Section: General Surgery

Original Research Article

THYROID-STIMULATING HORMONE LEVELS IN THYROID MALIGNANCY: INSIGHTS FROM A TERTIARY CARE TEACHING HOSPITAL FROM KERALA

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Abstract

Background: Thyroid cancer is the most common endocrine malignancy, with its incidence continuing to rise.The causal link between TSH and the initiation of thyroid cancer remains unclear, and it is uncertain if elevated TSH levels are a result of thyroid malignancy. This study aimed to create a database of serum thyroid-stimulating hormone (TSH) levels in thyroid malignancy among individuals with nodular thyroid disease. **Materials and Methods:** This cross-sectional study was conducted at Government Medical College, Kozhikode, from June 2019 to November 2021. A total of 218 patients diagnosed with thyroid carcinoma were included. **Result:** A total of 218 subjects were included in the study. The majority of subjects (101, 46.3%) were in the 26–40 years age group. Thyroid-stimulating hormone (TSH) levels were analyzed, and 188 (86.2%) subjects had TSH values between 1.71 and 5.5 µIU/mL, with a mean TSH level of 4.52 µIU/mL. **Conclusion:** This study aimed to assess the relationship between TSH levels and thyroid cancer in patients with nodular thyroid disease. The findings demonstrate a significant association between TSH levels within the upper-normal range (1.71 mIU/L to 5.5 mIU/L) and a higher incidence of thyroid cancer.

INTRODUCTION

Thyroid cancer is the most common endocrine malignancy, and its incidence continues to rise.[1] Clinically, thyroid carcinoma often presents as a solitary nodule or as a dominant nodule within a multinodular thyroid gland.[2] Numerous studies suggest that higher concentrations of TSH, even within the normal range, are associated with an increased likelihood of a subsequent thyroid cancer diagnosis in patients presenting with thyroid nodules.[3-5] Additionally, TSH is reported to play a central role in the development and progression of thyroid carcinomas.[1]

TSH is a key growth factor for thyroid nodules. Suppressing TSH levels through exogenous thyroid hormone can inhibit nodule growth and prevent new ones. TSH suppression has been linked to reduced recurrence and improved outcomes in differentiated thyroid cancer, especially in high-risk patients. Higher serum TSH levels may contribute to increased malignancy through TSH's tropic effects on thyroid tissue.[6]

The causal link between TSH and the initiation of thyroid cancer remains unclear, and it is uncertain if elevated TSH levels are a result of thyroid malignancy. This study aimed to create a database of serum thyroid-stimulating hormone (TSH) levels in thyroid malignancy among individuals with nodular thyroid disease.

MATERIALS AND METHODS

This cross-sectional study was conducted at Government Medical College, Kozhikode, from June 2019 to November 2021. A total of 218 patients diagnosed with thyroid carcinoma were included. Data collected included demographic details, FNAC results, serum TSH levels (measured using an automated immunochemiluminescent assay), and final surgical pathology findings. For analysis, patients were stratified into three TSH groups: 0.91–1.70 mIU/L, 1.71–5.5 mIU/L, and >5.5 mIU/L. Patients on thyroid hormone therapy or those with secondary thyroid malignancies, thyroid lymphoma, thyroiditis, or Graves' disease were excluded.

Statistical analysis was performed with Epi Info version 7.

RESULTS

A total of 218 subjects were included in the study. The majority of subjects (101, 46.3%) were in the 26–40 years age group, followed by the 41–60 years age group (88, 40.4%). Of the participants, 152

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(69.7%) were female, and 66 (30.3%) were male. Baseline characharestics of the study population is showed in [Table 1].

Pre-operative diagnoses, based on clinical examination, revealed that 177 (81.2%) subjects were diagnosed with solitary nodular thyroid (SNT), while 41 (18.8%) had multinodular goiter (MNG).Thyroid-stimulating hormone (TSH) levels were analyzed, and 188 (86.2%) subjects had TSH values between 1.71 and 5.5 µIU/mL, with a mean TSH level of 4.52 µIU/mL, which corresponds to the high-normal range (3rd quartile of the normal TSH range).Fine needle aspiration cytology (FNAC) results showed that 101 (46.3%) subjects were reported as having papillary neoplasm, followed by 97 (44.5%) with follicular neoplasm. Histopathological reports (HPR) after total thyroidectomy revealed that 109 (50%) subjects had follicular neoplasm, and 95 (43.6%) had papillary neoplasm. The majority of subjects with either nodularity exhibited TSH values between 1.71 and 5.5 µIU/mL.Comparison of TSH levels with different variables are shown in [Table 2].

Table 1: Base line characteristics of study population.

Variable	N(%)
Age group (in years)	
<25	14(6.4)
25-40	101(46.3)
41-60	88(40.4)
>60	15(6.9)
Gender	
Male	66(30.3)
Female	152(69.7)
Preop diagnosis	
Solitary Nodule Thyroid	177(81.2)
Multi Nodular Goitre	41(18.8)
TSH (µIU/ml)	
0.91-1.70	3(1.4)
1.71-5.5	188(86.2)
>5.5	27(12.4)
FNAC	
Follicular Neoplasm	97(44.5)
Papillary Neoplasm	101(46.3)
Hurthle cell Neoplasm	3(1.4)
Colloid Goitre	12(5.5)
Cystic Lesion	5(2.3)
Histopathology	
Follicular Carcinoma	109(50)
Papillary Carcinoma	95(43.6)
Hurthle Cell Carcinoma	3(1.4)
NA	11(5)

Table 2: Distribution of TSH level in various thyroid disorders among the study population

		TSH (µIU/ml)		
	N	**0.91-1.70**	**1.71-5.5**	**>5.5**
Preop diagnosis				
Solitary Nodule Thyroid	177	3 (1.7%)	151 (85.3%)	23 (13%)
Multi Nodular Goitre	41	0	37 (90.2%)	4 (9.8%)
Histopathology				
Follicular Carcinoma	109	3 (2.8%)	98 (89.9%)	8 (7.3%)
Papillary Carcinoma	95	0	81 (85.3%)	14 (14.7%)
Hurthle Cell Carcinoma	3	0	1 (33.3%)	2 (66.7%)

DISCUSSION

A number of reports have identified baseline serum TSH concentrations as a predictor for the diagnosis of malignancy in patients with thyroid nodules.[3,4,7] In a survey conducted by the National Cancer Registry Program, thyroid cancers ranked among the top five. Thiruvananthapuram, the capital of Kerala, India, exhibited the highest relative frequency of cases enrolled in the hospital registry. Males accounted for 1.99% and females 5.71% of these cases. The high prevalence of thyroid cancer and endemic goiter, despite extensive salt iodization, remains poorly understood. Incidence rates are notably high among younger women.[8]

101 (46.3%) out of 218 individuals were found to be in the age group of 26-40 years, followed by the 41-60 years age group (40.44%). 152 (69.7%) out of 218 individuals studied were female, while 66 (30.3%) were male. The majority had SNT (177, 81.2%), followed by MNG (41, 18.8%). The majority had TSH values between 1.71 – 5.5 µIU/ml, i.e., 188 (86.2%), with a mean TSH of 4.52 µIU/ml.

Papillary thyroid cancers (PTC) account for more than 90% of thyroid cancers (TCs), followed by follicular thyroid carcinoma (4.5%) and Hurthle cell

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carcinoma (1.8%).[9] In this study, 109 (50%) subjects had follicular carcinoma, followed by 95 (43.6%) with papillary carcinoma, and 3 (1.4%) with Hurthle cell carcinoma.

In this study, the highest incidence of thyroid malignancy was found in patients with TSH concentrations between 1.71 mIU/L - 5.5 mIU/L, with a mean TSH value of 4.52 mIU/L. Specifically, 86.2% (188 out of 218 patients) in this TSH range exhibited increased malignancy rates. The incidence of papillary carcinoma was 84.2% (85 out of 101 patients) and follicular carcinoma was 93.8% (91 out of 97 patients) in this TSH range.

The role of TSH in thyroid cancer development is debated. TSH receptor mutations linked to increased signaling are rare in thyroid carcinomas. In vitro studies show that other growth factors like IGF-I are more effective in stimulating thyroid cancer growth, and TSH requires cooperation with insulin/IGF-1 for its proliferative effects. A negative relationship exists between TSH receptor mRNA levels and cancer aggressiveness. Thyroid cancer can occur at varying TSH concentrations, including in suppressed states, and a genome-wide study found lower TSH levels in patients with increased thyroid cancer risk. These findings suggest TSH may contribute to thyroid tumor growth, though not in isolation.[1,10,11]

CONCLUSION

TSH has been linked to thyroid cancer growth, invasion, and angiogenesis. While TSH suppression therapy improves outcomes, the role of serum TSH in thyroid cancer development remains unclear. This study aimed to evaluate the association between TSH levels and thyroid cancer in patients with nodular thyroid disease. The results confirm a significant association between TSH levels in the upper normal range (1.71 mIU/L - 5.5 mIU/L) and an increased incidence of thyroid cancer.

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