

# Clinicopathological Profile of Patient with Solitary Thyroid Nodule Presented to OPD at a Tertiary Care Hospital Pakistan

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## ABSTRACT

**Objective:** To determine the clinicopathological profile of patient with solitary thyroid nodule presented to opd at a tertiary care hospital Pakistan

**Study Design:** Cross sectional study

**Settings:** Department of Diabetes and endocrinology, Hayatabad Medical Complex, Peshawar

**Materials & Methods:** Patients with confirmed diagnosis of a solitary thyroid nodule through imaging or clinical examination were included. Patients with a history of thyroidectomy or thyroid cancer, those with multiple thyroid nodules were excluded.

**Results:** The mean age of the patients in the study was 48.7 years (SD = 2.11). In terms of gender, 42.4% were female, while 57.6% were male. Swelling with dysphagia was reported by 25.6% of patients, swelling with pain by 20.8%, and swelling with fever by 1.6%. The distribution of thyroid nodule location revealed that 50.4% were in the left lobe, 48% in the right lobe, and a small percentage (1.6%) were bilateral. The ultrasonography findings of the patients revealed diverse characteristics of thyroid nodules. The most common were hypoechoic nodules, present in 38.4% of cases. Isoechoic nodules were observed in 26.4%, while mixed echogenicity was noted in 17.6% of patients. A smaller proportion, 9.6%, exhibited thyroid nodules with cystic components. A significant proportion, 57.6%, yielded benign results, while 22.4% were categorized as suspicious.

**Practical Implication:** Understanding the clinicopathological profile of patients with solitary thyroid nodules presenting at a tertiary care hospital in Pakistan can aid in refining diagnostic and treatment strategies, ultimately improving patient outcomes and reducing unnecessary interventions.

**Conclusion:** In conclusion, our study on the clinicopathological profile of patients with solitary thyroid nodules at a tertiary care hospital reveals a diverse presentation of clinical and ultrasonographic features.

**Keywords:** Solitary thyroid nodule, Clinicopathological profile, Ultrasonography, Fine-Needle Aspiration, Thyroid Disorders

## INTRODUCTION

A solitary thyroid nodule (STN) represents a discrete lesion within the thyroid gland that is palpably distinct from the surrounding tissue. While the majority of thyroid nodules are benign and asymptomatic, the presence of a solitary nodule raises clinical concern due to the potential for malignancy.<sup>1,2</sup> The incidence of thyroid nodules ranges from 4-10% in the whole adult population and from 0.2% to 1.2% in children. The prevalence of thyroid nodules has risen to 14-50% due to the extensive utilization of ultrasonography in clinical settings. Although there has been an increase, the majority of the lesions are still benign, with less than 5% becoming malignant.<sup>3</sup>

The development of solitary thyroid nodules is multifactorial, involving various molecular and environmental factors. Although the majority of these nodules are benign, they may harbor underlying malignancy.<sup>4</sup> The pathophysiology of STNs encompasses genetic mutations, hormonal imbalances, and exposure to ionizing radiation. Genetic alterations, such as mutations in the BRAF or RAS genes, have been implicated in the neoplastic transformation of thyroid cells, leading to nodule formation. Hormonal imbalances, particularly in thyroid-stimulating hormone (TSH) levels, may contribute to nodular growth. Furthermore, a history of ionizing radiation exposure, especially during childhood, increases the risk of developing both benign and malignant thyroid nodules.<sup>5,6</sup>

Several risk factors are associated with the development of solitary thyroid nodules. Age and gender play a role, with an increased prevalence observed in older individuals and in females. Iodine deficiency, endemic in certain geographical regions, is a well-established risk factor. Additionally, family history of thyroid disorders, autoimmune thyroid disease, and certain genetic syndromes contribute to the overall risk profile. Understanding these factors aids in risk stratification and guides the diagnostic approach for solitary thyroid nodules.<sup>7</sup>

As the identification and management of solitary thyroid nodules remain critical in clinical practice, a comprehensive understanding of their pathophysiology and associated risk factors

is imperative for clinicians and researchers alike. The clinicopathological profile of patients with solitary thyroid nodules is a comprehensive assessment that combines clinical features and pathological characteristics.<sup>9</sup> These nodules, often presenting as palpable masses, require meticulous evaluation to determine their nature—benign or malignant. The profile encompasses patient demographics, such as age and gender, alongside clinical symptoms and signs. Diagnostic imaging, including ultrasound and fine-needle aspiration, aids in characterizing the nodule's size, location, and cytological attributes. By integrating clinical and pathological data, clinicians can establish an accurate diagnosis, enabling tailored management strategies and timely intervention for patients with solitary thyroid nodules.<sup>10</sup>

Understanding the clinicopathological profile of patients with solitary thyroid nodules at a tertiary care hospital in Pakistan is crucial due to regional variations in thyroid disorders. This research aims to assess demographic, clinical, and pathological features to refine diagnostic and therapeutic strategies. The study's findings will contribute to local guidelines and improve healthcare outcomes by addressing unique population characteristics. Additionally, this research may aid in reducing the burden of thyroid cancer through early detection and tailored interventions. Ultimately, exploring this clinicopathological profile aligns with the broader goal of enhancing thyroid healthcare in the Pakistani population.

## MATERIALS AND METHODS

After approval from the hospital's ethical review board (ERB), this study was conducted at Department of diabetes and endocrinology HMC, Peshawar. The study included patients presenting to the OPD with a diagnosed solitary thyroid nodule. Informed consent was obtained from all participants. Patients with confirmed diagnosis of a solitary thyroid nodule through imaging or clinical examination were included. Patients with a history of thyroidectomy or thyroid cancer, those with multiple thyroid nodules were excluded.

Demographic information, including age, gender, and relevant medical history, was collected. Clinical features such as presenting symptoms and signs were documented. Imaging data, including ultrasound findings of the thyroid nodule, were recorded. Fine-needle aspiration (FNA) biopsy results and subsequent

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histopathological reports were included. All patients underwent thyroid ultrasound to assess nodule characteristics (size, echogenicity, vascularity). Patients with solitary thyroid nodules underwent FNA, and the obtained samples were sent for cytological examination. Surgical specimens, when available, were subjected to histopathological analysis.

Descriptive statistics were used to summarize demographic and clinical data. The prevalence of benign and malignant nodules was calculated. chi-square statistical test was employed to analyze associations between clinicopathological variables. Results were presented using tables and graphs, highlighting key clinicopathological characteristics of solitary thyroid nodules in the studied population.

### STUDY RESULTS

The mean age of the patients in the study was 48.7 years (SD = 2.11). The majority of patients fell within the age groups of 26-35 years (52.0%), followed by the 10-25 years group (36.8%). A small proportion of patients were in the 36-50 years age group (7.2%), and only 4% were over 50 years old. In terms of gender, 42.4% were female, while 57.6% were male. Regarding clinical history, the most common presentation was swelling only, observed in 52% of patients. Swelling with dysphagia was reported by 25.6% of patients, swelling with pain by 20.8%, and swelling with fever by 1.6%. The distribution of thyroid nodule location revealed that 50.4% were in the left lobe, 48% in the right lobe, and a small percentage (1.6%) were bilateral as shown in table 1.

The clinical presentation of included patients varied, with the most frequent symptom being a palpable neck mass, observed in 30.4% of cases. Difficulty swallowing was reported by 15.2%, hoarseness by 9.6%, and fatigue/weakness by 21.6% of patients. A notable portion, 23.2%, were asymptomatic as shown in table 2.

The ultrasonography findings of the patients revealed diverse characteristics of thyroid nodules. The most common were hypoechoic nodules, present in 38.4% of cases. Isoechoic nodules were observed in 26.4%, while mixed echogenicity was noted in 17.6% of patients. A smaller proportion, 9.6%, exhibited thyroid nodules with cystic components given in table 3.

Table 1: Baseline Demographics and Clinicopathological Characteristics of Included Patients

Variables	Characteristic	Number of Patients	Percentage
Age (Years)	Mean	Mean±SD	48.7±2.11
	10-25	46	36.8%
	26-35	65	52.0%
	36-50	09	7.2%
	> 50	5	4%
Gender	Male	7	57.6%
	Female	53	42.4%
History	Swelling Only	65	52%
	Swelling with Pain	26	20.8%
	Swelling with Fever	2	1.6%
	Swelling with Dysphagia	32	25.6%
Location	Right lobe	60	48%
	Left Lobe	63	50.4%
	Bilateral	2	1.6%

Table 2: Clinical Presentation of Included Patients

Symptoms	Frequency	Percentage
Palpable neck mass	38	30.4%
Difficulty swallowing	19	15.2%
Hoarseness	12	9.6%
Fatigue/Weakness	27	21.6%
Asymptomatic	29	23.2%

Table 3: Ultrasonography Findings of Patients

Variable	Frequency	Percentages
Hypoechoic nodules	48	38.4%
Isoechoic nodules	33	26.4%
Mixed echogenicity	22	17.6%
Cystic components	12	9.6%

The Fine-Needle Aspiration (FNA) results demonstrated diverse outcomes in the studied patients. A significant proportion, 57.6%, yielded benign results, while 22.4% were categorized as suspicious. Malignant findings were present in 20% of cases, highlighting the varying nature of the thyroid nodules assessed through FNA as shown in table 4.

Table 4: Fine-Needle Aspiration (FNA) Results

Outcome	Frequency	Results
Benign	72	57.6%
Suspicious	28	22.4%
Malignant	25	20.0%

### DISCUSSION

Thyroid nodules can develop due to a range of factors, including gender, age, levels of thyroid-stimulating hormone (TSH), and iodine intake. Furthermore, numerous studies have investigated the correlation among thyroid nodules and obesity, typically measured by BMI. Although some research, especially those that examine women, have found a connection among BMI and the likelihood of developing thyroid nodules, there are conflicting results.<sup>11</sup> The correlation between these factors has not been consistently observed in our findings, especially when studying pediatric populations. Thyroid hormones play a crucial role in controlling the body's baseline metabolic rate and thermogenesis. Moreover, previous study has linked thyroid hormones to indicators of an adverse metabolic profile, even when they are within the normal range.<sup>12</sup>

In comparison to Rajendran et al. (2018), our study demonstrates a slightly higher mean age of patients at 48.7 years (SD = 2.11). While the majority of our patients also fall within the middle age range (26-35 years), our study has a broader age distribution, including a smaller proportion in the 36-50 years age group (7.2%) and a limited representation of patients over 50 years old (4%).<sup>13</sup> Additionally, the gender distribution in our study shows a reverse trend with 42.4% females and 57.6% males, differing from the female preponderance reported by Rajendran et al. (2018) and enkatachalapathyTSetal.<sup>14</sup>

Similar to our results, Edwin et al. (2020) reported swelling as the predominant symptom in their study, with 50% of patients presenting with this manifestation. However, their distribution of swelling was more skewed towards the right lobe (74%), unlike our study, which demonstrated a more balanced distribution between the left and right lobes.<sup>15</sup> Daimary et al. (2023) also found that the majority of patients (52.83%) in their study presented with swelling alone, while a significant portion reported swelling with pain (20.75%) and varied grades of dysphagia (24.52%). Our study echoes these findings, particularly the prevalence of swelling with pain (20.8%) and swelling with dysphagia (25.6%).<sup>16</sup>

Bhansali SK, in a series of 600 cases, reported that pain and dysphagia were reported by 13% and 12% of patients, respectively. Although our percentages for these symptoms differ, the recognition of pain and dysphagia as clinical presentations is consistent with their observations.<sup>17</sup> Similarly, Pal R et al. noted in their study that the majority of cases (93.2%) presented with neck swelling only. While our study does not reach such a high percentage for swelling alone, it underscores the prominence of this symptom in patients with solitary thyroid nodules.<sup>18</sup>

Our study's ultrasonography findings align with the observations made by Khan et al. (2022), highlighting the varied characteristics of thyroid nodules. In our study, hypoechoic nodules were the most prevalent at 38.4%, closely resembling the USC diagnosis in Khan et al.'s study, which showed 19.28% of suspicious mixed echogenic nodules. The diversity in ultrasonography findings is further evidenced by our identification of isoechoic nodules in 26.4% of patients and mixed echogenicity in 17.6%, findings that echo the USC diagnosis in Khan et al.'s study, which showed 3% suspicious MNG and 17% suspicious mixed echogenic nodules. Interestingly, our study also found a smaller proportion (9.6%) of thyroid nodules with cystic

components.<sup>19</sup>Our study's Fine-Needle Aspiration (FNA) results align with the findings of Rayte et al. and Rakesh et al., showcasing the diverse outcomes encountered in thyroid nodules. In our study, 57.6% of FNAC results were benign, resembling the high prevalence of colloid goitre reported by Rayte et al., where 71.67% of FNAC results were colloid goitre. Additionally, Rakesh et al. found that the majority (36.5%) of FNAC diagnoses were colloid goiter, further emphasizing the recurring theme of benign outcomes in FNA results across studies.<sup>20,21</sup>

## CONCLUSION

In conclusion, our study on the clinicopathological profile of patients with solitary thyroid nodules at a tertiary care hospital in Pakistan reveals a diverse presentation of clinical and ultrasonographic features. The significant prevalence of benign outcomes in Fine-Needle Aspiration results underscores the importance of thorough diagnostic evaluation and tailored management strategies in this population.

**Limitations:** Limitations, such as potential selection bias or data constraints, were acknowledged. Suggestions for future research, including larger-scale studies or investigations into specific subgroups, were outlined.

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