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Microalbuminuria and Newly Diagnosed, Uncomplicated, Untreated Essential Hypertension

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Abstract **Original Research Article**

Introduction: High blood pressure (BP) is a major public health problem in India and its prevalence is rapidly increasing among both urban and rural populations. In fact, hypertension is the most prevalent chronic disease in India. The prevalence of hypertension ranges from 20-40% in urban adults and 12-17% among rural adults. Studies elsewhere have revealed association of microalbuminuria with early myocardial dysfunction in the form of left ventricular diastolic dysfunction. ***Objective:*** To study association of microalbuminuria with early myocardial dysfunction in the form of left ventricular diastolic dysfunction in patients of newly diagnosed, untreated and uncomplicated essential hypertension. ***Method:*** A prospective, stratified randomized, observational study was conducted on two hundred patients of newly diagnosed, untreated and uncomplicated essential hypertension who visited the medial outpatient department of Patna Medical College and Hospital between January 2014 and December 2014. The patients were subjected to a battery of test for imaging the heart and that included a standard chest roentgenogram, 12 lead ECG, Echocardiography, routine urine test and test for microalbuminuria. The results were statistically analyzed. ***Result:*** Positive co relation was observed in patients with newly diagnosed, uncomplicated, untreated hypertension having microalbuminuria with Left Ventricular Diastolic Dysfunction diagnosed by echocardiography. ***Conclusion:*** In the study microalbuminuria was found to be directly related with preclinical impairment of LV diastolic function and thus it can be used as early and reliable marker of preclinical cardiac structural and functional dysfunction.

Keywords: Hypertension, Microalbuminuria, Left Ventricular Diastolic Dysfunction.

INTRODUCTION

Hypertension has emerged as a global public health problem affecting adult population [1]. The exact cause for hypertension is difficult to ascertain as it is ascribed to complex interaction of genetic and environmental factors [1]. The presence of small amount of albumin in urine, labelled as microalbuminuria, has become a marker of associated cardiovascular risk and/or as an early sign of nephron damage and a predictor for end stage renal disease (ESRD) in both diabetic [2] and non-diabetic elderly populations [3]. Increased left ventricular mass [4] and/or carotid wall thickness [5] are associated with microalbuminuria associated with essential hypertension. In essential hypertension, it is even linked with the increased mortality.

Microalbuminuria is defined as the increased urinary excretion of albuminuria (30-300 mg/24 h) which cannot be detected by routine protein dipstick method [6]. Although the measurement of microalbuminuria can be done using random spot urine sample but considering the variation in urinary concentration and flow rate, the excreted urinary albumin can be adjusted with amount of creatinine excreted in urine. A positive albumin creatinine ratio or microalbuminuria is considered if it is 30-300 mg albumin/g creatinine, corresponding to 3.4-33.9 mg albumin/ mmol creatinine [7].

Measurement of microalbuminuria in essential hypertension has increased despite scanty evidence to support any prognostic value [8] as also due to dearth of evidence, it is argued that a reduction in microalbuminuria is followed by a decrease in risk. The aim of this study was to find out the association of urinary microalbuminuria in newly diagnosed essential hypertensive patients presenting at a tertiary hospital in eastern India.

MATERIALS AND METHODS

The study was designed as a prospective, observational study conducted at Department of

Medicine, Patna Medical College and Hospital, Patna over a period of one year from January 2014 to December 2014. Using stratified random sampling technique, the patients were selected, and the investigator recorded the data using a preformed questionnaire. The data was statistically analysed. Non obese patients who were newly diagnosed as a case of essential hypertension within last two years without any known comorbidity (Diabetes, CKD, etc) or complication and who had not been treated in the past for hypertension or renal ailment were included in the study whereas those of extreme of age satisfying other criteria were excluded.

RESULTS

A sample size of 200 was calculated and patients meeting the inclusion criteria were studied.

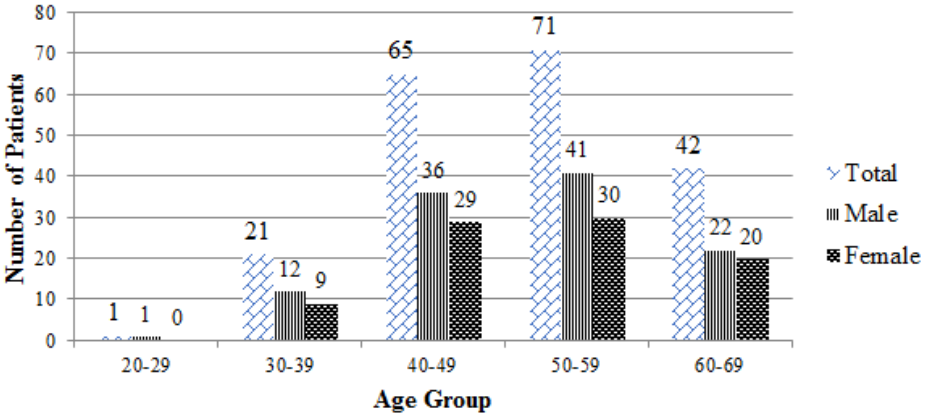

Chart-1: Age and Sex Distribution of Patient

Of the 200 patients enrolled for study, 112 (56%) were male and 88 (44%) were female. Youngest patient included was 28 year of age whereas the oldest was 67 year old while the majority of the patients were within the age group of 50-59 years [71 patients (35.5%)]. The patients were asymptomatic and had never received any antihypertensive treatment.

Table-1: Recorded Blood Pressure (mmHg)

		Maximum	Minimum	Range	Mean	Median	SD
Right Arm	*Systolic BP*	220	140	80	177.03	176	17.028
	Diastolic BP	130	80	50	103.86	102	8.828
Left Arm	*Systolic BP*	220	140	80	176.66	176	17.311
	Diastolic BP	130	80	50	103.42	100	8.930

Microalbuminuria was estimated from urinary albumin creatinine ratio from the early morning random urine samples by immune turbidimetric method. Among the 200 samples collected, 116 (64%) urine samples were positive for microalbumin whereas 72 samples (36%) showed absence of microalbumin.

The patients underwent echocardiography to estimate besides other parameters, the left ventricular mass, left ventricular EF, left ventricular concentric hypertrophy and based on parameters the degree of left ventricular diastolic dysfunction was ascertained.

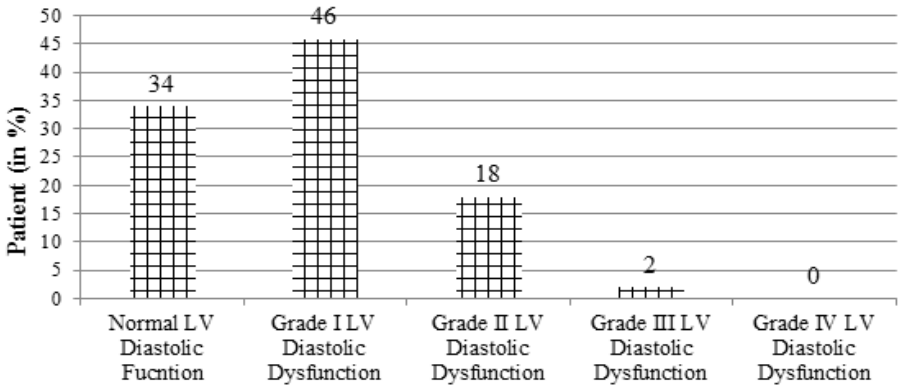

Chart-2: Prevalence of LVDD among the Patients

In the series 68/200 patients had normal LV Diastolic function whereas 92/200, 36/200 and 4/200 patients had grade I, II and III LV Diastolic Dysfunction. None of the included patient had Grade IV or irreversible / fixed restrictive diastolic dysfunction.

Analysis of microalbuminuria (MAU) negative patients revealed that amongst 72 patients, 67 patients were found to have normal LV Diastolic function whereas 5 patients had Grade I LVDD. The patients who tested positive for microalbuminuria (128/200), had normal left ventricular diastolic function in 1 patient, Grade I LVDD in 87 patient, Grade II LVDD in 36 patients and Grade III LVDD in 4 patients.

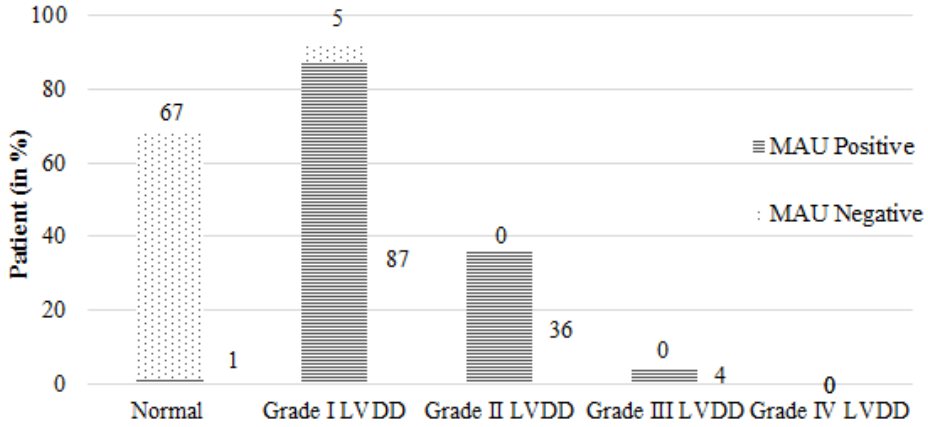

Chart-3: Microalbuminuria and LV Diastolic Dysfunction in patients

DISCUSSION

Hypertension though being a major global health issue most often remains undiagnosed. Even if a diagnosis is made, it is often inadequately treated. Only a quarter of hypertensive patients appear to have well controlled blood pressure. In United States alone, in 2011–2014, 84.1% of adults with hypertension were aware of their status, and among those diagnosed only 76.1% were taking medication to lower their blood pressure [9,10]. Hypertension is an important risk factor for cardiovascular disease, stroke, kidney failure, and other health conditions. Uncontrolled and prolonged elevation of BP can lead to a plethora of changes in the structure and vasculature of myocardium and conduction system of the heart as well as can lead to early changes in renal glomeruli leading to microalbuminuria. Studies have demonstrated the prevalence of microalbuminuria in essential hypertension varying in the range of 20 - 40%, depending on the selection criteria used [11, 12].

In our present study, microalbuminuria was observed in 64% patients with newly diagnosed uncomplicated hypertension without any significant co morbidity.

In a study conducted in Asia, the sub analysis of data from Pakistan and Thailand observed that 24.2% of the analysed patients with hypertension had microalbuminuria, which on comparison to western population studies in diabetic patient, was slightly higher [13,14,15]. Overall in this study of ten Asian countries, the prevalence of microalbuminuria was 39.8% and the prevalence of macroalbuminuria was 18.8%. Koreans had highest prevalence of microalbuminuria (56.5%) whereas it was lowest in the Pakistani subset [13-15].

Diastolic dysfunction is a known risk factor for the development of cardiovascular morbidity and has prognostic value. It is frequently encountered and is an indicator of manifest cardiac weakness. In the present study where common predisposing conditions for microalbuminuria like obesity, diabetes, CKD, etc. were already excluded, LVDD was observed to corelate well with microalbuminuria in newly diagnosed essential hypertension patients. The prevalence and grade of diastolic dysfunction was higher in hypertensive patients with microalbuminuria than in hypertensives without microalbuminuria. (64% vs 36%). The study further highlighted the role of Microalbuminuria as an early predictor of myocardial dysfunction that can be estimated by Echocardiography, a finding that is comparable to studies like MAPS and i-SEARCH and others [13-16].

CONCLUSION

In the study, newly diagnosed, uncomplicated and never-treated hypertensive patients, microalbuminuria was found to be related with preclinical impairment of LV diastolic function and thus it can be used as early and reliable marker of preclinical cardiac structural and functional dysfunction.

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