

SERUM CALPROTECTIN IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND ITS RELATION TO MICROVASCULAR COMPLICATIONS

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Introduction

DM is a leading cause of mortality, morbidity and reduced life expectancy. It is characterized by chronic hyperglycemia and altered cellular homeostasis, which lead to diffuse vascular damage and multi-organ dysfunction. In long term, patients with DM risk developing both micro- and macrovascular complications. Insulin resistance is defined as decreased sensitivity and responsiveness to insulin-mediated glucose disposal and inhibition of hepatic glucose production and plays a significant pathophysiologic role in T2DM.

Calprotectin is a soluble protein in white blood cells and is actively secreted during the stress response of phagocytes and is associated with inflammation and is found to be increased in subjects with insulin resistance.

Aim of the work

This study was conducted to:

1. Measure serum calprotectin in patients with T2DM.
2. Evaluate the relationship between serum calprotectin and insulin resistance in patients with T2DM.
3. Evaluate the relationship between serum calprotectin and microvascular complications (diabetic kidney disease, neuropathy and retinopathy) in patients with T2DM.

Subjects and Methods

SUBJECTS:

This case study was conducted on 100 patients with type 2 diabetes mellitus divided into two groups, Group (1): 50 patients with T2DM, further divided into 2 subgroups: Subgroup (1A): 25 patients with T2DM and microvascular complications. Subgroup (1B): 25 patients with T2DM without microvascular complications. Group (2): 50 normal subjects of matched age and sex as a control group.

Patients were recruited from the outpatient clinic of the Diabetes unit Alexandria Main University hospital.

Full informed consent was taken from the patients and approval of the ethical committee of the faculty was fulfilled.

METHODS:

After giving their signed informed consent; All participants underwent: full history taking, complete physical examination (Vital signs, anthropometric measures, a comprehensive neurological examination including the assessment of vibration perception threshold (VPT) using a neurothesiometer to assess DPN), fundus examination (by an ophthalmologist to assess DM retinopathy), and laboratory investigations: fasting plasma glucose (FPG), glycated haemoglobin (HbA1c), fasting insulin levels, HOMA-IR, total serum cholesterol, high density lipoprotein (HDL-C), low density lipoprotein (LDL-C), serum triglycerides, serum creatinine and calculation of estimated glomerular filtration rate (eGFR), and serum calprotectin, in addition to urinary albumin to creatinine ratio (uACR).

Results

Table 1: Comparison between the three studied groups according to serum Calprotectin

	Group 1A (n = 25)	Group 1B (n = 25)	Group 2 (n = 50)	F	p
Calprotectin (ng/ml)					
Min. – Max.	69.90 – 129.6	90.84 – 116.9	50.30 – 116.1		
Mean ± SD.	114.2 ± 15.16	105.6 ± 7.07	95.15 ± 13.51	19.686*	<0.001*
Median (IQR)	117.1 (112.3 – 124.2)	106.8 (100.5 – 109.5)	98.23 (89.09 – 104.6)		
Sig. bet. grps.	p ₁ =0.049*, p ₂ <0.001*, p ₃ =0.003*				

IQR: Inter quartile range SD: Standard deviation

F: F for One way ANOVA test, Pairwise comparison bet. each 2 groups was done using Post Hoc Test (Tukey) p: p value for comparing between the three studied groups p₁: p value for comparing between Group 1A and Group 1B p₂: p value for comparing between Group 1A and Group 2 p₃: p value for comparing between Group 1B and Group 2

*: Statistically significant at p ≤ 0.05

Group 1A: Individuals with T2DM that exhibit microvascular complications

Group 1B: Individuals with T2DM that do not exhibit microvascular complications

Group 2: Control group

Table 2: Correlation between serum Calprotectin with different parameters in T2D patients

Calprotectin vs.	Group 1A (n = 25)		Group 1B (n = 25)		Group 1A + 1B (n = 50)	
	r	p	r	p	r	p
Waist circumference (cm)	0.301	0.144	0.129	0.538	0.322*	0.022*
BMI (kg/m²)	0.095	0.650	-0.309	0.133	-0.033	0.818
FBS	-0.212	0.309	0.128	0.543	-0.167	0.247
HbA1c	0.099	0.638	0.135	0.520	0.155	0.281
F. Insulin	-0.033	0.876	-0.220	0.291	-0.039	0.788
HOMA-IR	0.571*	0.003*	0.416*	0.039*	0.490*	<0.001*
Average VPT	0.442*	0.027*	0.472*	0.017*	0.505*	<0.001*
DM duration	0.089	0.671	-0.212	0.309	0.004	0.977
U-ACR	0.434*	0.030*	0.410*	0.042*	0.504*	<0.001*
eGFR	-0.494*	0.012*	-0.440*	0.028*	-0.453*	0.001*
Neck circumference (cm)	0.467*	0.019*	0.564	0.003*	0.529*	<0.001*

r: Pearson coefficient

*: Statistically significant at p ≤ 0.05

Group 1A: Patients with T2DM and microvascular complications

Group 1B: Patients with T2DM without microvascular complications

Conclusion

From the outcome of our study, we can conclude that:

- Serum calprotectin levels were higher in T2DM patients compared to their controls.
- Moreover, serum calprotectin levels were higher in T2DM subjects with microvascular complications compared to those without microvascular complications.
- Serum calprotectin level was significantly correlated with HOMA-IR levels as an indicator of insulin resistance and β-cell function.
- There is positive correlation between serum calprotectin levels and markers of obesity (waist circumference and neck circumference) in T2DM patients.