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# STUDY OF THYROID DYSFUNCTION IN PATIENTS WITH METABOLIC SYNDROME

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**Abstract**

**Introduction:**

Metabolic syndrome (MS) is described as insulin resistance, clusters of abnormalities including abdominal obesity, hypertension, hyperglycaemia, increased triglycerides, and decreased high-density lipoprotein cholesterol (HDL-C). In maintaining thermogenesis and metabolic homeostasis Thyroxine and Triidothryronine play an important role. Thyroid is established by thyroid stimulation hormone (TSH). Thyroid hormones up-regulate metabolic pathways relevant to resting energy expenditure, hence obesity and thyroid functions are often correlated. It is still not clear whether these alterations in thyroid hormones are a cause or an effect of obesity. Hypothyroidism is well known to cause diastolic hypertension, endothelial dysfunction, hyperlipidemia and cardiovascular disease. The functions of thyroid affect the components of metabolic syndrome including triglycerides (TG), HDL–cholesterol (HDL-C), blood pressure and plasma glucose. The impact of various degree of thyroid dysfunction on components of metabolic syndrome, however, continues to be debatable. On components of metabolic syndrome, Thyroid dysfunction is also risk factor for ASCVD mediated by the effects of thyroid hormones on glucose metabolism, lipid and blood pressure. In India about onethird of the urban population in large cities has metabolic syndrome with the overall prevalence varying between 11% and 56%. Worldwide Thyroid diseases are most prevalent endocrine disorders. According to various studies it showed that about 42 million people in India suffer from thyroid diseases.

**Aim:** The main aim of this study was to study thyroid dysfunction in metabolic syndrome.

**Material and Methods:** In this study 150 patients with different age group from 20 years to 60 years old were included with metabolic syndrome diagnosed as per IDF criteria. From all the patients who visit hospital as OPD and IPD patients' detailed history was recorded and also laboratory examination were done.

**Result:** In this study total 150 patients with metabolic syndrome were included in which there were 82 were males and 68 were females. In this study there were maximum numbers of male patients in comparing with female patients as 43.3% and 54.7% respectively with different age group from 20 years to 60 years old. Out of total patients age group of 35 to 50 years old shows maximum and the age group 50- 60 years old showed least as 37% and 23% respectively. In this study in the age group of 35-50 had abnormal TGL values, compared to the other age groups. While HDL values were low in the 50-60 age group compared to others.

**Conclusion:** Thyroid dysfunction is common in metabolic syndrome patients. The prevalence of hypothyroidism is more common in metabolic syndrome. Therefore early detection and thyroxine replacement could reduce the significant cardiovascular risk. However, there is still a controversy whether the patients with subclinical hypothyroidism would be benefited from thyroxine replacement. Hence Subclinical hypothyroidism should be picked up and treated at the earliest.

**Keywords:** Metabolic syndrome, Thyroid dysfunction, hypothyroidism, HDL

## Introduction

Metabolic syndrome (MS) is described as insulin resistance, clusters of abnormalities including abdominal obesity, hypertension, hyperglycaemia, increased triglycerides, and decreased high-density lipoprotein cholesterol (HDL-C)[i]. Many features of this syndrome are known to predispose individuals to premature coronary artery disease[ii]. In maintaining thermogenesis and metabolic homeostasis Thyroxine and Triidothryronine play an important role. Thyroid is established by thyroid stimulation hormone (TSH). Thyroid hormones up-regulate metabolic pathways relevant to resting energy expenditure, hence obesity and thyroid functions are often correlated. It is still not clear whether these alterations in thyroid hormones are a cause or an effect of obesity[iii,iv&v]. Metabolic syndrome and hypothyroidism is closely co-related predecessor of atherogenic cardiovascular disease. Considerable overlap occurs in the pathogenic mechanisms of atherogenic cardiovascular disease by metabolic syndrome and hypothyroidism[vi]. Hypothyroidism is well known to cause

diastolic hypertension, endothelial dysfunction, hyperlipidemia and cardiovascular disease[vii, viii].

Recent studied has suggested that Role of insulin resistance in development of dyslipidemia in hypothyroidism[ix]. The functions of thyroid affect the components of metabolic syndrome including triglycerides (TG), HDL–cholesterol (HDL-C), blood pressure and plasma glucose. The impact of various degree of thyroid dysfunction on components of metabolic syndrome, however, continues to be debatable[x]. Thyroid dysfunction is defined as altered serum thyroid stimulating hormone (TSH) level with normal or altered thyroid hormones (free triiodothyronine [fT3] and free thyroxine [fT4])[xi]. On components of metabolic syndrome, Thyroid dysfunction is also risk factor for ASCVD mediated by the effects of thyroid hormones on glucose metabolism, lipid and blood pressure[xii]. Many studies showed that prevalence of Thyroid dysfunction among metabolic syndrome are association or relationship of metabolic syndrome and its components with Thyroid dysfunction however results are controversial[xiii, xiv]. Many research showed that prevalence rates highly depended upon the definition of metabolic syndrome as age, population and ethnicity. In India also due to rapid increased in its prevalence has been noted due to socioeconomic transitions to urbanization, urban migration, increasing affluence and mechanization[xv]. In India about onethird of the urban population in large cities has metabolic syndrome with the overall prevalence varying between 11% and 56%[xvi, xvii]. Worldwide Thyroid diseases are most prevalent endocrine disorders. According to various studies it showed that about 42 million people in India suffer from thyroid diseases[xviii]. However basic mechanism for metabolic syndrome plays an important role in hypothyroidism[xix]. The main aim of this study was to study thyroid dysfunction in metabolic syndrome.

**Material and Method:**

This study was conducted in Department of General Medicine Sindhudurg Shikshan Prasarak Mandal Medical College and Life Time Hospital Sindhudurg Maharashtra. In this study 150 patients with different age group from 20 years to 60 years old were included with metabolic syndrome diagnosed as per IDF criteria. From all the patients who visit hospital as OPD and IPD patients' detailed history was recorded and also laboratory examination were done. History regarding symptoms of hypothyroidism was recorded as well as laboratory examination result like thyroid profile tests and Glucose and lipid analysis were also recorded.

**Result:**

In this study total 150 patients with metabolic syndrome were included in which there were 82 were males and 68 were females. In this study there were maximum numbers of male patients in comparing with female patients as 43.3% and 54.7% respectively with different age group from 20 years to 60 years old. Out of total patients age group of 35 to 50 years old shows maximum and the age group 50- 60 years old showed least as 37% and 23% respectively. In this study in the age group of 35-50 had abnormal TGL values, compared to the other age groups. While HDL values were low in the 50-60 age group compared to others.

For all 150 patients with metabolic syndrome and abnormal thyroid function tests. 38.7% had subclinical hypothyroidism which was the most common amongst all and 14% had hypothyroidism, while subclinical hyperthyroidism was seen in only 2% and 0.7% had hyperthyroidism as shown in table no 1 below.

**Table 1:** Showing prevalence and variety of thyroid dysfunction

| | Number | Percent |
|---|---|---|
| **Subclinical hypothyroidism** | 58 | 38.7 |
| **Hypothyroidism** | 21 | 14.0 |
| **Euthyroidism** | 67 | 44.7 |
| **Subclinical hyperthyroidism** | 3 | 2.0 |
| **Hyperthyroidism** | 1 | 0.7 |
| **Total** | 150 | 100.0 |

In female patients, 38.2% had subclinical hypothyroidism, 13.2% had hypothyroidism and 48.6% of the patients had normal thyroid values as shown in table no 2 below.

**Table 2:** Showing prevalence of thyroid dysfunction in female patients

| Thyroid profile | Number | Percent |
|---|---|---|
| **Subclinical hypothyroidism** | 26 | 38.2 |
| **Hypothyroidism** | 9 | 13.2 |
| **Euthyroidism** | 32 | 47.1 |
| **Subclinical hyperthyroidism** | 1 | 1.5 |
| **Total** | 68 | 100.0 |

In male patients, 39% had subclinical hypothyroidism, 14.6% had hypothyroidism and 46.3% of the patients had normal thyroid values as shown in table no 3 below.

**Table 3:** Showing prevalence of thyroid dysfunction in male patients

| Thyroid profile | Number | Percent |
|---|---|---|
| **Subclinical hypothyroidism** | 32 | 39.0 |
| **Hypothyroidism** | 12 | 14.6 |
| **Euthyroidism** | 35 | 42.7 |
| **Subclinical hyperthyroidism** | 2 | 2.4 |
| **Hyperthyroidism** | 1 | 1.2 |
| **Total** | 82 | 100.0 |

In this study the distribution of male and female is quite similar in case of normal thyroid values whereas subclinical hypothyroidism is slightly higher in males compared to the females while hypothyroidism is almost equivalent in male and female. Subclinical Hyperthyroidism is slightly higher in males than female.

**Discussion:**

Metabolic syndrome is associated with endocrine and non-endocrine disorders which has widespread consequences. Thyroid functions Alterations are although well known but not recognized clinically and there is inconsistency in thyroid functions in metabolic syndrome[xx]. Thyroid hormones are most importance hormones which play a role in regulating energy balance and metabolism of glucose and lipids affecting the metabolic syndrome parameters including blood pressure, HDL-C, TG and plasma glucose. Hypothyroidism is also associated with dyslipidemia, obesity and increased risk of atherogenic CVD[xxi]. There are many studies which showed higher incidences of association of thyroid dysfunction with metabolic syndrome[xxii].

According to the study of Gyawali et al[xxiii] the prevalence of thyroid dysfunction in patients with metabolic syndrome 31.25% in which 28.90% had subclinical hypothyroidism, 1.55% had overt hyperthyroidism, 0.80% had subclinical hyperthyroidism and 68.75% were euthyroid and Overt hypothyroidism was not present which shows a little bit opposite to this study. In the Muhammed et al[xxiv] showed that in euthyroid population from Pakistan, showed that there was a significant difference in TSH values between study group and control group and in another study of Jayakumar et al[xxv] showed out of total patients with metabolic syndrome of which 60% of patients had thyroid abnormalities in which 44% had subclinical hypothyroidism, 15% had hypothyroidism which is little bit similar to this study.

Another study of Gaurav et al[xxvi] which was done in Indian women with metabolic syndrome, it showed that 53% had subclinical hypothyroidism and 25 % were euthyroid which was similar to this study. According to the study of Punia et al[xxvii] prevalence of metabolic variable in metabolic syndrome and associated thyroid dysfunction. In his study 62% had high TGL values, and 83 % had a low HDL which showed almost similar to this study.

**Conclusion:**

Thyroid dysfunction is common in metabolic syndrome patients. The prevalence of hypothyroidism is more common in metabolic syndrome. Therefore early detection and thyroxine replacement could reduce the significant cardiovascular risk. However, there is still a controversy whether the patients with subclinical hypothyroidism would be benefited from thyroxine replacement. Hence Subclinical hypothyroidism should be picked up and treated at the earliest.

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