



"A CLINICAL STUDY OF SIGNIFICANCE OF MICROALBUMINURIA IN ESSENTIAL HYPERTENSION"

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ABSTRACT Microalbuminuria has recently emerged as a marker of widespread vascular damage in essential hypertension. Microalbuminuria has received increasing attention as a prognostic marker for cardiovascular and renal risk in non-diabetic subjects. Microalbuminuria is now recommended in a risk stratification strategy for hypertension management, since its presence indicates early organ damage. The present study clearly demonstrated that microalbuminuria is significantly associated with target organ damage in essential hypertension.

KEYWORDS : Albuminuria, Transient Ischemic Attack, Stroke, Retinopathy

AIM OF THE STUDY: To determine the prevalence of microalbuminuria in patients with essential hypertension. To study the correlation of microalbuminuria with clinical profile and target organ damage in essential hypertension.

MATERIALS AND METHODS:

Patients with essential hypertension of varying durations attending outpatient units and patients who are admitted to medical wards of Government General Hospital, Vijayawada were chosen as subjects for this study during the period of June 2015 to July 2016.

Essential hypertension was diagnosed and severity of hypertension has been classified as per the joint national committee (JNC) VII report on prevention, detection, evaluation and treatment of high blood pressure.

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)
Normal	< 120	<80
Pre-hypertension	120-139	80-89
Stage 1	140-159	90-99
Stage 2	> 160	>100

Two or more readings separated by two minutes interval were averaged. In newly detected hypertensive patient, diagnosis was done based on the average of two or more readings taken at each of two or more visits after an initial screening. Secondary hypertension was ruled out by clinical examination and appropriate investigations.

INCLUSION CRITERIA

Patients with essential hypertension of varying durations attending outpatient units and patients who are admitted to medical wards of New Government General Hospital, Vijayawada, Andhra Pradesh.

EXCLUSION CRITERIA

Patients with diabetes mellitus
Patients with secondary hypertension

1. Pregnancy induced hypertension
2. Urinary tract infections
3. Acute and chronic renal failure
4. Patients with macroproteinuria

A total of 100 patients were studied. All subjects were investigated in detail including history of symptoms and signs suggestive of target organ damage, duration of hypertension, drug history, previous blood pressure recordings, complete urine analysis, complete blood picture, random blood sugar, blood urea, serum creatinine, ECG, Echo, Serum electrolytes, fasting lipid profile, Chest X Ray when there is evidence of cardiomegaly. 24 hour urine for microalbumin estimation was done by immunoturbidimetric assay. Ischemic heart disease was considered to be present based on past history and or ECG changes indicative of Ischemia/Infarction and confirmed by echocardiography. Left ventricular hypertrophy was diagnosed by applying Sokolow-Lyon-Voltage criteria and confirmed by echocardiography.

DISCUSSION

Proteinuria even in small quantities found to be nephrotoxic. In the

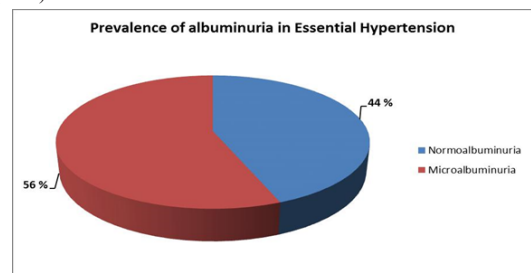
present study it was found that people with microalbuminuria at levels too low to detect with standard dipstick test are at increased risk not only for preclinical nephropathy but also for cardiovascular morbidity and other target organ damage¹ Hypertension is commonly associated with microalbuminuria. The mechanism is thought to be a renal manifestation of generalized vascular endothelial dysfunction and strongly associated with cardiovascular risk². The finding of microalbuminuria should trigger for a careful search of other cardiovascular risk factors and target organ damage with appropriate and aggressive intervention which if done at an early stage could have a great impact on patient outcomes. Several retrospective and cross sectional studies showed that the prevalence of cardiovascular disease and target organ damage is significantly higher among microalbuminuric hypertensives than their normoalbuminuric counterparts.

Therefore this study was conducted systematically in New Government General Hospital, Vijayawada, Andhra Pradesh during a period of 1 year to determine the prevalence of microalbuminuria in cases with essential hypertension and to study the correlation of microalbuminuria with clinical profile and complications of essential hypertension.

The present study included 100 cases of essential hypertension that were diagnosed denovo or already on treatment with various drugs and had excluded the cases with diseases causing increased albumin excretion other than essential hypertension.

PREVALENCE OF MICROALBUMINURIA

In the present study, out of 100 essential hypertension cases, 56 cases had microalbuminuria. The prevalence of microalbuminuria in essential hypertension was 56% which was slightly more compared to prevalence of microalbuminuria found in other studies like Pedrenelli R(27.4%)³, Anil Vij(30%), Yudkin (32.9%), Jalal S (37.5%), Bigazzi R(40%)⁴.



It is clear from above that the prevalence of microalbuminuria in present study was slightly higher compared to previous studies.

AGE:

The mean age of 100 essential hypertensives in present study population was 58.65±10.61 ranging from 38 to 82 years. Out of these 56 % cases were found to have microalbuminuria with mean age of 60.60±10.53 years when compared to cases with

normoalbuminuria with mean age of 56.15±10.28. This observation in present study is comparable and near to most of other studies conducted by Ghai R, Agarwal B, Kadam NN⁵

SEX IN RELATION TO ALBUMINURIA:

There were 52 males and 48 females in our study group, 55.8 % males and 56.2 % females had microalbuminuria which is statistically insignificant. Similar observations were found in studies conducted by Agarwal B (Male 32% and female 28%), Kadam NN (male 22.07%, female 21.56%). This shows that microalbuminuria is not related to sex of the patient.

When albuminuria was compared with sex among stage I and stage II hypertensives separately, microalbuminuria was slightly more common in males (50%) than females (33.3%) among stage I hypertensives and slightly more common in females (79.2%) than males (20.8%) among stage II hypertensives, but this was statistically insignificant showing clearly that there is no correlation between sex of the patient and albuminuria in essential hypertension.

DIASTOLIC BLOOD PRESSURE IN RELATION TO ALBUMINURIA:

In the present study mean diastolic blood pressure in microalbuminuria group was 98.14±8.55 mm Hg and in normoalbuminuria group 93.27±4.91 mm Hg, which was statistically insignificant. This was similar to study conducted by Deferrari G⁵⁸, which showed statistical insignificance with mean diastolic blood pressure in microalbuminuria group 100± 4.20 mm Hg and in normoalbuminuria group 97.04 ±4.67 mm Hg. But in a study conducted by Ghai R¹, showed statistical significance with mean diastolic blood pressure in microalbuminuria group, 98.15±11.65 mm Hg and in normoalbuminuria group 83.60±6.45 mm Hg.

SYSTOLIC BLOOD PRESSURE:

In the present study mean systolic blood pressure in microalbuminuria group was 169.96±19.32 mm Hg and in normoalbuminuria group was 155.72±13.27 mm Hg.

Thus the prevalence of microalbuminuria in essential hypertension correlates with the severity of hypertension, particularly with systolic blood pressure. Ghai R, Rodico JL Pedrinelli R⁶ also showed similar results.

SEVERITY AND DURATION OF HYPERTENSION IN RELATION TO ALBUMINURIA:

Out of 100 essential hypertensive cases in present study, 48 cases were stage I hypertensives out of which 20 cases were microalbuminuric with a mean range of microalbuminuria of 72.5±24.15 mg/day and 28 cases were normoalbuminuric with mean range of normoalbuminuria of 18.41±4.72 mg/day. Remaining 52 cases belong to stage II hypertension of which 36 cases were microalbuminuric with a mean range of 149.05±45.8 mg/day and 16 cases were normoalbuminuric with a mean range of normoalbuminuria of 25.6±2.52 mg/day. This shows that the prevalence & quantity of microalbuminuria increases with stage of hypertension which is statistically significant (P=0.006).

Present study also shows that the microalbuminuria in essential hypertension correlates well with the duration of the disease. The prevalence of microalbuminuria gradually increases as the duration increases from 44.4% in patients with < 1 year duration to almost 100 % in patients with > 15 years of duration. This shows that the cases having more than 10 years duration of hypertension are mostly microalbuminuric. This indicates that the longer the duration of hypertension more number of hypertensives will be microalbuminuric which is statistically significant (P=0.043)

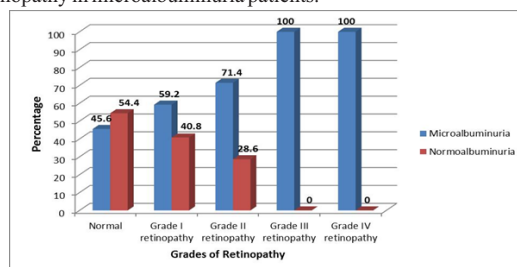
The mean duration of hypertension was 7.1±5.26 years in the total study population. Patients with microalbuminuria had a mean duration of hypertension 8.44±5.58 years and patients with normoalbuminuria had 5.38±4.30 years. Studies conducted by Kumar D⁷ (microalbuminuria group and normoalbuminuria group mean duration of hypertension was 11.29 and 9.63 respectively), Binachi S (in microalbuminuria group and normoalbuminuria group mean duration of hypertension was 10.15±2.93 and 7.93±1.03 years respectively) showed similar significance which was seen in the present study (P=0.009).

RETINOPATHY IN RELATION TO MICROALBUMINURIA:

The present study showed significant correlation between grades of hypertensive retinopathy in relation to microalbuminuria. In cases having grade I hypertensive retinopathy 59.2% were microalbuminuric and 40.8% were normoalbuminuric. In cases with

grade II hypertensive retinopathy 71.4% cases were microalbuminuric and 28.6% cases were normoalbuminuric in cases with grade III and grade IV retinopathy all (100%) were microalbuminuric whereas in normoalbuminuria group, most number of cases found to have either normal fundus or mild hypertensive retinopathy. (P=0.035)

This shows microalbuminuria correlates well with the prevalence of hypertensive retinopathy in cases with essential hypertension, which is statistically significant. Similar observations with high prevalence of retinopathy were also seen in other studies like Maura Ravera (82% Vs. 73%) but some studies like Kumar D (37.69% Vs. 11.6%) and Ghai R⁸ (28.6% Vs. 76%) showed lower prevalence of hypertensive retinopathy in microalbuminuria patients.



ALBUMINURIA IN RELATION TO LVH:

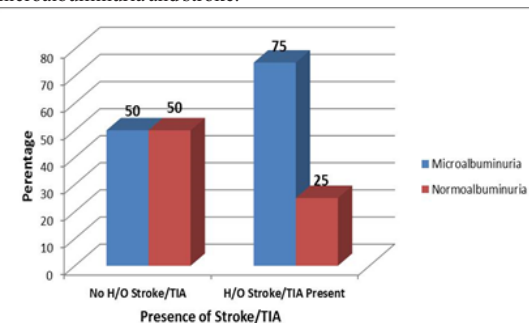
In the present study 39 cases were found to have left ventricular hypertrophy out of which 29 (74.3%) cases were microalbuminuric and 10 (25.7%) cases were normoalbuminuric. The remaining 61 cases were found to have no evidence of left ventricular hypertrophy of which most (55.8%) cases were normoalbuminuric compared to microalbuminuric patients (44.2%). This shows that most number of cases having microalbuminuria found to have left ventricular hypertrophy when compared to normoalbuminuria cases, which is statistically significant (P=0.003). Plavnic in his study observed that urinary albumin excretion is associated with concentric cardiac remodelling, the structural change that precedes the development of LVH. Similarly study conducted by Pontremoli R9 showed higher prevalence of concentric LVH as well as carotid atherosclerosis in patients with microalbuminuria.

ALBUMINURIA IN RELATION TO IHD:

In present study 27 cases had a history of Ischemic Heart Disease out of which 20 (74.1%) had microalbuminuria and remaining 7 (25.9%) cases were normoalbuminuric. Amongst the patients without history of Ischemic Heart disease most (50.7%) patients are normoalbuminuric. This shows that microalbuminuria had association with Ischemic Heart Disease, which is statistically significant (P=0.027). Yudkin (74 % Vs. 32.9%), Kuusisto (31% Vs. 22%), Agarwal (31% Vs 22%), Binachi S (21.3% Vs. 2.4%), Borch-Johnsen K10 et al showed similar significant correlation between microalbuminuria and Ischemic Heart Disease in their studies.

ALBUMINURIA IN RELATION TO STROKE/TIA:

In the present study 24 cases had a history of stroke / TIA out of which 18 (75%) cases had microalbuminuria and 06 (25%) cases had normoalbuminuria which indicates that microalbuminurics have higher prevalence of stroke/TIA than their normoalbuminuric counterparts. Of the remaining 76 cases without a history of stroke/TIA 38 (50%) were normoalbuminuric and 38 (50%) were microalbuminuric. This clearly shows that microalbuminuria has more association with stroke/TIA, which is statistically significant (P=0.031). Previous studies like the study conducted by Maura Ravera¹¹ also showed the similar significance between the association of microalbuminuria and stroke.



TOTAL CHOLESTEROL IN RELATION TO ALBUMINURIA:

In the present study the mean total cholesterol levels in the study

population was 197.04±24.02 mg/dl. Among the patients with microalbuminuria the mean total cholesterol was 202.35±24.51, which was higher compared to the mean total cholesterol levels of normoalbuminuric patients which was 190.27±21.81 mg/dl. The patients with total cholesterol levels greater than 200 mg/dl were higher among microalbuminurics (70.2%) than normoalbuminurics (29.8%), which was statistically significant (P=0.028).

Studies conducted by Redon J, Welt JNW, Maura Ravera¹¹ also showed similar significance with mean total cholesterol of 220.34±23.6 Vs. 190.12±20.2, 200.76±20.31 Vs. 188.54±16.23 and 224±5 Vs. 201±10 mg/dl respectively.

SERUM CREATININE:

In the present study serum creatinine levels were lower in microalbuminuric group (0.83±0.21) as compared to normoalbuminuric group (0.85±0.22). In the studies conducted by Rendon J (0.98±0.171 Vs 0.64±0.121) and Mogensen CE (1.08±0.192 Vs 0.79 ±0.182) serum creatinine levels were higher in microalbuminurics compared to normoalbuminuric counterparts.

ALBUMINURIA IN RELATION TO PVD:

In the present study 26 patients had peripheral vascular disease based on their ankle-brachial index values of which 20(76.9%) were microalbuminurics compared to 6(23.1%) cases who are normoalbuminurics, which is statistically significant (P=0.012). A similar study done by Richard D Forrest¹² et.al showed higher prevalence of peripheral vascular disease among microalbuminurics (44% Vs. 9.7%).

This shows clearly that there is higher prevalence of microalbuminuria in essential hypertension and there is a significant correlation between microalbuminuria and target organ damage in essential hypertension.

CONCLUSIONS:

1. The prevalence of microalbuminuria in essential hypertension was found to be 56% in the present study. There was no correlation between the sex of the patient and microalbuminuria in essential hypertension.
2. The prevalence and the degree of microalbuminuria increases with the severity of hypertension.
3. The prevalence of microalbuminuria increases with the duration of hypertension.
4. Increased systolic blood pressure has better correlation with microalbuminuria than normoalbuminuria.
5. The cases with microalbuminuria have higher prevalence of retinopathy and also had higher grades of retinopathy compared to their normoalbuminuric counterparts.
6. In essential hypertensives with microalbuminuria there is higher prevalence of LVH, Ischemic heart disease, cerebrovascular disease, peripheral vascular disease and higher total cholesterol levels.
7. The present study clearly demonstrated that microalbuminuria is significantly associated with target organ damage in essential hypertension.
8. Microalbuminuria can be used a marker of target organ damage in essential hypertension.
9. Routine examination of microalbuminuria in essential hypertension can be used to identify the patients with high risk of target organ damage.

SUMMARY:

The present study "SIGNIFICANCE OF MICROALBUMINURIA IN ESSENTIAL HYPERTENSION" was conducted in New Government General Hospital, Vijayawada, Andhra Pradesh.

A total of 100 patients were included in the study group using inclusion and exclusion criteria as per the protocol. The prevalence rate of microalbuminuria among hypertensives was 56% in the present study. Majority of microalbuminuria cases were found distributed among higher age group (60.6±10.53 Years). Cases with longer duration of hypertension (8.44±5.58 Years) were found to have higher prevalence of microalbuminuria. Patients with Stage II hypertension and higher systolic blood pressure (169.96±19.32mm Hg) were found to have higher mean range of microalbuminuria (149.05±45.8 mg/d) compared to their normoalbuminuric counterparts, which was statistically significant.

There was no correlation between sex distribution and microalbuminuria in the present study. Microalbuminuria in relation to serum creatinine levels showed no statistical significance. Levels of total cholesterol levels showed a positive correlation with microalbuminuric cases, which were statistically significant.

Hypertensives with microalbuminuria were found to have significantly higher prevalence of hypertensive retinopathy (69.8%), left ventricular hypertrophy (74.3%), Ischemic Heart Disease (74%), cerebrovascular disease (75%) and peripheral vascular disease (77%), which were statistically significant.

This shows that there is a significant association between microalbuminuria and target organ damage in essential hypertension.

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