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TO STUDY THE CO-RELATION OF MODERATELY INCREASED ALBUMINURIA WITH DURATION OF PRIMARY HYPERTENSION

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ABSTRACT **Background:** Hypertension (HT) is a major global health concern and a leading contributor to cardiovascular morbidity and mortality. Moderately increased albuminuria, an early marker of renal and vascular damage, is frequently observed in hypertensive patients and is associated with an elevated risk of cardiovascular events. This study aimed to evaluate the relationship between urinary albumin levels and urinary albumin-to-creatinine ratio (UACR) with duration of primary hypertension. **Methods:** A cross-sectional observational study was conducted over 12 months (September 2022 – August 2023) at the General Medicine OPD, Dr. RKGMC & Hospital, Hamirpur, Himachal Pradesh. A total of 332 patients aged 30–90 years with primary hypertension were enrolled. Patients with comorbidities or conditions affecting urinary albumin levels were excluded. Blood pressure was measured using standard protocols. Urinary albumin and UACR were analysed, and data were statistically assessed using Epi Info 7, with significance set at $p < 0.05$. **Results:** Out of 332 patients, 184 were male and 148 female. The majority (190) were under 60 years of age. Moderately increased albuminuria (UACR 30–300 mg/g) was observed in 192 patients, and 140 had UACR in the 3–30 mg/g range. A greater proportion of patients with hypertension duration >10 years exhibited elevated UACR levels compared to those with ≤10 years of hypertension. While the prevalence of Moderately increased albuminuria increased with the duration of hypertension, the association did not reach statistical significance. Patients with dyslipidemia or irregular treatment had higher rates of Moderately increased albuminuria. **Conclusion:** Moderately increased albuminuria is prevalent among patients with primary hypertension and shows a positive, though not statistically significant, correlation with hypertension duration. Its presence may serve as an early marker of end-organ damage, highlighting the need for routine screening and timely intervention in hypertensive individuals.

KEYWORDS : Hypertension, Moderately increased albuminuria, UACR, Primary Hypertension, Cardiovascular Risk

INTRODUCTION

Hypertension (HT) stands as a significant risk factor for cardiovascular disease and remains a leading cause of mortality and morbidity globally. Even in high-normal levels,[1] characterized as prehypertension (preHT),[2,3] elevated blood pressure (BP) has been linked to various cardiovascular events.[3]

Urinary albumin leakage serves as a manifestation of generalized vascular damage.[4] Moderately increased albuminuria (urinary albumin excretion (UAE) of 30-300 mg/24 h) has been identified as a crucial prognostic indicator across various clinical conditions and has been linked to an elevated cardiovascular risk and progressive renal damage. In patients with hypertension (HT), MA has been recognized as a marker of cardiovascular complications and a reliable predictor of ischemic heart diseases.[5,6] Left ventricular hypertrophy and increased carotid artery intima-media thickness, both indicative of subclinical cardiovascular diseases, are associated with MA in individuals at heightened risk of cardiovascular disease, particularly those with blood pressures above normal ranges.[7,8]

Recent long-term longitudinal studies have underscored the unfavorable prognostic significance of moderately increased albuminuria in hypertensive patients. Therefore, diagnosing moderately increased albuminuria at an early stage facilitates taking proper precautions and initiating appropriate management in hypertensive individuals. Clinical trials have demonstrated that reducing albuminuria through either an angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blockers (ARB) was associated with improved renal and cardiovascular outcomes. Furthermore, it has been demonstrated that the renoprotective and cardioprotective effects were correlated with the extent to which albuminuria was reduced.[9]

The prevalence of moderately increased albuminuria rises with age and the duration of hypertension. The severity of albuminuria correlates with blood pressure levels and shows responsiveness to blood pressure reduction. Despite numerous studies investigating this correlation, the variability in the prevalence of moderately increased albuminuria among hypertension studies ranges widely from 4% to 57%. Our aim was to investigate the relationship between urine albumin and urinary albumin-to-creatinine ratio (UACR) with the severity of primary hypertension.

MATERIAL AND METHODS

This Observational, Analytical cross-sectional study was conducted among patients with hypertension attending General Medicine OPD in Dr. RKGMC & Hospital, Hamirpur, HP. The study was conducted for a period of 12 months from September 2022 through August 2023.

Inclusion Critera: Patients aged 30-90 years, both males and females with primary hypertension coming to General Medicine OPD in Dr. RKGMC & Hospital, Hamirpur, HP.

Exclusion Criteria: Patients with urinary tract infections, recent strenuous exercise history, pregnancy or lactation, renal disease, severely increased albuminuria, congestive cardiac failure, NSAID intake history, ongoing infections, diabetes mellitus, hyperlipidemia, rheumatoid arthritis, and gout.

The study enrolled patients with primary hypertension or newly diagnosed primary hypertension attending the General Medicine OPD on Mondays and Fridays between September 2022 and June 2023. Blood pressure measurements were taken with patients seated quietly for at least 5 minutes, using an appropriately sized cuff. Two or more measurements were taken, and the average was considered as the blood pressure. Systolic blood pressure (SBP) was determined by the onset of the first Korotkoff sound, while diastolic blood pressure (DBP) was determined by the disappearance of the Korotkoff sound. Data were entered into Excel and then cleaned, followed by analysis using Epi Info 7. Qualitative variables were expressed as frequencies with 95% confidence intervals, while quantitative variables were

presented as mean ± standard deviation. Relationships were evaluated using chi-square tests, with statistical significance set at $p < 0.05$.

RESULTS AND OBSERVATION

In the present study we included 332 patients out of which 184 were male and 148 were female. Among the patients, 190 fall into the category of under 60 years old, while 142 belong to the group aged 60 years and above.

Within the sample, 192 patients have a Normal BMI (18.5 to 22.9), indicating a healthy weight. 86 patients fall into the Overweight category (BMI 23 to 24.9), suggesting a slight weight elevation. Additionally, 54 patients are classified as Obese (BMI > 25), indicating significant excess body weight. In our study 84 patients have a documented history of smoking tobacco, indicating a significant portion of the population engaging in this habit. Additionally, 36 patients have a history of alcohol consumption.

Among the patients surveyed, 148 individuals, exhibit urine albumin levels between 3-30. Conversely, 184 patients, display urine albumin levels between 30-300. In terms of UACR, 140 patients, have ratios falling within the 3-30 range. On the other hand, 192 patients exhibit UACR values within 30-300.

In our study, 78 individuals had UACR levels within the 3-30 range, while 100 individuals had levels within 30-300. Conversely, among patients receiving irregular or no treatment, 62 individuals had UACR levels within the 3-30 range, while 92 individuals had levels between 30-300 (Table 2).

Among patients with hypertension duration of ten years or less, 98 individuals exhibit UACR levels within the 3-30 range, while 140 individuals display UACR levels between 30-300. Conversely, for patients with hypertension duration exceeding ten years, 42 individuals have UACR levels within the 3-30 range, and 52 individuals have UACR levels 30-300 (Figure 1).

In the present study, among patients with hypertension duration of ten years or less, 102 individuals exhibit Urine Albumin levels within the 3-30 range, while 66 individuals have levels within 30-300. Conversely, for patients with a hypertension duration exceeding ten years, 46 individuals have Urine Albumin levels within the 3-30 range, and 48 individuals have levels within 30-300 (Table 3).

DISCUSSION

Moderately increased albuminuria is commonly observed in patients with essential hypertension and is well recognized as a predictor of higher cardiovascular risk and potentially renal dysfunction leading to increased mortality.[10] In light of the lack of credible locally relevant evidence, our study was conducted to assess the prevalence of Moderately increased albuminuria, potential risk factors contributing to its development, and the relationship between moderately increased albuminuria and Target Organ Damage (TOD) among patients with essential hypertension.[11]

In terms of patient demographics, our study includes a diverse distribution across age, gender, employment, and socio-economic status. Among the 332 patients, 190 are under 60 years old, while 142 are aged 60 and above. Gender-wise, there are 194 male and 148 female patients.

In Bakhtar V et al,[12].'s study, the majority of patients fell within the age brackets of 40-49 years (31.66%) and 60-69 years (27.5%), with an average age of 53.53±12.56 years. Males outnumbered females, constituting 54.16% (65 individuals) compared to 45.83% (55 individuals), resulting in a male-to-female ratio of 1:0.84. Similarly, in a study by Roopa et al, the gender distribution was equal, with a mean patient age of 59.53 years.[13]

In our study, individuals newly diagnosed with or managing hypertension for less than a year exhibited 24 cases with UACR levels of 3-30, while 28 showed levels of 30-300. Among those with hypertension duration of 1-5 years, 46 had UACR values of 3-30, and 74 had values of 30-300. Likewise, for individuals with hypertension for 6-10 years, 28 had UACR levels of 3-30, and 38 exceeded 30. Conversely, for patients with hypertension for over 10 years, 42 displayed UACR values of 3-30, while 52 exhibited levels surpassing 30. When categorized by hypertension duration, those with ≤10 years showcased 102 individuals with UACR levels of 3-30 and 136 with levels exceeding 30. Conversely, for patients with >10 years of hypertension, 46 had UACR levels of 3-30, and 48 had levels surpassing 30.

Sabharwal R K et al,[14] categorized patients based on the duration of hypertension into three groups: Group-I with a duration between 0-5 years, Group-II with a duration between 6-10 years, and Group-III with a duration exceeding 10 years. They observed a significant correlation between the duration of hypertension and urinary A:C ratio in the overall 174 hypertensive patients.

Pudota P N et al. compared the duration of hypertension with moderately increased albuminuria in a study involving 100 cases, where 30 were found to have moderately increased albuminuria. Among these cases, 13 patients had a hypertension duration between 6 to 10 years, 6 patients had a duration exceeding 10 years, and only 5 out of 40 patients had a duration of up to 5 years. Their findings indicated a statistically highly significant increase in the prevalence of Moderately increased albuminuria with increasing duration of hypertension (p value <0.01).[12]

CONCLUSION

In our study, a significant proportion of hypertensive patients exhibited Moderately increased albuminuria, which correlated positively with the duration of hypertension. However, this correlation did not reach statistical significance. Furthermore, patients with dyslipidemia were found to have a higher likelihood of developing Moderately increased albuminuria. Additionally, microalbuminuric patients demonstrated a greater degree of end-organ involvement compared to normoalbuminuric patients. Our findings align with other studies in establishing Moderately increased albuminuria as a marker for predicting end-organ involvement in hypertensive individuals.

Table 1: Distribution of Cases According to Urine Albumin and Urine Albumin Creatinine Ratio.

Parameter		No. of Patients	Percentage	95 % Confidence Interval
Urine albumin	3-30	148	44.58	36.87 – 52.48 %
	30-300	184	55.42	47.52 – 63.13 %
Urine albumin creatinine ratio (UACR)	3-30	140	42.17	34.56 – 50.07 %
	30-300	192	57.83	49.93 – 65.44 %
Total		332	100.00	

Table 2: Co-relation of Treatment Given and UACR

Treatment Given	UACR				Odds Ratio (95% CI)	P-Value
	3-30		30-300			
	No. of Patients	Percentage	No. of Patients	Percentage		
Regular Treatment	78	55.71	100	52.08	1.16 (0.62 – 2.14)	0.64
Irregular/No treatment	62	44.29	92	47.92		
Total	140	100.00	192	100.00		

Table 3: Co-relation of Duration of Hypertension Since Diagnosis and Urine Albumin.

Duration of hypertension since diagnosis	Urine Albumin				Odds Ratio (95% CI)	P-Value
	3-30		30-300			
	No. of Patients	Percentage	No. of Patients	Percentage		
≤ 10 Years	102	72.86	166	70.83	0.78 (0.39 – 1.55)	0.48
> 10 Years	46	32.86	48	25.00		
Total	140	100.00	192	100.00		

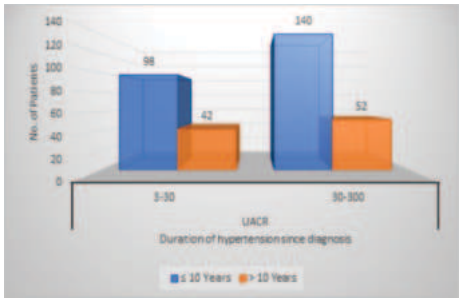

Figure 1: Co-relation of Duration of Hypertension Since Diagnosis and UACR.

REFERENCES

1. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. Nat Rev Nephrol. 2020;16:223–37.
2. Huang Y, Wang S, Cai X, Mai W, Hu Y, Tang H, et al. Prehypertension and incidence of cardiovascular disease: a meta-analysis. BMC Medicine. 2013;11:177.
3. Srivastava A, Mirza TM, Vaqar S, Sharan S. Prehypertension. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 May 12]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK538313/
4. Clausen P, Jensen JS, Jensen G, Borch-Johnsen K, Feldt-Rasmussen B. Elevated urinary albumin excretion is associated with impaired arterial dilatory capacity in clinically healthy subjects. Circulation. 2001;103:1869–74.
5. Prasad RM, Bali A, Tikaria R. Microalbuminuria. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 May 12]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK563255/
6. Tenekecioglu E, Yilmaz M, Yontar OC, Karaagac K, Agca FV, Tutuncu A, et al. Microalbuminuria in untreated prehypertension and hypertension without diabetes. Int J Clin Exp Med. 2014;7:3420–9.
7. Folsom AR, Yatsuya H, Psaty BM, Shahar E, Longstreth WT. Carotid Intima-Media Thickness, Electrocardiographic Left Ventricular Hypertrophy and Incidence of Intracerebral Hemorrhage. Stroke. 2011;42:3075–9.
8. Magnussen CG. Carotid artery intima-media thickness and hypertensive heart disease: a short review. Clinical Hypertension. 2017;23:7.
9. Pertusa S, Ramos-Lopez C, Martinez-Navas M, Palacios-Marqués A. Moderately increased albuminuria unmasked hypertension. BMJ Case Rep. 2014;2014: bcr2013202643.
10. Viazzi F, Leoncini G, Conti N, Tomolillo C, Giachero G, Vercelli M, et al. Microalbuminuria Is a Predictor of Chronic Renal Insufficiency in Patients without Diabetes and with Hypertension: The MAGIC Study. Clin J Am Soc Nephrol. 2010;5:1099–106.
11. Hitha B, Pappachan JM, Pillai HB, Sujathan P, Ramakrishna CD, Jayaprakash K, et al. Microalbuminuria in patients with essential hypertension and its relationship to target organ damage: an Indian experience. Saudi J Kidney Dis Transpl. 2008;19:411–9.
12. Vedamanickam R. Prevalence of Microalbuminuria in Hypertension Patients and Its Correlation with the Severity of Hypertension and End Organ Damage. Journal of Research in Medical and Dental Science. 2021;9.
13. Roopa AN, Reddy KSS, Chandrashekara P, Umabai KR, Madhuvan HS. Study of Microalbuminuria and Insulin Resistance in Patients with Essential Hypertension and Metabolic Syndrome and its Relationship to Target Organ Damage. JMSH. 2015;1:5–9.
14. (PDF) Incidence of microalbuminuria in hypertensive patients. ResearchGate [Internet]. [cited 2025 May 12]; Available from: https://www.researchgate.net/publication/232722121_Incidence_of_microalbuminuria_in_hypertensive_patients