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# Histopathological and Epidemiological Profiles of Thyroid Epithelial Cancers Observed at the Hospital Center of Soavinandriana, Antananarivo

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## ABSTRACT

***Backround:*** *Thyroid cancer is the most common endocrine malignancy tumor and its incidence has increased in many parts of the world. In Madagascar, published histopathological data remain scarce, making local hospital-based series useful for describing diagnostic profiles and care needs. The objective of this study was to describe the epidemiological, clinical, paraclinical and histopathological profiles of epithelial thyroid cancers diagnosed at the Hospital Center of Soavinandriana (CENHOSOA).*

***Methods:*** *This was a monocentric retrospective, descriptive and analytical study carried out in the Department of Pathology of CENHOSOA over a six-year period, from January 2013 to December 2018. All histologically confirmed epithelial thyroid cancers were included, whereas secondary thyroid tumours, duplicate records and unusable files were excluded.*

***Results:*** *Among 3041 specimens registered during the study period, 403 were thyroid specimens. After selection, 49 epithelial thyroid cancers were analysed, representing 1.6% of all specimens and 12.1% of thyroid specimens. The mean age was 46.1 ± 13.06 years, with a range from 18 to 79 years, and the 30–45-year age group was the most represented. Women predominated markedly, accounting for 43 cases (87.8%), with a sex ratio of 0.13. The main presenting feature was anterior neck swelling, and multinodular goiter was the most frequent ultrasound pattern. Total thyroidectomy accounted for 67.3% of specimens. Papillary carcinoma was the predominant histological type, observed in 85.7% of cases, followed by anaplastic (6.1%), follicular (4.1%) and medullary carcinomas (4.1%). The pT1 stage was the most frequent, accounting for 57.1% of cases; lymph node metastases were found in 8.1% of cases and one distant metastasis was reported.*

***Conclusion:*** *This Malagasy hospital-based series shows that epithelial thyroid cancers mainly affect young or middle-aged adult women and are largely dominated by papillary carcinoma. The findings support the need for earlier diagnosis, improved access to thyroid ultrasound and fine-needle aspiration, and standardized pathology report.*

## Keywords
Epidemiology, Histopathology, Madagascar, Papillary carcinoma, Thyroid gland.

## Introduction
Thyroid cancer is a malignant tumor that develops at the expense of the thyroid gland. It is usually revealed by a thyroid nodule, an increase in cervical volume, lymphadenopathy, or an incidental finding during imaging performed for another indication [1].

Globally, thyroid cancer occupies a paradoxical position. It is relatively low in lethality compared to many other solid cancers, but its incidence has significantly increased over the past decades. This increase mainly concerns papillary carcinoma, particularly small forms, and has largely been attributed to improvements in diagnostic methods, the widespread use of cervical ultrasound, and the detection of subclinical lesions. However, this does not explain all situations, as some countries also observe locally advanced forms, especially when access to diagnosis is delayed [2-6].

In Madagascar, published data on thyroid cancers remain limited. Anatomopathological series constitute an important source for better understanding the local presentation of these cancers, even though they do not allow estimating the incidence in the general population [1].

Recent classifications, particularly the WHO 2022 classification, emphasize diagnostic standardization, recognition of histological subtypes, and the progressive integration of molecular data when available [7-10].

The present study aims to describe the epidemiological, clinical, paraclinical, and histopathological aspects of epithelial thyroid cancers diagnosed over a six-year period, and to compare them with the data in the literature in order to derive practical implications for diagnosis, management, and follow-up.

## Materials and Method
This study was conducted at the Pathology Laboratory at the Hospital Center of Soavinandriana (CENHOSOA), Antananarivo. It is a hospital structure receiving surgical and cytological samples from CENHOSOA as well as from referring healthcare facilities. The study period extended over six years, from January 2013 to December 2018. It was a single-center, retrospective, descriptive, and analytical study. The source population included all samples recorded in the laboratory during the selected period. The study population consisted of patients for whom a thyroid sample had undergone an histopathology or cytopathological examination and focused solely on histologically confirmed epithelial thyroid cancers.

Secondary tumors located in the thyroid, duplicates, and cases in which essential information was missing or unusable were excluded. The information was collected from examination request forms, laboratory registers, and histopathology reports. Due to the retrospective nature, the analysis depended on the quality of the records and the information provided with the samples. Clinical, biological, ultrasound, and therapeutic data were not always complete, which represents a significant methodological limitation.

## Results
### Frequency
During the study period, 3041 samples were recorded at the Laboratory of Pathology and Cytology of CENHOSOA. Among them, 403 samples were of thyroid origin, representing 13.3%. Fifty-three of the thyroid samples were malignant. After excluding four secondary tumors, 49 cases of thyroid epithelial cancers were retained in this study. These 49 cases represented 1.6% of the total source population and 12.1% of the thyroid samples.

### Age
The average age of the patients was 46.1 years with a standard deviation of 13.06 years and extremes of 18 and 79 years. The age group of 30 to 45 years was the most represented with 20 cases, or 40.8%, those of 45 to 60 years, 18 to 30 years, and 60 years or more represented 30.6%, 14.3%, and 14.3% of the cases, respectively (Figure 1).

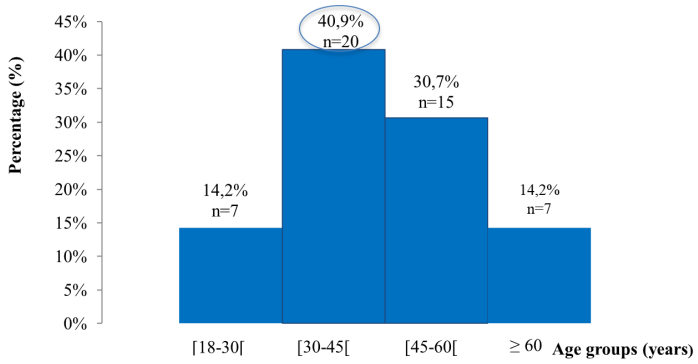


**Figure 1:** Distribution of patients according to age groups.

### Gender
The female gender was clearly predominant with 43 cases, or 87.8%, compared to 6 male cases, or 12.2%. The male/female sex ratio was 0.13 (Figure 2).

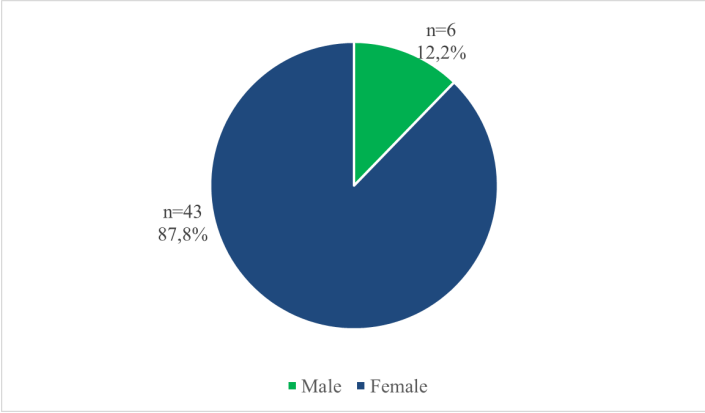


**Figure 2:** Distribution of patients by gender.

## Clinical symptom

Patients without particular medical history were the most observed, with 35 cases, or 71.4%. Histories of thyroidectomy and fine-needle aspiration each accounted for 12.3% of cases.

Basicervical swelling was the main presenting sign, observed in 46.9% of cases. This was followed by cases of goiter, thyroid nodules, and other cervical manifestations reported variably. On ultrasound, multinodular goiters were the most represented.

Total thyroidectomy was the most frequent procedure, representing 67.3% of cases. Other procedures corresponded to lobectomies (30.6%), lobo-isthmectomies, or additional samples according to surgical indications. The average weight of the gland was 57.6 g, and the average tumor size was 3.03 cm. Tumors were bilateral in 38.8% of cases.

## Histology

Papillary carcinoma was by far the most predominant, observed in 42 cases, or 85.7%.

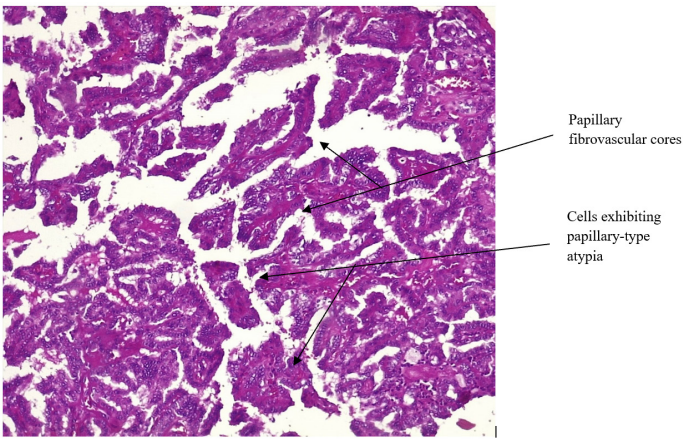


**Figure 3:** Thyroid surgical specimen **:** papillary carcinoma. Hematoxylin-eosin, Magnification x 40.
Source: Pathology Laboratory of Hospital Center of Soavinandriana (CENHOSOA).

The other histological types were anaplastic carcinoma in 3 cases, or 6.1%, vesicular carcinoma in 2 cases, or 4.1%, and medullary carcinoma in 2 cases, or 4.1%.

**Table 1:** Distribution according to histological type.

| Histological type | Number (n) | Percentage (%) |
|---|---|---|
| Papillary carcinoma | 42 | 85,7 |
| Anaplastic carcinoma | 3 | 6,1 |
| Vesicular carcinoma | 2 | 4,1 |
| Medullary carcinoma | 2 | 4,1 |
| Total | 49 | 100 |

The cross-analysis between gender and histological type showed that all non-papillary histological types were observed in female patients in this series, while the six male patients had papillary carcinoma. The association between gender and histological type was not statistically significant, with p = 0.567.

The analysis according to age showed a statistically significant association between age group and histological type, with p = 0.040. Cancers were more frequent between 30 and 45 years old.

Regarding tumor extension, stage pT1 was the most frequent with 28 cases, or 57.1%, followed by stage pT2 (7 cases), or 14.3%, stage pT3 (4 cases), or 8.2%. Stage pT4 was observed in 10 cases, or 20.4%.

**Table 2:** Distribution according to the pT stage.

| Stage pT | Number (n) | Percentage (%) |
|---|---|---|
| pT1 | 28 | 57,1 |
| pT2 | 7 | 14,3 |
| pT3 | 4 | 8,2 |
| pT4 | 10 | 20,4 |
| Total | 49 | 100 |

The resection margins were healthy in the majority of cases (85.7%). Lymph node metastases were found in 8.1% of cases. A metastasis from a papillary carcinoma in the frontal lobe was reported in 2.1% of cases. The overall results highlight a profile dominated by young or middle-aged adult women, a cervical clinical presentation, a high frequency of total thyroidectomy, a clear predominance of papillary carcinoma, and a majority of tumors classified as pT1.

## Discussion

This study reports the profile of 49 thyroid epithelial cancers diagnosed at the Pathology and Cytology Laboratory of CENHOSOA over a six-year period. The selected cases represented 1.6% of all recorded samples and 12.1% of thyroid samples. This proportion does not correspond to a population prevalence, as the series comes from a hospital laboratory and depends on surgical indications, referral practices, and the availability of tests. Nevertheless, it allows an assessment of the burden of cancer among thyroid pathologies that are operated on and histologically examined in this facility, as has already been noted in Malagasy hospital series [1].

The female predominance observed in our series is significant, with 87.8% women and a male/female sex ratio of 0.13. This distribution is consistent with the literature, which reports a higher frequency of thyroid cancers in women, particularly for differentiated carcinomas [1-3,5,6]. Several hypotheses are suggested, notably hormonal influence, the higher frequency of thyroid nodules in women, and more frequent use of monitoring examinations. The strong female predominance in our study may also be influenced by the frequency of goiters in the female population.

The average age of 46.1 years places the majority of patients in the adult group. The 30 to 45-year age group was the most represented, followed by the 45 to 60-year group. This profile is consistent

with the usual presentation of differentiated thyroid carcinomas, which often affect young or middle-aged adults [1,3,5,6]. Anaplastic forms are classically described in older patients and belong to an aggressive histological group in recent classifications [7,8,11]. However, the small sample size of this series limits the interpretation of age-related variations. The significant association observed between age group and histological type should therefore be considered an interesting finding, but it needs to be confirmed by multicenter studies.

The basicervical swelling was the main presenting sign. This presentation differs from contexts where a significant proportion of thyroid cancers are incidentally discovered during an ultrasound or a CT scan, related to the increased diagnosis of small papillary lesions [4-6]. In this context, the discovery of the neoplasm at the stage of a cervical mass or goiter suggests a rather late diagnosis. It highlights the importance of raising awareness among patients and healthcare providers regarding the evaluation of persistent thyroid nodules, progressive goiters, cervical lymphadenopathy, and signs of compression [10-12].

Multinodular goiter was the dominant ultrasound profile. Malignancy within a multinodular goiter constitutes an important diagnostic challenge. Ultrasound allows risk stratification based on the characteristics of one or more nodules: hypoechogenicity, irregular margins, microcalcifications, taller-than-wide shape, suspicious hypervascularization, and presence of lymphadenopathy. Stratification systems such as ACR TI-RADS can help standardize the indication for fine-needle aspiration, but their application depends on the quality of imaging and the training of the operators [10,12].

Fine-needle aspiration plays an essential role in the management of thyroid nodules. It helps guide surgical decisions, avoid certain unnecessary procedures, and prioritize suspicious nodules. The Bethesda classification standardizes cytological terminology and facilitates communication between cytopathologists and clinicians [10,13]. In this series, a history of fine-needle aspiration was reported in only one record, that is 2.1%. This low proportion may reflect either an actual underuse of fine-needle aspiration or insufficient information on the examination request forms.

Total thyroidectomy accounted for 67.3% of the samples. This rate can be explained by the frequency of multinodular goiters, by the suspicion of malignancy, by the surgical strategy chosen, or by the need for complementary treatment in certain differentiated cancers. International recommendations have evolved toward more individualized management, taking into account tumor size, histological type, extrathyroidal extension, lymph node involvement, risk of recurrence, and the possibility of specialized follow-up [10,11,14].

Papillary carcinoma was the most common histological type, accounting for 85.7% of cases. This predominance is consistent with international data, which show that papillary carcinoma constitutes the majority of diagnosed thyroid cancers [3,5-8,10,11]. It is also compatible with observations reported in the available Malagasy series [1]. Advances in ultrasound and cytology have particularly contributed to the detection of small papillary carcinomas in several countries [4-6,15], but in this series, the average size was higher, at 3.03 cm. Follicular carcinomas accounted for 4.1% of cases. Their diagnosis relies on evidence of capsular and/or vascular invasion, which requires sufficient histological sampling of the tumor capsule [7-9,14]. This particularity explains why cytology does not always allow differentiation between a follicular adenoma and a follicular carcinoma [13].

Medullary carcinomas also accounted for 4.1% of cases. Although they are in the minority, these cancers are of particular interest due to their parafollicular origin, their possible association with familial forms, and the relevance of measuring calcitonin [7-11]. Their histological recognition should lead, whenever possible, to an appropriate clinical and biological assessment and a search for family history.

Anaplastic carcinomas accounted for 6.1% of cases. This proportion, although concerning a small number, deserves attention. Anaplastic carcinoma is rare but very aggressive, often diagnosed at a locally advanced stage, with rapid growth and a poor prognosis [7,8,11].

The majority of cases were classified as pT1, representing 57.1%. This result can be interpreted as a favorable factor, but it must be qualified by the proportion of pT4, which reached 20.4%. The coexistence of early-stage tumors and cases with significant extension likely reflects a heterogeneity in access to diagnosis. These patients benefit from early surgery, while others consult or are operated on at a more advanced stage. This observation supports the need for earlier and better-coordinated diagnosis, while avoiding overtreatment of very small, low-risk lesions [10,11,15].

Lymph node metastases were observed in 8.1% of cases. This rate may be underestimated in cases of non-systematic lymph node dissection or incomplete staging data. In papillary carcinoma, cervical lymph node metastases are common and influence the risk of locoregional recurrence [10,11]. Careful examination of the lymph nodes sent to the laboratory, preoperative cervical ultrasound, and the quality of collaboration between surgeons and pathologists are therefore essential [10-12].

A metastasis in the frontal lobe was reported in this series. Brain metastases from thyroid cancers are rare, but they reflect advanced disease, are associated with a poor prognosis, and require specialized management [10,11]. The observation of such a case in a limited series serves as a reminder that the spectrum of thyroid cancer is not confined to indolent forms. In this study, the observed profile is that of a histologically diagnosed population, which limits generalization but provides useful information for hospital practice [1].

This study has limitations. Its retrospective nature exposes it to biases and to heterogeneity in the quality of information. Follow-up data, information on additional treatment, recurrence, and survival were not analyzed. Despite these limitations, this series helps document the histopathological profile of thyroid cancers in a Malagasy hospital setting and can serve as a basis for future multicenter studies. Some perspectives can be proposed. A multicenter study involving the main pathology laboratories of Antananarivo and the regions would allow for a more representative view. The systematic integration of thyroid cytology according to Bethesda, ultrasound classified according to a risk system, and standardized histological reports would improve data comparability [12,13].

Finally, the establishment of a hospital or national registry of thyroid cancers would allow for better monitoring of the evolution of incidence, treatments, and prognosis.

## Conclusion

This study shows that the patient profile was dominated by young or middle-aged adult women, with an average age of 46.1 years and a clear predominance of the female sex. Cervical swelling and goiter were the main modes of presentation. From a histopathological perspective, papillary carcinoma was largely predominant, followed by anaplastic, follicular, and medullary carcinomas. The majority of tumors were classified as pT1, but the presence of pT4, lymph node metastases, and a distant metastasis indicates that advanced forms do exist in this series. The results advocate for strengthening the early diagnosis of suspicious nodules and goiters, better accessibility to thyroid ultrasound and fine-needle aspiration, improved clinical information provided to the laboratory, and standardization of histopathological reports. Multicentric studies with clinical follow-up would allow a better assessment of the prognosis and recurrences of thyroid cancers in Madagascar.

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