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*Full Length Research Paper*

# **Prevalence of thyroid cancer among thyroid swelling in Jimma University Medical Center, South West Ethiopia: A five-year retrospective study**

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Thyroid cancer is the most common endocrine malignancies. It is postulated that goiter is a precursor lesion to the development of thyroid cancer. The worldwide prevalence of goiter in the general population is estimated at 4 to 7%. The objective of the study was to assess the burden of thyroid cancer among patients who visited Jimma University Medical Center (JUMC) with thyroid swelling over the past 5 years. The record of patients who have undergone Fine Needle Aspiration Cytology (FNAC) over the past five years from September 2012-July 2017 was taken as the source population and the patients who underwent FNAC for a thyroid swelling were taken as the study population. The information was collected by the principal investigator and a trained data collector using a structured data collecting guide. Data was compiled and analyzed using IBM SPSS version 22 software and presented using tables, graphs and figures. A total of 2008 thyroid cases which underwent FNAC from September 2012 to July 2017 were collected. Of these, 378 (18.9%) were male and 1626 (81.1%) female. It was observed that the highest prevalence of thyroid swelling cases occurred in the age group of 20 to 30 years with 577 (29.2%) of the participants. The most common thyroid lesion that was found was goiter accounting for 85.4% (1715/2008) of all thyroid swellings in patients that underwent FNAC during the study period. And the most common malignancy that was found was papillary carcinoma (PTC) accounting for 49.3% of malignant lesions. As known, the highest prevalence of carcinoma was found in 2016/17, with 25 (5.8%) and lowest in 2012/2013 with 8 (3.7%). Based on this study, although thyroid swelling is quite a common problem in and around Jimma, the prevalence of thyroid cancer is quite low. And the leading type of malignancy is papillary thyroid carcinoma. Age was found to have a statistically significant association with thyroid malignancy. And there is an increasing incidence of thyroid malignancy over the past 5 years.

**Key words:** Thyroid cancer, fine needle aspiration cytology, goiter.

## **INTRODUCTION**

Thyroid disorders are amongst the commonest endocrine disorders seen in Africa and worldwide. Both

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environmental and nutritional factors play important roles in the prevalence of the commonest thyroid disorders (Ogbera and Kuku, 2011).

Iodine deficiency disorders are the commonest cause of thyroid disorders in Africa. And the prevalence of endemic goiter ranges from 1 to 90% in the different areas of the continent (Ogbera and Kuku, 2011). Thyroid malignancies are a heterogeneous group of tumors which show considerable variability in biological behavior, histological appearances and response to therapy (Bekele and Osman, 2006).

Thyroid cancer is relatively uncommon and it approximately accounts for 1-5% of all cancers in women and less than 2% in men. But over the past several decades, an increase in incidence has been shown in Europe Canada and the USA and currently thyroid cancer is the 6th most common cancer worldwide (Layfield et al., 2009).

The worldwide prevalence of goiter in the general population is estimated at 4-15% and ten times more people are estimated to have impalpable thyroid swellings diagnosed on ultrasound which is up to 30% and autopsy results show that about 50% of the general population may have thyroid enlargements but luckily, less than 10% of these thyroid swellings are malignant (Bekele and Osman, 2006).

The reports on thyroid malignancy in Africa suggest that differentiated thyroid cancer tend to occur more commonly than the other forms of thyroid cancer. The documented prevalence rate of thyroid cancer in the African continent are as follows (papillary carcinoma: 6.7-72.1%, follicular: 4.9-68%), anaplastic: 5-21.4%, and medullary: 2.6-13.8%) and recently, for the differentiated thyroid cancer, there is a trend of increment in the rate of papillary carcinoma which may be attributed to the widespread iodination program which may have decreased the incidence of follicular neoplasm (Ogbera and Kuku, 2011).

In Ethiopia, there is very limited research done on thyroid cancer and most of the research that where done are around the northwest part of the country. And these studies show that thyroid swellings are very common in the community and that prevalence of thyroid malignancies are relatively lower than other parts of the world (Melak et al., 2014).

The high frequency of benign swellings among the total thyroid swellings creates a dilemma; how to manage patients with thyroid nodules which are probably benign but with still a chance of malignancy. FNA biopsy of a thyroid nodule is minimally invasive and safe and is usually performed on outpatient basis (Khan et al., 2010).

The result of FNA biopsy is operator dependent. In Addition, the result may be affected by the lesion characteristics, the accuracy of lesion and needle localization, the method of guidance, the number of aspirated samples, the needle gauge, the aspiration technique and the presence or absence of onsite facilities

for immediate cytological examination. (Godinho-Matos et al., 1992).

FNA is the only non-surgical method of determining whether a thyroid nodule is benign or malignant usually the results fall into one of the four categories: benign, malignant, insufficient and suspicious, by considering this classification, clinicians will be able to decide if a thyroid nodule will be removed by surgery or not (Layfield et al., 2009).

In order to design and implement appropriate interventions and care, knowledge on local prevalence, type and distribution of thyroid malignancy among thyroid enlarged patient have a great importance.

In Jimma University Medical Center, studies on factors affecting thyroid cancer are limited. This study aimed to assess the prevalence and type of thyroid malignancy among thyroid enlarged patients in Jimma, southwest part of Ethiopia. This study may help as a baseline data for further study elsewhere in the country.

## MATERIALS AND METHODS

### Study area, design and period

This study was conducted in JUMC Pathology Department which is located in Jimma City, 350 km south west of Addis Ababa, Ethiopia. The study was done from data abstracted from patient's record from September 2012 to July 2017. A record of all patients who have undergone FNAC from September 2012 to June 2017 was taken as the source population and all patients with thyroid lesions who have undergone FNAC examination in JUMC Pathology Department where taken as the study population. And the study design was a cross-sectional retrospective study design.

### Sample size determination and sampling procedure

Convenience non-probability sampling, utilizing inclusion and exclusion criteria were used and records of all patients in the study population within the study period were taken. And incomplete FNAC reports were two or more variables missing and those reports where the final FNAC diagnosis were not reported, were excluded from the study.

### Data collection and analysis

Data was collected using a structured data collecting format. The principal investigator and a trained data collector of the pathology department collected all the data. Data was cleared, edited and analyzed by using computer software IBM SPSS v22 and finally, it was presented using tables, graphs and figures. Tests of association among different variables were undertaken.

### Ethical consideration

A formal letter was written by Jimma University Student Research Program Department to the concerned authority to get ethical clearance and support during data collection. And a letter of approval was provided and data collection commenced with the

**Table 1.** Age and sex distribution of patients with thyroid lesion in JUMC Pathology Department, from September 2012/13 to July 2016/2017.

Age	No.		Total no. (%)
	Male	Female	
<10	12	13	25(1.3)
10-20	40	201	241(12.2)
20-30	114	461	575(29.2)
30-40	63	389	452(22.9)
40-50	55	291	346(17.6)
50-60	47	163	210(10.6)
>60	36	86	122(6.2)
Total	1604	367	1971(100)

**Table 2.** Distribution of thyroid lesion according to FNAC result among subjects who underwent thyroid FNAC at JUMC over the past 5 years (from September 2012/2013 to July 2016/2017)

FNA result	No.			%		
	Male	Female	Total	Male	Female	Total
Benign	353	1536	1889	17.61	76.64	94.25
Malignant	21	68	89	1.04	3.39	4.43
Suspicious	2	16	18	0.1	0.8	0.9
Non-diagnostic	2	6	8	0.1	0.3	0.4
Total	378	1626	2004	18.86	81.13	100

permissions of the Department of Pathology.

## RESULTS

A total of 2024 cases had undergone an FNAC examination for an enlarged thyroid swelling within the past five years, from September 2012 to June 2017. Out of these, 16 of the patients FNAC report were incomplete, so they were excluded from the study. Out of the 2008 patients included in the study, there were 378 (18.9%) male subjects and 1626(81.1%) female subjects. The age of the participants ranged from age of 2 to 98. The mean age for the diagnosis was 33.8 with a standard deviation of 14.03 and majority of the participants were between the ages of 20-30 with 577 (29.2%) cases followed by the age group 30-40 with 452 (22.9%) cases (Table 1)

Among these cases, 1893 (94.3%) of the lesions were benign and only 89 (4.4%) were found to malignant and 18 (0.9%) were suspicious for malignancy and the remaining 8(0.4%) samples taken were deemed inconclusive (Table 2).

The highest incidence of cancer was seen in the year, 2016/2017 with 27 (5.8%) of the reported cases found to be cancerous followed by the year, 2015/16 with 17 (5.7%) cases (Figure 1). The leading type of thyroid malignancy was papillary carcinoma with 44 (49.43%)

number of the cases followed by follicular neoplasms with 28 (31.4%) and the least common type of malignancy that was found was anaplastic carcinoma with 17 (19.1%) cases observed. During the study, no case of medullary, hurtle cell or metastatic carcinoma was found (Figure 2).

The sex-specific prevalence of thyroid cancer among patients with thyroid swelling was about 68 (4.18%) for the females and 21 (5.5%) for the male cases (Table 3). The difference was not statistically significant ( $P = 0.267$ ).

The age-specific prevalence of thyroid cancer among the patients with thyroid swellings was the highest in the age group of >60 years with 21 (17.2%) of the cases having malignant thyroid lesions followed by the age group of 50-60 with 14 (6.66%) having thyroid cancer (Table 4). The difference was found to be statistically significant ( $P = 0.00$ ).

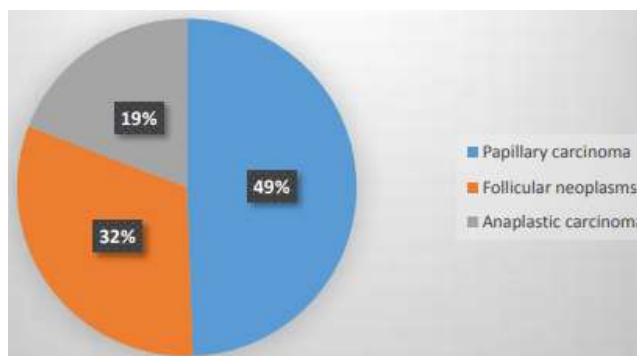
## DISCUSSION

Thyroid carcinoma is the leading cause of death among endocrine cancers following ovarian cancer and it is reported to be one of the fastest growing types of malignancies in the world. In this study, a lower incidence of thyroid cancer was noted: 89 (4.4%) as compared to a similar study conducted in the northeastern part of Ethiopia, Gondar (Melak et al., 2014) which observed a





**Figure 1.** The magnitude of thyroid cancer among thyroid swellings in patients of JUMC over the past 5 years: from September 2012 to June 2017.



**Figure 2.** Distribution of malignant thyroid lesions among subjects who underwent thyroid FNAC at JUMC over the past 5 years (from September 2012/13 to June 2016/17).

**Table 3.** Overall prevalence of thyroid cancer by sex of subjects for whom FNAC was done at JUMC over the last 5 years (September, 20012/13 to June, 20016/17).

Sex	Thyroid cancer status		Total	X <sup>2</sup> =1.36 P =0.267
	Yes	No		
	(%)	(%)	(%)	
Male	21(5.55)	357(93.52)	378(100)	
Female	68(4.18)	1558(95.15)	1626(100)	
Total	89(4.44)	1915(95.5)	2004(100)	

7.3% (62/846) case of thyroid cancer as well as other similar studies done in different countries such as the United Kingdom (18.3%) (Godinho-Matos et al., 1992), Romania (15.5%) (Cătană et al., 2012) and Pakistan (11%) (Sushel et al., 2009). Some of the possible reasons for the lower incidence of thyroid malignancies in this study could be the difference in the study design and

the fact that the previously listed studies used other noninvasive investigations such as ultrasound, isotope scan, and immunologic studies prior to conducting the FNAC. Also, the above-listed studies also used histological samples which had a higher sensitivity in diagnosing thyroid malignancies than FNAC alone.

Thus, even though Jimma has a higher incidence of

**Table 4.** Overall prevalence of thyroid cancer among thyroid swelling by age of patients in which FNAC was done at JUMC Pathology Department over past 5 years.

Age	Thyroid cancer status		Total	$\chi^2 = 53.197$
	Yes (%)	No (%)		
≤10	0(0)	25(100)	25(100)	P =0.00
10-20	6(2.48)	235(97.1)	241(100)	
20-30	19(3.29)	558(96.7)	577(100)	
30-40	15(3.31)	437(96.68)	452(100)	
40-50	11(3.16)	337(96.83)	348(100)	
50-60	14(6.66)	196(93.3)	210(100)	
>60	21(17.2)	101(82.78)	122(100)	
Total	86(4.35)	1889(95.64)	1975(100)	

abroad like in Mangalore, India (Goitre, 2012) and Switzerland (Franssila et al., 1981). The second most common type of malignancy was follicular carcinoma with 31.4% (28/89) of cases and this seems to be consistent with the study done in Gondar (Bekele and Osman, 2006) and Tanzania (Chalya et al., 2011).

In this study, the incidence of anaplastic carcinoma was 17 (19.11%) of the cases which was found to be higher than studies done in Gondar and India (Goitre, 2012). And in this study, no case of medullary carcinoma, hurtle cell or metastatic carcinoma were found even though standard textbooks show that medullary carcinoma and hurtle cell carcinoma account for about <5% of thyroid malignancy (Larry et al., 2017).

Regarding sex variations, a high prevalence of cancer cases was observed in male subjects, although the overall prevalence of thyroid enlargement was much higher in female subjects than males with a female to male ratio of 5:1. This idea is consistent with the idea of standard books as well as other studies done in most areas.

Regarding cancer prevalence by year, it was observed that the highest cancer prevalence was in the year, 2016/2017 and during the five years, the incidence of thyroid cancer has increased which has been noted in several studies done across the world, especially of the papillary type and the exact reason for this increase is still elusive.

In this study, the age group with the higher incidence of cancer is age greater than 60 years followed by those age group of 50-60 which is consistent with studies done in Gondar (Melak et al., 2014). Also, most standard textbooks suggest that the incidence of thyroid cancer increases as the age increase.

### Limitations of the study

Due to the fact that the data was collected retrospectively from a logbook, the author was not able to determine

certain variables such as pattern of growth, address and associated risk factors as well as other clinical and laboratory findings associated with thyroid malignancy and due to the incompleteness of some of the charts and the fact that the data was only of FNAC outcomes not supported by histologic diagnosis (important in confirming the suspicious as well differentiating follicular cancer from adenoma), the result of the study may be affected.

Since the study was conducted in only one facility, external validation may be difficult.

### CONCLUSION AND RECOMMENDATION

Thus, in conclusion, the highest prevalence of thyroid swelling was observed among the age group of 20-30 of the participants, although, the highest prevalence of thyroid cancer was seen among the age group of >60 years. Females have a higher prevalence of thyroid swellings as compared to males, but the incidence of thyroid cancer is more common in male subjects. Possibly, this is due to the hormonal influence which may render thyroid swellings in male subjects to become more cancerous.

During this study, it was shown that the prevalence of thyroid cancer in the study area increased over the past five years, and the authors recommend that further studies be done to assess possible reasons for this increase in the prevalence of thyroid cancer.

Finally, the authors recommend that JUMC Pathology Department should update their data storage so that it is easily accessible to future researchers and the FNAC request form should also be updated so that it will enable future studies to gather more information and draw conclusions.

### Abbreviations

**ATC**, Anaplastic thyroid cancer; **FN**, follicular neoplasm;

**FNAC**, fine needle aspiration cytology; **JUMC**, Jimma University Medical Center; **PTC**, papillary thyroid cancer; **SRP**, Student Research Program.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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