ORIGINAL RESEARCH PAPER

General Medicine

A CLINICAL STUDY OF THYROID DYSFUNCTION IN OBESE PATIENTS

KEY WORDS: Obesity, hypothyroidism, overweight, Body Mass Index

Dr. Sunil Kumar Mahavar Assistant Professor, Department of Internal Medicine, S.M.S Medical College, Jaipur (Rajasthan), India

Dr. Mayank Gupta* Senior Resident, Department of Internal Medicine, S.M.S Medical College, Jaipur (Rajasthan), India *Corresponding Author

Dr. H.C. Barjatiya Professor, Department of Internal Medicine, J.L.N. Medical College, Ajmer (Rajasthan), India

ABSTRACT

WHO has labeled obesity a global epidemic. A world heath report- 2017 estimated that 1.9 billion adult people worldwide were overweight and of these 650 million were obese. Obesity can result from hypothyroidism because of decreased calorie needs. This study was conducted to study the prevalence of thyroid disorders in obese subjects of either sex or age. 100 obese subjects in the age group 21-60 years of either sex with their weight of 130% of upper limit of predicted weight for their age or BMI>30 kg/m^2 were included. Serum FT3, FT4 & TSH levels were measured by radio immunoassay. Minimum 10 (71.4%) hypothyroid patients had high risk class I obesity with BMI of 30-35 and only 4 (28.57%) hypothyroid patients had very high risk class II obesity. This study concludes that obesity increases the risk of hypothyroidism, which is more common among younger females than males.

INTRODUCTION:

Since long, excessive body fat known by pejorative term obesity, has been a major concern for the human race. The world health organization (WHO) has labeled obesity a global epidemic. A world heath report- 2017 estimated that 1.9 billion adult people worldwide were overweight and of these 650 million were obese. In view of two most populous countries China and India, only 1% increase in the prevalence of obesity leads to 20 million additional cases. WHO defines overweight and obesity based on the body mass index with BMI 25-29.9 kg/sq. meter denoting overweight and BMI >30/sq. meter denoting obesity.

Formerly, obesity was considered fully explained by the single behavior of inappropriate eating in the setting of attractive foods. Biochemical alteration in human and experimental animal models and the complex interaction of psychosocial and cultural factors indicate that this disease in human is complex and deeply rooted in biological systems. Both genetic and environmental factors are likely to be involved in the pathogenesis[1].

These include excessive calorie intake, decreased physical activity and metabolic and endocrine abnormalities. Hence a number of subtypes of obesity exist.

The increase in obesity worldwide will have an important impact on the global incidence of cardiovascular diseases, type 2 diabetes mellitus, cancers, osteoarthritis, work disabilities and sleep apnea[2]. Obesity had already been implicated with menstrual irregularities, hyperandrogenism, and cholelithiasis[3]. Obesity has 9 more pronounced impacts on morbidity than on mortality.

Type of fat distribution has further classified into 2 types as truncal and central by different authors and can be simply observed as greater waist hip ratio e.g. WHR greater than 0.9 for men and 0.8 for women[4].

To evaluate the pattern of body fat distribution, different workers have used skin fold thickness, ultrasonography, computerized tomography and magnetic resonance imaging[5].

Obesity can result from hypothyroidism because of decreased calorie needs. However, only a minority of hypothyroid patients is truly obese and even smaller proportion of obese patients are hypothyroid[6].

A small percentage of obese patients are hypothyroid where as 60 % of hypothyroid patients gain weight[7].

As the incidence and prevalence of obesity is increasing progressively in proportion to the sedentary lifestyle in India, so hereby we are concentrating our work to reconsider the treatable causes i.e. sub clinical hypothyroidism in obese persons.

Serum leptin concentration in patients with thyroid disorder was higher as it is produced exclusively by adipocytes and is thought to act as lipostatic signal that regulate body weight homeostasis[8]. The result of the study indicates that thyroid hormones may play an important role in the secretion of leptin in human.

METHOD:

The present study is a hospital based observational descriptive study conducted at J.L.N. Medical College and Hospital in Ajmer. This study was conducted to study the prevalence of thyroid disorders in obese subjects of either sex or age. So this study was conducted to find out the relationship between abnormal thyroid function tests and obesity.

The patients attending medical outdoor/indoor of J.L.N medical College hospital Ajmer was taken for the study.

The data were recorded. 100 obese subjects in the age group 21-60 years of either sex with their weight of 130% of upper limit of predicted weight for their age or BMI>30 kg/m^2 were included. Serum FT3, FT4 & TSH levels were measured by radio immunoassay.

The standard curve is prepared by allotting mean count or B/T (%) on the coordinate against the standard concentration on the abscissa using either linear lines or semi log step paper. Detailed history and clinical examination followed with basic anthropometry and evaluation including blood count, blood sugar, liver and renal function tests, chest x-ray, other relevant investigations like HBsAg, HIV, and Lipid profile, USG thyroid gland were done to paucity of resources.

Individuals were deemed unfit if they have diabetes mellitus, hypertension, coronary artery disease, known case of hypothyroidism, Cushing's syndrome, any significant systemic illness and who were on certain drugs like Amiodarone, Lithium, Antithyroid drugs, Iodine containing contrast media etc.

RESULT:

A total 100 obese subjects with weight above 130% of the ideal weight for that height or BMI >30 kg/m^2 were included in the study.

There were 82% females and 18% males. All of the patients in the

study had BMI above 30 kg/m^2. Maximum 66% patients had BMI in the range of 30-35 kg/m^2, while 24% were in the range of BMI 35-40 kg/m^2 and 10% having BMI >40 kg/m^2.

Minimum 10 (71.4%) hypothyroid patients had high risk class I obesity with BMI of 30-35 and only 4 (28.57%) hypothyroid patients had very high risk class II obesity (BMI = 35-40 kg/m^2).

Table 1 Thyroid Profile in Obese subjects

No of obese subjects	No of Euthyroid	No. of Hypothyroid patients		
		Both clinical and biochemical	Only biochemical	Total
100	86	8	6	14
Percentage	86%	8%	6%	14%

The level of serum T3 (0.7 to 2.0 ng/ml), serum T4 (5.5 to 13.5 ug%) and TSH (0.17 to 4.05μIU/ml) were considered as normal range. Maximum number of patients (86%) had normal thyroid hormone profile while a small percentage (14%) of patients had hypothyroidism. Out of them (8%) patients were both clinically and biochemically hypothyroid while 6% were only biochemically (latent) hypothyroid. None of the patients had shown hyperthyroidism (table 1).

Table 2 Serum Thyroid stimulating hormone (TSH) levels in studied subjects

Group	No. of patients	Mean ±S.D. (μIU/ml)	Statistical significance
Euthyroid patients	86	3±0.82	P>0.01 (Non-significant)
Hypothyroid Patients	14	37.04±22.09	P<0.001 (Highly significant)

In 86 euthyroid patients, TSH mean value was 3 ±0.82 and most of the subjects were in normal range. (Table 2) In 14 hypothyroid patients, mean value was 37.04±22.09 which was highly significant. (P<0.001)

DISCUSSION:

In our study there were 18% males & 82% females. The patients having BMI of 30-35 kg/m^2 were classified as high risk class I, while BMI between 35 to 40 were considered as very high risk class II obesity. The patients who had BMI>40 kg/m^2 were considered as extreme high risk class III obesity.

In this study, maximum numbers of patients (66%) were in high risk class I obesity and 24% were in very high risk class II obesity. Only 10% patients had extreme high risk obesity.

In high risk obesity group, 71.42% patients were found to have hypothyroidism, while 4 hypothyroid patients were in very high risk obesity BMI. None of the hypothyroid patients were present in extreme high risk obesity group.

In hypothyroidism patients, obesity had <1 year of duration in 2 (14.28%) cases, 1-10 year duration in 10 (71.42%) cases, >10 year duration in 2 (14.28%) cases.

10 hypothyroid obese patients (71.42%) had less than 10 years duration of their obesity and 2 (14.28%) hypothyroid obese patients had 30 years duration of their obesity.

In our study, the duration of obesity were <10 year in 71.42% cases which correlates with longer duration of obesity. This long duration of obesity was explained on account of pre-supposing that they had primary obesity and recently gained weight secondary to hypothyroidism and developed other symptoms of hypothyroidism[9].

We observed that a small percentage (14%) of patients had thyroid hormone profile suggestive of hypothyroidism. Out of them, 8 (8%) patients were both clinically and biochemically hypothyroid, while 6% were only biochemically hypothyroid. All these hypothyroid obese patients had been put on thyroxine according to their bodyweight and were followed up.

In 86 euthyroid patients, TSH was in normal range (mean value 3±0.82). In 14 hypothyroid patients, mean value was 37.04±22.09. Mean of both groups was also statistically significant. (P<0.001)

CONCLUSSION:

This study concludes that obesity increases the risk of hypothyroidism, which is more common among younger females than males. However, a large size case control study is required to analyze the prevalence of hypothyroidism among obese patients.

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