

## Assessing Relationship between Vaspin and Biochemical Parameters and its Association with Diabetic Mellitus (T2DM): A Clinical Study

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Conflict of interest: Nil

### Abstract

**Aim:** The aim of the present study was to assess the assessment the relationship between vaspin and biochemical parameters and its association with Diabetic mellitus (T2DM).

**Methods:** The present study was conducted at Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India for one year. The study included 90 randomly selected participants who all underwent several important routine health check-ups. This study included 53 patients with confirmed T2DM (28 males and 25 females) and 37 healthy individuals free of diabetes, which is known as the control group.

**Results:** The mean value of glucose 229.251 mg/dl for participants with T2DM was significantly higher ( $P=0.001$ ) high compared to participants (control) whose mean glucose value was 93.214 mg/dl. The mean value of vaspin is 773.150 pg/ml for participants with T2DM was significantly high ( $P = 0.01$ ) compared to participants (control), where the mean value of vaspin was 303.660 pg/ml. The results showed that the mean values of vaspin were 745.210 pg/ml and 812.280 pg/ml for male and female participants with T2DM, respectively. However, the vaspin level of participants with gender was not significantly associated ( $P=0.079$ ). There was no significant correlation between vaspin and creatinine, troponin, CK-MB ( $p>0.05$ ) in patients with T2DM, but there was a significant positive correlation between vaspin and glucose ( $P=0.05$ ) in T2DM patients. Also, the results showed that there was a significant negative correlation between vaspin and vitamin B12 ( $P=0.05$ ) in T2DM patients.

**Conclusion:** In conclusion, the results of the current study showed that the levels of blood glucose and vaspin were significantly higher in T2DM patients than in control group participants and significantly associated with T2DM. While the levels of creatinine, troponin and creatine kinase (CK-MB) in T2DM patients were higher but not significant. While vitamin B12 levels were significant lower in T2DM patients compared to control group therefore significantly associated with T2DM.

**Keywords:** Vaspin, Biochemical parameters, Diabetic mellitus (T2DM)

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### Introduction

Type 2 Diabetes Mellitus (T2DM) accounts for about 90% diabetic patients worldwide and India leads the world with more than 62 million diabetes in 2013. [1] T2DM is on the way to become a pandemic disease in India. [2,3] As hyperglycemia, obesity, dyslipidemia, physical inactivity and stress are common risk factors shared by T2DM and Coronary Artery Disease (CAD), an increase prevalence of diabetes points towards an escalating risk of CAD. [4] CAD is two to four times more common in diabetic patients as compared healthy populations. [2,5] The prevalence of CAD among diabetic subjects was 21.4%, which was much higher than 14.9% among subjects with impaired glucose tolerance and 9.1% among those with healthy population. CAD leads to more than 80% of

all mortality and 75% of all hospitalizations in diabetic subjects. [2] Though there are wide ethnic and geographic variations in prevalence of T2DM and CAD, their association seems to be strong. [6]

Adipokines are proteins/peptides with hormone-like properties (some are cytokines), released from adipose tissue. Various adipokines like omentin-1, visfatin, leptin (a protein secreted by fat cells), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), resistin and adiponectin significantly affect obesity-related metabolic diseases by controlling fat metabolism, energy homeostasis and insulin sensitivity. [7,8] The obesity and atherosclerosis is linked by adipokines, as they influence the function of endothelial cells, arterial smooth muscle cells and macrophages in

vessel walls. [9-11] VASPIN is a Visceral Adipose Tissue Derived Serine Protease Inhibitor, one of the more recently discovered adipokine. It inhibit the proteases responsible for insulin resistance and carotid plaque development and its rupture. [12]

The aim of the present study was to assess the assessment the relationship between vaspin and biochemical parameters and its association with Diabetic mellitus (T2DM).

### Materials and Methods

The present study was conducted at Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India for one year. The study included 90 randomly selected participants who all underwent several important routine health check-ups. This study included 53 patients with confirmed T2DM (28 males and 25 females) and 37 healthy individuals free of diabetes, which is known as the control group. Where the ages of male ranged from 18 to 37 years, and the ages of female ranged from 18 to 37 years. Also, the control group included participants who met all inclusion criteria. The patients' ages ranged from 18 to 37 years.

#### Inclusion and Exclusion Criteria Inclusion Criteria

Cases were adults within the aforementioned age groups without Diabetic complications.

#### Exclusion Criteria

Diabetics complications: heart disease, myocardial infraction, unstable angina, stable angina, heart failure, Diabetic neuropathy, problems with feet, oral health, Diabetic retinopathy, hearing, and Gestational diabetes.

#### Biochemical and Clinical Measurements

Blood samples were collected and drawn from all participants after 15 minutes of rest and a ten-hour

fast. Blood samples were kept at 10 °C until centrifugation. All blood samples were stirred and centrifuged at 4000 g for 10 minutes at 28 °C after collection. Plasma was withdrawn and separated from blood samples immediately for vaspin assessment, then stored at -80 °C until vaspin measurement. Plasma vaspin was measured and determined by an enzyme- linked Immunosorbent assay (Elisa, Elabscience Company, USA) technique kit. Plasma concentrations of vaspin were measured and analyzed using (Bio-Tek Instruments, Inc, USA). Biochemical parameters that included blood glucose, creatinine and CK-MB were measured by biometrics. Blood glucose (BG) levels, or blood glucose were assessed by the Trinder reagent test using the god-pap method (Biolabo company, France). Serum creatinine assessed by enzymatic method (Biolabo Company, France). CK-MB assessed by Immune inhibition methods (Biolabo Company, France) while troponin concentration assessed by using the One- Step Immunoassay (Nanogen Point of care, Toronto, Ontario, Canada) and Serum vitamin B12 was determined by an enzyme-linked immunosorbent assay (ELISA) (technique Inc. kit, USA) and this analysis was performed using (bio- Tek Instruments, Inc, USA).

#### Statistical Analysis

SPSS version 24 was used to perform the statistical analyses. The value of  $p < 0.05$  was taken and determined to indicate statistical significance. Quantitative data are expressed as means  $\pm$  standard error (SE), which is used to used also to refer the standard deviation  $\pm$  (SD) of the samples. The use of Pearson's correlation was used to find the correlations between patients' biochemical parameters and vaspin.

#### Results

**Table 1: Comparing between biochemical parameters in T2DM patients and healthy participants (control)**

Parameters	Control Mean $\pm$ SE (N=40)	Patients Mean $\pm$ SE (N=50)	P-Value
Glucose mg/dl	93.214 $\pm$ 1.931	229.251 $\pm$ 0.984	0.001
Creatinine mg/dl	0.664 $\pm$ 0.071	0.940 $\pm$ 0.180	0.068
Vitamin B12 pg/ml	697.520 $\pm$ 6.214	173.760 $\pm$ 4.615	0.01
Troponin ng/ml	0.0056 $\pm$ 0.014	0.018 $\pm$ 0.021	0.241
CK-MB U/l	19.251 $\pm$ 0.054	26.798 $\pm$ 0.917	0.072

The mean value of glucose 229.251 mg/dl for participants with T2DM was significantly higher ( $P=0.001$ ) high compared to participants (control) whose mean glucose value was 93.214 mg/dl.

**Table 2: Comparing between vaspin levels in T2DM patients and healthy participants (control)**

Parameters	Control Mean $\pm$ SE (N=40)	Patients Mean $\pm$ SE (N=50)	P-Value
Vaspin pg/ml	303.660 $\pm$ 6.842	773.150 $\pm$ 7.145**	0.01

The mean value of vaspin is 773.150 pg/ml for participants with T2DM was significantly high ( $P = 0.01$ ) compared to participants (control), where the mean value of vaspin was 303.660 pg/ml.

**Table 3: Comparing vaspin levels between male and female**

Parameters	Male Mean±SE (N=23)	Female Mean ± SE (N=27)	P- Value
Vaspin pg/ml	745.210±7.218	812.280±6.175	0.079

The results showed that the mean values of vaspin were 745.210 pg/ml and 812.280 pg/ml for male and female participants with T2DM, respectively. However, the vaspin level of participants with gender was not significantly associated (P=0.079).

**Table 4: Correlation between biochemical parameters and vaspin in T2DM patients**

Correlation Patients Parameters	Glucose	Creatinine	Vit B12	Troponin	CK- MB
Vaspin	0.937	0.447	-0.954	0.214	0.318
P-Value	0.05	0.072	0.05	0.171	0.193

There was no significant correlation between vaspin and creatinine, troponin, CK-MB ( $p > 0.05$ ) in patients with T2DM, but there was a significant positive correlation between vaspin and glucose ( $P = 0.05$ ) in T2DM patients. Also, the results showed that there was a significant negative correlation between vaspin and vitamin B12 ( $P = 0.05$ ) in T2DM patients.

#### Discussion

Vaspin, an intriguing adipocytokine, has been shown to possess insulin sensitizing properties. [13] The available research suggests that vaspin may serve as a compensatory mechanism in the progression of obesity and metabolic diseases. [14] The upregulation of vaspin may potentially have a protective benefit against the development of insulin resistance. [15] The administration of central vaspin has been shown to result in a decrease in food consumption and to have prolonged benefits in decreasing blood glucose levels. The results indicate that vaspin may possess an insulin sensitizing impact on the white adipose tissue. [16] There is a prevailing belief that the elevation of vaspin levels might serve as a possible compensatory mechanism to counteract the unidentified proteases that tend to rise in instances of obesity and insulin resistance. [17] The inhibitory impact of vaspin, a member of the serine protease inhibitor family, on kallikrein 7 has been elucidated by Heiker, et al. [18]

The mean value of glucose 229.251 mg/dl for participants with T2DM was significantly higher ( $P = 0.001$ ) high compared to participants (control) whose mean glucose value was 93.214 mg/dl. The mean value of vaspin is 773.150 pg/ml for participants with T2DM was significantly high ( $P = 0.01$ ) compared to participants (control), where the mean value of vaspin was 303.660 pg/ml. The results showed that the mean values of vaspin were 745.210 pg/ml and 812.280 pg/ml for male and female participants with T2DM, respectively. Numerous research has shown evidence for a strong correlation between reduced muscle mass and disglycemia. In a study conducted on Korean individuals aged 65 years or older, it was shown that

the incidence rate (IR) was significantly greater in the obese group with lower muscle mass compared to the obese group without low muscle mass. [19] Furthermore, in a cohort research including patients without diabetes, it was shown that hyperinsulinemia, which is a compensatory mechanism aimed at regulating plasma glucose levels within the normal range, was strongly linked to the reduction of skeletal muscle mass throughout the 4.6-year follow-up period. [20] The findings of the study indicated that there was a correlation between an increase in muscle mass and a reduction in insulin resistance, as well as a lower chance of developing diabetes. Additionally, it was seen that the use of nutritional supplements led to an improvement in insulin sensitivity among older individuals with low muscle mass. [21]

However, the vaspin level of participants with gender was not significantly associated ( $P = 0.079$ ). There was no significant correlation between vaspin and creatinine, troponin, CK-MB ( $p > 0.05$ ) in patients with T2DM, but there was a significant positive correlation between vaspin and glucose ( $P = 0.05$ ) in T2DM patients. Also, the results showed that there was a significant negative correlation between vaspin and vitamin B12 ( $P = 0.05$ ) in T2DM patients. In our study, we aimed to evaluate vaspin and understand the pathophysiological effect of it on individuals with T2DM. An increase in the concentration of vaspin has been associated with several pathological conditions in obese individuals, including insulin resistance, dyslipidemia, oxidative stress, and inflammation. [22] Furthermore, these cases were directly related to patients with T2DM. Thus, this association could explain why the concentration of vaspin is increased in patients with T2DM. Our results indicate that the levels of vaspin were significantly higher for those with T2DM than the control group and that there is a close association between high vaspin concentration and T2DM. In view of this, the results we obtained were important and consistent with the results of the study conducted by Pilarski, et al. where their results indicated that there is a significantly positive association between vaspin and type 2 diabetes. [23]

In addition to that, another study conducted by Yang et al. indicated that there is an association between the higher concentration of vaspin and type 2 diabetes, and the association was positive between them, especially in obese patients. [24]

### Conclusion

In conclusion, the results of the current study showed that the levels of blood glucose and vaspin were significantly higher in T2DM patients than in control group participants and significantly associated with T2DM. While the levels of creatinine, troponin and creatine kinase (CK-MB) in T2DM patients were higher but not significant. While vitamin B12 levels were significant lower in T2DM patients compared to control group therefore significantly associated with T2DM. In addition, there was no significant association between gender and vaspin levels in patients with T2DM. Regarding the vaspin and biochemical parameters values in T2DM, we found that vaspin was a significant positively correlated with blood glucose levels and significant negatively correlated with vitamin B12 while there was non-significant positively correlation between vaspin, creatinine, troponin and (CK-MB) in T2DM patients.

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