Summary

Albuminuria has been shown to predict cardiovascular morbidity and mortality in individuals with type 2 diabetes mellitus independent of conventional cardiovascular risk factors including age, arterial hypertension and hypercholesterolemia.

This is a case control analytic study that identifies the association of albuminuria with left ventricular systolic & diastolic function in patients with type 2 diabetes mellitus but without evidence of clinically detectable heart disease

The study included 3 groups, each group include 20 diabetic patients according to A/C ratio (normo – micro and macroalbuminuric)

- **Group (1):** Included 20 diabetic patients with normoalbuminuria recognized as urine albumin / creatinine ratios < 30
- **Group (2)**: included another 20 diabetic patients with albumin / creatinine ratios ≥30 and < 300 mg albumin/g creatinine.
- **Group (3):** included another 20 diabetic patients with Macroalbuminuria recognized as urine albumin / creatinine ratios ≥ 300 mg/g.

In the current study, diabetic participants with microalbuminuria and macroalbuminuria were significantly older than those without albuminuria with no significant gender difference between groups.

Step-wise increases were seen in the prevalence of hypertension and obesity from the group without albuminuria to that with macroalbuminuria. Results of the present study also showed that there was no significant difference between groups regarding smoking habit, family history of cardiovascular disease and dyslipidaemia.

The duration of DM was significantly shorter in group I than group II and group III, the mean duration of DM (years) was 3±2 in group I, 11±5 in group II, and 15±6 in group III with significant difference (p = 0.001).

Normoalbuminuric subjects were more often treated with oral antidiabetic medications in comparison to microalbuminuric and macroalbuminuric persons, 100% of the patients of group I, 85% of group II and 60% of group III were on oral hypoglycemic drugs with significant difference (p = 0.004).

Contrary, subjects with micro- and macroalbuminuria were significantly more often treated with insulin only or insulin in combination with oral hypoglycemic than normoalbuminuric persons. (Table 8)

Subjects with microalbuminuria or macroalbuminuria had less glycemic control than subjects with normoalbuminuria, the mean fasting blood sugar (mg/dl) in group I was 147±31, 161±29 in group II, and 187±49 in group III (p = 0.001). The mean 2hPP (mg/dl) was 214±21 in group I, 240±24 in group II and 263±40 in group III (p = 0.001) (Table 9).

In the present study, the mean LVESd (cm) was 3±0.4 in group I, 3.3±0.4 in group II and 4±0.5 in group III (p = 0.001). The mean LVEDd (cm) was 4.5±0.6 in group I, 4.7±0.5 in group II and 5.2±0.6 in group III (p = 0.004). (Table 11) In addition, there was step-wise increase in prevalence of LV hypertrophy seen from no albuminuria to macroalbuminuria. Thickness of posterior wall as well as septal thickness was higher in the two groups of patients with albuminuria as compared with no albuminuria group.

In the present study, there is a step-wise decrease in the percentage ejection fraction and fractional shortening from the group without albuminuria to that with macroalbuminuria. The mean EF (%) in group I was 67±5, 60±4 in group II and 47±5 in group III (p = 0.001). The mean FS (%) was 37±4 in group I, 32±3 in group II and 24 ± 2 in group III (p = 0.001).The mean LV mass (gm) was 161±62 in group I, 209±52 in group II and 260±63 in group III (p = 0.001). (Table 10)

The results of the present study show that the mitral E velocity was lower and mitral A velocity was higher in the two groups with albuminuria, compared to that in the group with no albuminuria. Consequently, the mitral E/A ratio was lower in the groups with micro- or macroalbuminuria than in the group without albuminuria. Mitral deceleration time was longer in the two groups with albuminuria than in the group without albuminuria. The prevalence of abnormal diastolic function showed stepwise increases from no albuminuria to macroalbuminuria The mean E wave (cm/s) was 0.8±0.1 in group I, 0.5±0.1 in group II and 0.6±0.2 in group III with significant difference (p = 0.001). (Table 12)

The results of this work were tabulated and statistically analyzed.

Conclusion and Recommendations

In patients with diabetes mellitus the presence of any degree of albuminuria; either micro- or macroalbuminuria is significantly associated with subclinical left ventricular dysfunction; both systolic and diastolic, so all diabetic patients should have routine testing for the presence of albumin in urine. Those with Albuminuria should be considered high risk group and given suitable prophylactic measures to guard against progression to overt heart failure.

Increasing age, uncontrolled hypertension and diabetes were found to be significantly associated with albuminuria and so tight B.P and blood sugar control are highly recommend for diabetic patients with albuminuria.

The study highlights the beneficial value of using medications such as ACEI that decrease the incidence of albuminuria.