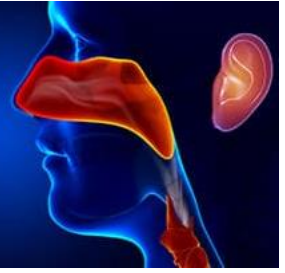


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## Comprehensive histopathological characterization of thyroid gland swellings in a tertiary care hospital in Bangladesh

**Dr. Md. Hasan Ali, Dr. Md. Mahmud Ali, Dr. SM Tanjil UL Alam, Dr. Md. Mijanur Rahman, Dr. Maruf Mohammad, Dr. Anup Talukder, Dr. Tamal Kumer Das, Dr. Kazi Mohammad Faruque, Dr. Shourav Kumer Sarker, Dr. Md. Rashedul Hasan and Dr. Md. Naimul Hossain**

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### Abstract

**Background:** Histopathology is the study of tissue to diagnose the disease. Several diagnostic tests have been done to determine the disease of tissue. Thyroid gland swelling is a major thyroid disorder including thyroid cancer nowadays. To identify the histopathological characterization of thyroid swelling, this study has been carried out.

**Methods:** This cross-sectional study was conducted in the Department of Otolaryngology and Head-Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from June 2021 to June 2022. A total of 150 patients with thyroid swelling, indicated diagnosis, and subsequent thyroid surgery, were purposively enrolled in this study. Data were analyzed and presented in both qualitative and quantitative formats using SPSS version 20.0.

**Results:** Female dominant (73.33%) study resulted in 48.67% of patients suffering from thyroid gland swelling due to adenomatous goiter and very few amount of patients suffered from carcinoma (8.67%). 16-30 aged participants are more susceptible to thyroid gland swelling (36%). The study also resulted in a sensitivity of 100% and 98.53% specificity. The predicted values were 87.5% and the study ended with 98.67% of efficacy.

**Conclusion:** Histopathological diagnosis is a sensitive, specific, and accurate diagnostic test for evaluating thyroid swellings. This study ended up with a negligible amount of false positive cases again, by histopathological diagnosis, 100% of carcinoma can be determined.

**Keywords:** Goitre, Hippocrates, endocrine disorder, histopathological, thyroid gland swelling

### Introduction

The thyroid gland is considered a major hormone-producing endocrine gland in the human body. 20-60 grams weighted thyroid gland produces two vital hormones including Triiodothyronine (T<sub>3</sub>), Tetraiodothyronine or Thyroxin (T<sub>4</sub>). Iodine is an important factor in producing thyroid hormone, as the body cannot produce iodine by itself, it needs to be added to the diet for proper regulation of the thyroid gland. Excessive consumption of iodine or deficiency of iodine can cause various diseases like Hyperthyroidism, Hypothyroidism, goitre, and/or thyroid autoimmunity [1]. Swelling of the Thyroid gland is a common problem detected in tertiary medical college hospitals in Bangladesh daily. Enlargement of the thyroid gland was described by "Hippocrates" [2]. Iodine deficiency is the most common cause of thyroid gland swelling goitre. An unusual lump is noticed in the neck area which is the basic symptom of goitre. According to a 1996 study, 47.1% of patients are suffering from goitre in Bangladesh [3]. Another important disease that can be notified for thyroid gland swelling is Nodular Thyroid Disease (NTD), which is more prevalent than goitre. Females are affected by Palpable thyroid nodules more than men [4]. Maximum thyroid nodules are benign, and a few patients can be diagnosed with thyroid cancer. Thyroid nodules can be detected at any age but the risk of cancer production is high in adults [5]. Thyroid swelling can be observed due to different reasons, only clinical history is not able to provide proper diagnostic criteria to a physician to detect the cause. FNAC is a very simple method to detect the cause but in FNAC study, expertness is mandatory to get an accurate result.

**Corresponding Author:**  
**Dr. Md. Hasan Ali**  
Resident Surgeon, Department  
of Otolaryngology and Head  
Neck Surgery, Sir Salimullah  
Medical College Mitford  
Hospital, Dhaka, Bangladesh  
E-mail:  
[drhasan36ssmc@gmail.com](mailto:drhasan36ssmc@gmail.com)

On the contrary, a histopathological study is effective in such cases to determine the actual cause of swelling. It enlightened medical professionals about the characterization of the nodules and helped to distinguish between benign and malignant lumps. It is the most appropriate approach to finding the pathological cause. It is a simple procedure where a medical professional collects the cell from the affected area and examines the cell under the microscope. Tissue is extracted from the affected area directly, thus this investigation is vastly accepted. Almost all the tertiary care hospitals in Bangladesh can provide histopathological examinations for their patients at a reasonable cost, it is less time-consuming and a reliable process for physicians also. The accuracy of the histopathological study is 97.5% in 750 patients [6], with specificity of 85.7%-97.7% and sensitivity of 83.5%-87.3% to detect the real-time cause of disease [7]. The primary objective of the study is to observe the histopathological characterization of thyroid gland swelling.

**Methodology**

A year-long cross-sectional study was conducted in the Department of Otolaryngology and Head-Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from June 2021 to June 2022. With the ethical approval of the institute. The whole mediation was directed following the standards of human exploration determined in the Helsinki Announcement [8] and was executed consistent with current guidelines and the arrangements of the Overall Information Assurance Guideline (GDPR) [9]. A sum of 150 patients was enrolled in this study with a history of thyroid swelling. The purposive sample collection technique is followed in this study and written consent was obtained from every patient before participation.

**Inclusion criteria**

- Patient with normal thyroid function.
- Patients with all age groups, sex, or demographic distribution.
- Patients with thyroid swelling with clinical and sonological grounds for histopathological diagnosis followed by thyroid surgery.

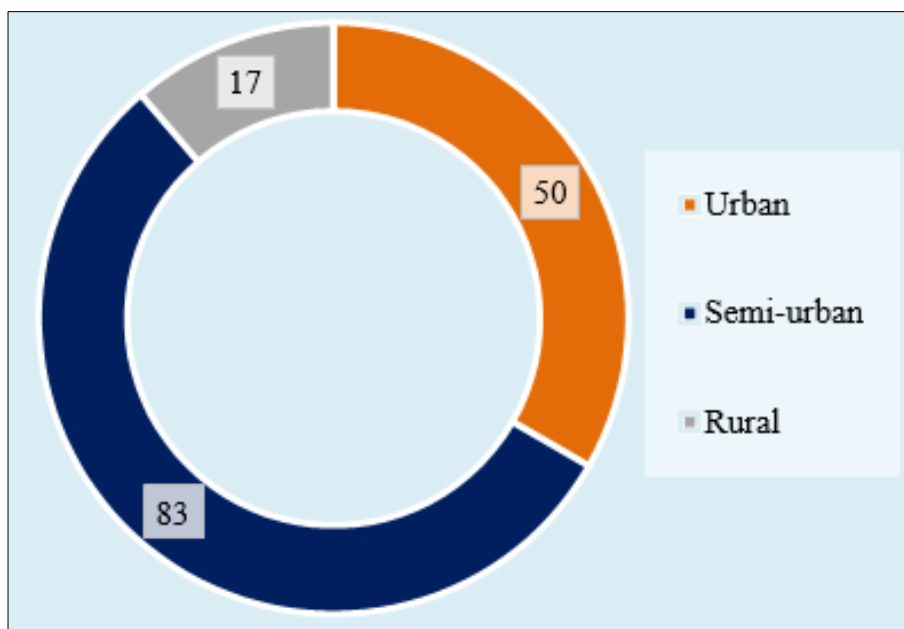
**Exclusion criteria**

- Patients with abnormal thyroid function.
- Previous history of thyroid or parathyroid surgery.
- Previous history of radiation therapy in the head and neck area.

Outcome-determining variables are patient-specific, including clinical signs, sex, age, and symptoms of thyroid enlargement. Goiter-related factors include the number of lumps, thyroid function tests results, ultrasonography, thyroid sweeps, and histopathological reports. Data analysis was done with the help of MS Excel and SPSS version 20.0 software. A p-value less than 0.05 was considered significant in the statistical analysis.

**Results**

This study on the histopathological characterization of Thyroid gland swelling finds the total ratio of male and female participants 0.36:1. The Study is female-dominant where the participants' mean age (±SD) has been calculated as 35.1±12.6 years. The residency of the patients with thyroid gland swelling shows that most of the patients came from semi-urban regions (55%), 34% are from rural citizens and 11% of patients belong to urban areas.



**Fig 1:** Ring chart showed residential distribution of patients (N=150)

Almost every study subject was enrolled with complaints of neck swelling and uneasiness (91.33% and 98.67%). 51.33% of patients complained about Dysphagia, among them, 20% of patients complained about Dysphonia and 8%

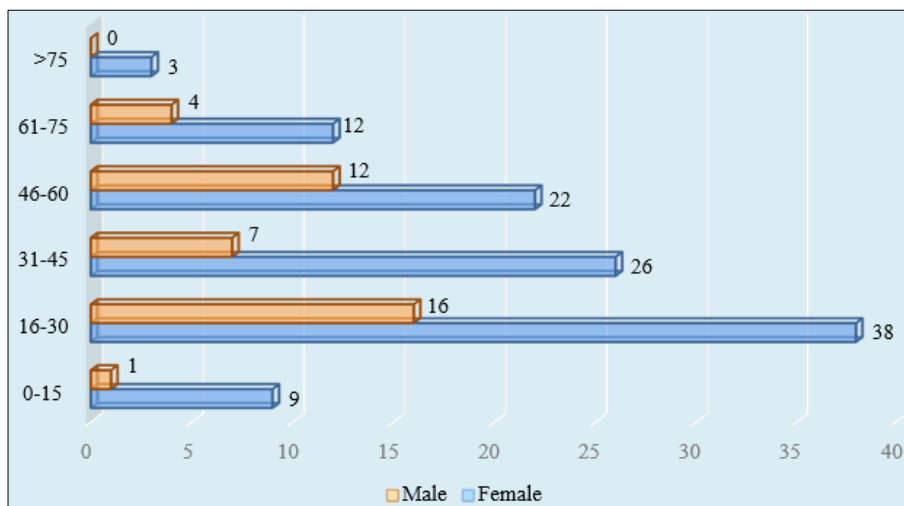
of patients felt severe pain for thyroid gland swelling. Clinical symptoms for thyroid gland swelling differ from patient to patient.

**Table 1:** Symptomatic distribution of patients (N=150)

Status	n	Percentage
Neck swelling	137	91.33%
Bone swelling	4	2.67%
Uneasiness	148	98.67%
Dysphonia	30	20%
Dysphagia	77	51.33%
Severe pain	12	8%
Stridor	2	1.33%

According to the results, we can see that most patients are affected by thyroid gland swelling at the age of 16-30. 31-45

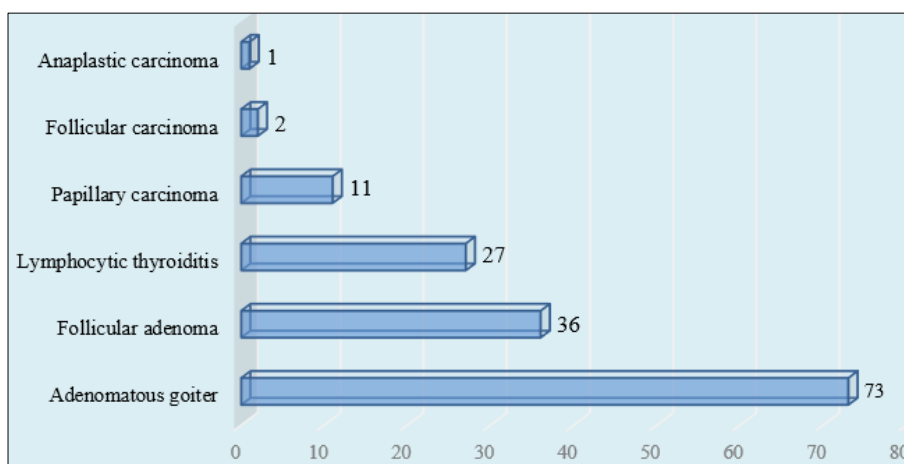
aged males and females are also in a risk of thyroid swelling as usual according to the study.



**Fig 2:** Bar chart showed distribution for thyroid swelling according to age and sex (N=150)

A histopathological study was also conducted to determine the cause of thyroid gland swelling. Here the result reveals that thyroid gland swelling occurs as a result of adenomatous goiter (48.67%) in maximum cases, the second leading cause of thyroid gland swelling is follicular

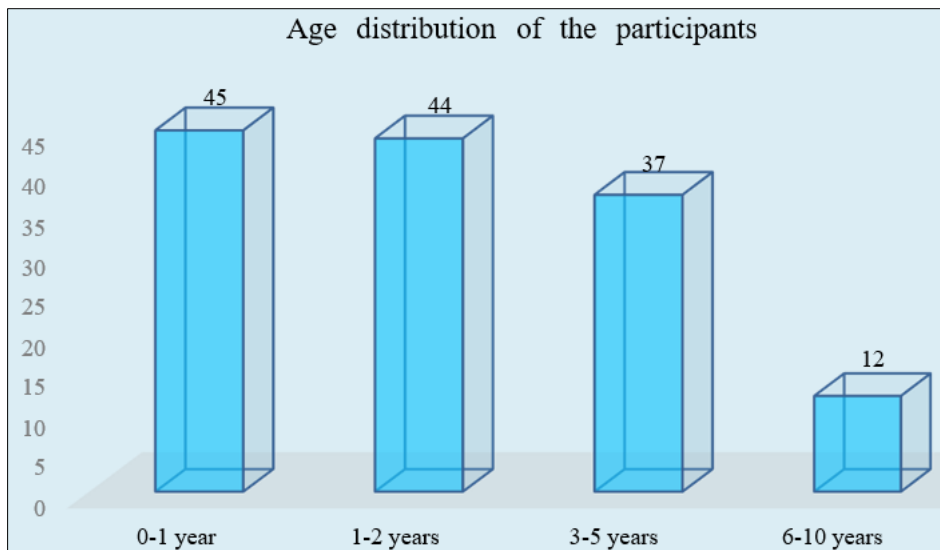
adenoma (24%), lymphocytic thyroiditis is another major cause (18%) and a few cases can be enrolled due to carcinoma. In our study, 7.33% of patients were admitted for papillary carcinoma, 1.33% due to follicular carcinoma, and 0.67% patient for anaplastic carcinoma.



**Fig 3:** Bar chart showed histopathological distribution of thyroid lesions (N=150)

A timeline of the patients suffering from thyroid gland swelling history has also been taken, here a smart amount of sought medical attention in between 0-1 years, and a few

patients have also undergone the sufferings of thyroid gland swelling for almost 6-10 years.



**Fig 4:** Bar chart showed distribution of patients according to thyroid swelling (N=150)

No patient tested false negative due to thyroid gland swelling for carcinoma in this entire study period but 2 false positive results have been observed by histopathological study.

**Table 2:** Histopathological outcome of the study population (N=150)

Status	Result	n	Total
Positive	True positive (a)	14	16
	False positive (b)	2	
Negative	False negative (c)	0	134
	True negative (d)	134	

$$\text{Sensitivity} = \frac{a}{a + c} = \frac{14}{14} = 100\%$$

$$\text{Specificity} = \frac{d}{b + d} = \frac{134}{136} = 98.53\%$$

$$\text{Predictive value} = \frac{a}{a + b} = \frac{14}{16} = 87.5\%$$

$$\text{Efficacy} = \frac{a + d}{a + b + c + d} = \frac{148}{150} = 98.67\%$$

The sensitivity of this procedure in this series is 100%; Specificity has been observed as 98.53%; Predictive value is 87.5%; Efficacy is determined as 98.67%.

**Discussion**

Endocrine disorders have become an emerging problem nowadays, among them a bulk amount of patients are surviving with thyroidal issues. In Bangladesh, more than 10% of patients are suffering with clinically evident thyroidal complications as of now [10]. According to this study, female patients are more deliberate to be affected by thyroid gland swelling. A 2014 study in India with thyroid gland swelling patients has also revealed that almost 90% of their study subjects were female [11] which shares a quite similar result (73.33%) with this study in Bangladesh. In

another study in Bangladesh with thyroid gland swelling patients were also provided related information to ours, in that study 84% of patients were female and the mean age of all patients was 39.6± 14.8 years [12]. The mean age of this current study is determined as 35.1±12.6 years and the result shows that patients are at a higher risk of being affected by thyroidal disorder aged 16-60. A study in the United States claims that their patients are more susceptible to thyroid disorder after 65 years [13] but another study in the subcontinent comes with a revelation that patients are much more susceptible to thyroid gland disorder at the age of 10-39 [14]. Both of the studies contradict this study in some points as this study is influenced by middle-aged participants. The residency of the study subject is another highlighted issue. Iodine is an important element for thyroidal health and the body cannot produce iodine by itself.

Geographical influence can be a major cause of thyroidal abnormalities. According to a 2021 study, coastal peoples are at a higher risk of thyroidal abnormalities than inland residents [15]. Our study found that semi-urban residents (55%) are more likely to be present at tertiary care hospitals with thyroid abnormalities than rural people (11%). Likewise, urban people (34%) are also conscious enough to seek medical attention from tertiary care hospitals. Primary symptoms of the thyroidal disorder are neck swelling as the gland is standing in the frontal region of the neckline. 91.33% of patients with thyroid gland swelling experienced neck swelling, 20% experienced dysphonia, and 51.33% of patients suffered from dysphagia. Voice-related discomfort is expected in these types of cases as the thyroid gland is positioned near to vocal cord. The histopathological study characterized the reasons behind thyroid gland swelling as adenomatous goiter, follicular adenoma, and lymphocytic thyroiditis while a small number of patients are diagnosed with carcinoma-related thyroidal disorders. The histopathological outcome seems identical to previous studies [16]. In this study, sensitivity has been reported as 100% and specificity as 98.53%. No false negative case is detected by histopathological characterization but 1.33% false positive case has been found. A sensitivity ranging from 82.6% to 95.2% and specificity ranging from 77.32% to 99.4% had been accounted for by a huge number of laborers in some foregoing studies [14].

### Limitation

This is a single-center study that does not exactly reflect the overall scenario of the whole country appropriately. The study sample is also limited as the study was conducted in a short period. There is some scope for future research to learn about histopathological characterization of thyroid gland swelling and some comparison studies in the same context.

### Conclusion

The present study is aligned with some recent data on thyroid gland swelling and its histopathological characterization. Patients with thyroid gland swelling have been approached for histopathological study to find out the results and efficacy of the study. The study concluded on a positive note that, in most cases, histopathological diagnosis enables to detection of the actual cause of thyroid gland swelling and it is capable of diagnosing carcinoma-related thyroid swelling with proper identification.

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#### Author's details

##### Dr. Md. Hasan Ali

Resident Surgeon, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

##### Dr. Md. Mahmud Ali

Junior Consultant, Department of Otolaryngology and Head Neck Surgery, Bangladesh Secretariat Clinic, Dhaka, Bangladesh

##### Dr. SM Tanjil UL Alam

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

##### Dr. Md. Mijanur Rahman

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

##### Dr. Maruf Mohammad

Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

##### Dr. Anup Talukder

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

##### Dr. Tamal Kumer Das

Indoor Medical Officer, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

**Dr. Kazi Mohammad Faruque**

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

**Dr. Shourav Kumer Sarker**

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

**Dr. Md. Rashedul Hasan**

Assistant Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

**Dr. Md. Naimul Hossain**

Registrar, Department of Otolaryngology and Head Neck Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh