Research Article

Clinicopathological correlation of serum TSH level in patients with thyroid nodule—a study of 100 cases

Chandrika Makwana, Nayana R Lakum, Hardik Makwana, Jayesh Joshi, Ashok Agnihotri

Department of Pathology, CU Shah Medical College, Surendranagar, Gujarat, India.
Correspondence to: Hardik Makwana, E-mail: dr_hardik82@yahoo.com

Received October 4, 2015. Accepted October 15, 2015

Abstract

Background: Thyroid nodules and goiter are very common lesions. Rare chance of carcinoma occurs in thyroid nodules. A higher thyroid stimulating hormone (TSH) level in the case of thyroid nodule is associated with an increased risk of carcinoma. A combined approach of cytology and serum TSH level will help in an early detection.

Objective: To assess the relationship of TSH with thyroid carcinoma in thyroid nodule. A combined approach of serum TSH and FNAC finding will increase the specificity to the diagnosis of thyroid nodular lesions.

Materials and Methods: A study was undertaken among the patients with nodular lesions of thyroid gland during the period from January 2011 to December 2013. Clinically, thyroid nodules confirmed by high resolution ultrasonography underwent serum TSH estimation and FNAC of the nodules. Finally, the outcome of histopathological examination of received thyroid specimens were analyzed whenever it was possible.

Result: A total of 100 patients with thyroid nodules were included in this study. Twenty-eight patients belonged to the age group of 31–40 years and 22 belonged to 41–50 years; 86 of them were women, and 14 of them were men. Fine needle aspiration cytology (FNAC) showed colloid goiter in 57 patients, papillary carcinoma in 2 patients, and follicular adenoma in 6 patients. Final histopathological report showed four cases of papillary carcinoma, four cases of follicular carcinoma, six cases of follicular adenoma, five cases of thyroiditis, and the rest being colloid goiter. Serum TSH level is divided into 2 limits: <0.39 μIU/mL and >2.50 μIU/mL. Forty-five cases revealed values more than 2.50 μIU/mL, and 15 cases presented values less than 0.39 μIU/mL. The mean TSH value was higher when compared with colloid goiter. The incidence of malignancy in nodular goiter is rising.

Conclusion: FNAC is the first choice of investigation in any case of thyroid nodule. The FNAC finding together with a high level of serum TSH increase the susceptibility of carcinoma. To assess the risk of malignancy, serum TSH is a very good screening tool.

KEY WORDS: Thyroid nodule, FNAC, serum TSH

Introduction

Thyroid nodule is a common clinical problem. The occurrence of clinically evident thyroid nodules in the common population is 4%–5%.[1] The prevalence of goiter is more than 40 million in India with more than 2 billion worldwide.[2] High resolution ultrasonography (USG) detects nodules in 19%–67% of cases, with higher frequencies in women and elderly persons.[3]

Although thyroid carcinoma is rare, it occurs in 5% of thyroid nodules.[4] Accurate diagnosis of thyroid nodules is necessary for appropriate clinical management of these patients and to avoid unnecessary surgical interventions. The majority of clinically diagnosed thyroid nodules were benign in nature, and those requiring surgical intervention owing to malignant lesions were 5%–20%. Clinical parameters raising the suspicion of malignancy include: male gender; young people (aged

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2016.04102015123	

<20 years) and old people (aged >70 years); and large lesion (>4 cm size).

Over the past two decades, fine needle aspiration cytology (FNAC) has become a preferred test, being a fast, safe, reliable, minimally invasive, cost effective, and reaching high sensitivity and specificity in the evaluation of thyroid nodules. However, limitations in FNAC owing to scanty sample, vascularity of thyroid swelling, variation in sampling technique, skill of the performing expert, and the experience of pathologist interpreting the aspirate do pose a problem in definitive diagnosis.[5]

In recent times, numerous studies have proposed that elevated concentrations of TSH, even within the normal range, are linked with a subsequent diagnosis of thyroid cancer in patients revealing thyroid nodules.[6] Furthermore, it has been observed that higher serum TSH levels are associated with advanced stages of thyroid cancer.[7] These findings put forward that TSH may play a key role in the development and/or progression of thyroid carcinomas.

The aims of this study were to identify the clinicopathological features along with correlation between various thyroid lesions (diagnosed on FNAC and histopathology) and serum TSH and assess the usefulness of serum TSH marker in predicting the likelihood of thyroid malignancy.

Materials and Methods

This was a prospective study of 100 patients of clinically diagnosed thyroid nodules. The study was carried out at the Department of Pathology of a tertiary-care Medical College and Hospital during the period of 2 years from January 2011 to December 2013. All patients with thyroid nodules underwent provisional diagnoses on the basis of history, physical examination of neck, ultrasound for thyroid gland, serum TSH level, FNAC, and biopsy whenever it was required. After clinically detected, thyroid nodule was confirmed by high resolution USG; the main focus was to correlate FNAC finding with serum TSH level and compare with gold standard histopathological findings wherever possible.

The study was approved by the Institutional Ethics Committee, and the FNAC procedure was performed after obtaining informed consent of all the patients included in this study. Careful palpation of the thyroid nodule was done to decide the location of aspiration. FNAC was done under aseptic conditions by using 10 cc or 20 cc disposable syringe with 23 gauge needle. The smears were dried and immediately fixed in ethyl alcohol. Thereafter, the smears were stained with hematoxylin and eosin (H & E).

Serum TSH level was measured in all the patients by fully automatic hormone analyzer. A total of 40 thyroidectomy specimens were processed in an automated tissue processing units and stained with routine H & E stain for histopathological examination.

In this study, FNAC findings of all the patients were correlated with serum TSH level and compared with histopathological finding.

Result

In this study, a total of 100 patients with clinically diagnosed thyroid nodule were attended. FNAC and measurement of serum TSH level were done in all the patients.

Of the 100 cases, 40 cases had undergone surgery and had been sent for biopsy to our Pathology Department, and histopathological correlation was made.

Clinical details and results of both FNAC and histopathology of thyroid lesions along with serum TSH level were recorded and compared.

The Tables 1–5 indicate the results of study, which are as follows:

Of the 100 cases, female subjects were 86%, whereas the male subjects were only 14%. Male to female ratio was 1:6.14.

Of the 92 benign cases, 41 cases showed higher serum TSH level, which was more than 2.50 μIU/mL; remaining 51 cases showed serum TSH level less than 2.49 μIU/mL. The mean TSH value for colloid goiter was 1.88. (0.04–4.46 μIU/mL).

In 8 malignant cases, 4 cases showed higher serum TSH level, which was more than 2.50 μIU/mL, and 4 cases showed serum TSH level, which was below 2.49 μIU/mL. The mean TSH value for malignant case was 4.89. (0.21–8.46 μIU/mL).

A total of 24 cases of colloid goiter showed serum TSH level, which was > 2.50 μIU/mL, and 7 cases showed serum TSH level, which was <0.39 μIU/mL.

All six cases of Grave's disease showed serum TSH level <0.39 μIU/mL.

Eleven cases of thyroiditis showed serum TSH level > 2.50 μIU/mL, and four cases showed serum TSH level <0.39 μIU/mL.

In malignant thyroid lesion, 4 cases showed serum TSH level higher, which was > 2.50 μIU/mL, and 1 case showed serum TSH level, which was <0.39 μIU/mL.

Discussion

In this study, a total of 100 patients presenting with thyroid nodule were included. FNAC and serum TSH level were done in all the patients. Histopathological study was also carried

Table 1: Distribution of cases according to age and gender

Age group (years)	Male (*N*)	Female (*N*)
11–20	1	10
21–30	0	19
31–40	4	24
41–50	3	19
51–60	3	10
≥61	3	4
Total, *N* (%)	14 (14)	86 (86)

Table 2: Distribution of cases and comparison between FNAC and histopathology findings

Types of lesions	FNAC findings	Histopathology findings
Nonneoplastic noninflammatory lesion, *N* (%)		
Colloid goiter	57 (57)	18 (45)
Grave's disease	6 (6)	2 (5)
Benign cystic thyroid lesion	4 (4)	1 (2.5)
Benign thyroid lesion	10 (10)	0
Nonneoplastic inflammatory lesion, *N* (%)		
Thyroiditis	15 (15)	5 (12.5)
Neoplastic lesion, *N* (%)		
Follicular neoplasm	6 (6)	10 (25)
Papillary carcinoma	2 (2)	4 (10)
Total	100	40

Table 3: Age-wise frequency of various thyroid lesions

Age	Colloid goiter	Thyroiditis	Grave's disease	Benign cystic lesion	Benign thyroid lesion	Malignant	Total, *N* (%)
11–20	6	4	1	0	0	0	11 (11)
21–30	9	2	1	2	3	2	19 (19)
31–40	15	4	1	1	4	3	28 (28)
41–50	15	3	1	0	2	1	22 (22)
51–60	7	1	2	1	0	2	13 (13)
>61	5	1	0	0	1	0	7 (7)
Total, *N* (%)	57 (57)	15 (15)	6 (6)	4 (4)	10 (10)	8 (8)	100

Table 4: Distribution of cases with benign and malignant disease in different TSH ranges

TSH (*μ*IU/mL)	Benign, *N* (%)	Malignant, *N* (%)	Total, *N* (%)
<0.06	17 (18.47)	1 (12.5)	18 (18)
0.06–0.39	4 (18.47)	0	4 (4)
0.40–1.39	14 (4.34)	2 (25)	16 (16)
1.40–2.49	16 (17.39)	1 (12.5)	17 (17)
2.50–4.99	22 (23.91)	2 (25)	24 (24)
5 or more	19 (20.65)	2 (25)	21 (21)
Total	92	8	100

Table 5: Relation between thyroid lesions and serum TSH level

TSH (*μ*IU/mL)	Colloid goiter, *N* (%)	Grave's disease, *N* (%)	Thyroiditis, *N* (%)	Benign thyroid lesion, *N* (%)	Benign cystic thyroid lesion, *N* (%)	Malignant thyroid lesion, *N* (%)	Total
<0.39	7 (46.7)	6 (40)	4 (26.7)	2 (13.3)	1 (6.7)	1 (6.7)	15
>2.5	24 (53.3)	0 (0)	11 (24.4)	4 (8.9)	2 (4.4)	4 (8.9)	45

Serum TSH level is divided into 2 limits: <0.39 *μ*IU/mL and >2.50 *μ*IU/mL.

out wherever possible. The age of the patients in this study ranged from 13 to 70 years, with the common age range between 31 and 40 years and a median of 35 years, which is comparable with the studies done by Khadilkar and Maji[8] and Afroze et al.[9]

We found that the female subjects were commonly affected, and the male to female ratio was 1:9 in this study; similar female preponderance was found in the studies done by Kamal et al.[10] and Tabaqchali et al.[11]

In this study, of the total 100 cases, 92 cases were benign and 8 cases malignant. This finding was comparable with the study done by Ikram et al.,[12] in which a total of 89 cases were studied; of them 82 were nonneoplastic and 7 neoplastic thyroid lesions. In Ko et al.,[13] 1,344 cases were nonneoplastic and 70 neoplastic thyroid lesions.

In the study by Friedman et al.,[14] it was observed that 20 thyroid nodules were diffuse and 80 nodular. In the study by Singh et al.,[15] 86 cases showed diffuse swelling and

13 nodular swelling. In the study by Kini et al.,[16] 78 cases showed diffuse swelling and 20 nodular swelling. In our study, clinically, 54% of the patients showed diffuse swelling, which was similar to the studies done by Singh et al.[15] and Kini et al.[16]. The nodule represents an early stage of the disease, when the clinical and hormonal changes are not established.

Of the 100 cases, 57% cases were colloid goiter, 9% lymphocytic thyroiditis, 4% Hashimoto's thyroiditis, 6% Graves' disease, 6% follicular neoplasm, and 2% papillary carcinoma. In the study by Afroze et al.,[9] 54.1% cases were colloid goiter, 4.7% Hashimoto's thyroiditis, 15.9% follicular neoplasm, and 6.5% papillary carcinoma. It is well correlated with this study.

In this study, of the 100 cases of FNAC of thyroid lesions, nine cases that were of benign pathology on cytological findings proved malignant on histopathological findings; three cases that were malignant on cytology proved benign on histopathological findings, five cases showed malignancy in both cytological and histopathological findings; and 23 cases showed benign pathology both on cytological and histopathological findings. So, the sensitivity of FNAC was 35.71%, specificity 88.46%, and accuracy 70%. In the study done by Sarfirullah et al.,[17] sensitivity of FNAC was 67.6%, specificity 84.7%, and accuracy 82%. In the study by Mundasad et al.,[18] sensitivity of FNAC was 52.6%, specificity 86.6%, and accuracy 82%. The sensitivity, specificity, and accuracy of FNAC were correlated with the study by Mundasad et al.[18]

This study observed that 8.9% malignant cases showed serum TSH level >2.50 μIU/mL; it was comparable with the studies by Boelaert et al.[6] and Haymart et al.,[7] in which it was 5.5% and 5%, respectively. The mean serum TSH value of differentiated carcinoma was more than the mean TSH value of colloid goiter.

In this study, the sensitivity and specificity of FNAC were 35.71% and 88.46%, respectively. It suggested that FNAC has its own limitations. We also observed that serum TSH level was also elevated in patients of colloid goiter. It was misleading without a correlation with FNAC findings. So, elevated TSH level together with FNAC findings increased the specificity of diagnosis.

Conclusion

Thyroid lesions occurred more common in female when compared with male individuals. The common age range is between 31 and 40 years, and the median age is 35 years for thyroid nodule. Inflammatory lesions were common than neoplastic lesions. Among the neoplastic lesions, benign were more common than malignant. Colloid goiter was the most common lesion, followed by lymphocytic thyroiditis. Follicular adenoma was the most common benign tumor, and papillary carcinoma was the most common malignant lesion. Serum TSH level was found to be (three times) high in malignant thyroid lesion when compared with benign lesion. Serum TSH level can be a good predictor of thyroid nodule.

So, finally, we concluded that FNAC is very useful for diagnosis and for deciding treatment option. Although statistically not significant, it can be stated that there is a trend toward cancer risk with rising TSH range in thyroid nodules. So, TSH may be used as an initial supportive screening test to predict malignancy in patients with thyroid nodule. Further studies with a larger number of cases may be required either to establish or refuse the probable relationship of serum TSH level with malignancy in patients with nodular goiter.

References

1. Gharib H, Papini E, Valcavi R, Baskin HJ, Crescenzi A, Dottorini ME, et al. American Association of Clinical Endocrinologists and Associazione Medici Endocrinologi medical guidelines for clinical practice for the diagnosis and management of thyroid nodules. Endocr Pract 2006;12(1):63–102.
2. Shah SN, Joshi SR. Goiter and goitrogenesis—some insights. J Assoc Physicians India 2000;48(Suppl 1):S13–4.
3. Marqusee E, Benson CB, Frates MC, Doubilet PM, Larsen PR, Cibas ES, et al. Usefulness of ultrasonography in the management of nodular thyroid disease. Ann Intern Med 2000;133(9): 696–700.
4. Chen H, Nicol TL, Rosenthal DL, Udelsman R. The role of fine needle aspiration in the evalution of thyroid nodules. Probl Gen Surg 1997;14:1–13.
5. Sharma R, Mathur DR. Diagnostic accuracy of fine needle aspiration cytology (FNAC) of the thyroid gland lesions. Int J Health Sci Res 2012;2(8):1–7.
6. Boelaert K, Horacek J, Holder RL, Watkinson JC, Sheppard MC, Franklyn JA. Serum thyrotropin concentration as a novel predictor of malignancy in thyroid nodules investigated by fine-needle aspiration. J Clin Endocrinol Metab 2006;91(11): 4295–301.
7. Haymart MR, Glinberg SL, Liu J, Sippel RS, Jaume JC, Chen H. Higher serum TSH in thyroid cancer patients occurs independent of age and correlates with extrathyroidal extension. Clin Endocrinol (Oxf) 2009;71(3):434–9.
8. Khadilkar UN, Maji P. Histopathological study of solitary nodules of thyroid. Kathmandu Univ Med J (KUMJ) 2008;6(24): 486–90.
9. Afroze N, Kayani N, Hasan SH. Role of fine needle aspiration cytology in the diagnosis of palpable thyroid lesions. Indian J Pathol Microbiol 2002;45(3):241–6.
10. Kamal MM, Arjune DG, Kulkarni HR. Comparative study of fine needle aspiration and fine needle capillary sampling of thyroid lesions. Acta Cytol 2002;46(1):30–4.
11. Tabaqchali MA, Hanson JM, Johnson SJ, Wadehra V, Lennard TW, Proud G. Thyroid aspiration cytology in new castle: a six year cytology/histology correlation study. Ann R Coll Surg Engl 2000;82(3):149–55.
12. Ikram M, Hyder J, Muzaffar S, Hasan SH. Fine needle aspiration cytology (FNAC) in the management of thyroid pathology—the Aga Khan University Hospital experience. J Pak Med Assoc 1999;49(6):133–5.
13. Ko HM, Jhu IK, Yang SH, Lee JH, Nam JH, Juhng SW, et al. Clinicopathologic analysis of fine needle aspiration cytology of the thyroid. A review of 1,613 cases and correlation with histopathologic diagnoses. Acta Cytol 2003;47(5):727–32.

14. Friedman M, Shimoaka K, Getaz P. Needle aspiration of 310 thyroid lesions. Acta Cytol 1979;23(3):194–203.
15. Singh P, Chopra R, Calton N, Kapoor R. Diagnostic accuracy of fine needle aspiration cytology of thyroid lesions. J Cytol 2000; 17(3):135–9.
16. Kini SR, Miller JM, Hamburger JI, Smith MJ. Cytopathology of papillary carcinoma of the thyroid by fine needle aspiration. Acta Cytol 1980;24(6):511–21.
17. Safirullah, Mumtaz N, Khan A. Role of fine needle aspiration cytology (FNAC) in the diagnosis of thyroid swellings. JPMI 2004;18(2):196–201.
18. Mundasad B, Mcallister I, Carson J, Pyper P. Accuracy of fine needle aspiration cytology in diagnosis of thyroid swellings. Internet J Endocrinol 2006;2(2):1504–10.

How to cite this article: Makwana C, Lakum NR, Makwana H, Joshi J, Agnihotri A. Clinicopathological correlation of serum TSH level in patients with thyroid nodule—a study of 100 cases. Int J Med Sci Public Health 2016;5:322-326

Source of Support: Nil, **Conflict of Interest:** None declared.