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Prevalence of Microalbuminuria in Non-diabetic Hypertensive Patients and its Correlation with Changes in Left Ventricular and Left Atrial Characteristics

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ABSTRACT

Background: Microalbuminuria is urinary albumin excretion in the range of 30-300 mg per 24 hours and is considered as an abnormal albumin excretion rate. Microalbuminuria is associated with epithelial dysfunction and have a high risk for target organ damage resulting in stroke, retinopathy and adverse cardiovascular events. The objective of the study was to determine the prevalence of microalbuminuria in non-diabetic hypertensive patients and its correlation with cardiovascular changes.

Methods: A quantitative cross-sectional study was done in 107 participants diagnosed as non-diabetic hypertensive patients visiting to Manmohan Memorial medical college and Teaching hospital and Manmohan Cardio-thoracic Vascular and transplant Centre. The assessed parameters were basic metabolic profile, urine evaluation and Echocardiography.

Results: The results showed microalbuminuria in 28 study participants and not seen in 79 participants. Similarly, microalbuminuria was observed more comparable in those with presence of left ventricular hypertrophy as compared to the absence of left ventricular hypertrophy (29.3% versus 22.8%) (p value 0.469); those with presence of left ventricular diastolic dysfunction as compared to the absence of left ventricular diastolic dysfunction (31.1% versus 19%) (p value 0.170) and those with dilated left atrium as compared to normal left atrium (26.7% versus 23.9%) (p value 0.820). In case of left ventricular ejection fraction, those with normal left ventricular ejection fraction (26.3%) had slightly higher proportion of micro-albuminuria than those with mild to moderate left ventricular systolic dysfunction (20%) (p value= 0.755)

Conclusions: There was no significant difference in the level of micro-albuminuria between non-diabetics, hypertensive patients with cardio vascular changes compared to patients with no cardiovascular changes.

Keywords: Hypertension; microalbuminuria; non-diabetic

INTRODUCTION

Microalbuminuria (MA) is defined as urinary albumin excretion in the range of 30-300 mg per 24 hours and is considered as an abnormal albumin excretion rate.[1-3] Patients with microalbuminuria usually have epithelial dysfunction and have a high risk for target organ damage resulting in stroke, retinopathy and adverse cardiovascular events.[2,3] Its prevalence increases if hypertension is untreated or patients stop using antihypertensive medications.[3]

Prevalence of hypertension is high in Nepal. According to STEPS survey 2019, prevalence of hypertension was 24.5% higher among male (29.8%) as compared to female (19.7%).[4] Microalbuminuria is an important predictor of future adverse cardiovascular events.[2,3] In the absence of indicative evidence, microalbuminuria is often missed out during investigating a patient's risk profile.

The objective of the study was to determine the prevalence of microalbuminuria in non-diabetic hypertensive patients and to examine its correlation with severity of hypertension and changes in left ventricular and left atrial characteristics.

METHODS

A quantitative cross sectional study was conducted in non-

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diabetic hypertensive patients attending in Manmohan Memorial medical college and Teaching hospital (MMTH) and Manmohan Cardio-thoracic Vascular and Transplant Centre (MCVTC). Ethical approval was obtained from the ethical review board of Nepal Health Research Council. Using consecutive sampling, a total of 107 participants meeting the eligibility criteria after getting informed consent were recruited in the study.

Clinical Examination was performed and all parameters were performed and assessed and recorded in the proforma. The assessed parameters were basic metabolic profile, urine evaluation and Echo findings. The presence of cardiovascular morbidities such as left ventricular hypertrophy (LVH), left ventricular diastolic dysfunction (LVDD), left ventricular systolic dysfunction (LVSD) and left atrial (LA) enlargement were assessed by echocardiography. LV systolic function is classified according to latest guideline of American College of Cardiology as normal if left ventricular ejection fraction (LVEF) is ≥50%, mild LV systolic dysfunction if LVEF = 40-50%, moderate LVSD if LVEF = 30-40% and severe LVSD if LVEF ≤ 30%.[5]Blood pressure was taken by manual sphygmomanometer. Spot urine sample was taken.

Inclusion criteria was non-diabetic hypertensive patients of age ≥18 years, both sexes having any grade of hypertension as per American Heart Association (AHA) 2018 guidelines[5] i.e. those with systolic BP ≥130 mmHg and/or diastolic BP ≥80mmHg. Exclusion criteria were patients with type II diabetes mellitus (DM) or impaired glucose tolerance test (IGTT); renal disease; serum creatinine >1.5 mg; major cerebrovascular events; patients who were not willing to participate and those not giving informed consent.

Information regarding micro-albuminuria and other clinical variables were obtained using existing clinical practice in hospital settings. Pretesting was conducted in MCVTC for assessing the appropriateness of the study tools. The data collected in pretesting was not included in the final analysis.

The data was analyzed using IBM SPSS version 21 for analysis. Inferential analysis was calculated using chi-square test for categorical independent and categorical dependent variables, independent t-test for categorical independent variable and continuous dependent variable. Similarly, correlation was done to observe the relationship between two continuous variables.

RESULTS

Total 107 patients were enrolled in the study, 65 were males and 42 were females with mean age of 53.29 ± 14.65 years. Microalbuminuria was seen in 17 out of 65 males and 11 out of 42 females (Figure 1).

The proportion of hypertensive patients with microalbuminuria was higher in those who had prolonged duration of hypertension (29.2%) than those recently diagnosed (20%). Similarly, those who did not have controlled blood pressure (28.2%) had higher proportion of microalbuminuria status than those who had blood pressure under control (17.6%). Duration of hypertension (p=0.312) and status of hypertension (p=0.366) did not have any significant effect on micro-albuminuria status among the study participants. Likewise, significant difference in microalbuminuria status was not observed with medical adherence (p=0.578) (Table 1).

Higher proportion of microalbuminuria was observed in those with the presence of LVH as compared to absence of LVH (29.3% versus 22.8%) (p value 0.469); those with presence of LVDD as compared to absence of LVDD (31.1% versus 19%) (p value 0.170) and those with dilated LA as compared to normal LA (26.7% versus 23.9%) (0.820). In case of LVEF, those with normal LVEF (26.3%) had slightly higher proportion of microalbuminuria than those with mild or moderate LVEF (20%) (p value 0.755) (Table 2).

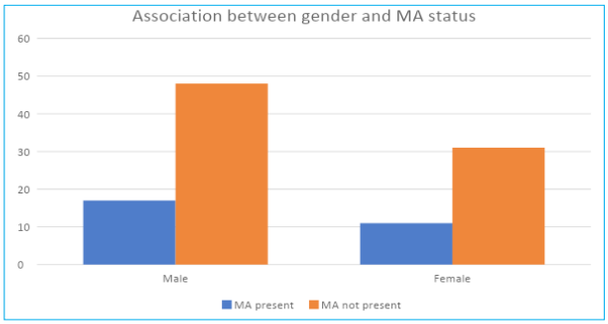

Figure 1. Association between gender and microalbuminuria status.

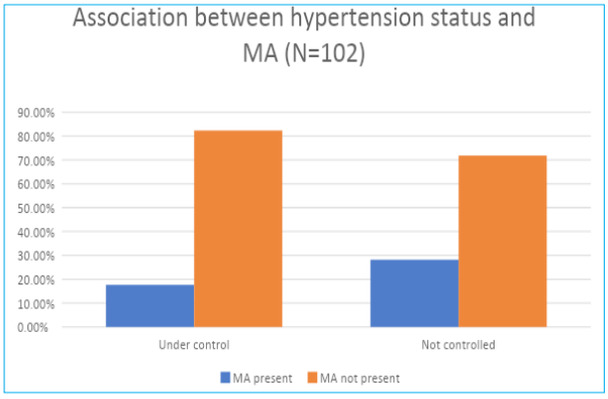

Figure 2. Association between hypertension status and microalbuminuria.

Table 1. Association between hypertension related characteristics and microalbuminuria.

Variables	Microalbuminuria (n=107)		Chi-square value	P value
	Yes (n=28) N (%)	No (n=79) N (%)		
Duration of hypertension (n=107)				
Recently diagnosed (≤6 months)	7(20%)	28(80%)	1.024	0.312
Diagnosed for >6 months	21(29.2%)	51(70.8%)		
Hypertension status (n=102)				
Under control	3(17.6%)	14(82.4%)	0.816	0.366
Not controlled	24(28.2%)	61(71.8%)		
Medication adherence (n=99)				
Regularly taking prescribed medicines	18(27.3%)	48(72.7%)	1.097	0.578
Taking medicines only when feel difficulty	1 (11.1%)	8 (88.9%)		
Not taking medicines or newly diagnosed hypertensive	6(25.0%)	26(75.0%)		

Table 2. Association between microalbuminuria and echocardiographic characteristics.

Variables	Microalbuminuria (n=107)		Chi-square value	P value
	Yes N (%)	No N (%)		
LVH (n=98)				
Present	12(29.3%)	29(70.7%)	0.524	0.469
Absent	13(22.8%)	44(77.2%)		
LVDD (n=103)				
Present	19(31.1%)	42(68.9%)	1.883	0.170
Absent	8(19%)	34(81%)		
LVEF (n=103)				
Normal	26(26.3%)	73(73.7%)	0.097	0.755
Mild /Moderate LV systolic dysfunction	1(20%)	4(80%)		
Left Atrium (n=82)				
Normal	16(23.9%)	51(76.1%)	0.052	0.820
Dilated	4(26.7%)	11(73.3%)		

DISCUSSION

The present study showed that there were no significant differences in the level of microalbuminuria between non-diabetics, hypertensive patients with cardio vascular changes as compared to those with no cardiovascular changes. The microalbuminuria is the earliest indicator of chronic kidney disease (CKD) in patient with Diabetes mellitus (DM) and Hypertension (HTN).[3] The prevalence of microalbuminuria is high in patient with DM and HTN as compared to the general population.[1] The findings showed no association between microalbuminuria and cardiovascular changes. However, those who had LVH, LVDD and dilated LA had higher prevalence of microalbuminuria than those who did not have such conditions.

A large sample study conducted in Netherland comprising of 7579 non-diabetic participants has shown micro-albuminuria as independent predictor of cardiovascular risk indicators. Other studies have also shown that microalbuminuria is associated with cardiovascular events and reduction of urinary albumin excretion through medication can reduce cardiovascular abnormalities.[6-8] Since most of the cardiovascular events were higher in those with microalbuminuria in our study, the urinary excretion albumin can be used as a screening tool for cardiovascular health.

In this study, the prevalence of microalbuminuria was higher in those who were diagnosed for HTN for longer duration than those who were recently diagnosed. Similarly, those who did not have controlled BP had higher prevalence of microalbuminuria than those with controlled blood pressure (BP). A large-scale study done in United States among 16,567 participants have shown that

microalbuminuria is significantly higher in hypertensive patients as compared to those with normal BP; the odds was lower for those with controlled BP and higher for stage II hypertensive patients.[9] Because of high prevalence of microalbuminuria in hypertensive population in our study, we can assume that antihypertensive medications that reduce microalbuminuria has a great role to reduce cardiovascular and renal complications.

The limitations of this study are small sample size and the study based on only two different institutions. Likewise, there was also missing information for some responses. Despite limitations, this study provides useful evidence in understanding the prevalence of microalbuminuria among hypertensive patients and assessing their cardiovascular health.

CONCLUSIONS

Although microalbuminuria occurred more frequently in patients with changes in left ventricular and left atrial characteristics, the association was not statistically significant. Further study with large sample size is required to understand the burden and impact of microalbuminuria in renal and cardiovascular health outcomes in Nepal.

CONFLICT OF INTEREST

The authors declare no conflict of interest

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