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Original Research

Comparison of Malondialdehyde, Cystatin C and serum creatinine in diabetes mellitus as compared to normal individual: A cross- sectional study

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ABSTRACT:
Background: Diabetes as a chronic disease that requires multifactorial risk reduction strategies. The present study was conducted to conducted to assess MDA, creatinine and Cystatin C in diabetes. **Materials & Methods:** 70 diabetic patients of both genders were put in group I and group II had healthy subjects. The level malondialdehyde (MDA), Cystatin C and creatinine levels were measured. **Results:** Group I had 45 males and 25 females and group II had 30 males and 40 females. MDA level in group I was 4.02 µM and in group II was 1.36 µM. Creatinine level was 0.92 mg/L in group I and 0.88 i mg/L n group II and cystatin in group I was 0.81 mg/L and in group II was 0.87 mg/L. The difference was significant (P< 0.05). **Conclusion:** There was increase level of MDA in diabetic as compared to non- diabetics.
Key words: Cystatin C, Creatinine, malondialdehyde

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INTRODUCTION

Diabetes as a chronic disease that requires multifactorial risk reduction strategies. The increasing incidence of type 2 diabetes mellitus (T2DM) is a metabolic disease characterized by hyperglycemia due to damage to insulin secretion, insulin action and / or both.[1] Estimates of DM patients in 2035 show that there are 347 million people living in urban areas and around 145 million people living in rural areas. Without effective management and prevention programs, the prevalence and complications of DM will continue to increase in the world.[2] DM complications are associated with long-term damage, dysfunction and disturbances in the organ systems which are initiated by blood vessel damage which is characterized by an increased risk of macrovascular and microvascular complications.[3]

Cystatin C (CysC) is a 13-kDa, non-glycosylated basic protein belonging to the cystatin super-family of cysteine proteinase inhibitors. Unique among cystatins, it seems to be produced by all human nucleated cells. It is produced at a stable rate, which is unaffected by inflammatory processes, sex, age, diet, and nutritional status. Many studies have demonstrated the superiority of serum CysC to serum creatinine as a marker of renal function in patients with diabetes, although this has not been a universal finding.[4,5] Malondialdehyde (MDA) is a major player in low - density lipoprotein (LDL) modification and is a product of the peroxidation of arachidonic, eicosapentaenoic and docosahexaenoic acids. Oxidised-LDL (ox-LDL) results from the interactions between aldehydes such as MDA and lysine residues in apoB-100 of LDL.[6] The present study was conducted to conducted to assess MDA, creatinine and Cystatin C in diabetes.

MATERIALS & METHODS

The present study was conducted among 70 diabetic patients of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Group I comprised of diabetics and group II had healthy subjects. The level of lipid peroxidation was determined by examination of malondialdehyde (MDA) using a modified method. Cystatin C was measured on Hitachi 7600 automatic analyzer by latex particle-enhanced turbidimetric immunoassays (PET) using rabbit polyclonal antihuman CysC antiserum. Serum creatinine levels were measured by automatic picric colorimetry on Hitachi 7600-110 automatic analyzer. The results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Status	Diabetes	Healthy
M:F	45:25	30:40

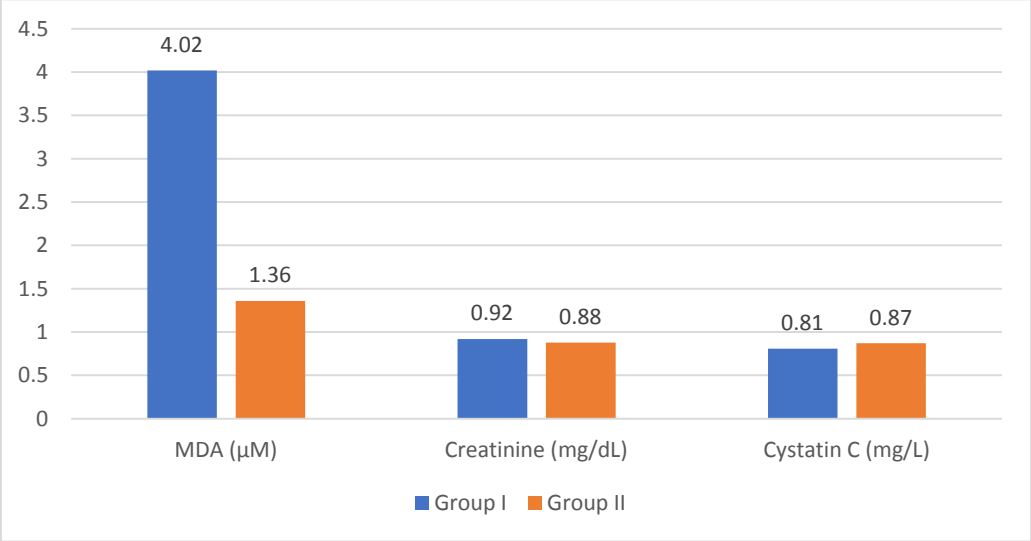
Table I shows that group I had 45 males and 25 females and group II had 30 males and 40 females.

Table II Assessment of MDA, creatinine and Cys C level

Parameters	Group I	Group II	P value
MDA (µM)	4.02	1.36	0.01
Creatinine (mg/dL)	0.92	0.88	0.82
Cystatin C (mg/L)	0.81	0.87	0.91

Table II, graph I shows that MDA level in group I was 4.02 µM and in group II was 1.36 µM. Creatinine level was 0.92 mg/L in group I and 0.88 i mg/L n group II and cystatin in group I was 0.81 mg/L and in group II was 0.87 mg/L. The difference was significant (P< 0.05).

Graph I Assessment of MDA, creatinine and Cys C level



DISCUSSION

Diabetes mellitus (DM) is a cluster of metabolic disorders characterised by abnormally elevated blood glucose levels (hyperglycaemia), which arise from the body's inability to produce insulin or to use it to its full potential.[7] Diabetes mellitus is characterized by hyperglycemia and insufficiency in the secretion and function of endogenous insulin.[8] Type II diabetes is a multicausal disease which develops slowly in a step-wise manner initially commencing with insulin resistance and progressing with time which results in failure of the body to maintain glucose hemostasis causing glucose intolerance.[9] The present study was conducted to conducted to assess MDA, creatinine and Cystatin C in diabetes.

In present study, we found that group I had 45 males and 25 females and group II had 30 males and 40 females. Agrawal et al[10] evaluated the total antioxidant status in relation to oxidative stress in Type 2 Diabetes Mellitus. 110 Type 2 diabetic patients in the age group of 30- 60 years with the similar number of age and sex matched healthy controls were taken. The Fasting Plasma Sugar values in diabetic subjects were 172.43 ± 43.02 mg/dl compared to the healthy controls 89.52 ± 10.21 mg/dl). The Post Prandial Plasma Sugar values among diabetic subjects was 247.26 ± 46.16 mg/dl) and in

controls was 115.34±42.18 mg/dl). There is significant increase in MDA levels among Diabetic patients 4.01±0.78µM in comparison to the controls (1.99±1.22 µM). In our study, there has been decreased total antioxidant status among diabetic cases as 0.49±0.42 mM whereas the healthy controls had a value of 1.73±1.41 mM.

We found that MDA level in group I was 4.02 µM and in group II was 1.36 µM. Creatinine level was 0.92 mg/L in group I and 0.88 mg/L n group II and cystatin in group I was 0.81 mg/L and in group II was 0.87 mg/L. Sunita et al[11] found that there was a significant difference in higher MDA levels in patients with T2DM than non-DM subjects. The MDA frequency distribution in the case was MDA normal (24%) and MDA normal (6%), whereas in the control was MDA Not Normal (26%) and MDA Normal (44%). There were significant differences in MDA frequency distribution between cases and controls (p= 0,000). The subjects of T2DM had a risk of 6.77 times an increase in MDA levels compared to Non-DMT2. The correlation between levels of GDP and MDA was statistically significant with a positive correlation direction.

Lee et al[12] staged the level of diabetic nephropathy and estimated GFR based on serum creatinine and cystatin C (CysC). Serum creatinine and CysC levels were 0.91 mg/dL and 0.87 mg/L, respectively. Correlation coefficients between CysC-GFR and each of the creatinine-based GFR measurements were 0.589, 0.569, and 0.479. Serum CysC was significantly ower in normoalbuminurics than in micro-albuminurics and macro-albuminurics and 1.05). Of the estimations of GFR, significant differences among the groups were found on CysC-GFR and CLcr. CysC-GFR (mL/min) was statistically lower in macroalbuminurics than in normoalbuminurics. The logistic regression analyses showed that retinopathy, A1C, CysC, diabetic duration, and CysC-GFR were indicators to predict the development of microalbuminuria. Serum CysC seems to be more accurate serum marker than serum creatinine in evaluating a prognostic stage of type 2 diabetic nephropathy.

CONCLUSION

Authors found that there was increase level of MDA in diabetic as compared to non- diabetics.

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