

MICROALBUMINURIA AS AN EARLY MARKER FOR LEFT VENTRICULAR HYPERTROPHY IN ESSENTIAL HYPERTENSIVE PATIENTS

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ABSTRACT:

BACKGROUND: Hypertension increases the risk for a variety of cardiovascular diseases. Patients with microalbuminuria are at increased risk not only for preclinical nephropathy but also for cardiovascular morbidity. Left ventricular hypertrophy is a potent independent predictor of cardiovascular events in hypertensive patients. Hence this cross sectional study was conducted to examine whether microalbuminuria is associated with LVH in non-diabetic hypertensive patients. **MATERIALS AND METHODS:** The study was done primarily among inpatients of Yenepoya Medical College Hospital, Deralakatte, Mangalore, Karnataka state located in South India. The study included cases with essential hypertension who met predefined criteria. One hundred thirty-five cases with essential hypertension were enrolled in the study after informed consent and excluding patients with diabetes mellitus, macroalbuminuria, secondary hypertension, CKD, urinary tract infections and acute febrile illness. Urine microalbumin spot was measured in all essential hypertensive patients. eGFR was calculated by Cockcroft and Gault formula. 2DECHO was done to look for left ventricular hypertrophy. **RESULTS AND OBSERVATIONS:** In this study, it was found that out of 135 enrolled patients, 60 patients (44.4%) had microalbuminuria and 75 patients (55.6%) had normoalbuminuria. 41 patients (30.4%) found to have left ventricular hypertrophy, out of which 27 patients had microalbuminuria. Mean urine microalbumin level among patients who had LVH was 65.3 which were clinically significant. The correlation between increased microalbuminuria and presence of left ventricular hypertrophy was found to be statistically significant. **CONCLUSION:** Microalbuminuria is associated with LVH in essential hypertensive patients and thus may serve as an early marker of LVH and help in identifying patients at increased cardiovascular risk.

KEYWORDS: *Microalbuminuria; Essential Hypertension; Left Ventricular Hypertrophy*

INTRODUCTION:

Non-communicable diseases are important causes of mortality and morbidity in India.¹ Among them, hypertension is one of the significant health problems worldwide. Hypertension is considered one of the foremost causes of chronic disease-related morbidity worldwide. It is estimated that the disability resulting from hypertension is about 9.2 crores at the global level, and the estimated mortality is 76 crores since 2011. The incidence of hypertension in India is around 10% of the adult population.² The majority of these hypertensive patients have essential hypertension, defined as a rise in blood pressure (BP) of unknown cause.³ Essential hypertension remains a major modifiable risk factor for cardiovascular disease (CVD) despite fundamental advances in our understanding of its pathophysiology and the

availability of effective treatment strategies. High blood pressure (BP) increases coronary vascular artery disease risk for millions of people worldwide, and there is evidence that the problem is only getting worse.⁴ Here, its control of BP which plays a part in the pathogenesis of the disorder. The world health organization itself stated that with uncontrolled hypertension, which is defined as a rise of systolic blood pressure more than 140mmHg and diastolic blood pressure more than 90mmHg, the risk of cerebral, retinal, cardiac, and renal events is increased. Hence, there will be an increase in hypertension-related complications like coronary heart disease, stroke, chronic kidney disease, and retinopathy.⁵ Hypertension plays a crucial role in the development of left ventricular hypertrophy (LVH). LVH is a strong, independent predictor of

cardiovascular events and all-cause mortality. Patients with LVH are at increased risk for coronary artery disease, stroke, congestive heart failure, and sudden cardiac death.⁶

The National Kidney Foundation of the United States defines MA as urine albumin excretion of approximately 30-300 mg/day in non-ketotic sterile urine.³ In essential hypertensives, an increased transglomerular passage of albumin may result from several mechanisms – hyperfiltration, glomerular basal membrane abnormalities, endothelial dysfunction, and nephrosclerosis.⁷ Microalbuminuria at levels too low to detect with standard dipstick tests are at increased risk not only for preclinical nephropathy but also for cardiovascular morbidity and other target organ damage.⁸

Despite the widely recognized dangers related to uncontrolled hypertension, the disease remains inadequately treated in most patients, mainly due to its asymptomatic nature even when it progressively damages multiple organ systems.³

Hence this study aims to examine whether microalbuminuria is associated with LVH in non-diabetic essential hypertensive patients.

AIMS AND OBJECTIVES:

This study was conducted to examine whether microalbuminuria is associated with LVH among essential hypertensive patients.

METHODS:

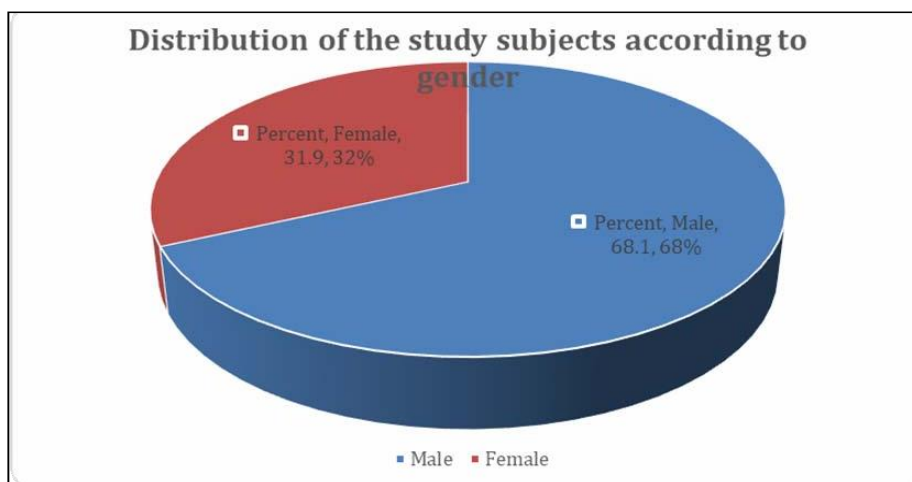
Study Type: The study was a Cross-Sectional study.

RESULTS:

Majority of patients in the study group were males (68.1%) and belongs to the agegroup more than 60 (52.6%).

Table 1: Gender of the cases in the study

Gender	Number	Percentage
Male	92	68.1
Female	43	31.9
Total	135	100.0



Graph 1: Gender of the cases in the study

Study Place: The study was done primarily among inpatients of Yenepoya Medical College Hospital, Deralakatte, Mangalore, Karnataka state located in South India.

Study Period: The study was conducted for a period of two years from November 2018 to November 2020. One hundred thirty-five patients were selected for this study after getting informed consent and ethical clearance.

Selection Criteria: Patients admitted to our hospital, having the age of more than 25 years with essential hypertension (undergoing treatment as well as newly detected) after excluding Diabetes mellitus, secondary hypertension, chronic kidney disease (creatinine >1.5 mg/dl), urinary tract infections, acute febrile illnesses were enrolled in this study.

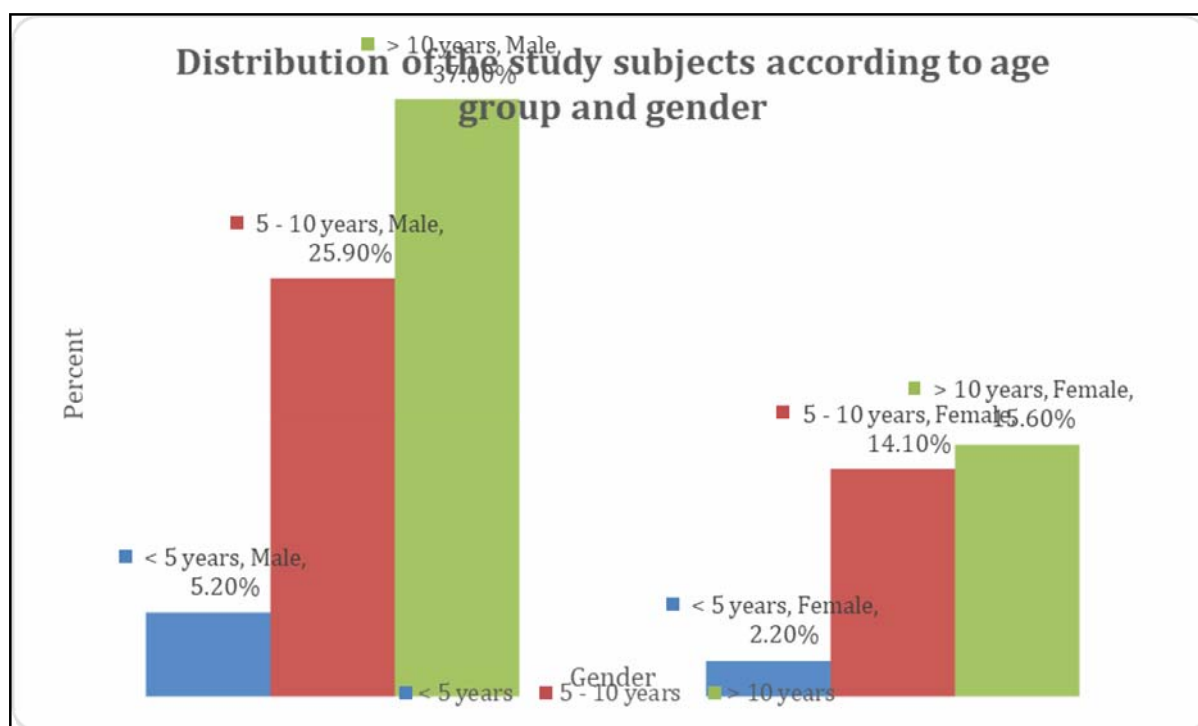
Blood pressure was measured according to the JNC 8 guidelines. Urine microalbumin spot was measured in all essential hypertensive patients. eGFR was calculated by Cockcroft and Gault formula. 2D ECHO was done to look for Left ventricular hypertrophy. All information was collected in a proforma.

STATISTICAL ANALYSIS:

Data analyzed by descriptive statistics such as mean, standard deviation, percentages, tables and graphs. Chi-square was applied to test the statistical association between qualitative variables. An unpaired t-test was applied to test the mean difference between two quantitative groups. p<0.05 considered statistically significant.

Table 2: Distribution of the study subjects according to age group and gender

Age group(years)	Gender		Total
	Male	Female	
< 40	7	3	10
	5.2%	2.2%	7.4%
40 – 60	35	19	54
	25.9%	14.1%	40.0%
> 60	50	21	71
	37.0%	15.6%	52.6%
Total	92	43	135
	68.1%	31.9%	100.0%

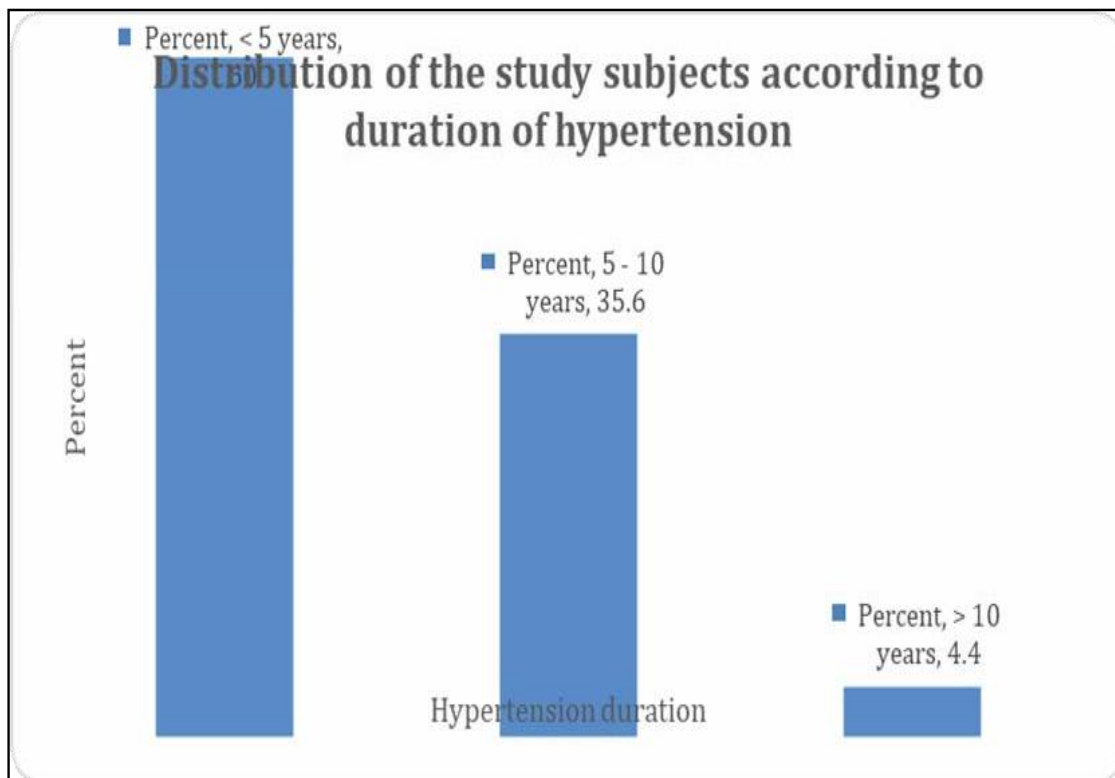


Graph 2: Distribution of the study subjects according to age group and gender

On evaluating the duration of hypertension, 81 cases (60%) had hypertension duration of fewer than 5 years. 35.6% of the study population were having hypertension for the duration between 5 and 10 years this was followed by 6 cases accounting for 4.4% of the study population having hypertension for more than 10 years. Our study group had majority of patients who had hypertension for less than 5 years because most of the patients with longer duration of hypertension had frank albuminuria and was excluded from the study.

Table 3: Distribution of the study subjects according to the duration of hypertension

Hypertension duration(years)	Number	Percentage
< 5	81	60.0
5 – 10	48	35.6
> 10	6	4.4
Total	135	100.0

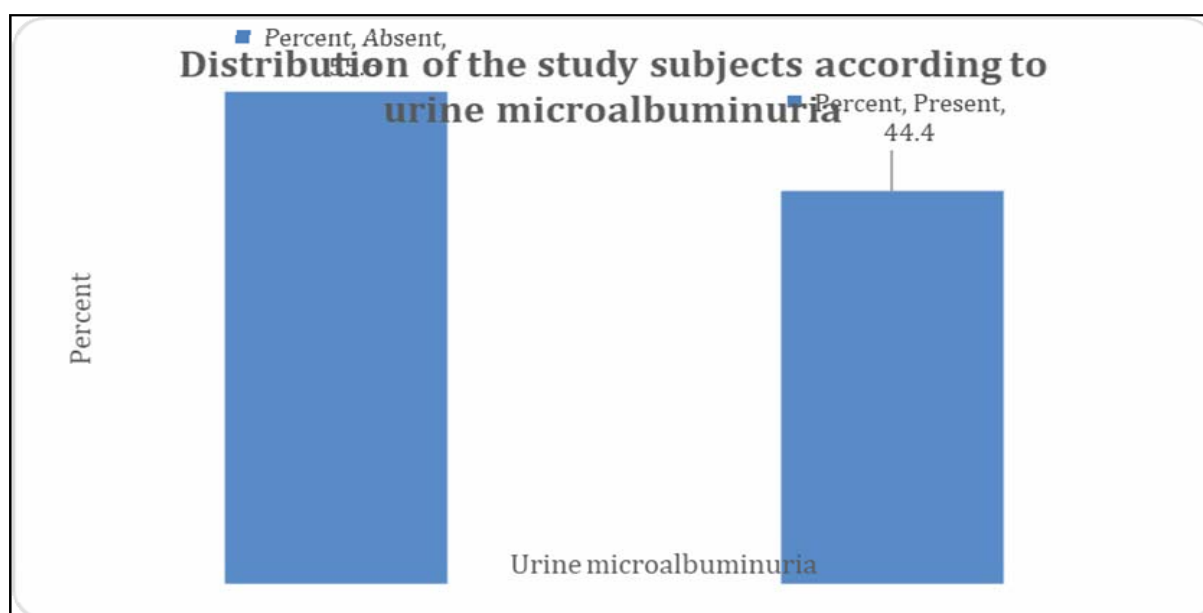


Graph 3: Distribution of the study subjects according to the duration of hypertension

Out of 135 study subjects, 60 patients had microalbuminuria which accounts for 44.4 percentages and 75 patients did not have microalbuminuria.

Table 4: Distribution of the study subjects according to urine microalbuminuria

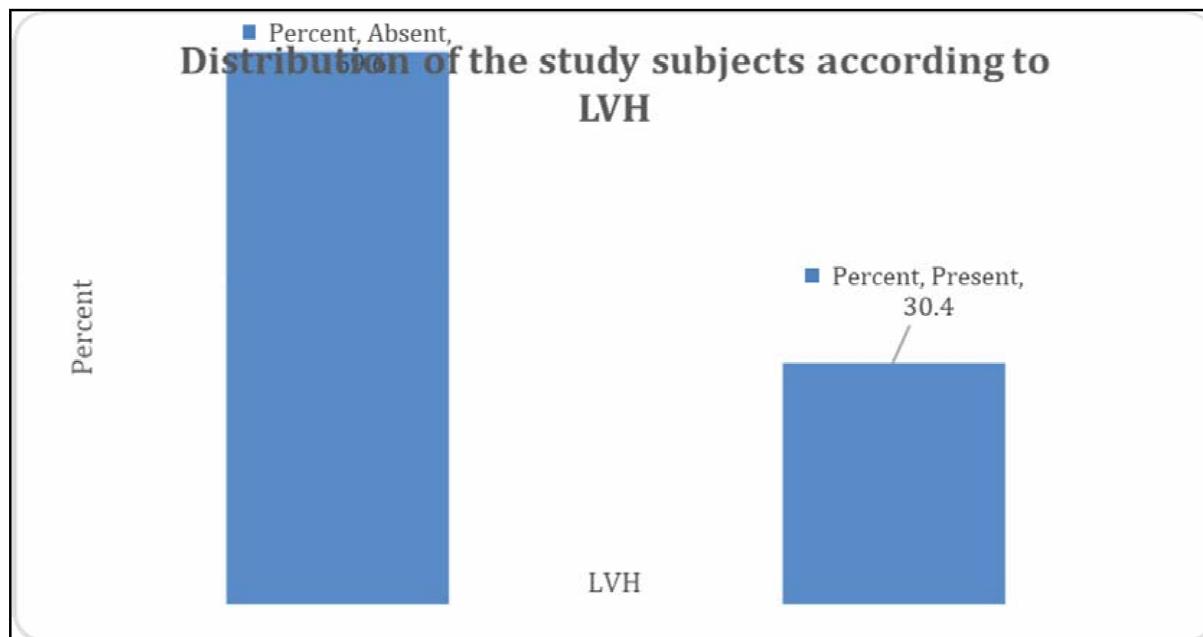
Urine microalbuminuria	Number	Percentage
Absent	75	55.6
Present	60	44.4
Total	135	100.0



Graph 4: Distribution of the study subjects according to urine microalbuminuria

Table 5: Distribution of the study subjects according to LVH

LVH	Number	Percentage
Absent	94	69.6
Present	41	30.4
Total	135	100.0



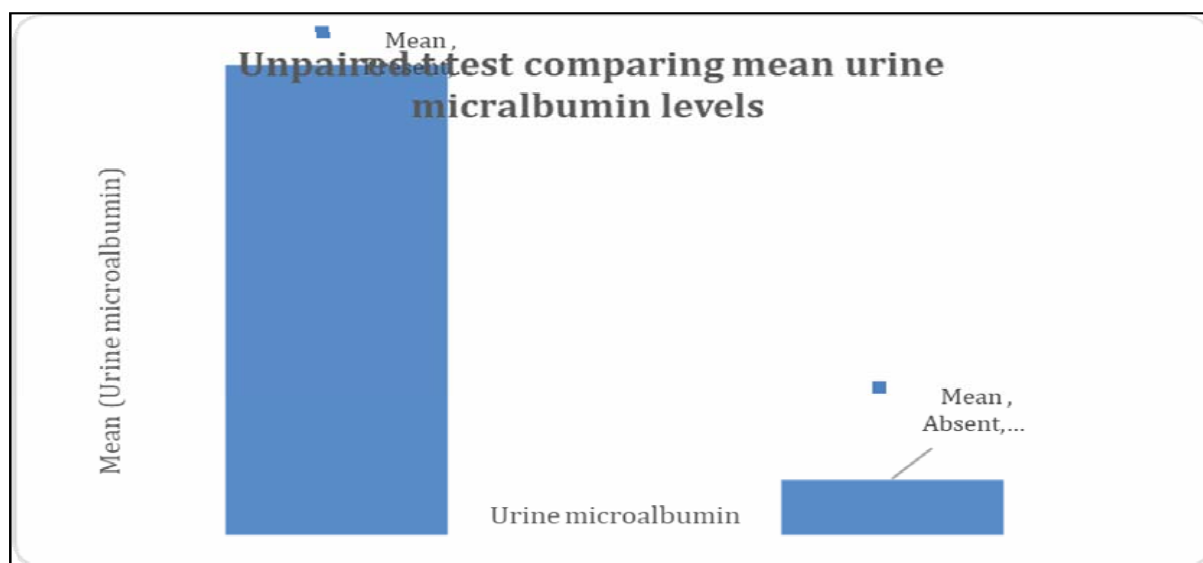
Graph 5: Distribution of the study subjects according to LVH

In this study out of 135 essential hypertensive patients, 41 patients had LVH. So the incidence of LVH among essential hypertensive's 30.4%.

Table 6: Unpaired t-test comparing mean urine microalbumin levels

Urine microalbumin	N	Urine Microalbumin levels (mg/l)		Mean difference	p-value*
		Mean	Standard Deviation		
Present	60	86.57	48.80	76.44	0.001
Absent	75	10.12	2.44		

*Unpaired t-test



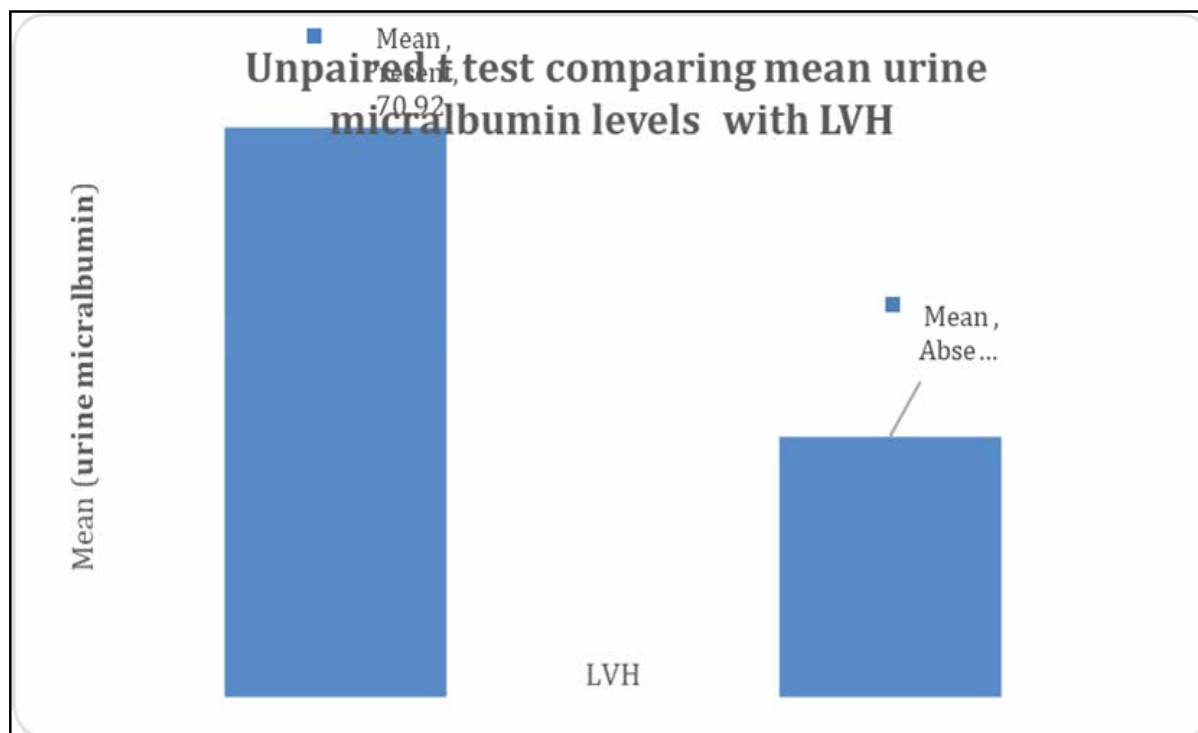
Graph 6: Unpaired t-test comparing mean urine microalbumin levels

In this study mean microalbumin levels among essential hypertensive patients having microalbuminuria is 86.57 and among no microalbuminuria patients is 10.12 mg/l.

Table 7: Unpaired t-test comparing mean urine microalbumin levels with LVH

LVH	N	Urine Microalbumin levels (mg/l)		Mean difference	p-value*
		Mean	Standard Deviation		
Present	41	70.92	66.22	38.52	0.001
Absent	94	32.40	35.61		

*Unpaired t-test



Graph 7: Unpaired t-test comparing mean urine microalbumin levels with LVH

It was observed that in this study mean urine microalbumin level among those who had LVH was 70.92 mg/l (SD-66.22mg/l) and it was 32.4 mg/l (SD -35.61) among those who did not have LVH which was clinically significant (p-value- 0.001).

DISCUSSION:

Hypertension is a major public health problem all over the world. It is one of the most important causes leading to mortality and morbidity when it is undiagnosed and inadequately controlled¹. Microalbuminuria is commonly seen in patients with essential hypertension and is a predictor of cardiovascular, renal dysfunction, and subsequent mortality. Hence this study is done to examine microalbuminuria as an early marker for left ventricular hypertrophy in essential hypertensive patients.

Prevalence of Microalbuminuria: In this study, prevalence of microalbuminuria among essential hypertensive patients was 44.4% (60 among 135 patients). In a similar study conducted by Bibek Paudal and team in the year 2012, the prevalence of microalbuminuria was 51.88%.⁹ In another study

conducted by Stalin and co-workers, it was 56%.¹⁰ Prevalence of microalbuminuria among essential hypertensive patients was 57.7% in a study conducted by Pragatebhole et al in the year 2015.¹¹ A similar study conducted in the year, 2018 by Aggarwal HK² showed the prevalence of microalbuminuria was 47%.

Age and Sex Distribution: It was observed in this study, among 10 patients who were less than 40 years of age, 2 patients had microalbuminuria. Twenty-three patients had microalbuminuria among 54 patients who were in the 40–60 year age group. Among 71 patients who had more than 60 years of age, 35 patients had microalbuminuria. Ninety-two patients in the study group were male and 43 were female. Among 92 male patients, 44 patients had microalbuminuria.

LVH and Microalbuminuria: LVH was present among 41(30.4%) essential hypertensive patients and among them 27 patients had microalbuminuria. Mean urine microalbumin level among patients who had LVH was 65.3 which were clinically significant. Similar results of a positive correlation between microalbuminuria and the presence of LVH among hypertensive patients were also seen in studies conducted by Pontremoli¹² and Aggarwal HK et al.²

CONCLUSION:

In this study it was observed that presence of Left ventricular hypertrophy was higher among essential hypertensive patients with microalbuminuria than in patients without microalbuminuria and was statistically significant. There is a positive correlation between the presence of microalbuminuria and LVH in essential hypertensive patients. Hence microalbuminuria can be taken as an early marker for Left ventricular hypertrophy in essential hypertensive patients and in such patients cardiac screening is required to look for hypertensive heart disease.

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