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# TSH receptor Antibody and its importance in treatment of Hyperthyroidism

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### Abstract

**Background:** Thyrotoxicosis has multiple etiologies, manifestations, and potential therapies. Appropriate treatment requires an accurate diagnosis and is influenced by coexisting medical conditions and patient preference. Biochemical value of TSH Receptor Antibody plays a vital role in diagnosis of Graves's disease from Thyroiditis. This helps us to avoid unnecessary treatment of hyperthyroidism with anti-thyroidal drugs. **Method:** This is a cross-sectional Study done in the patients with biochemical lab reports of hyperthyroidism. TSH Receptor antibody lab test was done in various labs in Kathmandu as per patient's choice. TSH receptor antibody was defined as positive and negative as per results above 1.8 IU/L and below 1.8 IU/L respectively. Results above 1.8 were treated accordingly as per standard protocol and available treatment options in National Academy of Medical sciences. Results: 153 Patients were evaluated for TSH receptor antibody test. 109 female and 54 males. Among female 27 and 82 were found to have below 1.8 IU/L and above 1.8 IU/L respectively. And in male 23 and 18 were below 1.8 IU/L and above 1.8 IU/L respectively. The youngest male was of age 17 year with TSH receptor antibody below 1.8 IU/L and oldest male was of age 58 year with TSH receptor antibody below 1.8 IU/L. The youngest female was of age 17 year with TSH receptor antibody below 1.8 IU/L and oldest female was of age 72 year with TSH receptor antibody above 1.8 IU/L. In both male and female the maximum number of patients visiting our center was average age of 31-40 years of age. **Conclusion:** TSH receptor Antibody laboratory is now easily available in Kathmandu valley, though it is now done in National academy of medical sciences. I have found it very easy to access the patients presenting with biochemical reports of hyperthyroidism and further plan for treatment as per reports of TSH receptor Antibody. Biochemical value of TSH Receptor Antibody plays a vital role in diagnosis of Graves' disease from Thyroiditis. This helps us to avoid unnecessary treatment of hyperthyroidism with Anti thyroidal drugs.

**Key words:** Hyperthyroidism, TSH receptor Antibody, Graves' disease, Thyroiditis

### Introduction

Thyrotoxicosis is a condition having multiple etiologies, manifestations, and potential therapies. The term "thyrotoxicosis" refers to a clinical state that results from inappropriately high thyroid hormone action in tissues generally due to inappropriately high tissue thyroid hormone levels. Appropriate treatment of thyrotoxicosis requires an accurate diagnosis.

For example, thyroidectomy is an appropriate treatment for some forms of thyrotoxicosis and not for others. Additionally, b-blockers may be used in almost all forms of thyrotoxicosis, whereas ant thyroid drugs (ATDs) are useful in only some.

The choice of initial diagnostic testing depends on cost, availability, and local expertise. TSH receptor antibody is cost effective because if it is positive it confirms the diagnosis of the most common cause of thyrotoxicosis. If negative it does not distinguish among other etiologies, however, and it can be negative in very mild GD.

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### Material and Methods

This is a Cross-Sectional Study done in National Academy of Medical sciences in Endocrine unit out patients department. The patients with Biochemical lab reports of Hyperthyroidism from January 01 2022 till 31 December 2022 were evaluated for TSH receptor antibody. TSH Receptor antibody lab test was done in various labs in Kathmandu valley as per patient's choice. Total of 153 patients with biochemical reports of Hyperthyroidism were sent for TSH Receptor antibody test. TSH receptor antibody was defined as positive and negative as per results above 1.8 IU/L and below 1.8 IU/L respectively. Results above and below 1.8 IU/L were treated accordingly as per standard protocol and available treatment options in National Academy of Medical sciences and Kathmandu valley. Results were evaluated and graphed using a simple excel program.

### Results:

Fig 1: TSH Receptor Antibody results in Male patients. Total Male patients-54

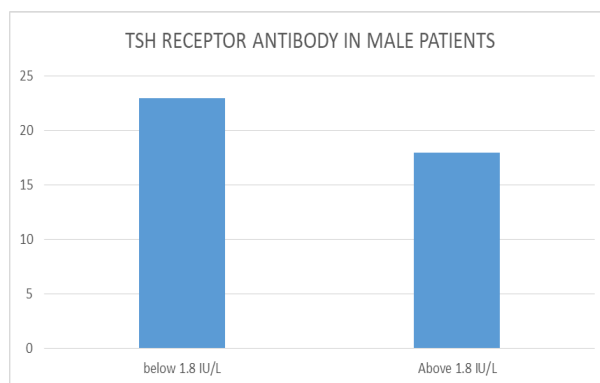


Fig 2: Tsh Receptor Antibody results in Female patients. Total Female-109

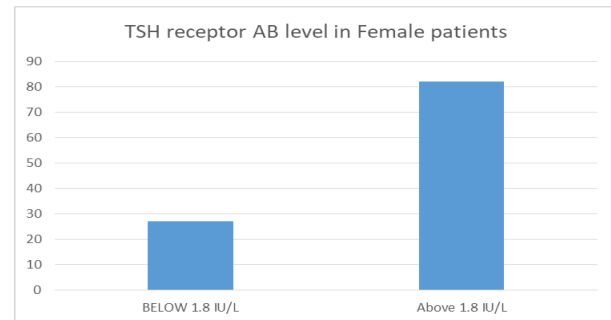
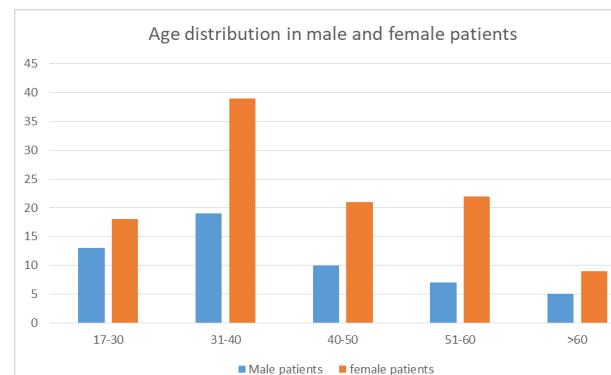


Fig 3: Age distribution in Male and female patients



### Discussion:

The most common causes include Graves' disease (GD), toxic multinodular goiter (TMNG), and toxic adenoma (TA) <sup>1</sup>

Overhyperthyroidism is defined as a subnormal (usually undetectable) serum thyrotropin (TSH) with elevated serum levels of tri iodothyronine (T3) and/or free thy-roxine estimates (free T4). Subclinical hyperthyroidism is defined as a low or undetectable serum TSH with values within the normal reference range for both T3 and free T4.

Endogenous hyperthyroidism is most commonly due to GD or nodular thyroid disease. GD is an autoimmune disorder in which thyrotropin receptor antibodies (TRAb)

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stimulate the TSH receptor, increasing thyroid hormone production and release.<sup>2</sup>

Less common causes of thyrotoxicosis include the entities of painless and subacute thyroiditis, which occur due to inflammation of thyroid tissue with release of preformed hormone into the circulation.<sup>3-8</sup>

In our study 153 Patients were evaluated for TSH receptor antibody test. 109 female and 54 males. Among female 27 and 82 were found to have below 1.8 IU/L and above 1.8 IU/L respectively. And in male 23 and 18 were below 1.8 IU/L and above 1.8 IU/L respectively. The youngest Male was of age 17 with TSH receptor antibody below 1.8 IU/L and oldest male was of age 58 with TSH receptor antibody below 1.8 IU/L. The youngest Female was of age 17 with TSH receptor antibody below 1.8 IU/L and oldest female was of age 72 with TSH receptor antibody above 1.8 IU/L. In both male and female the maximum number of patients visiting our center was average age of 31-40 years of age.

Untreated or partially treated thyrotoxicosis is associated with weight loss, osteoporosis, atrial fibrillation, embolic events, muscle weakness, tremor, neuropsychiatric symptoms, and rarely cardiovascular collapse and death.<sup>9-10</sup>

Recent epidemiological research found that the prevalence of several autoimmune endocrine illnesses, such as autoimmune thyroid disease (AITD), has been steadily rising<sup>11</sup>. The complex etiology of AITD includes genetic and environmental factors; females are more likely to be affected. Graves' disease (GD) and Hashimoto's (HT), which make up the majority of cases of AITD, have a high correlation in those over the age of 45 to 50 years. These patients have high levels of autoantibodies against thyroid proteins, namely thyroglobulin, thyroid peroxidase, and thyroid stimulating

hormone receptors antibodies (TRAb).

The etiology of thyrotoxicosis should be determined. If the diagnosis is not apparent based on the clinical presentation and initial biochemical evaluation, diagnostic testing is indicated and can include, depending on available expertise and resources, (1) measurement of TRAb, (2) determination of the radioactive iodine uptake (RAIU), or (3) measurement of thyroidal blood flow on ultrasonography.

In a patient with a symmetrically enlarged thyroid, recent onset of orbitopathy, and moderate to severe hyperthyroidism, the diagnosis of GD is likely and further evaluation of hyperthyroidism causation is unnecessary. In a thyrotoxic patient with a non-nodular thyroid and no definite orbitopathy, measurement of TRAb or RAIU can be used to distinguish GD from other etiologies.

The choice of initial diagnostic testing depends on cost, availability, and local expertise. TRAb is cost effective because if it is positive it confirms the diagnosis of the most common cause of thyrotoxicosis. If negative it does not distinguish among other etiologies, however, and it can be negative in very mild GD. If third-generation TRAb assays are not readily available, RAIU is preferred for initial testing.

The TSH-Receptor (TSHR) is a G-protein-coupled transmembrane receptor. The gene is on the long arm of chromosome 14q3112. TRAb have a significant influence on the pathophysiology of GD-induced hyperthyroidism. The American Thyroid Association (ATA) and the American Association of Clinical Endocrinologists propose a thyroid scan as the primary diagnostic method in their joint guidelines<sup>13-14</sup>. The British Thyroid Association advises testing for TRAb except in exceptional circumstances<sup>13</sup>. To differentiate between GD and subacute painless

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thyroiditis (SPT), TRAb testing is helpful. TRAb testing is beneficial in differentiating postpartum thyroiditis from recurrent GD<sup>13-16</sup>. Like other Immunoglobulin G (IgG), TRAb may easily cross the placenta during pregnancy in GD patients. As a result, they can activate the fetal thyroid gland, leading to fetal thyrotoxicosis<sup>17</sup>. Because of this, pregnant women with GD who have high levels of TRAb are considered high-risk pregnancies. Fetal thyrotoxicosis can have significant side effects on the mother and baby, like intrauterine death, growth retardation, heart failure, fetal hydrops, placental abruption, premature birth, etc., if it is not treated<sup>18</sup>. Although the involvement of TRAb in the etiology of GO is yet unclear, the incidence and severity of GO in hyperthyroid patients rise with TRAb concentration. More than 90% of patients in an experiment on euthyroid individuals with GO had positive TRAb<sup>19-20</sup>.

### Conclusion:

TSH receptor Antibody test is now easily available in Kathmandu valley. Though it is not done in National academy of medical sciences. I have found it very easy to access the patients presenting with biochemical reports of Hyperthyroidism and further plan for treatment as per reports of TSH receptor Antibody. Biochemical value of TSH Receptor Antibody plays a vital role in diagnosis of Graves' disease from Thyroiditis. This helps us to avoid unnecessary treatment of Hyperthyroidism with Anti Thyroidal drugs.

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