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Original Research

Correlation of Serum Adiponectin and Leptin levels in Type 2 Diabetes Mellitus

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ABSTRACT:
Aim- To assess the relationship between circulating levels of adiponectin and leptin and the presence of type 2 diabetes mellitus in individuals. **Materials and Methods-** 30 individuals with type 2 diabetes receiving treatment. 30 patients age- and gender-matched control participants were recruited for comparison. Data analysis was performed using SPSS software. **Results-**Serum leptin levels were significantly higher (26.2 U/ml) in diabetics than in non-diabetics (15.3U/ml). Like-wise, serum adiponectin was significantly higher in the diabetic group in comparison to non-diabetic group. **Conclusion-** Adiponectin and leptin levels have the potential to serve as valuable clinical markers for Type 2 Diabetes.
Keywords- Diabetes, Leptin, Adiponectin

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INTRODUCTION

Adipose tissue is a key endocrine organ that communicates with brain, muscle, liver, and pancreas, thereby maintaining energy homeostasis. The communication between adipose tissue and other organs is mainly mediated by multiple endocrine substances secreted by adipose tissue, referred to as adipocytokines.[1] Changes in the levels of adipocytokines are suspected to be indicators of dysfunction in adipose tissue. Additionally, adipocytokines could provide critical clues regarding the pathophysiological mechanisms of type 2 diabetes mellitus (T2DM).[2,3]

Obese people are at risk for diabetes, CVD, stroke, cancer, and obstructive sleep apnea. Better knowledge of DM, CVD, and obesity pathogeneses linkages is needed to create innovative techniques for lowering patient health problems and discovering new diagnostic biomarkers. Leptin is a 16-kDa protein hormone that regulates appetite and energy balance. Leptin has a key function in the pathogenesis of obesity and IR.[4] Experimental investigations show that serum leptin regulates brain glucose. Some studies found a high connection between diabetes biomarkers and leptin levels,[5]while others found none. Adiponectin, another adipokine, protects against IR/diabetes and atherosclerosis. Reduced adiponectin levels may contribute to T2DM, obesity, and CVD. Adiponectin regulates insulin sensitivity, glucose, lipid metabolism, and cardiovascular homeostasis.[6] Leptin and adiponectin are hormones secreted from adipose tissue; leptin promotes metabolism and lowers hunger, while adiponectin mediates insulin-sensitizing action. Abnormal levels of leptin are linked to obesity and IR. Greater adipose tissue (body fat) mass and IR raise leptin levels, whereas higher body fat mass and insulin sensitivity reduce adiponectin levels.[5- 7] Hence; the present study was conducted for assessing the relationship between circulating levels of adiponectin and leptin and the presence of type 2 diabetes mellitus in individuals.

MATERIALS AND METHODS

The study was designed as an observational cross-sectional study involving a total of 30 individuals with type 2 diabetes (comprising 16 men and 14 women)

receiving treatment. Additionally, 30 patients age- and gender-matched control participants were recruited for comparison. Anthropometric measurements such as height, weight, waist circumference, and hip circumference were recorded, with specific techniques utilized for measurements like waist circumference and height. Blood pressure was also assessed following a standardized procedure. Fasting blood samples were collected from participants. Serum adiponectin and leptin levels were evaluated using auto-analyser. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The study comprised 30 individuals with diabetes (cases) and 30 individuals without diabetes (controls) within the age range of 40 to 65 years. The mean age of the case group was 51.12 ± 3.68 years, whereas the mean age of control group was 40.31 ± 6.17 years. Both groups included 16 males and 14 females, and there was no significant gender difference noted between the case and control groups, as indicated in Table 1. Serum leptin levels were significantly higher (26.2 U/ml) in diabetics than in non-diabetics (15.3U/ml). Like-wise, serum adiponectin was significantly higher in the diabetic group in comparison to non-diabetic group.

Table 1: Distribution of study groups according to gender

Gender	Group	
	Case n (%)	Control n (%)
Male	16(53.4)	16(53.4)
Female	14(46.6)	14(46.6)
Total	30(100)	30(100)

Table 2: Serum adiponectin and leptin levels according to gender in control group and case group

Group	Adiponectin (µg/ml)	Leptin(U/ml)	p-value
Control group	5.1	15.3	0.001*
Case group	9.2	26.2	0.001*

*: Significant

DISCUSSION

Diabetes and its complications are a major cause of morbidity and mortality in the United States and contribute substantially to health care costs. Although we have already seen an epidemic of diabetes in the United States over the past 2 decades, we can expect a continued rise in the incidence of diabetes as the population ages, a continued increase in adult obesity rates, and an increase in the population of minority groups that are at high risk for diabetes. In addition, rising childhood obesity rates and the increasing diagnosis of type 2 (formerly “adult-onset” diabetes) among children and young adults have become an increasingly serious health crisis, which will result in more people having and managing diabetes for most of their lives.[8- 10]

Serum leptin levels were significantly higher (26.2 U/ml) in diabetics than in non-diabetics (15.3U/ml). Like-wise, serum adiponectin was significantly higher in the diabetic group in comparison to non-diabetic group. In a study conducted by Saltevo et al. in 2009[9], it was found that adiponectin concentrations decreased more significantly in women compared to men among individuals with prediabetes and Type 2 Diabetes. Despite higher absolute adiponectin concentrations in women, the gender ratio (women to men) for adiponectin concentrations showed a linear decrease. Adipocytokines, which are produced by adipose tissue, play vital roles in regulating energy balance and maintaining homeostasis.[10,11] Leptin and adiponectin, in particular, play significant roles in influencing insulin sensitivity and inflammation, making them closely linked to Type 2 Diabetes. It is commonly understood that leptin acts as a pro-inflammatory cytokine, while adiponectin exhibits anti-diabetic and anti-inflammatory properties.[11,12]

Liu, Wei et al compared leptin, resistin, and adiponectin concentrations in patients with newly diagnosed T2DM who had normal body mass index (BMI) and those who were obese.In total, 85 healthy participants and 38 patients with diabetes (19 with normal BMI and 17 who were obese) were enrolled. After adjustment for BMI and waist circumference, the median leptin concentration was higher in the obese group (6.77 (3.89–10.73) ng/mL) than in the normal BMI group (1.69 (0.80–3.89) ng/mL) (P = .007), whereas the median adiponectin concentration was lower in the obese group (1.03 (0.75–2.36) µg/mL vs 3.36 (0.59–7.63) µg/mL, P = .03). In addition, the adiponectin/leptin ratio was higher in the normal BMI group (145.6 (41.3–495.9) ng/mL) than in the obese group (20.55 (8.74–36.94) ng/mL, P = .002).Compared with the normal BMI T2DM group, the obese T2DM group exhibited a disturbed adipocytokine profile in the form of a significantly increased leptin concentration and reduced adiponectin level.[12]Bidulescu, A. et al assessed the association of leptin and adiponectin with incident type 2 diabetes (T2D), their interactions with sex and obesity status, and mediation by insulin resistance.Among our 3363 participants (mean age 53 years, 63% women), 584 developed incident T2D. Leptin was directly associated with incident T2D when modeled without HOMA-IR (HR = 1.29, 95% CI = 1.05–1.58). This direct association between leptin and T2D was significant among men

(HR = 1.33, 95% CI = 1.05–1.69), but nonsignificant among women (HR = 1.24, 95% CI = 0.94–1.64); statistical interaction with sex was nonsignificant (p = 0.65). The associations in all participants and in men were nullified by HOMA-IR (HR = 0.99, 95% CI = 0.80–1.22; HR = 1.00, 95% CI = 0.78–1.28, respectively), indicating mediation through insulin resistance (proportion mediated: 1.04), and were not observed in abdominally obese participants. Adiponectin was inversely associated with T2D even after adjustment for HOMA-IR in women (HR = 0.68, 95% CI = 0.55–0.84), but not in men (HR = 0.80, 95% CI = 0.62–1.04). The inverse association was present only among abdominally obese participants, and persisted after adjustment for HOMA-IR.[13]

CONCLUSION

Adiponectin and leptin levels have the potential to serve as valuable clinical markers for Type 2 Diabetes.

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