

Insulin resistance and thyroid hypofunction in obese women – A cross sectional study

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Abstract

We evaluated the relationship between thyroid hypofunction and insulin resistance among obese female patients visiting to endocrinology outpatient clinics (OPD) done at Sparsh Endocrinology & Diabetic Center. In this cross-sectional study, a total of fifty female subjects with age group of 30-60 years, whose body mass index was above 30 kg/m² were studied for 16 months between July 2013 to November 2014 who were attending our endocrinology OPD were studied. Subjects with known disease or disorder of endocrine systems or who were receiving medications like, thyroid hormones preparations, Lithium, Amiodarone or corticosteroids were excluded. Blood samples were assayed for T3, T4, TSH, FBS, Fasting Insulin and HOMA IR was calculated. A total of fifty subjects participated in the study. The mean age of the patients was 31.4 ± 7.32 years. Among these subjects TSH analysis revealed that 26% were having subclinical hypothyroidism (SCH). We found that 46% of these SCH subjects are having insulin resistance while 24% of patients with normal thyroid function are having insulin resistance as estimated by HOMA IR. P-value=0.6 and the odds ratio is 0.667, with a 95% confidence interval extending from 0.19 to 2.09. The observed difference in insulin resistance was not statistically between the subjects with SCH and normal obese subjects. In our study we observed that insulin resistance co exists with thyroid-hypo function in 46% of obese subjects. Caution has to be executed in interpretation of results as our sample is small.

Introduction

Thyroid disease is widespread in women than men and women are five to eight times more likely to develop hypothyroidism. Thyroid illness can increase the risk of cardiovascular disease, infertility, and osteoporosis [1]. The association between thyroid function and body weight in euthyroid individuals has been given an important medical concern. The overt hypothyroidism (OH) and sub-clinical hypothyroidism (SCH) are established risk factors for insulin resistance [2, 3] and multiple studies have proved the association between insulin resistance, hypothyroidism and metabolic syndrome for overt hypothyroidism [4-7]. The prevalence of thyroid disease in patients with diabetes is significantly higher than that in the general population [8]. This indicates a possible interplay between thyroid status and insulin sensitivity. Bakker *et al.* [9] Chubb and Davis *et al.* [10] evaluated Insulin resistance augments the deleterious effect of hypothyroidism on the lipid profile and explained the complex interplay between thyroid function and insulin resistance in diabetic dyslipidemia [10]. To this purpose, we have evaluated the relationship between thyroid hypofunction and insulin resistance among obese female patients visiting to medical OPD.

Materials and methods

In this cross-sectional study, a total of fifty female subjects with age group of 30-60 years, whose body mass index was above 30 kg/m² were studied for 16 months between July 2013 to November 2014 who were attending our Endocrinology OPD were studied. Subjects with known disease or disorder of endocrine systems or who were receiving medications like, thyroid hormones preparations, Lithium, Amiodarone or corticosteroids were excluded. Participants underwent clinical and routine laboratory examination. From each patient five ml of blood sample was collected after an overnight fast of >8 h. Plasma glucose levels were measured using a hexokinase enzymatic

reference method [11]. Fasting insulin levels were measured using a radioimmunoassay (RIA) method. HOMA-IR [12] was used to evaluate Insulin resistance (fasting serum insulin (μU/ml) × fasting plasma glucose (mmol/L)/(22.5). A HOMA-IR value of 2.5 is taken as an indicator of IR in adults. Thyroid hormone assay was carried out by chemiluminescence (CLIA) method [13] and the reference values g/dl. Patients with μg/ml T4 – 5.13 – 14.06 μIU/L, T3 – 0.8-2.0 μIU/L in our laboratory were TSH: 0.4 – 4.5 μ IU/L. Sub clinical hypothyroidism is defined as normal T4 and T3 and TSH >4.5 M IU/L.

Statistical analysis

Data were entered into excel spread sheet 2007. Statistical analysis was performed using Graph pad prism version-5. Data was described as mean ± SD or actual numbers & percentages. To compare the frequency of variable among different groups chisquare analysis was used.

Results

A total of fifty subjects participated in the study. The mean age of the patients was 31.4 ± 7.32 years. Among these subjects TSH analysis revealed that 26% were having subclinical hypothyroidism (SH). We found that 46% of these SH subjects are having insulin resistance while 24% of patients with normal thyroid function are having insulin resistance as estimated by HOMA IR. P-value=0.6 and the odds ratio is 0.667, with a 95% confidence interval

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Table 1. Observed difference in insulin resistance between the subjects with SH and normal obese subjects.

Based on TSH	SH	Normal	P value
TSH (μ IU/L)	>4.5	<4.5	P>0.05-ns
n	13 (26%)	37 (74%)	-
Age (yrs)	33.21 \pm 6.14	29.40 \pm 9.12	ns
HOMA IR	6/13 (46%)	9/37 (24%)	ns

extending from 0.19 to 2.09. The observed difference in insulin resistance was not statistically between the subjects with SH and normal obese subjects (Table 1).

Discussion

Now a day there was much interest on the influence of thyroid hormone action on insulin levels. The pathophysiological basis underlying glucose intolerance, dyslipidemia, abdominal obesity and hypertension has been attributed to insulin resistance [1,14]. Insulin resistance is a cardinal feature of type 2 diabetes mellitus and increased risk of dyslipidemia along with relatively frequently found mild thyroid dysfunction [15]. B M Singh *et al.* study illustrates the complex interplay between thyroid hormonal status and insulin levels in the pathogenesis of insulin resistance [16].

In the present study we have addressed the potential linkage among thyroid hypofunction and insulin resistance in obese females and found that our results were supported by Hala A Abd El-Hafez, *et al.* [17] in their study that thyroid function and volume in PCOS women are significantly associated with BMI suggesting that obesity may represent a link between IR and thyroid changes in these women.

In conclusion, in our study we observed that insulin resistance co exists with thyroid-hypo function in 46% of obese subjects. Caution has to be executed in interpretation of results as our sample is small.

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