 5.4: Frequency of histopathologic patterns of TC.

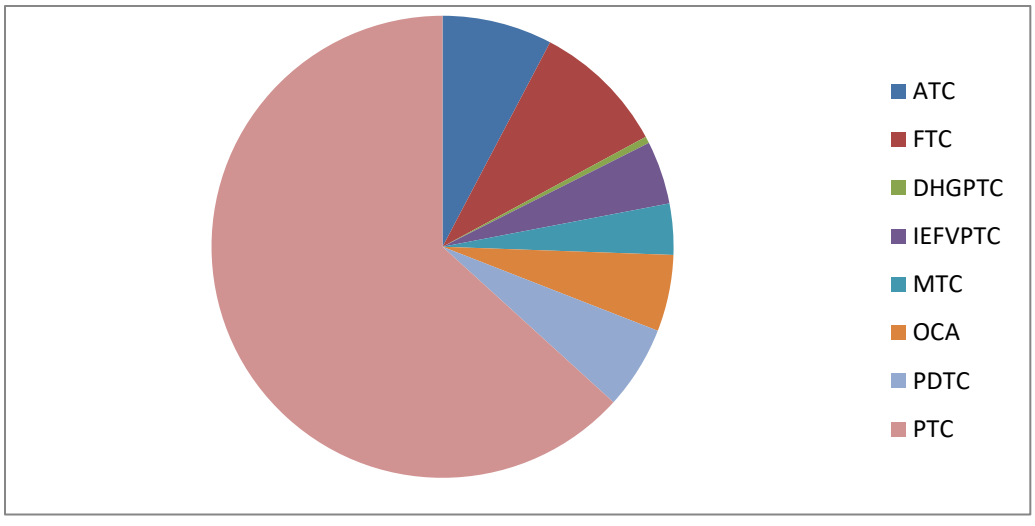

Figure 5.4: Pie chart showing histopathologic patterns of TC.

The analysis of age distribution among different types of thyroid cancer reveals distinct patterns. The highest occurrences of PTC were noted in the 3rd (28.2%), 4th (22.5%), and 5th (17.6%) decades of life. FTC showed a higher occurrence in the 6th decade of life, with 38.1% of cases diagnosed in this age group. The fifth decade of life (61.5%) was noted as the common age for PDTC. OCA had occurrences primarily in the 6th (25%) and 8th (25%) decades of life. Most patients with IEFVPTC were in their fifties (6th decade). MTC was predominantly diagnosed in the 3rd to 5th decades of life, collectively accounting for 75% of cases. The seventh decade of life was identified as the most common age for ATC, with 75% of cases occurring in this age group. Only one case of DHGTC was recorded, with the patient in their forties at diagnosis.

Age range in yrs.	PTC n (%)	FTC n (%)	PDTC n (%)	OCA n (%)	IEFVPTC n (%)	MTC n (%)	ATC n (%)	DHGTC n (%)	Total (n)
1-10	2(1.4%)	0	0	0	0	0	0	0	2
11-20	18(12.7%)	1(4.8%)	0	0	0	1(12.5%)	0	0	20
21-30	40(28.2%)	4(19%)	1(7.7%)	2(16.7%)	3(30%)	2(25%)	0	0	52
31-40	32(22.5%)	3(14.3%)	0	2(16.7%)	3(30%)	2(25%)	0	0	42
41-50	25(17.6%)	4(19%)	8(61.5%)	2(16.7%)	0	2(25%)	1(25%)	1(100%	43
51-60	17(12%)	8(38.1%)	2(15.4%)	3(25%)	4(40%)	1(12.5%)	0	0	35
61-70	6(4.2%)	1(4.8%)	2(15.4%)	0	0	0	3(75%)	0	12
71-80	1(0.7%)	0	0	3(25%)	0	0	0	0	4
81-90	1(0.7%)	0	0	0	0	0	0	0	1
Total	142	21	13	12	10	8	4	1	211

Table5.5: Occurrence of TC types in relation to age range of patients.

The analysis of the 211 cases of thyroid carcinoma reveals that PTC (142) is the most prevalent type. Out of the 142 PTC cases, 86 cases (60.5%) were not classified into specific subtypes. The remaining 56 cases (39.5%) were subtyped into specific subtype.

Classic PTC is the most common subtype, making up nearly half of the cases (46.4%). Follicular PTC is also significant, accounting for over a third of the cases (37.5%). Other subtypes, while less common, include encapsulated (5.3%) and solid subtype (3.6%), as well as several rare subtypes, each representing a small percentage (1.8%) of the total.

PTC subtype	Frequency (n)	Percent (%)
Classic	26	46.4
Follicular	21	37.5
Encapsulated Classic	3	5.3
Solid	2	3.6
Diffuse Sclerosing	1	1.8
Tall cell	1	1.8
Hobnail	1	1.8
Oncocytic	1	1.8
Total	56	100

Table 5.6: Distribution of PTC subtypes

Among a total of 211 cases, 205 cases were pathologically staged, from which the majority had Stage T3 TC, representing 42.6% of the cases. This was followed by Stage T2, which accounted for 31.4%. Stage T1 comprised 23.5% of the cases. A small percentage, only 2.5%, were classified as Stage T4, indicating advanced disease. For both females and males, the most common pathologic stage was T3, followed by T2.

Pathologic stage (T)	Frequency n (%)	Female n (%)	Male n (%)
T1	48 (23.5%)	39(25.5%)	9(17.3%)
T2	65 (31.4%)	47(30.7%)	18(34.6%)
T3	87(42.6%)	63(41.2%)	24(46.1%)
T4	5 (2.5%)	4(2.6%)	1(1.9%)
Total	205	153(100%)	52(100%)

Table 5.8: Frequency of pathologic stage in relation to sex.

The following data indicates that for the majority of differentiated thyroid carcinomas (PTC, FTC, PDTC, and IEFVPTC), T3 is the most prevalent pathologic stage. In contrast, OCA and MTC are more commonly found at T2. There are two staged ATC cases with T3 and T4 each.

	Pathologic stages (T)				
Histopathologic patterns	T1	T2	T3	T4	Total n(%)
PTC	41	48	51	2	142(69.3%)
FTC	3	4	13	0	20(9.7%)
PDTC	0	1	8	2	11(5.4%)
OCA	2	5	4	0	11(5.4%)
IEFVPTC	0	3	7	0	10(4.9%)
MTC	2	4	2	0	8(3.9%)
ATC	0	0	1	1	2(0.97%)
DHGTC	0	0	1	0	1(0.5%)
Total n(%)	48(23.5%)	65(31.7%)	87(42.6%)	5(2.5%)	205(100%)

Table 5.7: Pathologic stage of TC in relation to specific histopathologic pattern

Among the total of 211 cases, lymph node dissection was performed in 50 (23.7%) cases and lymph node metastasis was observed in 44 (88%) cases. The majority of metastasis was found in patients with PTC.

Histopathologic Pattern	Tumor, node Metastasis	Frequency (n)
PTC	T1N0	1
	T1N1a	2
	T1N1b	6
	T1N1	2
	T2N0	2
	T2N1a	1
	T2N1b	3
	T2N1	10
	T3N0	1
	T3N1b	7
	T3N1	6
FTC	T1N1	1
PDTC	T2N1b	1
	T3N0a	1
OCA	T2N1	1
IEFVPTC	T3N0	1
MTC	T1N1a	1
	T2N1a	1
	T3N1	2
Total		50

Table5.9: Frequency of histopathologic patterns, LN dissection and LN metastasis.

6. DISCUSSION.

A retrospective analysis was conducted over five years, encompassing a total of 223 cases of thyroid cancer. After applying specific inclusion criteria, 211 cases were selected for detailed analysis. The remaining 12 cases were excluded due to reasons such as recurrent thyroid cancer and core biopsy samples that did not meet the study's criteria.

In this study, out of 211 cases of thyroid cancer, females were most commonly affected (74.8%) compared to males (24.5%), with a female-to-male (F: M) ratio of 3:1. This is comparable to a previous study conducted in the same area (TASH) in 2016, which showed that thyroid cancer was more common in females than in males, with an F:M ratio of 2.5:1. Another study conducted at Saint Paul's Hospital Millennium Medical College in Addis Ababa from 2018 to 2022 analyzed the histopathologic data of 212 malignant thyroid cancer cases. The female-to-male ratio in this study was noted to be 3:1, and the overall prevalence of thyroid cancer was higher in females than in males and Jimma with F:M ratio of 3:1. (10, 12,14).

This study demonstrated that the younger age group affected by thyroid cancer was between 1-10 years, while the older age group ranged from 81-90 years. The highest incidence of thyroid cancer was observed in the 3rd decade of life, accounting for 24.6% of cases, whereas the lowest incidence occurred in the 9th decade, with only 0.5% of cases. The mean age of patients diagnosed with thyroid cancer in this study was 39.39 years. These findings align with a study conducted in Jimma, where the majority of thyroid cancer diagnoses were reported in the 20-49 age group, with an average age of 34.8 years. Similarly, another study from Kashmir indicated that the peak incidence of thyroid cancer occurred in the 3rd and 4th decades of life (1, 15).

In this study, PTC was identified as the most prevalent histopathologic type of thyroid cancer, accounting for 67.3 % of cases, followed by FTC at 10%. These findings are consistent with the majority of existing literature, which similarly reports PTC as the most common type of thyroid carcinoma, followed by FTC (1,4, 10-15,18-23). However, it is important to note that some studies have reported FTC as the predominant histopathologic pattern of thyroid cancer. For example, a study conducted in Sudan found a prevalence of FTC at 41%, while another study in Nigeria reported a prevalence of FTC at 51.4%. This discrepancy suggests that a higher occurrence of FTC may be linked to more severe iodine deficiency in certain regions and populations, which can significantly influence the development and types of thyroid carcinoma Overall, these results highlight the importance of understanding regional variations in thyroid cancer incidence and histopathology, potentially driven by environmental factors such as iodine availability (16, 17).

PDTC was identified as the third most common type of thyroid cancer, accounting for 6.2% of cases. This prevalence is notably higher compared to findings from other studies, such as one conducted in St. Paul, where PDTC constituted only 2.8% of cases, and another study in Jimma, which reported PDTC at 2.2%. The observed increase in the prevalence of PDTC in our study may suggest a rising trend in the incidence of this particular histopathologic pattern of thyroid cancer, warranting further investigation (12, 15).

In this study, Oncocytic carcinoma (OCA) was found to represent 5.7% of thyroid cancer cases, while medullary thyroid carcinoma (MTC) accounted for 3.8%, and anaplastic thyroid carcinoma (ATC) was observed in 1.9% of cases. These findings align with numerous studies and reports in the literature, which consistently indicate that these histopathologic patterns are among the least common forms of thyroid cancer (11, 12, 15).

Among the subtyped cases of papillary thyroid carcinoma (PTC), classic PTC was the most prevalent, comprising 46.4% of the total. This was followed by the follicular variant at 37.5%, and the encapsulated subtype, which accounted for 5.3%. The less common subtypes included diffuse sclerosing PTC (DSPTC), tall cell variant PTC (TCPTC), hobnail variant PTC (HNPT), and Oncocytic variant PTC (OCPTC), each representing 1.8% of the cases. These findings align with a study conducted in St. Paul, which also identified classic PTC (76%) as the most common subtype followed by follicular subtype (15%) (12).

The analysis revealed that a significant majority of patients had pathologic Stage T3 thyroid cancer, with 87 out of 205 patients (42.6%) presenting at this advanced stage. This finding indicates a higher prevalence of advanced disease compared to a study conducted in India in 2016, where 67% of cases were classified as Stage T1 based on TNM staging. The higher pathological stage at diagnosis in our community may be attributed to several factors, including delayed patient presentation. Many individuals may postpone seeking medical attention, leading to a diagnosis at a more advanced stage. Additionally, limited public awareness regarding thyroid cancer may contribute to this trend, as many people often perceive thyroid swellings as benign conditions rather than potential indicators of malignancy (23).

7. STRENGTH AND LIMITATION OF THE STUDY

7.1. Strength

This study was conducted based on the updated WHO classification of thyroid neoplasms.

The study included histopathologic subtypes and pathological stages of thyroid cancer.

7.2. Limitation

This study is a single-center facility-based investigation, which limits its ability to represent the histopathologic patterns of thyroid cancer in the general population.

The retrospective nature of the study and the relatively few numbers of the specific thyroid pathologies may also be additional limitations.

There were cases with undocumented pathologic stages, as well as cases without specific subtypes for each histopathologic pattern.

8. CONCLUSION

This study characterizes the histopathologic patterns of thyroid cancer observed in surgical biopsy samples submitted to the pathology department of TASH from September 2019 to August 2024. The results indicate that papillary thyroid carcinoma (PTC) is the most prevalent histopathologic type, followed by follicular thyroid carcinoma (FTC) and poorly differentiated thyroid carcinoma (PDTC). Notably, a higher incidence of PDTC was observed in this study, warranting further investigation into its implications and potential underlying factors.

Anaplastic thyroid carcinoma (ATC) and DHGTC were found to be the least common patterns. Among the subtypes of PTC, classic PTC emerged as the most frequently recorded subtype. The demographic analysis revealed a higher prevalence of thyroid cancer in females compared to males, consistent with findings from both local and international studies.

Furthermore, it is concerning that a significant proportion of patients (42.6%) presented with advanced-stage thyroid cancer at the time of diagnosis. These findings underscore the need for enhanced screening and early detection strategies to improve patient outcomes.

9. RECOMMENDATIONS

A national cancer registry is vital for understanding the true burden of cancer in a country. It facilitates local and national comparisons, informs public health strategies, and ultimately helps improve cancer care and outcomes for patients.

Implementing proper documentation practices and adhering to the WHO classification enhances the quality of pathology reporting and also supports future research and interventions aimed at improving outcomes for patients with thyroid cancer.

To obtain a more accurate and comprehensive understanding of thyroid cancer patterns, multi-center studies with diverse populations are essential.

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