

Spectrum of Tc-99m Thyroid Scintigraphy Findings of Thyrotoxicosis Patients Attending at INMAS, Sylhet: An Institutional Based Study

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Abstract

Original Research Article

Introduction: Thyrotoxicosis is a type of disorder that has fairly common clinical presentation and variety of aetiologies. The aetiological diagnosis is very important as the management is different and it is quite difficult to start treatment without diagnosing the exact cause. Thyroid scan helps in differentiating the various causes more precisely. Ultrasonogram of thyroid gland along with serum thyroid hormones levels are also routinely being advocated. **Objective:** The study aims to evaluate the spectrum of Tc-99m thyroid scintigraphy findings of thyrotoxicosis patients attend at Institute of Nuclear Medicine and Allied Science (INMAS), Sylhet, Bangladesh. **Patients and Methods:** A total of 325 new biochemically diagnosed thyrotoxicosis patients from July 2021 to June 2024 were included in the study and retrospective observation study was done. They underwent further evaluation with ultrasonography of thyroid gland and 99mTc scintigraphy. **Results:** Out of 325 patients of thyrotoxicosis, 181 (55.69%) had hyperfunctioning thyroid gland; 95 (29.23%) had thyroiditis; 33 (10.15%) had toxic multinodular goitre (TMNG); 13 (4.0%) of solitary toxic nodule / Toxic Adenoma (TA) and 03 (0.92%) had thyromegaly with euthyroid status at thyroid scan. **Conclusion:** Thyroid scan plays a vital role in proper diagnosis & treatment response evaluation of thyrotoxic patients. To distinguish between thyrotoxicosis and other thyroid diseases, physicians may routinely perform thyroid scans.

Keywords: Thyrotoxicosis; 99mTc scintigraphy; Ultrasonography.

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INTRODUCTION

Thyrotoxicosis is a clinical condition that occurs when thyroid hormone levels (serum T3 and/or T4) are too high, regardless of the cause [1]. Thyrotoxicosis is often confused with hyperthyroidism. The latter is an overactivity of the thyroid gland, leading to increased synthesis and release of thyroid hormones. These terms are not interchangeable, as thyrotoxicosis can also occur in thyroid diseases that are not associated with impaired thyroid function, such as thyroiditis [2]. The clinical manifestations of thyrotoxicosis, regardless of its cause, are nearly identical [3]. Determining the cause is crucial for appropriate treatment [4]. Thyroid scintigraphy and radioactive iodine uptake are the imaging modalities of choice for diagnosing thyrotoxicosis and assessing thyroid function [3]. The scintigraphic features of the various thyroid conditions responsible for thyrotoxicosis may overlap, but identifying them helps narrow the differential diagnosis

and facilitates the physician's evaluation and treatment of these conditions.

This study was conducted to assess the Tc-99m scintigraphy findings of thyrotoxicosis patients and to correlate with biochemical findings.

PATIENTS AND METHODS

The study was retrospective. The study was carried out at the Institute of Nuclear Medicine and Allied Sciences (INMAS) in Sylhet, Bangladesh. Study period was in between July 2021 to June 2024. A total of 325 biochemical diagnoses were made during the study period. Patients with a history of thyroid disease or thyroid surgery, and those with other serious illnesses, were excluded. A Tc-99m thyroid scan was performed on all patients; 5 mCi of technetium-99m was administered, and acquisition of images were performed with a dual-head gamma camera 20 minutes later, with the patient in a sitting position. Data analysis was done

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by using Statistical Package for Social Sciences (SPSS) version 20.

INTERPRETATIONS

Increased diffuse radiotracer activity in the thyroid and suppression of salivary gland radioactivity were compatible with hyperfunctioning thyroid gland / Graves' disease (GD); focal increase in radio-tracer activity while suppressing the rest of the thyroid parenchyma and salivary activity was compatible with a toxic adenoma (TA); more than one focal zone of increased radio-tracer activity accompanied by intermediate cold zones or areas of reduced activity was the diagnosis of toxic multinodular goitre (TMNG), and

the reduction or very low radio-tracer activity in the thyroid gland suggests thyroiditis.

RESULTS

Among 325 thyrotoxicosis patients, 87 were male and 238 were female; mean age 40.89 ± 14.54 years & age ranges from 12 years to 90 years. Out of 325 patients 181 (55.69%) had hyperfunctioning thyroid gland, 179 patients involving both lobes of thyroid gland and only 02 patients involving right lobe; 95 (29.23%) had thyroiditis; 33 (10.15%) had toxic multinodular goitre (TMNG); 13 (4.0%) of solitary toxic nodule / Toxic Adenoma (TA) and 03 (0.92%) had thyromegaly with euthyroid status at thyroid scan (figure).

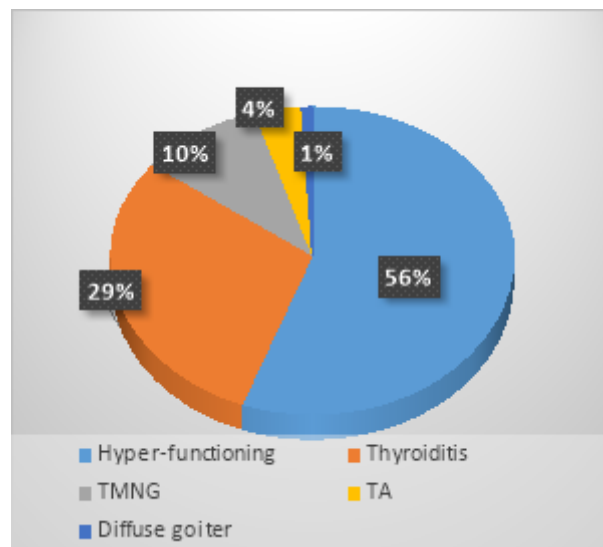


Figure: Scintigraphy findings of thyrotoxicosis patients in the study

DISCUSSION

Thyrotoxicosis is a clinical condition associated with excess thyroid hormone activity, usually due to high circulating thyroid hormone [2]. Common causes of thyrotoxicosis include Graves' disease (GD), toxic multinodular goitre (TMNG) and thyroiditis [5, 6]. The presence of circulating TRAb is a marker of autoimmune GD and its measurement provides more accuracy in GD diagnosis [7, 8]. Thyroid scintigraphy and measurement of TPO antibodies may be sufficient to evaluate Graves' disease from other causes of thyrotoxicosis when TRAb testing is not available and patients came with atypical clinical presentations. Thyroid uptake and scan can be used to differentiate excess production of thyroid hormone or destruction of thyroid follicular cells in thyrotoxicosis patients, as well as between diffuse and focal activity of radiotracer [9]. Antithyroid medication with carbimazole and propylthiouracil reduces the accuracy of radionuclide thyroid scintigraphy; therefore, these medications should be discontinued for couple of days before scintigraphy to optimize its efficacy and increase diagnostic accuracy [10]. Thyroid scintigraphy is contraindicated in pregnancy and lactation [11], and in these cases, high resolution ultrasound is the most

reliable tool for identifying the various causes of thyrotoxicosis [12, 13].

In the present study, the prevalence of thyrotoxicosis was three times higher in women (73.23%), comparison to men, and the mean age was 40.89 ± 14.54 years. These results are quite similar of previous study conducted by Riyadh, where more than two-thirds of patients with Graves' disease were women and the mean age was 32 ± 0.9 years [14]. Distinguishing Graves' disease and thyroiditis based only clinical presentations can be difficult one. In such conditions, isotope thyroid scintigraphy and thyroid uptake considered definitive diagnostic tool along with thyroid hormonal assay [15]. In the study, most patients with hyperthyroidism showed homogeneously diffuse radiotracer distribution with high levels of uptake, and in thyroiditis, showed heterogeneity with lower uptake of the radiotracer, which is consistent with previous studies [16, 17].

CONCLUSION

Thyroid scan plays a vital role in proper diagnosis & treatment response evaluation of thyrotoxic patients. To distinguish between thyrotoxicosis and other thyroid diseases, physicians may routinely perform thyroid scans.

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