

Vascular complications and their correlation with microalbuminuria and common carotid artery intima media thickness in indian type 2 diabetics.

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Received:11/08/2013

Revised: 15/10/2013

Accepted:25/11/2013

Abstract:

Background: Atherosclerosis being most important entity in diabetic patients controls various vascular complications. Microalbuminuria which commonly assumed to be marker of renal injury also plays an important role in assessing cardiovascular morbidities. Common carotid artery intima media thickness which is marker of atherosclerotic changes also used for assessing cardiovascular changes in diabetics. **Study design:** This is a case control study conducted at govt. medical college, Kota. The study population comprised of normotensive type II diabetic patients (n=50) of both sexes between 30-70 yrs of age. Normotensive non-diabetic persons served as controls (n=50). **Observations:** The mean age in study population was 53.75±9.67 yrs for males and 49.80±11.73 for females, whereas the mean age in controls was 50.15±7.20 yrs and 49.33±9.33 yrs respectively. The degree of microalbuminuria in type II diabetic population was significantly higher & increased with advancing age. Microalbuminuria was greater in those with higher BMI levels and advancing age. The common carotid artery intima media thickness (CCAimt) increased with advancing age in both the groups although the mean values were significantly higher among diabetic population as compared to controls (0.98±0.07 vs 0.71±0.04). **Summary:** Degree of urinary albumin excretion in type II diabetes patients has significant relation with CCAimt values.

Keywords: Microalbuminuria, Vascular complication, carotid intima media thickness.

INTRODUCTION:

Micro and macrovascular complications of diabetes go hand in hand. It is often believed that these are two different pathologic entities. The other view point is that these are just different phases of same pathophysiologic process. Atherosclerotic disease accounts for a major morbidity and mortality among diabetics. Majority of deaths among diabetic individuals and all manifestations of cardiovascular disease are substantially more common in patients with type II diabetes than in non-diabetic

individuals. Microalbuminuria an established marker of diabetic nephropathy begins insidiously and may precede the diagnosis of type II Diabetes mellitus, occurring with insulin resistance syndrome and its components including obesity & Hypertension.¹ Epidemiological & experimental data suggests that microalbuminuria is associated with an increased risk for all cause and cardiovascular mortality, cardiac abnormalities, cerebrovascular disease and

possibly peripheral arterial disease. It has emerged as a prognostic indicator for cardiovascular disease and an indication for screening and intervention to reduce all cardiovascular risk factors among diabetics.² Common carotid artery intima media thickness (CCA-IMT) has been associated with all modifiable and non-modifiable risk factors.³ CCA-IMT represents a marker of subclinical atherosclerosis and helps for early detection of atherosclerosis in pre-symptomatic individuals.^{4,7} Association between microalbuminuria a predictor of cardiovascular disease and CCA-IMT a marker of cardiovascular disease has been reported as significant by various researchers.^{8,9} The data from Indian diabetic population is yet to be scrutinized and assessed in quantitative terms. Endothelial dysfunction and chronic inflammation have been suggested as possible conditions to explain the association between microalbuminuria and cardiovascular disease.

This study was designed to find the association between the microalbuminuria and CCA-IMT among Indian type II diabetes population objectively and in quantitative terms.

MATERIAL & METHODS:

The study population comprised of normotensive type II diabetic patients (n=50) of both sexes between 30-70 yrs of age attending OPD. Normotensive non-diabetic persons served as controls. Exclusion criteria was as follows-

1. Receiving lipid modifiers or ACE inhibitors.
2. Hypertension, cerebrovascular disease, COPD, overt proteinuria, renal disease, malignancy.
3. Age less than 30 yrs or more than 70 yrs.
4. Smokers current or past

5. Patient non willing to participate in the study.

Detailed history including present or past illness, risk factors, personal history and drug history was elicited. Physical examination including recording of vitals detailed evaluation of system involved was done. Subjects underwent investigations including haemogram, blood sugar, uric acid, creatinine, fasting lipid profile, ECG, B mode ultrasound with a 7-11 MHz linear array transducer was performed to study carotid intima media thickness by single skilled radiologist. Microalbuminuria was measured in morning spot urine sample. Urine albumin & creatinine were measured by Pyrogallol Red method and rate Jaffe reaction respectively. Urine albumin mg/ml to creatinine ratios (ACR) was calculated for all subjects. Microalbuminuria was considered as value between 30-300 mg/gm.

RESULTS

The study population comprised of 50 type II diabetes patients (male=40, female=10) compared with 50 age & sex matched controls (male=26, female=24). The mean age in study population was 53.75±9.67 yrs for males and 49.80±11.73 for females, whereas the mean age in controls was 50.15±7.20 yrs and 49.33±9.33 yrs respectively. Type II diabetes subjects had greater mean body mass index than their non-diabetic counterparts.

Table 1: demographic profile of study population

	Cases (n=50)	Controls (n=50)
Male/Female	40/10	26/24
Mean age (males)	53.75±9.67 years	50.15±7.20 years
Mean age (females)	49.80±11.73 years	49.33±9.33 years

The degree of microalbuminuria in type II diabetic population was significantly higher & increased with advancing age. Microalbuminuria was greater in those with higher BMI levels and advancing age. Likewise the degree of glycemia had significant influence on magnitude of microalbuminuria. The common carotid artery intima media thickness (CCAIMT) increased with advancing age in both the groups although the mean values were significantly higher among diabetic population as compared to controls (0.98 ± 0.07 vs 0.71 ± 0.04). The effect of age was more in diabetic population. The study population was categorized in different age groups which showed increase in mean duration of diabetes with increasing age. When duration of diabetes was studied against degree of microalbuminuria and CCAIMT there was a linear relation between these two variables and duration of diabetes. Type II diabetes subjects showed a significant rise in CCAIMT levels as their degree of microalbuminuria increased. Thus high level of CCAIMT was associated with increased duration of diabetes, increased levels of microalbuminuria and high body mass index.

Table 2: observations in study population

	Microalbuminuria	CCAIMT	Comment
Age	Increases	Increases	Mean values higher in cases than controls
Duration of DM2	increases	Increases	Linear correlation
BMI	increases	Increase	
Microalbuminuria	-	Increases	

DISCUSSION:

The metabolic dysregulation associated with diabetes causes secondary pathological changes in multiple organ systems. Microalbuminuria is an established marker of diabetic nephropathy and has been claimed as a marker for cardiovascular events which account for about 70% of all deaths among diabetics. CCAIMT represents atherosclerosis and its measurement at an early age could have serious prognostic and therapeutic implications both in terms of quality of life and life expectancy. Intima Media Thickness of large vessels can be considered as simplest inexpensive precise and reproducible measure of underlined atherosclerotic vascular disease. In our study microalbuminuric subjects were more obese as compared to non-albuminuric subjects in both diabetic and non-diabetic groups which corroborates with the observations by Nelaj et al² study in which microalbuminuria was more among higher BMI individuals. The difference was statistically significant. Likewise influence of age and duration of diabetes on degree of microalbuminuria was similar to that of Nelaj et al² and Mykkanen L et al.⁸ As was the observation by Mykkanen L et al the glycemic control had significant influence on microalbuminuria ($p < 0.01$). The same observations were confirmed by Abdurrahman Al Shaikh.¹⁰ The prevalence of microalbuminuria among diabetics was higher (84%) as compared to that of Fatma Al-Maskari et al¹¹ (61%), Abdurrahman Al-Shaikh et al (46.6%) and Matsagoura M et al⁹ (38.3%). Probably this difference is due to genetic susceptibility and the size of study population. In our study mean CCAIMT value was higher in microalbuminuric diabetics compared with non-albuminuric diabetics (1.02 ± 0.23 vs 0.77 ± 0.20 mm, $p=0.049$). These

observations are similar to the previous studies of Nelaj E et al (1.28 ± 0.35 vs 1.09 ± 0.28 mm, $p=0.03$), Rodondi N et al¹² (802 vs 732 μ m, $p<0.001$), Mastagoura M et al⁹ (0.99 ± 0.14 vs 0.89 ± 0.15 mm, $p<0.05$), Pujia A et al¹³ (0.76 ± 0.30 vs 0.69 ± 0.10 mm, $p=0.002$). Thus in Indian type II diabetic population the CCAIMT values are higher in microalbuminuric subjects compared to non-albuminuric subjects as was observed by various research groups in different ethnic populations.

CONCLUSIONS

It is concluded from our study that degree of urinary albumin excretion in type II diabetes patients has significant relation with CCAIMT values. Microalbuminuria is significantly influenced by BMI, duration of diabetes and glycemic control among type II diabetes individuals. Microalbuminuria is an important marker of atherosclerosis in type II diabetes population.

Thus presence of microalbuminuria in Indian type II diabetes population not only indicates presence of diabetic nephropathy but is an important predictor of cardiovascular disease at an early stage. Clinicians can use microalbuminuria for risk stratification of vascular complications in Indian type II diabetic population. An early detection of microalbuminuria and timely intervention could have longer therapeutic implication.

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