Original Article

SERUM LEPTIN IN OBESE TYPE 2 DIABETES MELLITUS

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ABSTRACT

Leptin, a protein hormone expressed and released by adipocytes, is considered to have a role in the regulation of body weight and associated energy metabolism. The aim of this study was to investigate the serum leptin levels in obese type 2 diabetes mellitus individuals. Twenty obese male with type 2 diabetes mellitus (group A) and twenty obese male without type 2 diabetes mellitus (group B) were enrolled in the study. In both groups the body mass index (BMI), HbA1c and serum leptin levels were assessed. Serum leptin concentration of Group A was significantly lower than of group B; 34.38±15.56 ng/ml versus 46.29 ±/13.51 ng/ml, respectively; p< 0.01. Serum leptin level was also significantly lower in a studied group of poorly controlled diabetes mellitus individuals compared to the one of well-controlled diabetics; 29.49 ± 11.82 ng/ml versus 37.89 ± 10.54 ng/ml, respectively; p < 0.05. We also found a lower serum leptin level in obese male with type 2 diabetes mellitus than that of non diabetic obese. Serum leptin was lower in poorly controlled diabetes than of well controlled diabetes. We suggest that further studies are required to make clear the issue for lower leptin level and its role in the development of insulin resistance.

Key words: *Leptin, Type 2 diabetes mellitus, Obesity*

Introduction

Leptin, a protein hormone expressed and released by adipocytes and encoded by obese gene. It is considered to have a role in the regulation of body weight and associated energy metabolism[1]. Leptin functions primarily as an anti-obesity hormone. Obesity is a well known risk factor for the development of diabetes mellitus. Leptin has been implicated in the regulation of adipose mass[2] and has been reported to alter both insulin sensitivity [3,4] and insulin secretion[5]. Although it is clear that circulating leptin is positively correlated with body fat mass[6] Serum leptin levels were studied in hypothyroid females[7], infertile patients[8], pre-eclampsia patients [9] and patients with liver disease [10].There is controversy about the level of circulating leptin whether it is reduced[11], raised [12,13] or remains unchanged [14–16] in type 2 diabetes.

In this study we aimed to investigate leptin levels in obese male subjects with type 2 diabetes mellitus and in a small group with poor glycemic control.

Methods

Twenty obese male with type 2 diabetes mellitus (group A) and twenty obese male without type 2 diabetes mellitus (group B) were enrolled in the study. Patients having HbA1c greater than 8.0% were accepted as poorly controlled diabetes. The height (m), weight (kg) and BMI (kg/m2) were recorded. All subjects had a BMI equal to or greater than 30 for participating in the study as the obese subject. Before collecting venous blood samples using standard venipuncture , subjects were asked to have a fasting period of 12 h. In both groups, HbA1c and serum leptin levels were assessed at Microbiological laboratory, Chennai,India. HbA1c levels were measured using Nycocard reader. Serum leptin levels were measured using an enzyme immunoassay method (ALPCO,USA). The limit of detection for leptin is 0.50 ng/ml.

The results are expressed as Mean ± SD for all the parameters and the statistical significance of differences among groups was examined by using t-test. For all

statistical assessments a value of $p < 0.05$ was accepted to be statistically significant.

Results

The characteristics and biochemical parameters of obese diabetic and obese non-diabetic subjects are summarized in Table 1. Serum leptin concentration was significantly lower in group A than group B (34.38±15.56 ng/ml versus 46.29 ± 13.51 ng/ml, respectively; $p < 0.01$). Of the twenty diabetic subjects, leptin was also significantly lower (Table 2) with 9 poorly controlled diabetes mellitus individuals than 11 well-controlled diabetics (29.49 ± 11.82 ng/ml versus 37.89 ± 10.54 ng/ml, respectively; $p < 0.05$).

Discussion

Serum leptin levels are found higher in women than in men[17] and this is probably owing to adipose tissue in women being higher than in the opposite sex, the existence of negative correlation between leptin and testosterone levels[18]. Leptin has the ability of regulation of insulin secretion from the pancreatic islet cells.[19] After leptin was given to mice who had leptin deficiency, it has been demonstrated that there had been a decrease in hyperglycemia and hyperinsulinemia, inhibition in hepatic gluconeogenesis and insulin secretion via direct effects on beta cells.[20]

Some investigators have found that in more obese patients with type 2 diabetes mellitus, the leptin levels were less in patients with not well controlled diabetes than in well-controlled diabetic subjects.[21] This was related to the insulin deficiency. In our study also, leptin levels were significantly lower in patients who have HbA1c above 8.0%. It has been found that untreated diabetes gave rise to a reduction in leptin levels owing to an ineffective release of insulin by the monodrug therapy[22] .

In this study, We found low serum leptin level in obese male with type 2 diabetes mellitus than non diabetic obese and also leptin is lower in poorly controlled diabetes than well controlled. We suggest that further studies are required to make clear the issue for lower leptin level and it's role in the development of insulin resistance.

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Table 1 : Characteristics and biochemical parameters of obese diabetic and obese non-diabetic subjects.

	Obese diabetic (group A)	**Obese non-diabetic (group B)**	**p-value**
BMI (kg/m2)	31.24 ± 3.60	33.09 ± 2.19	0.516
Leptin (ng/ml)	34.38±15.56	46.29 ±/13.51	< 0.01
HbA1c (%)	8.86 ± 2.01	5.8 ± 0.12	< 0.001

Table 2: Leptin levels in subjects who have poorly and well controlled diabetes mellitus.

	Poorly controlled diabetes (n = 9)	**Well controlled diabetes (n = 11)**	**p - value**
Leptin (ng/ml)	29.49 ± 11.82	37.89 ± 10.54	< 0.05

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