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CORRELATION BETWEEN CIGARETTE SMOKING AND MICRO ALBUMINURIA WITH ABNORMAL RENAL FUNCTION

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Conflicts of Interest: Nil

ABSTRACT:

Introduction: *Microalbuminuria is defined as moderate increase in the level of urine in albumin. It occurs when the kidney leaks small amounts of albumin into the urine, in other words, when an abnormally high permeability for albumin in the glomerulus of the kidney occurs. Normally, the kidneys filter albumin, so if albumin is found in the urine, then it is a marker of kidney disease. The term microalbuminuria is now discouraged by Kidney Disease Improving Global Outcomes and has been replaced by moderately increased albuminuria.*

Material and Methods*: The present study was carried out in the Dept. of Medicine in collaboration with Dept. of Biochemistry or Central Clinical Laboratory at Prakash Institute of Medical Science & Research Urun-Islampur, Maharashtra, India from 2016 to Nov 2018. Total 100 subjects of age group 35-70 years were included in this study. Out which 70 were cigarette smokers and 30 were normal healthy control.*

Results*: In the present study, we found significant increased levels of urinary albumin and urinary albumin creatinine ratio in cigarette smokers as compared to non-smokers.*

Conclusion*: On the basis of our study results we concluded that the smokers have significantly higher levels of urine albumin and urine albumin creatinine ratio when compared to controls. The quantity of smoking has a direct effect on the urine albumin and urine albumin creatinine ratio. The urine albumin and uACR is directly related to number of cigarettes smoked per day.*

Keywords: Cigarette Smokers, Renal Function, Microalbuminuria, uACR

Introduction

Microalbuminuria (MA) a sensitive measure of urinary albumin excretion has been useful in identifying a risk factor for cardiovascular mortality in hypertensive patients, particularly those who are older, obese and smokers. The cause of MA in essential hypertension is unclear; however, it is associated with hypertensive end organ damage, including left ventricular hypertrophy and retinopathy due to prolonged, poorly controlled hypertension (1).

In developed countries cigarette smoking is the most common identifiable cause of adult. It is associated with atherosclerosis, thrombogenesis and vascular occlusion and also affected to vascular and hormonal systems is well known (2). Chronic smoking adversely influences the prognosis of nephropathies, kidney diseases, hypertensive nephrosclerosis, polycystic kidney, and glomerulonephritis (3, 4). The smoking have been affected renal and increases the development of albuminuria and decreased glomerular filtration rate (GFR). Thus smoking is main cause of chronic kidney disease (CKD) in the general population. It is also noted that in some studies the adverse effects on the kidney were suggested to be prominent in elderly smokers in the patient group in the general population in age 60–65 years and above (4-6).

In diabetes mellitus (DM) smoking increases the risk of microalbuminuria and progression of

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microalbuminuria accelerates the proteinuria and subsequent renal failure (4, 7). Therefore the prevalence of microalbuminuria was higher in smokers than in non-smokers with DM in a population-based cohort. Regarding non-diabetic nephropathies, with polycystic kidney disease, proteinuria was more frequent in smokers than non-smokers (8) the median time to end-stage renal disease (ESRD) was shorter in smokers than non-smokers (9).

Therefore; the aim of present study was to find out the relation between the amount of cigarette consumption and the prevalence of proteinuria, which will help to clarify the features of smoking-induced renal damage as an emerging healthcare issue in developing countries and another aim of present study is to evaluate the effect of cigarette smoking on the renal functions.

MATERIAL AND METHODS:

The present study was carried out in the Dept. of Medicine in collaboration with Dept. of Biochemistry or Central Clinical Laboratory at Prakash Institute of Medical Science & Research Urun-Islampur, Maharashtra, India from 2016 to Nov 2018. Clearance from Ethical Committee of the institution was obtained. Informed written consent was taken from each patient in their known language.

Study Group

Total 100 subjects were enrolled in this study of age group between 35-70 years. Out of 70 were cigarette smokers and 30 were normal healthy without cigarette smokers.

Cigarette smokers are divided into four categories:

I. less than 5 Cigarettes per day

II. 5-10 Cigarettes per day

III. 11-20 Cigarettes per day

IV. More than 20 Cigarettes per day.

Exclusion criteria

Subjects with the diagnosis of high blood pressure and taking antihypertensive drugs, Patients with known HBsAg, HCV and HIV were excluded from study.

Collection of Blood sample

3 ml blood sample was collected in a plain vial from study group and control group participants. After centrifugation at 1500 rpm for 3 minutes, the serum was assayed for estimate serum urea by urease method and modified Jaffe's method was used to estimate serum creatinine.

Collection of Urine sample

For the screening of urinary albumin and urinary creatinine concentration, first morning void urine sample was collected. Urinary Albumin was done by using BCG method and Creatinine was done by using Jaffe's method by using fully auto analyzer. Urine Albumin Creatinine ratio (uACR) calculated by using following formula

Urine Albumin Creatinine ratio = Urinary Albumin (mg/dl) / Urinary Creatinine (gm/dl).

Data Analysis

Data were expressed as mean ±SD. Mean values were assessed for significance by unpaired student –t test. A statistical analysis was performed using the Stastical Package for the Social Science program (SPSS, 23.0). Frequencies and percentages were used for the categorical measures. Probability values $p < 0.05$ were considered statistically significant.

OBSERVATION AND RESULTS:

Table 1: shows distribution of patient's as per cigarette smoking per day

Smoking Per day	Age Group	Smokers
Less than 5 Cigarettes	35-70	07
5-10 Cigarettes		12
11-20 Cigarettes		22
More than 20 Cigarettes		29
Total		**70**

Above table shows that the 7 patients take less than 5 cigarettes 12 take 5-10 cigarettes, 22 takes 11-20 cigarettes and 29 takes more than 20 cigarettes per day**.**

Table 2: Shows biomedical Parameters level in study group and control group

Biomedical Parameters	(Group I)	(Group II)	p-value
Urea (mg/dl)	30.02 ± 5.27	28.52 ± 4.96	0.295
Creatinine (mg/dl)	1.81 ± 0.71	0.90 ± 0.12	<0.0001*
Uric Acid (mg/dl)	6.12 ± 4.96	5.93 ± 0.73	0.601
Urine Albumin (mg/L)	60.93± 29.10	19.76 ± 3.04	<0.0001*
Creatinine Clearance (mg/dl)	88.93± 4.92	93.90 ± 6.28	0.047

Above table no 2 show the concentration or level of serum creatinine and urinary albumin was significantly highly increased found in group I than group II. And the level of urinary albumin and serum creatinine increases due to adversely influences the prognosis of nephropathies, kidney diseases, hypertensive nephrosclerosis, polycystic kidney, and glomerulonephritis. Microalbuminuria was found to be directly related to the amount of cigarettes smoking per day. The amount of cigarettes smoked per day was found to be directly related to urinary ACR levels in smokers (per day).

DISCUSSION:

The present study shows smoker had higher mean urinary albumin level and urinary albumin creatinine ratio, which is directly related to the number of cigarettes smoked per day among smokers (pack-day). Also, more smokers had microalbuminuria, which signify smokers have 4 times higher prevalence of microalbuminuria than non-smokers. Our results are similar to many previous studies (10-13). Cerami C et. al. and Viassara H. et.al. (14-15) reported that cigarette contain glycotoxins, form advance glycation end products, which may enhanced vascular permeability causes albuminuria. Therefore microalbuminuria is increased in smokers as compared to non-smokers.

Tobacco contains Nicotine increases masengial cell proliferation via activation of nicotinic receptors (16). Nicotine increases synthesis of fibronectine, which is critical matrix component involved in the progression of chronic kidney diseases (17) Smoking induces a transient decrease in renal plasma flow and glomerular filtration rate (18, 19). Cigarette smoking causes a nicotine-induced stimulation of the sympathetic nervous system that acutely increases arterial pressure and heart rate. Microalbuminuria is the earliest manifestation of kidney damage found in cigarette smokers (20), and more prominently in smokers with diabetes mellitus (21). Earlier it has observed that in 6–15% of the general population (22,23), and thus may be twofold or more sensitive in the detection of early kidney damage than ordinary dipstick-measured proteinuria. Considering that microalbuminuria has been proven to constitute a significant risk for cerebro- and cardiovascular diseases (CVD) (24), the measurement of microalbuminuria in such health check-ups as conducted in worksites to detect smokers at high risk of CKD and CVD should be examined for its usefulness .

CONCLUSION

On the basis of our study results we concluded that the smokers have significantly higher levels of urine albumin and urine albumin creatinine ratio when compared to controls. The quantity of smoking has a direct effect on the urine albumin and urine albumin creatinine ratio. In this research need further attention of clinician and nephrologists, looking to the highly prevalent smoking addiction in Indian community as an independent risk factor and its impact on renal function, therefore; more such studies can be required.

REFERENCES

1. Yeh J: Albuminuria and cardiovascular disease risk factors in American Indians. Circulation 1990:82: 620-630.
2. Salonen JT, Salonen R. Ultrasound B-mode imaging in observational studies of atherosclerotic progression. Circulation. 1993;87(3 Suppl):II56–65.

3. Orth SR, Hallan SI. Smoking: a risk factor for progression of chronic kidney disease and for cardiovascular morbidity and mortality in renal patients—absence of evidence or evidence of absence? Clin J Am Soc Nephrol. 2008;3:226–236. doi: 10.2215/CJN.03740907.
4. Orth SR, Ritz E, Schrier RW. The renal risks of smoking. Kidney Int. 1997;51:1669–1677. doi: 10.1038/ki.1997.232.
5. Bleyer AJ, Shemanski LR, Burke GL, Hansen KJ, Appel RG. Tobacco, hypertension, and vascular disease: risk factors for renal functional decline in an older population. Kidney Int. 2000;57:2072–2079
6. Regalado M, Yang S, Wesson DE. Cigarette smoking is associated with augmented progression of renal insufficiency in severe essential hypertension. Am J Kidney Dis. 2000;35:687–694.
7. Stegmayr B, Lithner F. Tobacco and end-stage diabetic nephropathy. Br Med J 1987; 295: 581–582.
8. Chapman AB, Johnson AM, Gabow PA, Schrier RW. Overt proteinuria and microalbuminuria in autosomal dominant polycystic kidney disease. J Am Soc Nephrol; 1994; 5: 1349 –1354.
9. Ward MM, Studenski S. Clinical prognostic factors in lupus nephritis. The importance of hypertension and smoking. Arch Intern Med 1992; 152: 2082–2088.
10. Gupta RK, Gupta R, Maheshwari VD, Mawliya M. Impact of smoking on microalbuminuria and urinary albumin creatinine ratio in non-diabetic normotensive smokers. Indian J Nephrol. 2014; 24: 92–96. 7.
11. Shah T, Purohit G. Microproteinuria in chronic cigarette smokers as a predictor of renal diseases: A case control study. Biomedical Research 2013; 24: 55-588.
12. Gerstein HC, Mann JF, Pogue J, Dinneen SF, Hallé JP, Hoogwerf B, et al. Prevalence and determinants of microalbuminuria in high-risk diabetic and nondiabetic patients in the heart outcomes prevention evaluation study. The HOPE study investigators. Diabetes Care. 2000;23:B35–9.
13. Pinto-Sietsma SJ, Mulder J, Janssen WM, Hillege HL, de Zeeuw D, de Jong PE. Smoking is related to albuminuria and abnormal renal function in nondiabetic persons. Ann Intern Med. 2000;133:585–91.
14. Cerami C, Founders H, Nicholl I. Tobacco smoke is a source of toxic reactive glycation products. Proc Natl Acad Sci USA 1997;94: 915-920.
15. Viassara H, Fuh H, Makita Z etal. Exogenous advanced glycosylation end product induces complex vascular dysfunction in normal animal: A model of diabetic and ageing complication. Proc Natl Acad Sci USA.1992; 89:120-43.
16. Bruno G, Cavallo-Perin P, Bargero G et al. Prevalence and risk factors for micro- and macroalbuminuria in an Italian population-based cohort of NIDDM subjects. Diabetes Care1996;19: 43–47.
17. Halimi JM, Philippon C, Mimran A. Contrasting renal effects of nicotine in smokers and non-smokers. Nephrol Dial Transplant 1998;13: 940–944.
18. Ritz E, Benck U, Frank E etal. Effect of smoking on renal hemodynamics in healthy volunteers and in patients with glomerular deseases. Jn Am Soc Nephrol 1998;9:1798-804.
19. Gambaro G, Verlato F, Budacovic A etal. Renal impairments in chronic smokers. Jn Am Soc Nephrol 1998; 9:562-67.
20. Pinto-Sietsma SJ, Mulder J, Janssen WM, Hillege HL, Zeeuw D, Jong PE. Smoking is related to albuminuria and abnormal renal function in nondiabetic persons. Ann Intern Med. 2000;133:585–591.
21. Couper JJ, Staples AJ, Cocciolone R, Nairn J, Badcock N, Henning P. Relationship of smoking and albuminuria in children with insulin-dependent diabetes. Diabet Med. 1994;11:666–669.
22. Atkins RC, Polkinghorne KR, Briganti EM, Shaw JE, Zimmet PZ, Chadban SJ. Prevalence of albuminuria in Australia: the AusDiab Kidney Study. Kidney Int Suppl. 2004;S22–4.
23. Gerstein HC, Mann JF, Pogue J, Dinneen SF, Halle JP, Hoogwerf B, et al. Prevalence and determinants of microalbuminuria in high-risk diabetic and nondiabetic patients in the Heart Outcomes Prevention Evaluation Study. The HOPE Study Investigators. Diabetes Care. 2000;23(Suppl 2):B35–B39
24. Yuyun MF, Khaw KT, Luben R, Welch A, Bingham S, Day NE, et al. Microalbuminuria independently predicts all-cause and cardiovascular mortality in a British population: The European Prospective Investigation into Cancer in Norfolk (EPIC-Norfolk) population study. Int J Epidemiol. 2004;33:189–198.