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Frequency of Malignancy in Solitary Thyroid Nodule in a Tertiary Care Hospital

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Abstract
Introduction: *Solitary thyroid nodules (STN) are common in clinical practice. Nodules can be found in up to 90% of women more than 60 years of age and are 3-4 times more in women compared to men. The research work available concerning the frequency of malignancy in solitary thyroid nodules is not acceptable. This study aims to find out the frequency of malignancy in solitary thyroid nodules and the factors associated with it.*
Methods: *This cross-sectional observational study was carried out in the Department of ENT & Head neck surgery, Sher-E-Bangla Medical College Hospital, Barishal for six months. A total of 112 (N=112) participants were enrolled in this study. Before the commencement of this study, the research protocol was approved by the ethical committee at Sher-E-Bangla Medical College Hospital. Completed data forms were reviewed, edited, and processed for computer data entry. The data analysis was performed using Statistical Package for the Social Sciences (SPSS) Version 22.0.*
Result: *The mean age of the patients was 33.20±10.20. Most of the patients (87,77.7%) were female. It was observed that all patients (112,100.0%) had swelling, sixteen (16,14.3%)had pain and three patients (3,2.7%) had hoarseness of voice. Seventy-eight (78,69.6%) of the 112 patients were diagnosed with a colloid goitre, followed by follicular adenoma in sixteen patients (16,14.3%), papillary carcinoma in eleven patients (11,9.8%), follicular carcinoma in five patients (5,4.5%) and medullary carcinoma in two patients (2,1.8%). A thyroid function test was done for all the patients reported for solitary thyroid nodule (STN). Out of them ninety-four patients (94,84%) were reported for Euthyroid.*
Conclusion: *The most common reason for malignancy in solitary nodules is papillary carcinoma followed by follicular carcinoma. It detects papillary carcinoma in a solitary nodule with high sensitivity and specificity. In ultrasound, the utmost sensitive parameter in questioning malignancy is hypoechogenicity of the nodule, the most specific structures were lymphadenopathy followed by microcalcification.*
Keywords*: STN, Women, Swelling, Gland*

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I. Introduction

The solitary thyroid nodule (STN) may be referred to as a separate swelling in an impalpable gland. The swelling is often observed accidentally. The swelling may also be encountered as a causal finding when a patient is inquired about some unrelated disease [1]. Thyroid nodules are common in clinical practice. There may be solitary within a usual thyroid gland or foremost within a multinodular goitre. The frequency of thyroid gland lumps depends on several factors like age, sex, diet, iodine deficiency, endemic areas, fluorosis belt, and radiation exposure. High fluoride levels in drinking water and ground waters are known to interfere with iodine uptake by the thyroid gland and cause clinical hypothyroidism and nodule formation in the thyroid gland [2]. Thyroid nodules can be either benign or malignant. Solitary thyroid nodules (STN) have a high probability of

being malignant and should be classified accurately for optimum management [3]. Solitary nodules may be present in the lobes connected by the isthmus, located at the front of the neck below the thyroid cartilage, and can essentially be a leading nodule of multinodular goitre, asymmetrical enlargement of one lobe of the thyroid as in chronic lymphocytic thyroiditis (Hashimoto's thyroiditis), simple goitre, and malignant nodule, unilateral agenesis, or rarely developmental errors such as ectopic tissue [4,5]. The significance of solitary thyroid nodules lies in the substantial threat of malignancy in contrast with other thyroid swellings [6]. The frequency of malignancy within a clinically specious solitary thyroid nodule in children is relatively low (0.22-1.35%) compared with adults (4.0%) but the frequency of malignancy in nodules of pediatric patients (15-25%) is much higher than in those of adults (4.0%) [7]. Thyroid nodules can be found in up to 90% of women over the age of 60 years and are 3-4 times more frequent in women than men [8]. Most of the thyroid nodules are benign, and only 5-20% of nodules are malignant [9]. Benign nodules are classified as adenomas, colloid nodules, cysts, infectious nodules, lymphocytic or granulomatous, hyperplastic nodules, thyroiditis, and congenital anomalies [9]. Malignant nodules can be classified into differentiated (papillary and follicular carcinomas), medullary carcinoma, undifferentiated, and miscellaneous like lymphoma, sarcoma, squamous cell carcinoma, fibrosarcoma, mucoepidermoid carcinoma and metastatic tumor [10]. Early diagnosis helps in early treatment and results in good outcomes. But late diagnosis indicates an advanced stage of disease with unsatisfactory treatment and poor prognosis [11]. The preoperative assessment of thyroid nodules to distinguish between benign & malignant nodules is very significant [12]. It helps to avoid preventable wide surgery and potential surgery-related adverse effects such as hypothyroidism, hypocalcemia & recurrent laryngeal nerve injury [13]. Additionally, the research work available regarding the frequency of malignancy in solitary thyroid nodules is not satisfactory. This study aims to find out the frequency of malignancy in solitary thyroid nodules and the factors associated with it.

II. Objectives

General Objective:

- To evaluate frequency of malignancy in solitary thyroid nodule in a tertiary care Hospital.

Specific Objectives:

- To evaluate the clinical presentation and sonographic finding of solitary thyroid nodule.
- To see the frequency of malignancy after histopathological confirmation.
- To see the socio-demographic characteristics of the patients

III. Methodology

This cross-sectional observational study was carried out in theDepartment of ENT & Head neck surgery, Sher-E-Bangla Medical College Hospital, Barishalfor six months. A total of 112 (N=112) participants were enrolled in this study. The patients with suspicious solitary nodules planned for thyroidectomy were selected after careful history taking, thorough general and systemic examination and appropriate investigations fulfilling inclusion and exclusion criteria.Prior to the commencement of this study, the research protocol was approved by the ethical committee in Sher-E-Bangla Medical College Hospital. Verbal consent was taken from all the participants before starting data collection.

Inclusion criteria:

- Patients with suspicious solitary thyroid nodules (STN).
- Patients between 15 to 55 years of age.

Exclusion criteria:

- Patients below the age of 15 years.
- Patients with thyroid swellings other than solitary nodules clinically and surgically proved multinodular goiter
- Pregnant females
- Patients with a history of radiation exposure to the neck, and those patients with a family history of thyroid cancers
- Patients not giving informed consent to take part in this study.

Data analysis:

The study coordinators performed random checks to verify data collection processes. Completed data forms were reviewed, edited, and processed for computer data entry. Frequencies, percentages, and cross-

tabulations were used for descriptive analysis. The data analysis was performed using Statistical Package for the Social Sciences (SPSS) Version 22.0. The significance level of 0.05 was considered for all tests.

IV. Result

Among the study population (N=112), the mean age of the patients was 33.20±10.20. The maximum number of patients (43,38.4%) were from 31 to 40 years old, around one-third of patients (36,32.2%) age was between 21-30 years, and only nine patients (9,8%) age was ≤20 years. Most of the patients (87,77.7%) were female and about one-fifth of the patients (25,22.3%) were male. The difference was statistically significant between males and females (P<0.05). The majority of the patients (69,61.6%) were poor, and only seven (7,6.2%) belonged to the upper class. The difference was statistically significant (P<0.05) [Table 1]. It was observed that all patients (112,100.0%) had swelling, sixteen (16,14.3%)had pain and three patients (3,2.7%) had hoarseness of voice. The difference was statistically significant (P<0.05) [Table 2]. Half of the patients (56,50%) had symptoms around 4 to 6 months, and only two (2,1.8%) had symptoms for more than 2 years [Table 3]. Based on USG findings, half of the patients (57,50.9%) were solid, thirty-seven (37,33.0%) were cystic and eighteen (18,16.1%) were mixed. Most of the patients (96,85.7%) had benign and sixteen (16,14.3%) had malignant thyroid nodules. The difference was statistically significant (P<0.05) [Table 4]. Seventy-eight (78,69.6%) of the 112 patients were diagnosed with a colloid goitre, followed by follicular adenoma in sixteen patients (16,14.3%), papillary carcinoma in eleven patients (11,9.8%), follicular carcinoma in five patients (5,4.5%) and medullary carcinoma in two patients (2,1.8%) [Table 5]. A thyroid function test was done for all the patients reported for solitary thyroid nodule (STN). Out of them ninety-four patients (94,84%) were reported for Euthyroid, and nine cases (9,8%) were reported as Hypothyroid and Hyperthyroid each [Table 6].

Table 1: Distribution of the study population based on Characteristics (N=112)

Characteristics	**(N,%)**
Age **Mean±SD:**33.20±10.20	
≤20	9,8.0%
21-30	36,32.2%
31-40	43,38.4%
41-50	15,13.4%
>50	9,8.0%
Sex	
Male	25,22.3%
Female	87,77.7%
Socio-economic status	
Poor	69,61.6%
Middle-class	36,32.1%
Upper-class	7,6.2%

Table 2: Distribution of the study population based on Clinical presentation (N=112)

Clinical presentation	**(N,%)**	***p-value***
Swelling	112,100.0%	
Pain	16,14.3%	0.001
Hoarseness of voice	3,2.7%	

Table 3: Distribution of the study population based on Duration of symptoms (N=112)

Duration of symptoms	**(N,%)**
1-3 month	38,34.0%
4-6 month	56,50.0%
7-12 month	9,8.0%
1-2 years	7,6.2%
>2 years	2,1.8%

Table 4: Distribution of the study population based on Diagnosis of USG findings &Diagnosis of FNAC in solitary thyroid nodule(N=112)

Findings	**(N,%)**
Solid	57,50.9%
Cystic	37,33.0%
Mixed	18,16.0%
Diagnosis of FNAC	
Benign	96,85.7%
Malignant	16,14.3%

Table 5: Distribution of the study population based on Histopathological findings (N=112)

Histopathological findings	(N,%)
Colloid nodule	78,69.6%
Follicular adenoma	16,14.3%
Papillary carcinoma	11,9.8%
Follicular carcinoma	5,4.5%
Medullary carcinoma	2,1.8%

Table 6: Distribution of the study population based onThyroid function test (N=112)

Thyroid function test	(N,%)	*p-value*
Euthyroid	94,84.0%	
Hypothyroid	9,8.0%	0.001
Hyperthyroid	9,8.0%	

V. Discussion

Solitary thyroid nodules (STN) are termed localized wounds within the thyroid gland that are palpably or radiologically different from the surrounding thyroid parenchyma [7].

Clinically, STNs are more frequent and are present in up to 50% of old people [14].

Initial investigation should include cautious history and thorough clinical inspection and thyroid function tests. With the help of imaging techniques, mainly ultrasound, the chance of detection of thyroid nodules has increased many bends. Thyroid cancers occur in nearly 5% of all thyroid nodules independent of their size. The prevalence of thyroid malignancy is growing over the years [15].

Thyroid swellings are a common clinical problem in our country. Most thyroid swellings are multi-nodular but a good percentage are solitary thyroid nodules [16].

Thyroid nodules are 3-4 times more frequent in women than men. A nodule may be an adenoma, cyst, multinodular goitre, thyroiditis and thyroid cancer [17]. This current study was planned to determine the frequency of malignancy in solitary thyroid nodules in a tertiary care Hospital. The present study findings were discussed and compared with previously published relevant studies.

This study shows most of the patients were age group of 31-40 years (38.4%), mean age being 33.20 years which is similar to others [16,18,19]. A study carried out at Combined Military Hospital, Rawalpindi found that the majority were in the age group of 31-40 years (40%) [20]. Another study reported out of 33 patients, the majority 12(36.4%) were in the age group of 31-40yrs [21] Maximum incidence was in the age group of 30-40 (35%) conducted in a similar study [22]

Most of the patients (87,77.7%) were female and about one-fifth of the patients (25,22.3%) were male in this present study. This finding was alike to another study that reported that among 188 patients, 146 (77.65%) were female and 42 (22.34%) were male [23] Another study suggested that the majority of the patients were female 76% whereas 24% were male [16]. The prevalence of thyroid nodules appears to increase throughout life. Thyroid nodules are four times more common in women than in men. These findings were comparable with a study conducted by another article in which the female to male ratio was 2.5:1 [20].

This study shows there is a close relationship between patients with thyroid disease and socio-economic status, with the poor socio-economic group having a higher incidence 61.6% followed by the middle group 32.1%. The cause is not exactly known, it might be related to illiteracy, superstitions and fear of surgery. Therefore, the findings of the study are in good agreement with the findings of the other research works [16,21,23].

Regarding presenting complaints in current study shows the most common presenting feature observed was swelling (100%) followed by pain (14.3%) and hoarseness of voice (2.7%) which was similar to another studies [16,24]

. Another study suggested that swelling was observed in all cases (100%) followed by pain (15%) [25].

In this study, out of 112 patients, 57(50.9%) had solid swellings on ultrasonography, 37(33%) had cystic swellings on ultrasonography, and 18(16.1%) had mixed features. A similar finding reported that out of 33 patients, 14(42.4%) had solid swellings on ultrasonography, 14(42.4%) had cystic swellings on ultrasonography, and 5(15.2%) had mixed features [21].

An article revealed 43 (71.67%) swellings were solid, 5(8.33%) were cystic and 12(20%) were mixed [20]. Ultrasonography can accurately detect nonpalpable nodules, estimate the size of the nodule and the volume of the goitre, and differentiate simple cysts, which have a low risk of being malignant, from solid nodules or from mixed cystic and solid nodules, which have a 5 per cent risk of being malignant [26].

Current content depicted that, out of 112 patients, 16(14.3%) were malignant patients with solitary nodule thyroid who underwent FNAC. An author demonstrated that. the incidence of malignancy in solitary thyroid nodules was 13.33% [20]. Previous studies reported that the incidence of malignancy in solitary thyroid nodules was 14.3% [27].

In this current study, the commonest cause of solitary nodule by histopathology confirmed was colloid nodule (69.6%) then follicular adenoma (14.3%), papillary carcinoma (9.8%), follicular carcinoma (4.5%) and medullary carcinoma (1.8%), which was similar to another article [27]

Out of 107 cases, 62 were diagnosed as colloid goitre, 27 were diagnosed as follicular adenoma, 6 were diagnosed as thyroiditis, 3 had follicular malignancy, 3 had papillary carcinoma, and 6 patients had inadequate material depicted in another study. Papillary carcinoma was the commonest lesion (50%) followed by follicular 25%, medullary and anaplastic 12.5% each found in another study [20]. The incidence of differentiated thyroid cancer (papillary and follicular cancer and their variants) has gradually increased in the last few decades. In iodine-sufficient regions, such as the United States, the relative proportions of papillary and follicular cancer are approximately 85% and 15% respectively [28].

In the present study, there were no mortalities, and no patient developed post-operative complications like recurrent laryngeal nerve palsy, or wound infection.

VI. Conclusion

Solitary nodule of the thyroid is more common in females. Most of the patients with solitary nodules of the thyroid present with swelling alone. The most common cause of malignancy in solitary nodules is papillary carcinoma followed by follicular carcinoma. FNAC was the investigation of choice in the evaluation of solitary nodule of the thyroid. It detects papillary carcinoma in a solitary nodule with high sensitivity and specificity. In ultrasound, the most sensitive parameter in suspecting malignancy is hypoechogenicity of the nodule, the most specific features were lymphadenopathy followed by microcalcification.

VII. Limitations of the study

- The sample size of the study was small
- The study period was short
- The study was carried out in single center
- Long term follows up was not possible to take

VIII. Recommendations

From the findings of this study we recommend to carry out large multi-centric prospective study. Public health efforts in Bangladesh should address the need for early diagnosis of thyroid nodules. Formulating specific guidelines is essential. There is a necessity for setting a screening docket to cover all age groups for early detection and treatment of cases. Furthermore, strategies should be implemented to accelerate government programs. To get robust data, multi centre studies are in great need of policymakers to interpret the demonstrable scenario and to take necessary steps towards mitigating this problem. Further research is also needed to detect cancerous patients.

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Ethical approval: The study was approved by the Institutional Ethics Committee.

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