



## Original Research Article

# Study of Prevalence of Diabetes Mellitus among Patients Suffering from Thyroid Disease

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## Abstract

**Objectives:** To study the prevalence of Diabetes Mellitus in patients suffering from thyroid disorders

**Methodology:** This study was conducted in KIMS hospital Bengaluru and it was a prospective observational study. The patients suffering from thyroid diseases and visiting outpatient department of General Medicine who satisfied the inclusion criteria were asked to get their GRBS or RBS values measured. The results were analyzed accordingly.

**Results and Discussion:** The study included one hundred patients who attended outpatient department. Among them, 90 patients were suffering from hypothyroidism and the rest were hyperthyroid patients. Among the 90 hypothyroid patients, 79 cases were females and 11 were males. The prevalence of diabetes mellitus among the hypothyroidism patients found to be 10% (9 patients) and where as in hyperthyroid patients found to be 50%. Out of 100 patients 14% of the patients (9 hypothyroid and 5 hyperthyroid) were found to have diabetes mellitus.

**Conclusion:** This study showed that hyperthyroid patients are more prone to have diabetes mellitus (50%) as compared to hypothyroid patients (10%).

**Keywords:** Diabetes Mellitus, hypothyroidism, hyperthyroidism, plasma insulin.

## Introduction

Thyroid diseases and Diabetes Mellitus are the two most common endocrine disorders encountered in clinical practice. Studies have shown that the diseases mutually influence each other and associations between both the conditions have long been reported. Thyroid hormones contribute to the regulation of carbohydrate

metabolism and pancreatic function. On the other hand, diabetes affects thyroid functions to variable extent. The thyroid gland produces two related hormones, thyroxin (T4) and triiodothyronine (T3) which are regulated by TSH. Acting through nuclear receptors, these hormones play a crucial role in cell differentiation during development and help to maintain thermogenic and metabolic

homeostasis in the adult. Autoimmune disorders of the thyroid gland can either stimulate the overproduction of thyroid hormones (thyrotoxicosis) or cause glandular destruction and hormone deficiency (hypothyroidism).<sup>1</sup>

The thyroid axis is a classic example of an endocrine feedback loop. Hypothalamic TRH stimulates pituitary production of TSH, which in turn stimulates thyroid hormone synthesis and secretion and feedback to inhibit TRH and TSH production. The "set-point" in this axis is established by TSH. TRH is the major positive regulator of TSH synthesis and secretion. The Peak TSH secretion occurs 15 min after administration of exogenous TRH.<sup>2</sup>

Thyroid dysfunction chiefly comprises hypothyroidism and hyperthyroidism although the entity belongs to the same organ but with vast difference in pathophysiology as well as clinical picture. The interface between thyroid malfunction owing to diabetes is a matter of investigation. There is a deep underlying relation between diabetes mellitus and thyroid dysfunction. A plethora of studies have evidenced an array of complex intertwining biochemical, genetic, and hormonal malfunctions mirroring this pathophysiological association. 5' adenosine monophosphate-activated protein kinase (AMPK) is a central target for modulation of insulin sensitivity and feedback of thyroid hormones associated with appetite and energy expenditure. Hypothyroidism (Hashimoto's thyroiditis) or thyroid over activity (Graves' disease) has been investigated to be associated with diabetes mellitus. A meta analysis reported a frequency of 11% in thyroid dysfunction in the patients of diabetes mellitus. Autoimmunity has been implicated to be the major cause of thyroid-dysfunction associated diabetes mellitus. And the prevalence of Diabetes mellitus (DM) among hypothyroid patients is also found to be 7.01 %.<sup>(3-9)</sup>

The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system, so it is important to study the

influence of thyroid disorders on the blood glucose regulation in the body. Hence we aimed to study the prevalence of diabetes mellitus among patients suffering from thyroid disorders in KIMS Hospital and Research Centre, Bengaluru.

### Materials and Methods

The study was conducted in Kempegowda Institute of Medical Sciences (KIMS) & Research centre, Bengaluru which is a tertiary care teaching hospital. The study was carried out for a period of 6 months (from January 2016 to June 2016). It is a prospective observational study, conducted to study the prevalence of diabetes mellitus among patients suffering from thyroid disorders. The Ethical Committee clearance was obtained and informed consent was taken from the participating patients.

Patients above the age of 18 years and who were suffering from thyroid illness were included in the study. Patients suffering from renal failure, hepatic failure and pregnant patients were excluded from the study.

The patients who visited outpatient department (OPD) with the history of thyroid disorders and those who were newly diagnosed to have thyroid disorders were screened for their blood glucose levels.

A well designed patient profile form was prepared and required information was collected from patient which includes Demographic data such as age, gender, Past history, Family history, personal history, medication history, physical examination, laboratory data: TSH, T3, T4 etc. The data collected is analysed by simple percentage method to conclude the study results.

### Results

One hundred patients who were suffering from thyroid illness and visited OPD during the study period recruited in the study. Among them, 90 patients were hypothyroid patients. Out of 90 hypothyroid patients, 79 were females and 11 were males (figure no.2). Out of 100 patients, 10 were suffering from hyperthyroidism (figure no1),

out of which 7 were female patients and 3 were male patients (figure no.3).

The study revealed that 50% of the hyperthyroid patients were found to have diabetes (figure no.5).

The prevalence of diabetes mellitus among the hypothyroid patients was found to be 10 % (9 patients) as shown in figure no.6.

In our study 14% of the patients (9 hypothyroid and 5 hyperthyroid) were found to have diabetes mellitus. The study revealed that the prevalence of diabetes mellitus among hyperthyroidism and hypothyroid patients accounts 50% and 10%.

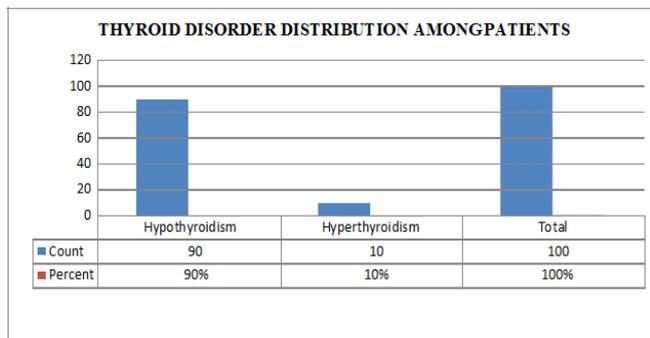


Figure - 1

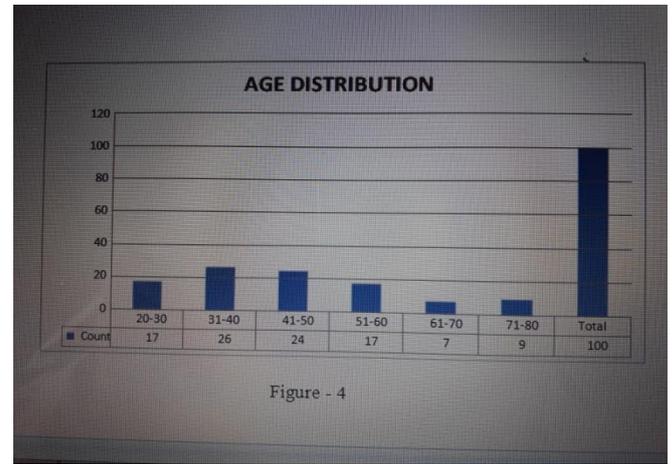


Figure - 4

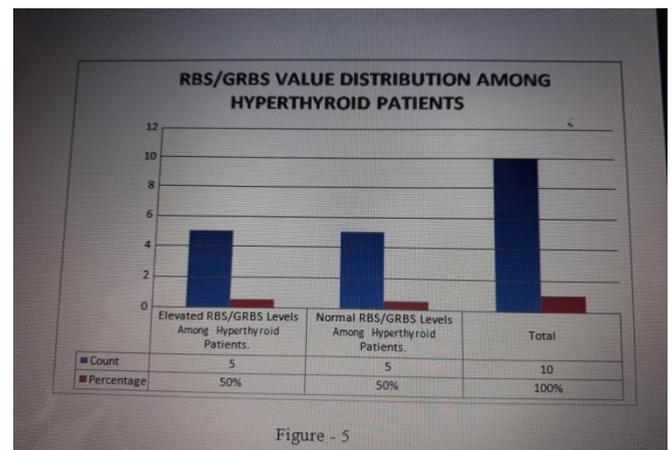


Figure - 5

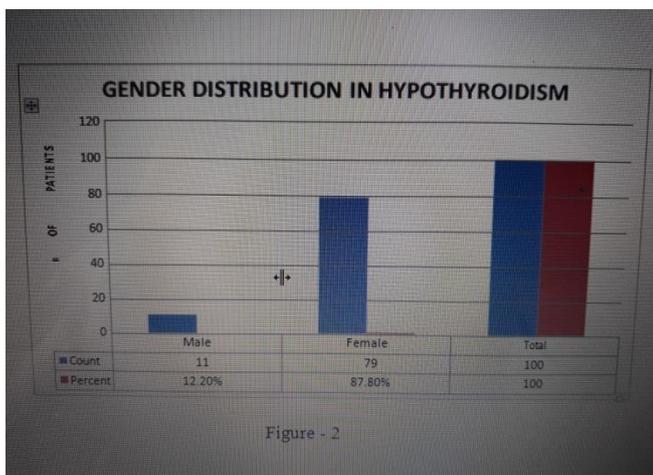


Figure - 2

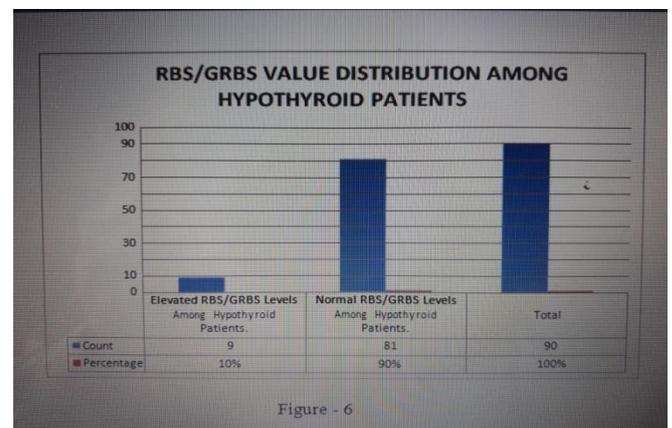


Figure - 6

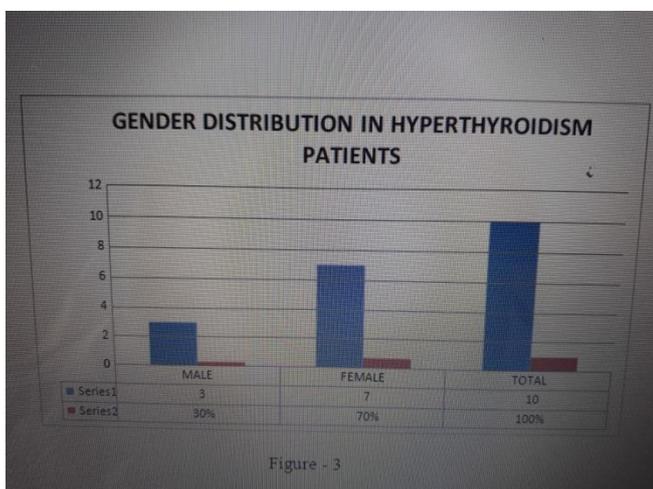


Figure - 3

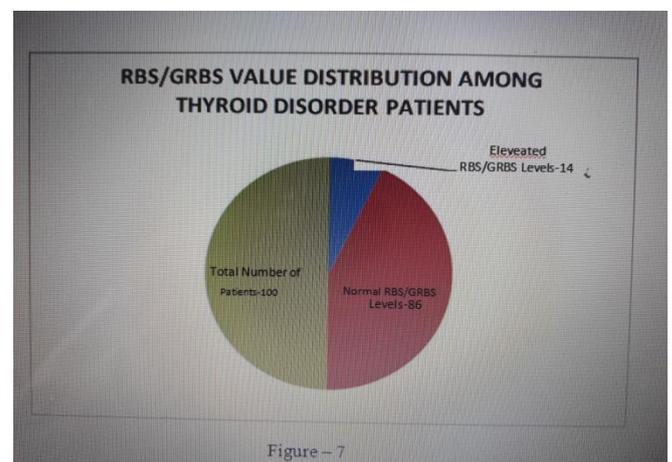


Figure - 7

## Discussion

Thyroid hormones affect glucose metabolism via several mechanisms. Hyperthyroidism has long been recognized to promote hyperglycemia. During hyperthyroidism, the half-life of insulin is reduced most likely secondary to an increased rate of degradation and an enhanced release of biologically inactive insulin precursors. Endogenous production of glucose is also enhanced in hyperthyroidism via several mechanisms. Thyroid hormones produce an increase in the hepatocyte plasma membrane concentrations of GLUT2 which is the main glucose transporter in the liver and consequently, the increased levels of GLUT-2 contribute to the increased hepatic glucose output and abnormal glucose metabolism. Additionally, increased lipolysis is observed in hyperthyroidism resulting in an increase in free fatty acids that stimulates hepatic gluconeogenesis which leads to hyperglycemia.<sup>10</sup>

Sub-clinical hypothyroidism and overt hypothyroidism are established risk factors for insulin resistance which is one of common cause for development for Diabetes Mellitus.<sup>4</sup>

Ashrafuzzaman, Taib AN, Rahman R, Latif ZA. (2010) conducted a study on "Prevalence of diabetes among hypothyroid subjects" of Four hundred forty two consecutive cases of hypothyroidism. Impaired glucose Tolerance (IGT) was also found higher among hypothyroid subjects than population prevalence (8.6%).<sup>3</sup>

Helen C. Lambeth et al. In April 2003 had studied the association between autoimmune thyroid dysfunction and type 1 diabetes. The study indicates that all subjects with type 1 diabetes should undergo annual screening by serum TSH measurement to detect asymptomatic thyroid dysfunction, particularly those with positive TPO antibodies.<sup>5</sup>

Mireilla Hage et al. in 2011 conducted the study about the relationship between Thyroid disorders and diabetes mellitus which is characterized by a complex interdependent interactions.

In this study we observed that the prevalence of Diabetes mellitus in patients suffering from hyperthyroidism and hypothyroidism is about

50% and 10%. Hence patients with thyroid disease should be screened for Diabetes.

## Conclusion

This study concludes that Out of the 100 patients suffering from thyroid disorders 14% of the patients (9 hypothyroid and 5 hyperthyroid) were found to have diabetes mellitus. The prevalence of diabetes mellitus among the hypothyroidism and hyperthyroid patients found to be 10% and 50%. This study showed that patients suffering thyroid conditions are more prone to have diabetes mellitus and it is evident that hyperthyroid patients are more prone to have diabetes mellitus (50%) as compared to hypothyroid patients (10%).

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