Section: Biochemistry

Research

SERUM ADROPIN, INSULIN AND URINARY MICROALBUMIN IN DIABETIC NEPHROPATHY: A TEACHING HOSPITAL BASED STUDY

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Abstract

Background: Diabetic nephropathy is one of the microvascular complications seen in chronic cases of diabetes mellitus. Around 20-40% cases of diabetes mellitus become the victim of diabetes nephropathy. It is expressed in liver and encoded by Energy Homeostasis Associated (Enho) gene consist of 76 amino acid residues. The study is aimed to study the serum adropin, insulin and urinary microalbumin in diabetic nephropathy patients. **Materials and Methods:** This was the hospital-based cross-sectional study conducted in the Rama Medical College after getting the ethical approval from the institutional ethics board of the Department of Biochemistry. One hundred and three (103) diabetic nephropathy and 101healthy controls were enrolled in the study. Serum adropin and insulin levels were estimated using Enzyme Linked Immunoassay (ELISA) method. The urinary microalbumin was measured using immunoturbidimetric method. **Result:** Comparison of variables between the groups revealed the significant difference in serum adropin, insulin, and urinary microalbumin (P value: <0.05) between diabetic nephropathy and healthy controls. Serum adropin was significantly correlated with serum insulin level in the nephropathy group (r=0.85, P value: 0.03). However, no significant correlation was seen with urinary microalbumin level (r=0.67, P value: 0.45) in the diabetic nephropathy group. **Conclusion:** Serum adropin was decreased in diabetic nephropathy in comparison to healthy subjects. Urinary microalbumin level was not significantly correlated with serum adropin level. The positive correlation of serum adropin with insulin showed that adropin may fluctuate in serum along with serum insulin levels.

INTRODUCTION

Diabetes mellitus is one of the endocrine disorders associated with hyperglycemia and disturbances in carbohydrate, fat, and protein metabolism.[1] Diabetic nephropathy is one of the microvascular complications seen in chronic cases of diabetes mellitus. Around 20-40% of cases of diabetes mellitus become the victim of diabetes nephropathy.[2] Moreover, hypertension and hyperglycemia may contribute to renal injury in Diabetic patients.[3]

Adropin is a protein hormone, identified inthe liver of mice. It is expressed in the liver and encoded by Energy Homeostasis Associated (Enho) gene consists of 76 amino acid residues.[4] Adropin is involved in glucose homeostasis, increased adiposity, and insulin sensitivity.[4] Some studies have shown the reduction of serum adropin levels in Type 2 Diabetes Mellitus (T2DM) patients.[5] The serum adropin was elevated in rats that are induced diabetes mellitus by Streptozotocin in comparison to the control rats.[6]

T2DM is characterized by insulin resistance and beta cell failure. Obesity also plays the role in insulin resistance, which leads to hyperinsulinemia and finally T2DM.[7,8]Firstly, the serum insulin level is found to be increased in obese patients before they become diabetic. Measurement of serum insulin mirrors the status of insulin resistance, the therapeutic application of insulin, and future complications in diabetic patients.[9]

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Diabetic Nephropathy (DN) reduces the life expectancy of diabetic patients and Microalbuminuria is an early biomarker of diabetic nephropathy.[10] Microalbuminuria is considered positive when the albumin to creatinine ratio (ACR) is 30-300mg/g creatinine in two of three tests within a three to six months period in a spot urine sample.[11,12]

The current study aimed to find out the comparison of adropin, insulin, and urinary microalbumin between healthy controls and diabetic nephropathy patients. In addition, the correlation of serum adropin level with serum insulin level, urinary microalbumin, and other parameters of sugar profile was carried out.

MATERIALS AND METHODS

This was the hospital-based cross-sectional study conducted in the Rama Medical College after getting ethical approval from the institutional ethics board of the Department of Biochemistry. One hundred and three (103)diabetic nephropathy and 101healthy controls were enrolled for the study after taking verbal and written consent. Serum adropin and insulin levels were estimated using Enzyme-Linked Immunoassay (ELISA) method. The urinary microalbumin was measured using the immunoturbidimetric method.

All the data were entered in Microsoft Excel version 2010 and converted into Statistical Package of Social Sciences (SPSS) version 22. The Chi-square test was used to compare the categorical data. An Independent t-test was used to compare the mean between the two groups. Pearson correlation was used to find out the correlation between the variables. A p value of less than 0.05 and a 95% confidence interval were considered statistically significant.

RESULTS

The current study investigated the serum adropin, insulin, and urinary microalbumin in diabetic nephropathy population and healthy controls. We had 103 diabetic nephropathy populations out of which 48 were female and 55 were male. Similarly, in healthy controls 44 were female and 57 were male patients as illustrated in [Figure 1].

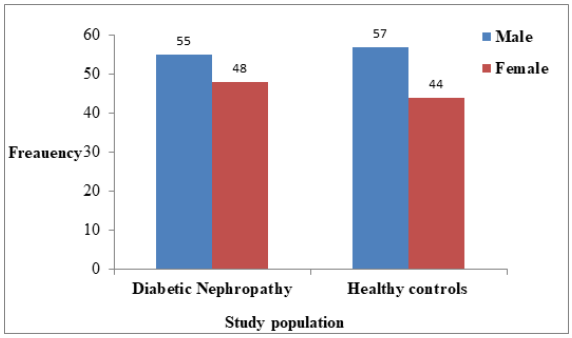

Figure 1: Distribution of population based on gender

Comparison of variables between the groups revealed the significant difference in serum adropin, insulin, and urinary microalbumin (P value: <0.05) between diabetic nephropathy and healthy controls as illustrated in [Table 1].

[Table 2] illustrates the correlation of serum adropin with insulin, microalbumin, and other variables in the Diabetic nephropathy population. Serum adropin was significantly correlated with serum insulin level in the nephropathy group (P value: 0.03). However, no significant correlation was seen with urinary microalbumin level (P value:0.45).

Table 1: Comparison of variables between diabetic nephropathy and healthy controls

S.No.	Variables	Diabetic nephropathy (n=103)	Healthy controls (n=101)	P value*
1.	Age (years)	51.340±11.47	54.34±8.42	0.02*
2.	Adropin (ng/mL)	5.93±3.018	12.75±3.92	0.00*
3.	BSF (mg/dL)	189.47 ± 74.08	83.75 ± 15.52	0.00*
4.	BSPP (mg/dL)	317.17±82.57	131.34±23.36	0.00*
5.	HbA1C (%)	10.71±7.41	5.27±0.51	0.00*
6.	Insulin (ng/mL)	30.71±11.21	10.43±20.36	0.02*
7.	Microalbumin (mg/g Creatinine)	61.463±24.0183	18.27±4.50	0.00*

Table 2: Correlation of variables with serum adropin level in the Diabetic nephropathy population

S.no.	Variables	r	P* value
1.	BSF	-0.08	0.5
2.	BSPP	-0.20	0.16
3.	HbA1C	-0.10	0.48
4.	Insulin	0.85	0.03*
6.	Microalbumin	0.67	0.45

Table 3: Correlation of serum adropin with other variables

S.no.	Variables	r	P value
1.	BSF	0.25	0.00*
2.	BSPP	-0.07	0.47
3.	HbA1C	0.25	0.01*
4.	Insulin	0.01	0.89
5.	Microalbumin	0.06	0.50

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The correlation analysis was also done in healthy controls to reveal the correlation of serum adropin with different variables as illustrated in [Table 3]. The correlation analysis revealed the significant correlation of serum adropin with fasting blood glucose (r=0.25, P value:0.00), and glycated hemoglobin (r=0.25, P value: 0.01). However, there was no significant correlation of serum adropin with serum insulin level (r=0.01, P value: 0.89) and urinary microalbumin (r= 0.06, P value: 0.50).

DISCUSSION

The current study revealed a significant reduction of serum adropin in diabetic nephropathy patients in comparison to the healthy controls. Zang H et al also revealed a similar type of results; they reported the median serum adropin 5.5 and 3.8 respectively in healthy controls and diabetic nephropathy group.[13]From the animal model studies, adropin has been reported as a regulator of insulin sensitivity and glucose tolerance.[4,14]

Our study also reported asignificant positive correlation of serum adropin with insulin in the diabetic nephropathy group (r=0.85, P value: 0.03). There was no significant correlation betweenserum adropin with urinary microalbumin (r=0.67, P value: 0.45).A study by Hu W and Chen Li reported a significant negative correlation between serum adropin with albumin creatinine ratio, which contradicts our study.[15]

The precise role of adropin in the pathogenesis of diabetic nephropathy is unknown.Akcilar R et al reported that adropin decreases the expression of tumor necrosis factor-alpha (TNFα) and interleukin 6 (IL6) in the pancreas of diabetic rats.[16] Our study revealed a significantly increased serum insulin level in the diabetic nephropathy population. It has been reported that insulin resistance may occur which leads to an elevation of serum insulin levels. Mack R reported the importance of the estimation of insulin in diabetic patients.[9]

CONCLUSION

From our study, serum adropin was decreased in diabetic nephropathy in comparison to healthy subjects. Urinary microalbumin level was not significantly correlated with serum adropin level. The positive correlation of serum adropin with insulin showed that adropin may fluctuate in serum along with serum insulin levels.

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