

Original article:

Factors affecting urinary albumin creatinine ratio (UACR) a retrospective study at Dr. Hedgewar hospital Aurangabad, a tertiary care center

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Abstract-

Introduction- A high UACR level is known sensitive indicator of the glomerular basement membrane function and is used as an early marker of progression to kidney disease, as well as cardiovascular death in diabetes mellitus. Various studies have demonstrated this fact but few studies have studied relation between high UACR and environmental factors. Present study aims to see various factors affecting UACR (Age, Gender, Diabetes, BMI, HBA1C).

Material and methods – We retrospectively collected values of UACR from laboratory and searched data of those patients from electronic medical records section of the hospital. For comparison in non-diabetic population we collected data from above 40 health check-up retrospectively. Enrolment was done by applying exclusion and inclusion criteria as follows, inclusion criteria- age 40 to 70years those giving valid consent , exclusion criteria pregnant, breast feeding females, patients with known nephropathy, connective tissue disorder, those receiving ACE inhibitors and those not willing to give consent.

Results – we found that diabetic group had higher UACR (>30) as compared to non-diabetic group, (p<0.005). Among diabetic group positive correlation of high UACR was found with HbA1c and high BMI. We did not find positive correlation between high UACR and hypertension, age, diet preferences, and difference between UACR of those receiving angiotensin converting enzymes (ARBs).

Conclusion: We found that diabetic group had higher UACR (>30) as compared to non-diabetic group (p<0.005). Among diabetic group positive correlation of high UACR was found with BMI,& HbA1c.

Keywords: UACR, DM, HbA1c, BMI.

Introduction

Recent statistics from the World Health Organization (WHO) are showing, an increase in the prevalence of diabetes worldwide, and especially in the developing countries. Currently, India is leading the world with the largest number of diabetic subjects and this is expected to further rise in the coming years.⁽¹⁾ Diabetic nephropathy is the leading cause of end stage renal disease worldwide. Microalbuminuria is considered to be an early stage of diabetic nephropathy. Hence studies on diabetes related complications are essential to assess the burden of diabetes and its early detection.⁽²⁾ Microalbuminuria level is considered a sensitive indicator of the glomerular basement membrane function and can be used as an early marker of progression to kidney disease, as well as cardiovascular death in

diabetes mellitus. Microalbuminuria has been associated with different cardiovascular risk factors, such as hypertension, hypertriglyceridemia etc.⁽³⁾ Various studies have demonstrated this fact but few studies have studied relation between high UACR and factors. Our Present study work aim to see various factors affecting UACR.

Material & Methods

This study was carried out in department of medicine of Dr. Hedgewar Hospital, Aurangabad. It was retrospective observational study with duration of 3 months. Ethical committee clearance was obtained before the study. We collected values of UACR from laboratory which was measured with Beckman Coulter AU480 machine with impedance turbidometry method.

Then searched data of 35 known cases of NIDDM patients whose UACR was measured and who has attended medicine OPD from electronic medical records section of the hospital. **(Group A)**

For comparison in non-diabetic population we collected data of 35 people who has attended above 40 health check-up and having fasting BSL<100 and post prandial BSL<140 retrospectively. **(Group B).**

Enrolment was done by applying exclusion and inclusion criteria. The inclusion criteria was : Age 40 to 70 years, Type 2 DM, Willing to give valid consent; While the exclusion criteria was pregnant and breast feeding females, Age>70 and <40, Type 1 DM, HBA1c level >10, Patients with connective tissue disorders, Patients with nephropathy, Those receiving ACE inhibitors, Those having dyslipidemia, Current UTI , Those not willing to give consent.

We applied unpaired t test to compare variables in two groups while we used Pearson correlation to correlate variables using SPSS (Ver. 20). We took p value <0.005 to be significant.

Results

The Mean and Standard Deviation of age of group A was 57.28 ±10.86 and of group B was 55.91±9.10 (Graph 1) Gender distribution in two groups showed 37.15% males and 62.8% females in group A , while 40% males and 60% females in Group B. (Graph 2, Table 1). In group A mean BMI was 27.24±4.07 and in group B 26.77±3.48. In group A mean systolic BP was 140.05±14.32 and in group B 140.02±14.21 while in group A dystolic BP was 86.85±5.78and in group B 85.6±7.05. the values of Age, BMI and BP(Systolic and Dystolic) were compared in between two groups using unpaired t test and showed statistically not significant result. For Age the P value was 0.569 for BMI p value was 0.607 while for Systolic BP was 0.993 and Dystolic BP was 0.418 (Table 2)

Fasting and post meal blood sugar levels in group A was 130±43.82 and 198.6±52.9 while in group B was 106.54±10.57 and 119.71±16.11. The values of HBA1C in group A was 7.77±1.30 while in group B was 6.69±0.69. The value of UACR in group A was 31.95±24.06 and in group B was 17.6 ±15.4. Again unpaired t test was used to compare the two groups and showed statistically significant result for Fasting BSL (p=0.003) and post meal BSL (p=0.000), HBA1C (P=0.000) and UACR (p=0.004) (Table 3).

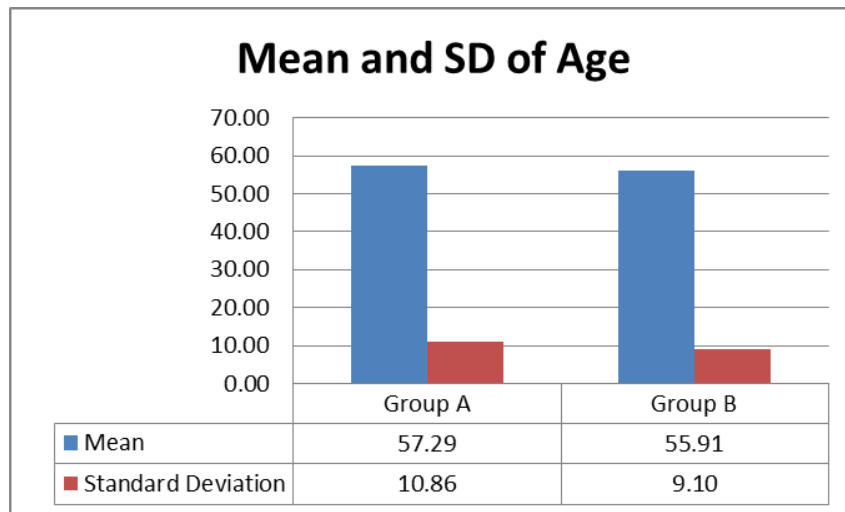
In group A (diabetics)

A positive Correlation is found in between HBA1C and UACR and BMI and UACR was found, We do not find positive correlation with age, gender, diet preferences, hypertension. (Table 4, 5)

Study limitations

Small sample size and Duration of diabetes was not included these were major study limitations.

Graph 1: Mean and SD of Age



Graph 2: Gender wise Distribution

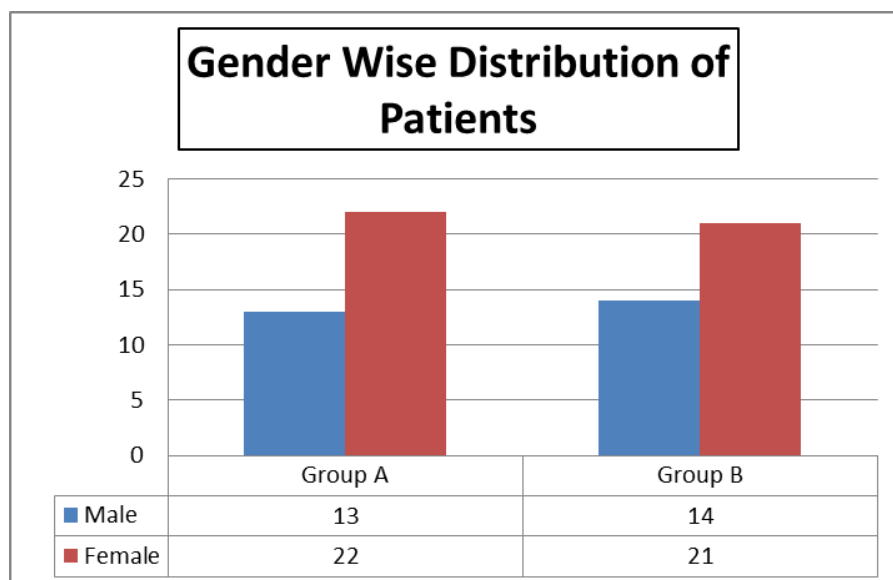


Table 1: Gender wise distribution of population

Gender	Group A		Group B	
	Number	Percentage	Number	Percentage
Male	13	37.15%	14	40.00%
Female	22	62.85%	21	60.00%
Total	35	100.00%	35	100.00%

Table 2 : Comparison of Variables using Unpaired t test

Outcome measures	Group A	Group B	t value	df	95% Confidence interval of difference	p - Value	Sign.
	Mean±SD	Mean±SD					
Age	57.28±10.85	55.91±9.10	0.573	68	(-3.407 to 6.150)	0.569	Not Significant
BMI	27.24±4.07	26.77±3.48	0.517	68	(-1.338 to 2.275)	0.607	Not Significant
BP- Systolic	140.05±14.32	140.02±14.21	0.008	68	(-6.779 to 6.836)	0.993	Not Significant
BP- Dystolic	86.85±5.78	85.6±7.05	0.815	68	(-1.821 to 4.335)	0.418	Not Significant

Table 3 : Comparison of Variables using Unpaired t test

Outcome measures	Group A	Group B	t value	df	95% Confidence interval of difference	p - Value	Sign.
	Mean±SD	Mean±SD					
BSL-F	130.00±43.82	106.54±10.57	3.078	68	(8.249 to 38.66)	0.003	Significant
BSL-PP	198.62±52.91	119.71±16.11	8.441	68	(60.257 to 97.57)	0.000	Significant
HBA1C	7.77±1.30	6.69±0.69	4.332	68	(0.584 to 1.581)	0.000	Significant
UACR	31.95±24.06	17.64±15.45	2.96	68	(4.665 to 23.986)	0.004	Significant

Table 4: Correlation of HBA1c with UACR

Correlation		UACR
HBA1C	Pearson Correlation	.654**
	Sig. (2-tailed)	0
	N	35

Table 5: Correlation of BMI with UACR

Correlation		UACR
BMI	Pearson Correlation	.732**
	Sig. (2-tailed)	0.002
	N	35

Discussion

Discussion part is very short . Kindly add more 3 -4 paragraphs or 850 words.

A high microalbuminuria level is considered a sensitive indicator of the glomerular basement membrane function and can be used as an early marker of progression to kidney disease, as well as cardiovascular death in T2DM, and even in non-diabetic patients. Many of the risk factors associated with microalbuminuria are related to each other, and it is sometimes difficult to find the independence of the association. It has been suggested that the appearance of microalbuminuria precedes the risk of T2DM. T2DM is a disease that develops over a long time and which is preceded by a long preclinical period in the form of insulin resistance.

We did retrospective observational study with the help of laboratory and electronic medical record data in diabetic patients attending OPD and those non-diabetic who came for above forty checkup.

We found that diabetic group had higher UACR (>30) as compared to non-diabetic group ($p<0.005$). Among diabetic group positive correlation of high UACR was found with BMI, & HbA1c. While We did not find positive correlation between high UACR and hypertension, age, diet preferences.

Many of the risk factors can be modified. The modification of risk factors via lifestyle interventions, and other measures to control the clinical variables, may influence the prevention of complications, save money and improve the quality of life of these patients.

By knowing the conditioning factors of ACR >30 mg/g in the population, strategies can be designed to prevent the appearance of ACR >30 mg/g as a metabolic and cardiovascular risk factor.

As discussed in review of literature our findings correlated with previous studies. We found positive correlation of higher BMI with high UACR.

Conclusion

We found that diabetic group had higher UACR (>30) as compared to non-diabetic group ($p<0.005$). Among diabetic group positive correlation of high UACR was found with BMI, & HbA1c.

References

1. Varghese A, Deepa R, Rema M, Mohan V. Prevalence of microalbuminuria in type 2 diabetes mellitus at a diabetes centre in southern India. *Postgrad Med J* [Internet]. 2001 Jun 1 [cited 2018 Apr 15];77(908):399–402. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/11375456>
2. Hasanato RM. Diagnostic efficacy of random albumin creatinine ratio for detection of micro and macro-albuminuria in type 2 diabetes mellitus. *Saudi Med J* [Internet]. 2016 Mar [cited 2017 Mar 22];37(3):268–73. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26905348>
3. Younes N, Cleary PA, Steffes MW, de Boer IH, Molitch ME, Rutledge BN, et al. Comparison of urinary albumin-creatinine ratio and albumin excretion rate in the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications study. *Clin J Am Soc Nephrol* [Internet]. 2010 Jul [cited 2017 Mar 21];5(7):1235–42. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20448066>
4. Gupta DK, Verma LK, Khosla PK, Dash SC. The prevalence of microalbuminuria in diabetes: a study from north India. *Diabetes Res Clin Pract* [Internet]. 1991 May 1 [cited 2018 Apr 15];12(2):125–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/1879303>
5. Gutiérrez-Repiso C, Rojo-Martínez G, Soriguer F, García-Fuentes E, Vendrell J, Vázquez JA, et al. Factors affecting levels of urinary albumin excretion in the general population of Spain: the Di@bet.es study. *Clin Sci* [Internet]. 2013 Feb 1 [cited 2017 Mar 26];124(4):269–77. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22970892>