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A PROSPECTIVE STUDY OF MICROALBUMINURIA IN ESSENTIAL HYPERTENSION AND ITS CORRELATION TO TARGET ORGAN DAMAGE

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Abstract

Introduction: Hypertension is a major global health issue, responsible for killing and disabling a large number of patients through its various complications. Hypertension affects approximately 1 billion people worldwide. The relationship between blood pressure and the risk of coronary vascular disease is continuous, consistent, and independent of other risk factors. Adequate hypertension control remains elusive, primarily due to the asymptomatic nature of the disease for the first 15-20 years, even as it progressively damages the cardiovascular system.

Materials and methods: This study was conducted in OP and IP wing of Department of General Medicine. The study population were the patients admitted in general medicine wards and those attending medical outpatient unit in Government Medical College, Ananthapur with a diagnosis of essential hypertension. A total of 75 subjects were selected after attaining their consent in written format. Data collection was by clinical history, examination and investigations. A preset proforma was used to collect data. Detailed clinical examination was done. The investigations collected were FBS, PPBS, FLP, serum creatinine, urine routine, urine culture, 24-hr urine albumin excretion, chest x-ray, ECG, echocardiogram in all cases and CT brain in relevant cases.

Results: The minimum age was 31 and the maximum was 59. The mean age was 48.62, SD 7.44. Of the total 75 subjects, 51 (68.7%) belonged to the group from 18.5 to 22.9 (normal), 16 (21.3%) belonged to group from 23 to 24.9 (overweight), 8 (10%) belonged to group > 25 (obese). Among the regularly treated hypertensives, no patients had microalbuminuria and the prevalence of microalbuminuria was more in patients with no and irregular treatment and the difference was statistically significant with p-value 0.000 (< 0.05)

Conclusion: Control of risk factors amenable to prevention (control of hypertension, weight and lipid levels) may have a favourable effect in preventing, delaying and lessening microalbuminuria. Microalbuminuria in hypertensive subjects seems to be a very important test to be considered in the evaluation of target organ damage.

Key Words: Hypertension, Microalbuminuria, FBS, PPBS, FLP, serum creatinine, urine routine, urine culture**.**

INTRODUCTION

Hypertension is a major global health issue, responsible for killing and disabling a large number of patients through its various complications. Hypertension affects approximately 1 billion people worldwide. The relationship between blood pressure and the risk of coronary vascular disease is continuous, consistent, and independent of other risk factors. Adequate hypertension control remains elusive, primarily due to the asymptomatic nature of the disease for the first 15-20 years, even as it progressively damages the cardiovascular system. Coronary heart disease is the leading cause of mortality and morbidity, and the significance of hypertension as a risk factor for coronary heart disease is well established.[1]

Benign arteriolar nephrosclerosis in hypertensive patients (BP over 140/90 mmHg) over an extended period may manifest as mild to moderate elevation of serum creatinine, microscopic hematuria, and/or microalbuminuria. The association between microalbuminuria and hypertension was described by Parving et al. in 1974. Microalbuminuria has a major impact on cardiovascular risk. In recent years, microalbuminuria has become a prognostic marker for cardiovascular disorders.[2]

In essential hypertension, increased trans glomerular passage of albumin may result from mechanisms such as hyperfiltration, glomerular basal membrane abnormalities, endothelial dysfunction, and nephrosclerosis.[3]

Microalbuminuria, which represents an albumin excretion rate (AER) of 30-300 mg/24 hours, is defined as elevated urinary albumin excretion below the level of clinical albuminuria, undetectable by Albustix and detectable only by special methods. Microalbuminuria's prognostic role extends to the early detection and intervention in patients with hypertensive nephropathy.[4]

Therefore, it is crucial to detect nephropathy as early as possible to take proper precautions and initiate appropriate management. Several epidemiological studies have shown that proteinuria and microalbuminuria are independent predictors of cardiovascular morbidity and mortality in patients with essential hypertension.[5]

MATERIALS AND METHODS

Study Design: A cross-sectional study.

Study Location: This study was conducted in OP and IP wing of Department of General Medicine. The study population were the patients admitted in general medicine wards and those attending medical outpatient unit in Government Medical College, Ananthapur with a diagnosis of essential hypertension.

Sample size for the study= 75

Period of Study: January 2023 to December 2023.

Inclusion Criteria

- Patients newly diagnosed with essential hypertension according to JNC VII criteria-

  Stage 1: Systolic BP of 140 to 159 mmHg and diastolic BP of 90 to 99 mmHg.

  Stage 2: Systolic BP > 160 mmHg and diastolic BP > 100 mmHg.

- Past history of essential hypertension.

Exclusion Criteria

1. Patients with Diabetes Mellitus: Either history of diabetes or those newly detected (Diagnosed by ADA criteria).

2. Patients with secondary hypertension.

3. Pregnancy.

4. Patients with history of ischaemic heart disease.

5. Patients with urinary tract infection by history or investigations.

6. Patients with raised serum creatinine [> 1.2 mg/dL] and macroalbuminuria (Dipstick positive albuminuria).

7. Patients on ACE inhibitors and ARBs.

This study was conducted in the patients admitted and those attending medical outpatient unit under the Department of General Medicine. A total of 75 subjects were selected after attaining their consent in written format. Data collection was by clinical history, examination and investigations. A preset proforma was used to collect data. Detailed clinical examination was done. The investigations collected were FBS, PPBS, FLP, serum creatinine, urine routine, urine culture, 24-hr urine albumin excretion, chest x-ray, ECG, echocardiogram in all cases and CT brain in relevant cases.

Statistical Analysis

Data analysis was done with the help of SPSS version 16. Tables and Graphs were created with the help of SPSS and Microsoft Excel. Descriptive data that included numbers and percentages

were calculated for all the categories. Categorical data were analysed by Chi-square tests for statistical significance. A p-value (two-tailed) of < 0.05 was considered statistically significant.

RESULTS

S.No	Age group	Percentage
1	30-34	4
2	35-39	10
3	40-44	14.7
4	45-49	22.7
5	50-54	23.3
6	55-59	25.3

Table 1: Distribution in different Age Group

The minimum age was 31 and the maximum was 59. The mean age was 48.62, SD 7.44.

S.No	BMI	Number
1	18.5-22.9	51
2	23-24.9	16
3	>25	8

Table 2: Distribution as per BMI

Of the total 75 subjects, 51 (68.7%) belonged to the group from 18.5 to 22.9 (normal), 16 (21.3%) belonged to group from 23 to 24.9 (overweight), 8 (10%) belonged to group > 25 (obese).

S.No	Microalbuminuria	Percentage
1	Yes	26.67%
2	No	73.33%

Table 3: Proportion of Subjects with Microalbuminuria

In this study, the number of subjects who were found to have microalbuminuria were 20 (26.7%).

Age group	Microalbuminuria	
	Yes	No
30-34	0	3
35-39	0	7
40-44	0	11
45-49	2	15
50-54	8	10
55-59	10	9

Table 4: Distribution among different Age Groups

It was observed that as the age advances, the prevalence of microalbuminuria increases among hypertensive patients and the difference was statistically significant with p-value 0.000 ($p < 0.05$).

Duration of hypertension	Microalbuminuria	
	Yes	No
New	0	19
<5 years	9	13
5-10 years	2	14
>10 years	10	2
Unknown	0	7

Table 5: Microalbuminuria depending upon the Duration of Hypertension

There was statistically significant increase in the prevalence of microalbuminuria among patients with hypertension of long duration with p-value 0.000 (< 0.05).

Treated and Untreated Hypertensives	Microalbuminuria	
	Yes	No
No treatment	8	18
Irregular treatment	12	13
Regular treatment	0	24

Table 6: Microalbuminuria among Treated and Untreated Hypertensives

Among the regularly treated hypertensives, no patients had microalbuminuria and the prevalence of microalbuminuria was more in patients with no and irregular treatment and the difference was statistically significant with p-value 0.000 (< 0.05)

Fundus	Microalbuminuria	
	Yes	No
Not seen	1	10
Normal	7	22
Grade I	1	8
Grade II	5	10
Grade III	3	4
Grade IV	3	1

Table 7: Microalbuminuria and Fundus

LVH	Microalbuminuria	
	Yes	No
LVH absent	5	48
LVH Present	15	8

Table 8: Microalbuminuria and LVH

DISCUSSION

The prevalence of microalbuminuria in this study was 26.7% (20 out of 75 patients). In an Indian study conducted by Ravjitkaur et al in 2008, prevalence of microalbuminuria in hypertensive was 33.3%. In 1992, Stefano Bianchi et al published the first large study on the prevalence of microalbuminuria in hypertensives. It was found to be 35%. Palatini et al in HARVEST study and the PREVEND-IT (Prevention of Renal and Vascular End Stage Disease-Study performed in the Dutch city of Groningen) showed a prevalence of 8 - 15%. Another study by Tsioufis et al in 2002 reported a prevalence of 47%. The variability in prevalence may be explained by-Difference in the methods of urine collection and Characteristics of study population.[6]

In the present study, the prevalence of microalbuminuria was higher in the older age groups [$p < 0.05$]. This is in concurrence with study by Nakamura et al.[7]

In the present study, there was statistically significant increase in the prevalence of microalbuminuria among patients with hypertension of long duration with p-value 0.000 (< 0.05). This is in concordance with previous study by Aher et al.

In the present study, patients with higher levels of blood pressure had higher probability of having microalbuminuria with a significant p-value 0.003 (< 0.05)

In the present study, there were a total of 101 smokers (67.3%) and 49 non-smokers (32.7%). And prevalence of microalbuminuria was 23.7% among smokers and 32.7% among non-smokers and there was no statistically significant association between smoking and microalbuminuria [p= 0.248]. This observation is discordant with that seen in previous studies on this aspect. One possible explanation for this variability may be an error in the classification of smokers and non-smokers. This was done on the basis of history.[8]

In the present study 35 patients had changes of hypertensive retinopathy, 29 patients had normal fundus, in 23 patients fundus was not visualised due to hazy media. Of the 35 patients with fundus changes 12 patients (34.7%) had microalbuminuria, 22 patients (65.2%) did not have microalbuminuria, hence the present study showed a statistically significant association between microalbuminuria and the presence and severity of retinopathy ($p < 0.05$).[9] The odds ratio for a microalbuminuric patients of having retinopathy was 9.7 (95% Confidence Interval 2.8 - 34.6). Beisen et al in 1997 has observed an increased prevalence of hypertensive retinopathy in a group with persistent microalbuminuria despite adequate treatment ($p < 0.03$). In 2002, Cerasola et al has observed a greater prevalence of retinopathy among those patients with microalbuminuria.[10]

CONCLUSION

In this study, 40 (26.7%) subjects were found to have microalbuminuria. It was observed that as the age advances, the prevalence of microalbuminuria increases among hypertensive patients and the difference was statistically significant (p= 0.000). Prevalence of microalbuminuria among patients with hypertension of long duration was more and the difference was statistically

significant (p= 0.000). Microalbuminuria was more common in those hypertensives with dyslipidaemia with a significant p-value of 0.01 (< 0.05). Patients with higher levels of blood pressure had higher probability of having microalbuminuria with a significant p-value 0.003 (< 0.05). A higher proportion of patients with advanced hypertensive retinopathy had microalbuminuria and the association was statistically significant with p-value 0.001 (< 0.05%). A higher proportion of patients with hypertensive vascular involvement of brain had microalbuminuria and the association was statistically significant with p-value 0.01 (< 0.05).

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