ORIGINAL ARTICLE

Correlation between Increased Albuminuria and Left Ventricular Hypertrophy in patient of Type 2 Diabetes Mellitus

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ABSTRACT

Aim: To determine the association between increased albuminuria and hypertrophy of left ventricle in patients of type 2 diabetes mellitus.

Methods: One hundred patients of type 2 diabetes mellitus fulfilling the inclusion criteria were selected from 01st Aug 2015 to 31 October 2015. A detailed history including duration of diabetes was obtained. They were investigated for serum creatinine, serum triglyceride, albuminuria and left ventricular hypertrophy by electrocardiography. An association between increased albuminuria and left ventricular hypertrophy was found out.

Results: There were 63 male patientsand 37 were female patients. The mean urinary albumin excretion was 211.53±146.12 µg/minute. The mean adjusted Cornell voltage was 9.45±1.65. The mean serum triglyceride was 288.39±56.87mg/dl. The mean serum creatinine was 1.14±0.17 ml/minute. A positive relationship was observed between albuminuria and adjustedCornell voltage.

Conclusion: Our results showed that patients with type 2 diabetes and increased albuminuria should be evaluated for increased left ventricular hypertrophy mass as an important and potentially reversible cardiovascular risk factor.

Key words: Type 2 diabetes mellitus, increased urinary albumin excretion, left ventricular mass.

INTRODUCTION

Diabetes mellitus is a common syndrome due to impaired glucose metabolism which occurs due to either deficiency of insulin or increased resistance of insulin. Diabetes mellitus leads to changes in multiple organ system[1]. And also leads to increased cardiovascular morbidity and mortality. Cardiovascular mortality and morbidity is due to diabetes mellitus and other cardiovascular risk factors but diabetes is the major contributory factor in cardiovascular mortality and morbidity after controlling for all known cardiovascular risk factors type 2 diabetes mellitus leads to two fold increased in cardiovascular death rate in men and four fold increased in death rate in women[2]. People with diabetes have a risk of ischemic heart disease two to five times greater than non diabetic individuals type 2 diabetes along with chronic complications is a common problem in our country there is comprehensive data available in the literature about ischemic heart disease and its association in the non risk factors in Pakistani diabetic[3].

Albuminuria is a very common complications of diabetes mellitus and is related to cardiovascular complications[4]. Albuminuria is associated with increased left ventricular mass in patients of type 2 diabetes mellitus. Each subject was interviewed and examined and investigated for fasting serum glucose urinary volume, urinary albumin[5].

Early detection of diastolic dysfunction in blood pressure patients to diminish complexities and enhance result. The level of left ventricular hypertrophy (LVH) was 66.66%[6]. On contrasting hypertensive patients and without left ventricular hypertrophy, E and A wave speeds, E:A proportion, deceleration time and isovolumic unwinding time were comparable. 33.33% of patients had no left ventricular hypertrophy within the sight of diastolic brokenness so left ventricular hypertrophy was not an autonomous factor related with unusual stream designs in hypertensive patients with ordinary systolic contractility. Disabled unwinding was the prevalent example of diastolic brokenness and expanded further with age[7].

Elevated albuminuria has been appeared to be related with rise in cardiovascular mortality in patients with sort 2 diabetes.

MATERIAL &METHODS

One hundred patients of type 2 diabetes fulfilling the inclusion criteria were included in this study. This study was carried out in all medical units of mayo hospital Lahore from 1st may 2015 to 31st October 2015.Informed consent was obtained from all the patients. A detailed history including duration of

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diabetes was taken. Thorough general physical examination was done to identify patients mentioned in exclusion criteria. Plasma glucose of 126mg/dl or higher after an overnight fast on more than one occasion. After 75 gm oral glucose, diagnostic values are 200mg/dl or more 2 hours after the oral glucose. They were investigated for serum creatinine, serum triglyceride, urinary albumin excretion and left ventricular mass by electrocardiography. An association between increased albuminuria and left ventricular hypertrophy was found out. The collected information was entered in SPSS version 11.0 and analyzed accordingly.

RESULTS

In the sex distribution of the patients, there were 63(63%) patients male and 37(37%) patients female.

The mean urinary albumin excretion was 211.53±146.12 µg/minute.The mean adjusted Cornell voltage was 9.45±1.65. The majority of the patients 75(75%) were in the adjusted Cornell voltage were 6.0 to 10.0. There were 10(10%) patients of adjusted Cornell voltage range from 6.0 to 8.0. There were 65 (65%) patients of adjusted Cornell voltage range from 8.1 to 10.0

There were 11(11%) patients of DM duration of 1-2 years, 26(26%) patients of DM duration of 3-4 years, 32(32%) patients of DM duration of 5-6 years, 25(25%) patients of DM duration of 7-8 years, 3(3%) patients of DM duration of 9-10 years and 3(3%) patients of DM duration of more than 10 years.

The mean serum triglyceride was 288.39±56.87 mg/dl. There were 7(7%) patients of serum triglyceride range of upto 200mg/dl, 22(22%) patients of serum triglyceride range of 201-250mg/dl, 29(29%) patients of serum triglyceride range of 251-300mg/dl, 29(29%) patients of serum triglyceride range of 301-350mg/dl, 10 (10%) patients of serum triglyceride range of 351-400mg/dl and 3(3%) patients of serum triglyceride range of more than 400mg/dl.

The mean serum creatinine was 1.14±0.17 ml/minute. There were 33(33%) patients of serum creatinine range of upto 1.0 ml/minute, 53(53%) patients of serum creatinine range of 1.1-1.2 ml/minute, 11(11%) patients of serum creatinine range of 1.3-1.4 ml/minute and 3(3%) patients of serum creatinine range of 1.5-1.6 ml/minute.

Table 1: Distribution of patients by urinary albumin excretion(n=100)

Urinary albumin excretion (µg/min)	n	%age
Upto 20	9	9.0
20-200	46	46.0
>200	45	45.0
Mean±SD	211.53±146.12	

SD Standard deviation

Table 2: Distribution of patients by adjusted Cornell voltage(n=100)

Adjusted Cornell voltage	n	%age
6.0-8.0	10	10.0
8.1-10.0	65	65.0
10.1-12.0	20	20.0
12.1-14.0	3	3.0
14.1-16.0	2	2.0
Mean±SD	9.45±1.65	

Table 3: Distribution of patients by body mass index(n=100)

Body mass index (kg/m^2)	n	%age
27-30	48	48.0
31-33	38	38.0
34-37	4	4.0
38-40	8	8.0
>40	2	2.0
Mean±SD	31.46±3.45	

Table 4: Distribution of patients by serum triglyceride(n=100)

Serum triglyceride (mg/dl)	n	%age
Upto 200	7	7.0
201-250	22	220
251-300	2	2.0
301-350	29	29
351-400	10	10.0
>400	3	3.0
Mean±SD	288.39±56.87	

Table 5: Distribution of patients by serum creatinine(n=100)

Serum creatinine (ml/min)	n	%age
Upto 1.0	33	33.0
1.1-1.2	53	53.0
1.3-1.4	11	11.0
1.5-1.6	3	3.0
Mean±SD	1.14±0.17	

DISCUSSION

Albuminuria has been associated with increased cardiovascular mortality in patientswith type 2 diabetes. Prevalence of increased urinary egg whites discharge was 28.5%. Body mass list (BMI) (just females) and hemoglobin (HbA1c) altogether corresponded with macroalbuminuria, while hypertension was related with microalbuminuria. Diabetes span, high systolic circulatory strain, add up to cholesterol, high-thickness lipoprotein (HDL) cholesterol, low-thickness lipoprotein (LDL) cholesterol and triglycerides were fundamentally connected with both smaller scale and macroalbuminuria. In the different strategic relapse investigation, a critical relationship of albuminuria was found with diabetes length, hypertension, low HDL cholesterol, current smoking status, and increased serum creatinine. Prevalence of increased urinary egg whites discharge was like that portrayed

in other topographically close populaces. The more grounded affiliation found with microvascular diabetes inconveniences proposes that increased urinary egg whites discharge is a superior indicator for renal harm than for cardiovascular sickness in the sort 2 diabetes mellitus populace[10].

In sort 2 diabetic patients, increased urinary egg whites discharge is firmly connected with insulin resistance and related cardiovascular hazard factors. This affiliation is by all accounts more grounded in men than in ladies[11].

In our study, the mean duration of diabetes was 5.37±2.69 years. As compared with the study of Takebayashi et al[12] the mean duration of diabetes of the patients was 10.4±7.8 years, which was not similar to our study. This was due to the study population and duration of study.

In our study, the mean body mass index was 31.46±3.45 kg/m^2. But according to the study of Hanninen et al[68] the mean body mass index was 30.5±5.5 kg/m^2 which was comparable with the results of our study.

In our study, the mean serum triglyceride was 288.39±56.87 mg/dl. But in the study of Hirata-Dulas et al[13] the mean serum triglyceride was 250 mg/dl, which was comparable with our results.

In our study the mean serum creatinine was 1.14±0.17mg/dl. But in the study of Lou et al[14] the mean serum creatinine was 1.2±0.5mg/dl, which was similar with our results and comparable with our study.

It is suggest that in type 2 diabetes, the association between coefficients of variance of RR and urinary albumin excretion is significant in patients with macroalbuminuria.

In the larger part of patients the difference in urinary egg whites discharge was little, yet the range was wide. A feeble non-huge connection amongst microalbuminuria and all-cause mortality and cardiovascular horribleness was observed[29].

CONCLUSION

Our outcomes demonstrated that patients with sort 2 diabetes and increased albuminuria ought to be assessed for increased left ventricular hypertrophy mass as a vital and possibly reversible cardiovascular hazard factor.

REFERENCES

1. Nobakhthaghighi N, Kamgar M, Bekheirnia MR, Mcfann K, Estacio R, Schrier RW. Relationship between urinary albumin excretion and left ventricular mass with mortality in patients with type 2 diabetes. Clin J Am SocNephrol 2006; 1: 1187-90.
2. Palmieri V, Bella JN, Arnett DK, Liu JE, Oberman A, Schuck MY, et al. Effects of type 2 diabetes mellitus on left ventricular geometry and systolic function in hypertensive subjects: Hypertension genetic epidemiology network (HyperGEN) study. Circulation 2001; 103: 102-7.
3. Wachtell K, Ibsen H, Olsen MH, Borch-Johnsen K, Lindholm LH, Mogensen CE, et al. Albuminuria and cardiovascular risk in hypertensive patients with left ventricular hypertrophy: The life study. Ann Intern Med 2003; 139: 901-7.
4. Rehman K, Hashim R, Anwer MS, Qureshi A, Mohammad K. Type 2 diabetes and its association with hypertension and high urinary albumin excretion. Pak J Med Res 2004; 43: 153-6.
5. Khan MS, Moin S. Prevalence of cardiovascular risk factors in type 2 diabetic patients with IHD. Pak Armed Froces Med J 2005; 55: 8-13.
6. Abbasi MA, Hafeezullah, Abro AD, Sheikh M. Smoking is related to albumin excretion in type 2 diabetes mellitus. Pak J Physiol 2006; 2: 45-8.
7. Siddique T, Sulehria SB, Javed F, Qureshi IH, Riaz MK. Assessment of diastolic dysfunction in hyupertensive patients and its association with left ventricular mass index. Ann King Edward Med Coll 2006; 12: 239-40.
8. Parving HH, Oxenboll B, Svendsen PA, Christiansen JS, Andersen AR. Early detection of patients at risk of developing diabetic nephropathy: a longitudinal study of urinary albumin excretion. ActaEndocrinol (Copenh) 1982; 100: 550–5.
9. Viberti GC, Hill RD, Jarrett RJ, Argyropoulos A, Mahmud U, Keen H. Microalbuminuria as a predictor of clinical nephropathy in insulin-dependent diabetes mellitus. Lancet 1982; 1: 1430–2.
10. Mogensen CE, Christensen CK. Predicting diabetic nephropathy in insulin-dependent patients. N Engl J Med 1984; 311: 89–93.
11. Takebayashi K, Matsutomo R, Matsumoto S, Suetsugu M, Wakabayashi S, Aso Y, et al. Relationship between heart rate variability and urinary albumin excretion in patients with type 2 diabetes. Am J Med Sci 2006; 331: 72-8.
12. Estacio RO, Coll JR, Tran ZV, Schrier RW. Effect of intensive blood pressure control with valsartan on urinary albumin excretion in normotensive patients with type 2 diabetes. Am J Hypertens 2006; 19: 1241-8.
13. Rutter MK, McComb JM, Forster J, Brady S, Marshall SM. Increased left ventricular mass index and nocturnal systolic blood pressure in patients with Type 2 diabetes mellitus and microalbuminuria. Diabet Med 2000; 17: 321-5.
14. Lou LM, Gimeno JA, Gomez-Sanchez R, Labrador T, Beguer P, Lou MT, et al. Comparison of clinical arterial pressure, home arterial pressure measurement, and ambulatory arterial pressure monitoring in patients with type II diabetes mellitus and diabetic nephropathy. Nefrologia 2002; 22: 179-89.