

**RELATIONSHIP BETWEEN MICROALBUMINURIA AND  
DYSLIPIDAEMIA, SERUM GLUCOSE, FRUCTOSAMINE  
AND THE ANTIOXIDANTS STATUS IN SRI LANKAN  
DIABETICS**

BY

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### **Abstract**

The mean concentration of microalbumin for well controlled diabetics (Serum glucose < 126 mg/dl) was  $24.59 \pm 30.28$  mg/l and the values ranged from 5.25 to 170.00 mg/l. The mean value for poorly controlled diabetics (Serum glucose > 126 mg/dl) was  $36.48 \pm 48.30$  mg/l and the values ranged from 4.50 to 200.00 mg/l. The mean value for control was  $8.54 \pm 2.55$  mg/l and the values ranged from 3.90 to 14.50 mg/l.

There was no significant difference in the concentration of urine microalbumin between the two diabetic groups ( $p > 0.05$ ) but both groups had significantly higher value than controls ( $p < 0.05$ ).

Diabetics were classified into three groups according to the albuminuric status and their biochemical parameters are described accordingly. Urinary albumin index (ratio of urine microalbumin to creatinine-mg/g) represented the albuminuric status in diabetics.

Diabetics with  $UAI > 22$  mg/g were grouped as normoalbuminurics, diabetics with UAI between 22 to 50.5 mg/g were grouped as microalbuminurics and diabetics with  $UAI > 50.5$  mg/g were grouped as macroalbuminurics.

The mean UAI for the normoalbuminurics was  $12.86 \pm 4.88$  mg/g, for the microalbuminurics was  $31.77 \pm 7.07$  mg/g and for the macroalbuminurics was  $137.47 \pm 92.85$ .

The status of serum lipids and the glycaemic status for the three albuminuric groups such as normoalbuminuria, microalbuminuria and macroalbuminuria were, the concentration of serum total cholesterol was ( $210.84 \pm 53.21$ ,  $207.58 \pm 37.87$ ,  $212.56 \pm 46.56$  mg/dl), HDL cholesterol was ( $44.81 \pm 11.45$ ,  $44.81 \pm 11.45$ ,  $46.27 \pm 10.64$  mg/dl), LDL cholesterol was ( $139.36 \pm 45.28$ ,  $137.43 \pm 34.26$ ,  $141.24 \pm 38.30$  mg/dl), triglycerides was ( $132.72 \pm 83.57$ ,  $126.70 \pm 51.69$ ,  $125.28 \pm 58.78$  mg/dl), glucose was ( $153.41 \pm 58.99$ ,  $153.29 \pm 52.23$ ,  $146.07 \pm 53.33$  mg/dl) and fructosamine was ( $3.04 \pm 0.64$ ,  $3.28 \pm 0.55$ ,  $3.4 \pm 0.89$  mmol/l) respectively. There was no significant difference ( $p > 0.05$ ) found in the three albuminuric groups in the above parameters.

The systolic blood pressure ( $133.78 \pm 16.12$ ,  $130.64 \pm 13.95$ ,  $132.61 \pm 12.87$  mmHg) and diastolic blood pressure ( $80.73 \pm 8.26$ ,  $80.64 \pm 7.27$ ,  $81.52 \pm 9.59$  mmHg) did not significantly differ among the above three groups.

The incidence of hypercholesterolaemia was 21.9%, 9.7% and 17.4%, elevated levels of LDL cholesterol was 21.9%, 12.9% and 8.7%, hypertriglyceridaemia was 21.9%, 9.7% and 17.4%, hyperglycaemia was 65.85%, 90.32% and 78.26%,

increased levels of fructosamine was 80.49%, 83.87% and 69.56% in the normoalbuminurics, microalbuminurics and macroalbuminurics, respectively.

Serum total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose and systolic blood pressure did not show any significant correlation neither with UAI nor urine albumin concentration. Serum fructosamine did not associated with UAI but showed significant positive correlation ( $r = 0.2092$ ,  $p = 0.0466$ ) with urine albumin concentration. Diastolic blood pressure positively correlated only with UAI ( $r = 0.1994$ ,  $p = 0.0386$ ) but not with urine albumin concentration. A significant positive association was observed between urine total protein and urine albumin concentration ( $r = 0.4742$ ,  $p = 0.0001$ ) but not between urine total protein and UAI.

The concentration of red cell glutathione in diabetics ( $29.03 \pm 7.28$  mg/dl) was significantly ( $p < 0.05$ ) low compared to normal controls ( $32.91 \pm 5.44$  mg/dl). The concentration of serum ascorbic acid did not differ significantly ( $p > 0.05$ ) in diabetics ( $0.99 \pm 0.53$  mg/dl) and controls ( $0.87 \pm 0.40$  mg/dl). Serum ceruloplasmin levels in diabetics ( $170.10 \pm 51.40$  units/l) was significantly ( $p < 0.05$ ) elevated in diabetics compared to controls ( $144.45 \pm 52.86$  units/l). Concentration of serum uric acid was significantly ( $p < 0.05$ ) reduced in diabetics ( $0.265 \pm 0.08$  mmol/l) than controls ( $0.364 \pm 0.09$  mmol/l).

The ratio of red cell glutathione to haemoglobin showed significant positive association with serum total cholesterol ( $r = 0.1463$ ,  $p = 0.0359$ ) and LDL cholesterol ( $r = 0.1409$ ,  $p = 0.0434$ ). Serum ascorbic acid marginally positively correlated with total cholesterol ( $r = 0.1387$ ,  $p = 0.0556$ ) but showed significant positive correlation with serum LDL cholesterol ( $r = 0.1742$ ,  $p = 0.0159$ ). Serum ceruloplasmin showed significant negative association with total cholesterol ( $r = 0.2613$ ,  $p = 0.0008$ ) and LDL cholesterol ( $r = 0.2635$ ,  $p = 0.0007$ ). There was a significant negative correlation between serum uric acid concentration and serum glucose ( $r = 0.3005$ ,  $p = 0.0001$ ).

Sri Lankan diabetics are affected by nephropathy. Their excretion of microalbumin in urine is significantly elevated than normal controls. Present study proved that there was no relationship between microalbuminuria and dyslipidaemia and serum glucose but fructosamine had significant effect on the progression of microalbuminuria in diabetics.

Sri Lankan diabetics may be vulnerable to oxidative stress and tissue damage because the status of antioxidants such as red cell glutathione and serum uric acid was significantly reduced and the concentration of serum ceruloplasmin was significantly elevated in diabetics than controls.