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Evaluation of Serum Adropin Level in Type 2 Diabetic Patients and its Correlation with Body Mass Index

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM), the most common metabolic disease in all populations, is a costly disease and consume more than 8.69% of total health expenditure. T2DM is also considered as an independent risk factor for both microvascular and macrovascular problems. **Methods:** This present study was designed to evaluation of serum adropin level in type 2 diabetics and its correlation with body mass index. **Results:** The levels of fasting blood sugar, glycosylated hemoglobin, total cholesterol, triglycerides and low density lipoprotein cholesterol were significantly higher in the type 2 diabetics, while the high density lipoprotein cholesterol and Adropin levels were lower as compared to control group. **Conclusion:** Adropin was inversely correlated with Fasting blood sugar in type 2 diabetics and was also negatively correlated with body mass index.

Keywords: Adropin, Type 2 DM & BMI.

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM), the most common metabolic disease in all populations,[1] is a costly disease and consume more than 8.69% of total health expenditure. T2DM is also considered as an independent risk factor for both microvascular and macrovascular problems.[2] T2DM is characterized initially by two principal defects; insulin resistance and beta cell failure which eventually lead to glucose intolerance and hyperglycemia . In recent years, much attention has been focused on potential role of molecules involved in regulation of metabolic homeostasis and complicated interactions between its components in pathogenesis of T2DM. The metabolic homeostasis is principally modulated through the neuroendocrine incorporation of the central stress pathways to the CNS centers that control appetite and energy expenditure.[3] Adropin is a peptide hormone that was discovered in 2008 by Kumar et al. This protein consists of 76 amino acids, and it was originally described as a secreted peptide, with residues 1-33 encoding a secretory signal peptide sequence. Adropin is one of the recent discovered peptide hormones with protective roles involved in metabolic homeostasis, which is a product of the energy homeostasis associated (Echo) gene.[4] Except for observations on animals, reduced adropin concentration in human is usually related to increased risk of metabolic disorders, involving gestational diabetes mellitus, metabolic syndrome, nonalcoholic fatty liver disease and polycystic ovary syndrome.[5,6] Considering the evidence mentioned above,[7,8] adropin might possess potent effects on metabolic adaptation to macronutrients, modulation of insulin sensitivity and maintenance of energy homeostasis. It is most likely, but still lack of evidence that adropin might be involved in the occurrence and development of T2DM. This present study was designed to evaluation of serum adropin level in type 2 diabetic patients and its correlation with body mass index.

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MATERIALS AND METHODS

This present study was conducted in the Department of Biochemistry, Govt. Medical college shahdol, Madhya Pradesh during the period July 2018-june 2019. Total of 50 subjects in the age group 30-65 years were randomly selected to obtain mixed group of subjects from Govt. Medical college shahdol and were screened to identify, (i) Non-diabetic subjects as control in Group-A and (ii) Type 2 diabetic patients as cases in Group-B on the basis of ADA criteria:

Inclusion criteria:

- FBG ≥126 mg/dL or
- OGTT ≥200 mg/dL or
- Random blood glucose ≥ 200 mg/dL or
- HbA1c > 6.5%

Exclusion criteria:

- Chronic liver and renal disease
- History of inflammatory
- Infectious
- Malignant diseases

Methodology:

i. Fasting Blood Glucose by GOD-POD method.[9]
ii. Glycosylated Haemoglobin (HbA1c) by ion exchange resin method.[10]
iii. Total Cholesterol (TC) by enzymatic end point CHOD-POD method.[11]
iv. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase method.[12]
v. HDL-Cholesterol by direct enzymatic end point method.[13,14]
vi. LDL-Cholesterol by Friedewald's formula.[15]
vii. Serum Adropin levels were determined by ELISA kit

Statistical analysis:

Results were analyzed by using Unpaired Student T-test with "P" value < 0.05 for significance and Pearson correlation coefficient was used to evaluate any relationship between different variables.

RESULTS & DISCUSSION

A total of 25 Type 2 diabetic patients as cases and 25 Healthy subjects controls were included in this study. The mean age of cases and controls were 41.6±6.23 and 35.9±4.03 years respectively and there was no significant difference between them (p=0.14). There were significant differences regarding body mass index (BMI). Mean values of all parameters and p-values are given in table-1. The levels of fasting blood sugar, glycosylated hemoglobin, total cholesterol, triglycerides and low density lipoprotein cholesterol were significantly higher in the type 2 diabetics patients, while the high density lipoprotein cholesterol and Adropin levels were lower as compared to control group.

Table 1: Comparison of Biochemical parameters between cases and Controls

Biochemical Parameters	Cases (25)	Controls (25)	P- value
	Mean ± SD	Mean ± SD	
BMI kg/m2	26.72 ± 4.21	23.46 ± 2.51	0.001
FBS(mg/dl)	168 ± 25.2	102 ± 12.06	0.001
HbA1c (%)	8.1 ± 2.42	5.2 ± 1.4	0.001
TC (mg/dl)	257.6±32.7	146.6±2.5	0.001
TG (mg/dl)	204.9±21.04	110.5±20.3	0.001
HDL-c(mg/dl)	39.02 ± 8.07	42.6 ± 6.02	0.21*
LDL-c(mg/dl)	187.02 ± 36.8	124.06 ± 18.15	0.001
Adropin ng/ml	2.12 ± 0.12	3.82 ± 0.42	0.01

Note: Statistically Significant at p value <0.05; *NS: Statistically not Significant

Adropin level were found to be significantly lower in type 2 diabetic patients compared to healthy subjects. Adropin was inversely correlated with Fasting blood sugar in type 2 diabetic patients and was also negatively correlated with BMI. In the present study, we have reported that serum concentrations of adropin were significantly decreased in T2DM patients compared with control subjects. Besides, serum adropin levels of obesity group were lower than that of normal weight group within study participants. Adropin has been identified as potent regulatory hormone implicated in the maintenance of insulin sensitivity and glucose tolerance in mice.[16,17] Aydin et al. demonstrated that serum and tissue adropin levels were both increased in streptozotocin-induced diabetic rats.[18] In addition to animal based researches, a series of studies in humans have been implemented to further ascertain the correlation of serum adropin levels with systemic insulin resistance and metabolic disorders. Celik et al. assumed that decreased adropin level in maternal and cord serum of the GDM patients was associated with the underlying pathogenesis of GDM,[19] which was in accordance with another case-control study conducted in Iranian pregnant women.[20] Besides, previous researches have also shown that low levels of plasma adropin were associated with metabolic syndrome, NAFLD and PCOS.[21,22] Nevertheless, the concentrations of adropin in T2DM patients were not as clear. We found in the present study that serum adropin levels in T2DM patients were significantly decreased compared with control subjects. The result was consistent with findings by Wu et al. reporting that serum adropin level was lower in T2DM patients than in nondiabetic patients, which were observed in individuals with chest pain and suspected coronary artery disease.[23] In current study, we then explored the correlations of adropin with FBS & BMI in all participants and Adropin was inversely correlated with Fasting blood sugar in type 2 diabetic patients and was also negatively correlated with BMI. Our findings were in agreement with previous researches,[24] suggesting the reasonable link of adropin with glucolipid metabolism and insulin sensitivity. Our study was based on a single measurement of serum adropin in the fasting state, which could not reflect adropin concentration fluctuation over time especially after the stimulation of macronutrient consumption.

CONCLUSION

In conclusion, Type 2 diabetic patients have lower adropin levels and serum adropin was inversely correlated with Fasting blood sugar in type 2 diabetic patients and was also negatively correlated with BMI. Besides, obese T2DM patients are found to have more considerably reduced levels of adropin. Peptide hormone adropin, involved in glucolipid metabolism and insulin sensitivity, is necessary to be further explored of its variation characteristics after macronutrient consumption and pathophysiological mechanism in T2DM.

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