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Clinical, laboratory and histopathological profiles of thyroid carcinoma patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia from January 2020 to June 2024

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Abstract

Thyroid carcinoma is a malignancy of the thyroid gland and it is the most common endocrine tumor. Globally, thyroid carcinoma ranks 7th in incidence and 24th in mortality, while in Indonesia, thyroid carcinoma ranks 12th among all carcinomas. Therefore, this study aims to determine the clinical, laboratory, and histopathological profiles of thyroid carcinoma patients. This study used a retrospective descriptive method with total sampling technique. The data were collected from medical records of thyroid carcinoma patients at Dr. Soetomo General Academic Hospital from January 2020 to June 2024. A total of 141 thyroid carcinoma patients were enrolled in this research. Most were aged 51-60 years (34.0%) and female (74.5%). The most commonly reported symptoms were a lump in the neck (100%), hoarseness (19.9%), and pain in the lump (15.6%). Nodules were commonly found to be >4 cm (49.6%), predominantly on the right side of the neck (36.9%). Most patients had normal FT4 (66.0%) and TSH levels (61.7%). Most patients had TR5 ultrasound results (44.7%). The most common histopathological type is papillary (91.5%), and stage 1 (47.5%) is the most common stage. Lymph nodes were the most frequent site of metastasis (36.2%). In conclusion, thyroid carcinoma most commonly occurs in patients aged 51-60 years, predominantly female, and the main complaint is a lump in the neck. Most patients have normal laboratory results and TR5 ultrasound results. The most common type is papillary, at stage 1, with the most common metastasis to lymph nodes.

Keywords: Thyroid Carcinoma; Clinical Profile; Laboratory Profile; Histopathological Profile

1. Introduction

Thyroid carcinoma is a malignancy of the thyroid gland; an endocrine gland located at the front of the neck that plays a role in producing hormones that regulate the body's metabolism. Thyroid carcinoma is the most common type of endocrine tumor, accounting for 95% of all endocrine tumors and representing approximately 2.5% of all malignancies [1]. According to the Global Cancer Observatory [2], thyroid carcinoma ranks 7th in incidence, while mortality ranks 24th worldwide. In Indonesia, thyroid carcinoma ranks 12th in incidence among all types of carcinomas [3].

Age, gender, genetic factors or family history, and radiation exposure are risk factors for thyroid carcinoma [4]. The recurrence rate in women diagnosed with early-stage thyroid carcinoma is lower than in men, but in the late stage, the recurrence rate in women and men is the same [5]. In the period 2014–2018, globally, the incidence of thyroid carcinoma was 22.8 cases per 100,000 individuals per year in women, while in men, the incidence was 8 cases per

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100,000 individuals per year [6]. Another study states that in 2020, the incidence of thyroid carcinoma in women was 10 cases per 100,000 individuals, and in men it was 3 cases per 100,000 individuals [7]. Patients with well-differentiated thyroid carcinoma have a good long-term prognosis with a very high five-year survival rate, approaching 100% [8].

Advances in the detection and diagnosis of thyroid carcinoma have been ongoing for many years, ranging from increased use of technology, such as thyroid ultrasound, FNAB (Fine Needle Aspiration Biopsy), the use of thyroglobulin as a marker in laboratory tests, to molecular testing [9]. Clinical profile, laboratory profile, and histopathology type are important aspects that must be known and understood to determine the appropriate diagnosis and therapy for thyroid carcinoma patients. The importance of studies on clinical profile, laboratory profile, and histopathology type in thyroid carcinoma patients motivates researchers to expand their understanding and knowledge on these topics by conducting research related to clinical profile, laboratory profiles, and histopathological types in thyroid carcinoma patients at Dr. Soetomo General Academic Hospital, which is a type A hospital and one of the national referral hospitals in Indonesia

2. Material and methods

This study is a retrospective descriptive study to determine the clinical, laboratory, and histopathological profiles of thyroid carcinoma patients at Dr. Soetomo General Hospital from January 2020 to June 2024. This study was approved by the Health Research Ethics Committee of Dr. Soetomo General Academic Hospital with ethics number 1829/LOE/301.4.2/XI/2024. The study population consisted of all patients who met the inclusion criteria, namely all patients aged >18 years with a diagnosis of thyroid carcinoma at Dr. Soetomo General Academic Hospital between January 2020 and June 2024, and the exclusion criteria were incomplete medical records. Sampling was conducted using total sampling, with data collected including age, gender, main complaint, nodule size, nodule location, FT4 levels, TSH levels, interpretation of ultrasonography results, histopathology type, stage, and metastasis.

The material for this study was the medical records of thyroid carcinoma patients, and the instruments used were data collection sheets, laptops, and Microsoft Excel. The data obtained will be processed using Microsoft Excel and analyzed descriptively. The results will be presented in the form of frequencies and percentages, grouped according to predetermined variables.

3. Results

The number of thyroid carcinoma patients at Dr. Soetomo General Academic Hospital from January 2020 to June 2024 who met the inclusion and exclusion criteria was 141 patients.

Table 1 Patient Demographics and Clinical Presentation of Thyroid Carcinoma Patients (n=141)

Variable		**Frequency (n)**	**Percentage (%)**
Age (Years)	19-20	1	0.7
	21-30	15	10.6
	31-40	13	9.2
	41-50	31	22.0
	51-60	48	34.0
	61-70	26	18.4
	71-80	7	5.0
Gender	Male	36	25.5
	Female	105	74.5
Main Complaint	Lump in the neck	141	100
	Pain in the lump	22	15.6
	Hoarseness	28	19.9
	Difficulty swallowing	17	12.1

	Difficulty breathing	19	13.5
Nodule Size (cm)	≤ 1	4	2.8
	> 1 dan ≤ 2	12	8.5
	> 2 dan ≤ 4	55	39.0
	> 4	70	49.6
Nodule Location	Right side of the neck	52	36.9
	Left side of the neck	42	29.8
	Bilateral sides of the neck	47	33.3

Based on table 1, clinical data shows that the majority of patients were aged 51-60 years old (48 patients, 34.0%) and most patients were female (105 patients, 74.5%). Patients may experience one or more symptoms. The most common complaint was a lump in the neck (141 patients, 100%). Other common complaints include hoarseness in 28 patients (19.9%) and pain in the lump in 22 patients (15.6%). Most nodules were >4 cm in size in 70 patients (49.6%) and located on the right side of the neck in 52 patients (36.9%).

Table 2 Laboratory Results (FT4 and TSH) of Thyroid Carcinoma Patients (n=141)

Variable		**Frequency (n)**	**Percentage (%)**
FT4 level (ng/dL)	< 0,89	41	29.1
	0,89–1,76	93	66.0
	> 1,76	7	5.0
TSH level (μIU/mL)	< 0,55	39	27.7
	0,55–4,78	87	61.7
	> 4,78	15	10.6

Based on table 2, the majority of patients had FT4 levels within the normal range in 93 patients (66.0%) and TSH levels also within the normal range in 87 patients (61.7%).

Table 3 Interpretation of Ultrasonography Results in Thyroid Cancer Patients (n=141)

Interpretation	**Frequency (n)**	**Percentage (%)**
TR5 (highly suspicious)	63	44.7
TR4 (moderately suspicious)	35	24.8
TR3 (mildly suspicious)	23	16.3
TR2 (not suspicious)	9	6.4
TR1 (benign)	1	0.7
Malignant mass	12	8.5
Uninodular goiter	2	1.4
Multinodular goiter	4	2.8
Diffuse goiter	4	2.8
Cystic goiter	1	0.7
Cystic lesion	2	1.4

Based on the data obtained, patients may have one or more ultrasound findings, for example, category TR5 in the right lobe and TR4 in the left lobe. Based on table 3, most patients had ultrasound results of TR5 (TI-RADS 5) indicating a highly suspicious for malignancy, in 63 patients (44.7%).

Table 4 Histopathological Types and Stage of Thyroid Carcinoma Patients (n=141)

Variable		Frequency (n)	Percentage (%)
Histopathological Types	Papillary	129	91.5
	Follicular	6	4.3
	Medullary	0	0
	Anaplastic	4	2.8
	Oncocytic	2	1.4
Stage	I	67	47.5
	II	38	27.0
	III	7	5.0
	IVa	4	2.8
	IVb	22	15.6
	IVc	3	2.1

Based on table 4, the dominant histopathology type in patients was papillary in 129 patients (91.5%). According to disease stage, stage I was the most common stage, found in 67 patients (47.5%).

Table 5 Distribution of Metastasis Among Thyroid Carcinoma Patients (n=141)

Metastasis	Frequency (n)	Percentage (%)
Lymph Nodes	51	36.2
Cervical lymph nodes	51	36.2
Supraclavicular lymph nodes	2	1.4
Non-Lymph Node Mass	5	3.5
Submandibular	3	2.1
Supraclavicular	3	2.1
Organs	25	17.7
Brain	1	0.7
Lung	24	17.0
Bones	21	14.9
Cranium	7	5.0
Clavicle	1	0.7
Humerus	4	2.8
Sternum	3	2.1
Ribs	1	0.7
Vertebrae	4	2.8
Inguinal region	2	1.4

Femur	1	0.7
Knee	1	0.7
No data related to metastasis	61	43.3

Based on table 5, patients can be identified as having one or more metastases. The dominant location of metastasis found in patients was spread to the lymph nodes, especially the cervical lymph nodes in 51 patients (36.2%). In addition, the most common metastasis was found in organs, especially the lungs in 24 patients (17.0%), and metastasis to the bones in 21 patients (14.9%). Metastasis data were not found in 61 patients (43.3%).

Table 6 Distribution of Histopathological Types Based on Age, Gender, and Main Complaint

Variable		Papillary	Follicular	Medullary	Anaplastic	Oncocytic
Age (Years)	19-20	1 (0.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	21-30	15 (11.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	31-40	13 (10.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	41-50	28 (21.7%)	2 (33.3%)	0 (0%)	1 (25.0%)	0 (0%)
	51-60	40 (31.0%)	4 (66.7%)	0 (0%)	3 (75.0%)	1 (50.0%)
	61-70	25 (19.4%)	0 (0%)	0 (0%)	0 (0%)	1 (50.0%)
	71-80	7 (5.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total Patients		129	6	0	4	2
Gender	Male	35 (27.1%)	0 (0%)	0 (0%)	1 (25.0%)	0 (0%)
	Female	94 (72.9%)	6 (100%)	0 (0%)	3 (75.0%)	2 (100%)
Total Patients		129	6	0	4	2
Main Complaint	Lump in the neck	129 (100%)	6 (100%)	0 (0%)	4 (100%)	2 (100%)
	Pain in the lump	21 (16.3%)	1 (16.7%)	0 (0%)	0 (0%)	0 (0%)
	Hoarseness	28 (21.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Difficulty swallowing	15 (11.6%)	2 (33.3%)	0 (0%)	0 (0%)	0 (0%)
	Difficulty breathing	18 (14.0%)	0 (0%)	0 (0%)	0 (0%)	1 (50.0%)
Total Patients		129	6	0	4	2

Based on table 6, the majority of patients with papillary thyroid carcinoma were in the 51-60 age group (31.0%) and the 41-50 age group (21.7%). Follicular thyroid carcinoma was often found in the 51-60 age group (66.7%) and the 41-50 age group (33.3%). Anaplastic thyroid carcinoma is most commonly found in the 51-60 age group (75.0%). Oncocytic thyroid carcinoma can be found in 1 patient each in the 51-60 and 61-70 age groups. Most thyroid carcinoma patients were female across various histopathological types of thyroid carcinoma, ranging from papillary, follicular, anaplastic, and oncocytic. The main complaint often experienced by patients was a lump in the neck, which was found in patients with thyroid carcinoma of various histopathological types. Another significant complaint in patients with papillary thyroid carcinoma is hoarseness and pain in the lump. A prominent complaint in patients with follicular thyroid carcinoma is difficulty swallowing and pain in the lump. In patients with oncocytic thyroid carcinoma, the complaint accompanying the lump in the neck is difficulty breathing.

Table 7 Distribution of Histopathological Types Based on FT4 and TSH Levels

Variable		Papillary	Follicular	Medullary	Anaplastic	Oncocytic
FT4 level (ng/dL)	< 0,89	39 (30.2%)	1 (16.7%)	0 (0%)	1 (25.0%)	0 (0%)
	0,89–1,76	83 (64.3%)	5 (83.3%)	0 (0%)	3 (75.0%)	2 (100%)
	> 1,76	7 (5.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total Patients		129	6	0	4	2
TSH level (μIU/mL)	< 0,55	37 (28.7%)	2 (33.3%)	0 (0%)	0 (0%)	0 (0%)
	0,55–4,78	78 (60.5%)	4 (66.7%)	0 (0%)	3 (75.0%)	2 (100%)
	> 4,78	14 (10.9%)	0 (0%)	0 (0%)	1 (25.0%)	0 (0%)
Total Patients		129	6	0	4	2

Based on table 7, most patients with papillary, follicular, anaplastic, and oncocytic thyroid carcinoma had FT4 levels within the normal range (0.89-1.76 ng/dL) and normal TSH levels (0.55-4.78 μIU/mL).

Table 8 Distribution of Histopathological Types Based on Interpretation of Ultrasonography Results

Interpretation	Papillary	Follicular	Medullary	Anaplastic	Oncocytic
TR5 (highly suspicious)	58 (45.0%)	2 (33.3%)	0 (0%)	1 (25.0%)	2 (100%)
TR4 (moderately suspicious)	31 (24.0%)	4 (66.7%)	0 (0%)	0 (0%)	0 (0%)
TR3 (mildly suspicious)	23 (17.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
TR2 (not suspicious)	9 (7.0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
TR1 (benign)	1 (0.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Malignant mass	10 (7.8%)	0 (0%)	0 (0%)	2 (50.0%)	0 (0%)
Uninodular goiter	2 (1.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Multinodular goiter	3 (2.3%)	0 (0%)	0 (0%)	1 (25.0%)	0 (0%)
Diffuse goiter	4 (3.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cystic goiter	1 (0.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cystic lesion	2 (1.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total Patients	129	6	0	4	2

Based on table 8, the majority of patients with papillary thyroid carcinoma had TR5 ultrasound results in 58 patients (45.0%), followed by TR4 and TR3 categories. Follicular thyroid carcinoma was commonly found in categories TR4 and TR5. In anaplastic thyroid carcinoma, two patients had malignant mass ultrasound results, one patient had a TR5 ultrasound result, and one patient had a multinodular goiter ultrasound result. In oncocytic thyroid carcinoma, two patients had TR5 ultrasound results.

Table 9 Distribution of Histopathological Types Based on Stage

Stage	Papillary	Follicular	Medullary	Anaplastic	Oncocytic
I	66 (51.2%)	1 (16.7%)	0 (0%)	0 (0%)	0 (0%)
II	33 (25.6%)	4 (66.7%)	0 (0%)	0 (0%)	1 (50.0%)
III	6 (4.7%)	0 (0%)	0 (0%)	0 (0%)	1 (50.0%)
IVa	4 (3.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
IVb	20 (15.5%)	1 (16.7%)	0 (0%)	1 (25.0%)	0 (0%)
IVc	0 (0%)	0 (0%)	0 (0%)	3 (75.0%)	0 (0%)
Total Patients	129	6	0	4	2

Based on table 9, the dominant stage in papillary thyroid carcinoma was stage I, which was found in 66 patients (51.2%), followed by stage II in 33 patients (25.6%). Follicular thyroid carcinoma was most commonly found in stage II in 4 patients (66.7%). Anaplastic thyroid carcinoma was found in advanced stages, namely stage IVc in 3 patients (75.0%) and IVb in 1 patient (25.0%). Oncocytic thyroid carcinoma was found in stages II and III, with 1 patient each (50.0%).

4. Discussion

4.1. Patient Demographics and Clinical Presentation

This study shows that most patients were aged 51-60 years, with a total of 48 patients (34.0%). These results are not significantly different from the study by Elhassan *et al.* [10], which reported that the dominant age group was 50-59 years old, and are consistent with the study by Girardi [11], which reported that 51-60 years old was the most common age group among patients. The reason why the 51-60 age group dominates is likely because patients have been exposed to cumulative risk factors, such as radiation exposure and smoking, and have a higher frequency of health checkups.

The majority of patients in this study were female, in 105 patients (74.5%). This finding is in line with research by Sudarmanto *et al.* [12], which shows that the incidence rate in women (79.9%) is higher than in men (21.1%). Women have a higher incidence because of exposure to estrogen, which can increase cell proliferation, trigger DNA damage, and thus trigger the development of thyroid carcinoma. An imbalance between the two isoforms of the estrogen receptor, namely Erα (which promotes thyroid tumor growth) and Erβ (which inhibits thyroid tumor growth), can stimulate cell proliferation [4]. In addition, it can also be assumed that women are more proactive in undergoing screening or seeking health services [13, 14].

The results of the study show that a lump in the neck is the symptom most commonly experienced by patients (100%), followed in order by hoarseness (19.9%), pain in the lump (15.6%), difficulty breathing (13.5%), and difficulty swallowing (12.1%). These findings are consistent with research by Elhassan *et al.* [10], which reported that a lump in the neck is the most common complaint among patients. Hoarseness, difficulty swallowing, and difficulty breathing are symptoms that often accompany a lump in the neck [15]. A study by Zamora *et al.* [16] also explains that patients may also experience pressure or pain in the neck. Clinical manifestations, such as difficulty swallowing, hoarseness, and difficulty breathing, may indicate a poor prognosis because they are the result of local invasion [9].

Nodule size >4 cm was the most common nodule size, found in 70 patients (49.6%). This finding was not significantly different from the study conducted by Harahap *et al.* [17] at Haji Adam Malik Hospital, Medan, which reported that the majority of nodule sizes in patients were ≥4 cm (47.4%). However, the results of the author's study differ from a study at a tertiary hospital in Saudi Arabia, which reported that the most common nodule size was 1.0-1.9 cm, found in 195 patients (64.8%) [18]. The reason why the majority of nodule sizes in Saudi Arabia are smaller than in Indonesia may be due to widespread access to early detection or thyroid screening, as well as awareness of the importance of regular health checkups so that nodules can be identified before they grow larger. Large nodules may indicate a higher possibility of malignancy compared to small nodules [19].

The results of this study show that the most common location of nodules is the right side of the neck, found in 52 patients (36.9%), followed by the bilateral sides of the neck in 47 patients (33.3%) and the left side of the neck in 42 patients (29.8%). This means that nodules are more commonly found on the unilateral side of the neck (94 patients) than on the bilateral side of the neck (47 patients). These findings are in line with the study by Miciak *et al.* [20], which reported that the majority of patients had unilateral nodules, and the study by Smit *et al.* [21], which stated that nodules were more commonly found on the right side (56.5%) in patients. However, this study shows a difference from the studies by Dewi *et al.* [22] and Sudarmanto *et al.* [12], which reported that nodules were most commonly found on the bilateral sides of the neck. Thyroid carcinoma with unilateral nodules has a lower progression rate compared to thyroid carcinoma with bilateral nodules, which has a higher progression rate, such as being more aggressive, higher stage, extrathyroid extension, lymphatic and perineural involvement [20, 23].

4.2. Laboratory Results (FT4 and TSH)

In this study, most patients had FT4 levels within the normal range (0.89-1.76 ng/dL), in 93 patients (66.0%), and TSH levels within the normal range (0.55-4.78 μIU/mL), in 87 patients (61.7%). High FT4 and TSH levels are correlated with an increased risk of thyroid carcinoma [24]. However, research by Dewi and Seputra [25] states that lower FT4 levels and higher TSH levels are found more often in patients with thyroid carcinoma than in patients with benign thyroid nodules.

In a study conducted by Sasson *et al.* [26], a relationship was found between high FT4 levels and thyroid malignancy, and low FT4 and TSH levels may increase the potential for a nodule to exhibit benign characteristics. The risk of thyroid carcinoma increases when FT4 levels reach approximately 2.2 ng/dL or higher [24]. Although the average FT4 level in patients with malignant thyroid nodules is still within the normal range, more patients in this group have FT4 levels that deviate significantly from the average compared to patients with nodules with benign characteristics [26].

TSH acts as a growth factor in the thyroid and has a mitogenic role in the proliferation of thyroid carcinoma cells [27]. There is a significant correlation between high TSH levels in euthyroid patients and an increase in thyroid carcinoma [28]. The lowest risk of thyroid carcinoma diagnosis was identified in individuals with TSH levels below the normal limit (<0.4 IU/L), and the highest risk was in individuals with TSH levels above 5.5 IU/L, with the possibility of being diagnosed with thyroid carcinoma increasing in individuals with TSH levels above 0.9 IU/L [29]. Thus, further research is still needed to clarify the influence of hormones involved in thyroid function on the initiation of thyroid carcinoma [24].

4.3. Interpretation of Ultrasonography Results

Ultrasound is a crucial imaging method for assessing thyroid nodules and can be used to distinguish between benign and malignant lesions, as well as to detect small nodules [16]. Ultrasound findings suggestive of malignancy include irregular edges, hypoechoic or highly hypoechoic echogenicity, taller-than-wide shape, punctate echogenic foci, or microcalcifications [30, 31]. Ultrasound findings show that the most common result in patients is TR5 (highly suspicious) in 63 patients (44.7%), followed by TR4 (moderately suspicious) in 35 patients (24.8%) and TR3 (mildly suspicious) in 23 patients (16.3%). This is consistent with a study by Smit et al. [21], which explained that TR5 was the most common ultrasound result in patients (40.7%). In addition, research by Xu et al. [32] found that the most common ultrasound result in patients was TR5, followed sequentially by TR4, TR3, TR2, and TR1.

Higher TR scores are significantly associated with nodule malignancy [21]. TIRADS scores have a strong correlation with malignant histopathological results. Findings from ultrasound examinations, including solid nodule characteristics, enlarged lymph nodes, and TIRADS scores greater than 3, can be early indicators of thyroid malignancy even before confirmation through histopathological examination [33]. The reason for low TR scores is likely due to the nodule being too small or located in an unfavorable or hidden position, thus failing to show the characteristic features of a malignant nodule. In this study, some ultrasound results were not in TR format but were presented in descriptive narratives and conclusions. For example, ultrasound findings described the presence of a mass categorized as a malignant mass, leading to a strong suspicion of thyroid carcinoma. Thus, ultrasound results cannot be used as a definitive diagnosis and must be confirmed by anatomic pathology examination.

4.4. Histopathological Types and Staging

The majority of histopathological types in thyroid carcinoma patients were papillary (91.5%), followed by follicular (4.3%), anaplastic (2.8%), oncocytic (Hurthle cells) (1.4%), and no medullary types were found. These findings are consistent with the study by Sudarmanto *et al.* [12], which reported that papillary was the most common histopathological type in patients (92.7%) and the study by Fitriyani *et al.* [34], which reported that 72.7% of patients had papillary histopathology. However, this study differs from research by Elhassan *et al.* [10] at the National Cancer Institute of Gezira University and Emmanuel *et al.* [35] at Jos University Hospital, Nigeria, which stated that the most common histopathological type was follicular thyroid carcinoma. The reason why the papillary type was the most frequently found type was likely due to an increase in cases that were accidentally identified when patients underwent screening examinations.

According to this study, the most commonly identified stage in patients was stage I (47.5%), followed by stage II (27.0%), advanced stages (IVa, IVb, IVc) (20.5%), and stage III (5.0%). These findings are supported by research by Sudarmanto *et al.* [12] and Shah *et al.* [36], which explains that the majority of stages found in patients are stage I. Although stage I is the most commonly found stage, conditions such as stage IV must also be considered and serve as a reminder for medical personnel because there is a possibility of high severity cases in newly admitted patients [12]. However, this study differs from the results of studies by Elhassan *et al.* [10] and Harahap *et al.* [17], which show that most patients are in stage IV. The reason why the majority of cases in those studies are found to be in advanced stages is thought to be because thyroid carcinoma often does not show symptoms and is found incidentally when it is already in an advanced stage.

4.5. Distribution of Metastasis

Based on the results of this study, the most common metastasis identified in patients was metastasis to the lymph nodes, especially the cervical lymph nodes (36.2%), followed by spread to organs, especially the lungs (17.0%), and metastasis to the bones (14.9%). These findings are in line with a study by Fukuda *et al.* [37], which found that the most common metastasis was to the lymph nodes (n= 42; 25.9%), followed by the lungs in 39 patients (24.1%), and then the bones in 17 patients (10.5%). According to Lee *et al.* [38], distant metastasis is commonly found in the lungs and bones. Without adequate treatment, thyroid carcinoma can spread and invade the trachea, esophagus, and other neurovascular structures [38].

Based on this study, brain metastasis is a rare occurrence (n=1). Brain metastasis is correlated with low survival rates and often occurs or develops after spread to other organs [39]. However, the results of this study differ from those of Elhassan *et al.* [10], who reported that lymph node involvement was found in only a small proportion of patients, namely less than a quarter of all patients (22%). In addition, in that study, bone was the site most commonly found in distant metastases, followed by the lungs, liver, and brain, respectively.

4.6. Distribution of Histopathological Types Based on Age, Gender, and Main Complaint

Based on the results of this study, the distribution of histopathological types by age shows that papillary thyroid carcinoma is most commonly found in the 51–60 age group (31.0%), followed by the 41–50 age group (21.7%), and the 61–70 age group (19.4%). Based on research by Girardi [11], papillary thyroid carcinoma occurs widely in the 45–64 age range. Meanwhile, according to Ocak *et al.* [40], the papillary type occurs widely in the 41–50 age group, and according to Pranav *et al.* [41], the papillary type occurs widely in the 30–50 age group. In follicular thyroid carcinoma, the majority of patients are in the 51–60 age group (66.7%) and 41–50 age group (33.3%). This is not much different from Ocak *et al.* [40], who found that follicular carcinoma is most common in the 41-50 age group. According to Girardi [11], the follicular type is commonly found in the 45-64 age group and ⩾65 age group. Anaplastic thyroid carcinoma is often found in people aged 51-60 years. According to research by Girardi [11], the anaplastic type is more common in individuals aged ⩾ 65 years, and according to Fidiawaty *et al.* [42], anaplastic carcinoma occurs in individuals aged 55-64 years. Oncocytic thyroid carcinoma is often found in patients aged 51-60 years and 61-70 years. This is not much different from the study by Sherman *et al.* [43], which states that the oncocytic type is commonly found in people aged 50-60 years, and the study by Jin *et al*. [44], which reports that the average age of patients with oncocytic thyroid carcinoma is 50.3 years.

The findings of this study show the distribution of histopathological types based on gender, revealing that the majority of thyroid carcinoma patients are female in almost all histopathological types, ranging from papillary, follicular, anaplastic, and oncocytic. These results are consistent with studies conducted by Elhassan *et al.* [10] and Harahap *et al.* [17], which state that in various histopathological types, females constitute the largest group in cases of thyroid carcinoma.

According to the results of this study, the distribution of histopathology types based on the main complaint shows that the majority of patients with various histopathology types experience complaints of a lump in the neck. Other main complaints that most often accompany a lump in the neck in the papillary type are hoarseness and pain in the lump. According to research conducted by Girijakumari *et al.* [45], the most common accompanying complaints in the papillary type are pain in the lump and difficulty swallowing. In the follicular type, complaints that are also commonly found are difficulty swallowing and pain in the lump. In the oncocytic type, difficulty breathing is a complaint experienced in addition to a lump in the neck.

4.7. Distribution of Histopathological Types Based on FT4 and TSH Levels

In this study, the majority of patients with papillary, follicular, anaplastic, and oncocytic thyroid carcinoma had FT4 levels within the normal range (0.89–1.76 ng/dL) and normal TSH levels (0.55–4.78 μIU/mL). However, research by Wang *et al.* [24] shows that an increased risk of thyroid carcinoma correlates with high FT4 and TSH levels, and further studies are needed on the role of thyroid hormones in the development of thyroid carcinoma. Based on research by Fitriyani *et al.* [34], there is no significant correlation between thyroid function laboratory results and the histopathology type of thyroid carcinoma.

4.8. Distribution of Histopathological Types Based on Interpretation of Ultrasonography Results

Based on the results of this study, papillary thyroid carcinoma was most commonly found in the TR5 (highly suspicious) category (45.0%), followed by TR4 (moderately suspicious) and TR3 (mildly suspicious). In follicular thyroid carcinoma, the most common ultrasound results were in the TR4 and TR5 categories. In anaplastic thyroid carcinoma,

most patients had malignant mass ultrasound results, followed by TR5 and multinodular goiter. In oncocytic thyroid carcinoma, the majority had TR5 ultrasound results. These findings indicate that most histopathological types have the highest number of ultrasound results in the TR5 and TR4 categories. This is in line with a study conducted by Smit *et al.* [21], which states that the most common ultrasound results in patients with thyroid carcinoma are TR5 and that a higher TR level has a significant correlation with the malignancy of a nodule.

4.9. Distribution of Histopathological Types Based on Stage

In this study, the distribution of histopathological types based on clinical stage showed clear variations, namely papillary thyroid carcinoma, which was the most common histopathological type, and most papillary cases were identified in the early stage, namely stage I (51.2%), followed by stage II (25.6%) and advanced stage, namely stage IVb (15.5%). This is consistent with the study conducted by Sinambela *et al.* [46], which stated that the papillary type was most commonly found in stage I. In follicular thyroid carcinoma, the majority of patients were in stage II, with a total of 4 patients. However, research by Shah *et al.* [36] states that follicular thyroid carcinoma is mostly found in stage I. In anaplastic thyroid carcinoma, patients were found in advanced stages, namely stage IVc in 3 patients and IVb in 1 patient. This is in line with research conducted by Menon *et al.* [47], which states that anaplastic carcinoma is very aggressive and has a tendency to metastasize to regional lymph nodes and distant sites. The oncocytic type was found in stage II and III, with 1 patient each. However, the findings of this study differ from those of Jin *et al.* [44], who reported that the majority of patients were in stages I and II.

5. Conclusion

Based on the results of this study, the majority of thyroid carcinoma patients were aged 51-60 years old and female. The most common symptoms were a lump in the neck, hoarseness, and pain in the lump. Most nodules were > 4 cm in size and located on the right side of the neck. According to laboratory results, the majority of patients had normal FT4 and TSH levels. Most patients had TR5 on ultrasonography. Papillary was the most common histopathological type, with stage I being the most dominant stage found in patients. The most commonly identified metastasis was to the lymph nodes, particularly the cervical lymph nodes.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare there is no conflict of interest

Statement of ethical approval

This research has received approval from the Dr. Soetomo General Hospital Health Research Ethics Committee with ethics number 1829/LOE/301.4.2/XI/2024 on November 13, 2024.

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