INCIDENCE OF MICROALBUMINURIA IN TOBACCO CHEWERS

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ABSTRACT

It is well established that smoking increases the risk for cardiovascular disease. From the studies in diabetic subjects it has been shown that smoking induces microalbuminuria and accelerates the progression to end stage renal disease. Little is known whether smoking is also related to microalbuminuria and renal end organ damage in non diabetic subjects. The hypothesis which was put forward that tobacco chewing is related to microalbuminuria and renal functional changes in non diabetic subjects. We therefore performed a population based study in the Anand city of Gujarat in which we studied the relation between tobacco chewing and urinary albumin excretion. Tobacco chewers had a higher urinary albumin excretion (Albumin excretion 373 ± 13.9 mg /day : P <0.01) than those who do not consume tobacco. In conclusion tobacco chewing is associated with albuminuria.

KEY WORDS

Microalbuminuria , Urinary albumin excretion (UAE).

INTRODUCTION

In recent years it has become apparent that tobacco chewing and cigarette smoking is associated with excessive morbidity and mortality from a variety of disease (1). Cardiovascular and lung disease are the most prominent (2) but recently the adverse effects of smoking on renal function have gained more and more attention (3). The adverse effect of smoking on renal function has not been investigated extensively in non-diabetic subjects. Several studies show a relation between smoking and albuminuria (4, 5). Microalbuminuria i.e. slightly elevated urinary albumin excretion was initially demonstrated in patients with diabetes mellitus where it was shown to be associated with atherogenic changes in the cardiovascular risk profile (6, 7) and to predict increased mortality and cardiovascular disease (8). Persons with diabetes and smoking are also associated with albuminuria and abnormal renal function. Nothing however is known about the incidence of albuminuria in tobacco chewers and abnormal renal function.

Proteinuria is an abnormally high amount of protein in urine. Proteins in the blood too large to pass through

the glomeruli are negatively charged proteins. Thus a size and charge barrier keeps protein molecules from entering the urine. But when the glomeruli are damaged, proteins of various sizes are pass through them and are excreted in the urine.

Five types of proteinuria are distinguished by milligrams (mg) of protein during 24 hr urine collection.

1. Microalbuminuria		30 to 150 mg
2. Mild		150 to 500 mg
3. Moderate		500 to 3000 mg
4. Heavy		1000 - 3000 mg
5. Nephrotic range		3000 - 3500 mg

As kidney disease progresses, more protein enters in the urine, people with nephrotic range proteinuria typically have extensive glomeruli damage and usually nephrotic syndrome.

Hypertension and diabetes are the two biggest risk factors for proteinuria, old age and weight gain also increase the risk.

Patients with diabetes mellitus are at high risk and may develop renal damage. End stage renal disease requiring dialysis or transplantation develops in approximately one third of patient with type 1 diabetes. (9) Diabetes is a common cause of renal failure. The range of 20 to 200 μ g/min or (30 to 300 mg/day) of increased UAE define microalbuminuria. In addition increased UAE, independently and in conjunction with Hyperinsulinemia identifies a group of non diabetic subjects at increased risk of coronary artery disease (10)

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MATERIALS AND METHODS

Fifty tobacco chewers and fifty volunteers who do not consume tobacco were studied. As we are aware about hypertension, diabetes leads to microalbuminuria, knowing that fact we have excluded all the diabetic and hypertensive subjects in the present study. In tobacco chewers group volunteers who were consuming 10 to 12 gm/day for a period of 2 to 3 years were selected. All the patients were taken from our hospital (HM Patel Centre For Medical Care and Education).

Study design

Fifty volunteers from both the group were subjected to blood pressure, measurement of height and weight. Next day urine samples were collected from them (Tobacco chewers as well as non tobacco chewers) 24 hr urine samples were collected and stored in the refrigerator at 4°C. Fasting blood samples were also collected. Urine sample was analyzed for albumin on semiautoanalyzer by end point procedure (11) and blood sample was analyzed for serum creatinine (12, 13), serum urea (14) and plasma glucose (15-17).

RESULTS AND DISCUSSION

The result obtained from Fifty volunteers tobacco chewers and Fifty volunteer who do not consume tobacco. The blood samples were analyzed on semiautoanalyzer (RA-50). The mean values for plasma glucose were 104.9 ± 21.6 mg/dl Serum creatinine and serum urea 1.1 ± 0.09 mg/dl and 25.1 ± 7.2 mg/dl respectively. All the values were within normal limits except the microalbuminuria i.e. in urine sample the albumin concentration was more than the normal limits (> 300 mg/dl: 373 ± 13.9 mg /dl). At the same time in the group who do not consume tobacco the values for the same parameters like plasma glucose, serum creatinine, Serum urea and microalbumin in urine remains in normal limits. Plasma glucose 83.5 ± 11.3 mg/dl, serum creatinine 1.1 ± 0.1 mg/dl serum urea 26.3 ± 10.0 mg/dl and albuminuria 93.6 ± 13.9 mg/dl respectively.

Gosling and Beavers (18) reported one of the few studies of the relation between alcohol consumption and slight albuminuria. Although they found no significant association in their study. In contrast Winocoe *et al.* (19) reported a positive relation between the albumin: creatinine ratio and alcohol intake in 10 subjects with slight albuminuria. Ethanol ingestion is known to cause hyperlipidemia (20) very low density lipoprotein, triglyceride and chylomicron concentrations are both increased after alcohol consumption.

A positive association between current cigarette smoking and clinical albuminuria has been observed in a number of studies of patients with diabetes mellitus (21-24). The mechanism of tobacco-induced slight albuminuria is uncertain. Increased heart rate and blood pressure among non-diabetic cigarette smokers have been reported (25) which may increase glomerular filtration rate and renal plasma flow. Alternatively because smoking is associated with high amounts of carboxyhemoglobin and decreased oxygen delivery to tissue albuminuria may be caused by hypoxia in the renal microcirculation (25).

We observed lower urinary albumin concentration among healthy individuals where as in tobacco chewers the urinary albumin is very high (i.e. 373 ± 13.9 mg/day) ($P < 0.01$) when compared to who do not consume tobacco.

Present study concludes that patients consuming Tobacco 10-12 g/day for 2 to 3 years lead to albuminuria i.e. more than 300 mg/dl in urine in non-diabetic subjects. The creatinine and urea in plasma shows absolutely normal range 1.1 ± 0.09 mg/dl and 25.1 ± 7.2 mg/dl respectively. From plasma urea and creatinine levels we conclude that the kidney function is absolutely normal but microalbumin shows ($P < 0.01$) significantly higher values. From this observation we conclude that a small amount of albumin is excreted in the urine which may lead to future abnormalities in renal function.

In conclusion tobacco chewers may be associated with albuminuria and abnormal renal function in a non-diabetic and non-hypertensive people in future.

Table 1. Shows the values of plasma glucose, serum creatinine, serum urea and micro albumin in urine samples with non tobacco chewers and tobacco chewers

Subject	Plasma glucose (mg/dl)	Serum creatinine (mg/dl)	Serum Urea (mg/dl)	Microalbumin (mg / 24 hr.)
Tobacco chewers M = 50	104.9 ± 21.6	1.1 ± 0.09	25.1 ± 7.2	373 ± 13.9
Non Tobacco chewers M = 50	83.5 ± 11.3	1.1 ± 0.1	26.3 ± 10.0	93.6 ± 13.9

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REFERENCE

1. The Health consequences of smoking publication 73-8704. Behesde Md. US Dept. of education and welfare public health service (1973).
2. Mammond, E.C. (1966) Smoking is relation to the death rates of one million men and women . In Epidemiological approaches to the study of cancer and other disease Haenazel W.Ed. National cancer institute monograph 19. Bethesda Md US Deptl of Health Education and Welfare Public Health Service, 127-204.
3. Orth, S.R., Ritz, E. and Schrier, R. (1997) The renal risk of smoking. *Kidney int.* 51, 1669, 77.
4. Metcalf, P.A., Baker, J.R., Scragg, P.K.R., Dryson, E., Scott, A.J. and Wild, C.J. (1993) Albuminuria in people at least 40 years old : effect of alcohol consumption regular exercise and cigeratte smoking. *Clin. Chem.* 93/9, 97.
5. Cirillo, M., Sennigalliesi, L., Laurenzi, M., Alfieri, R., stamler, J., Stamler, R. *et al.* (1998) Microalbuminuria in non diabetic adults. *Arch. Intern. Med.* 158, 1933-1939.
6. Jensen, T., Stender, S. and Decker, T. (1988) Abnormalities in plasma concentration of lipoproteins and fibrinogen in type I (Insulin dependent) diabetic patients with increase urinary albumin excretion. *Diabetologia* 31, 142-145.
7. Niskanen, L., Uusitupa, M., Sarland, H., Siltonen, O., Voutilaimne, E. and Penthia, I. (1990) Microalbuminuria predicts the development of serum lipoprotein abnormalities favoring atherogenesis is newly diagnosed type 2 (non insulin dependent) diabetic patients. *Diabetologia* 33, 237-243.
8. Jarrett, R.J., Viberto, G.C., Angyropoulos, A., Hill, R.D., Mahmud, U. and Murreis, T.J. (1984) Microabluminuria predicts mortality in non insulin dependent diabetes. *Dibet. Med.* 1, 17-19.
9. Reddi, A.S. and Camerini Davalos, R.A. (1990) Diabetic nephropathy an update. *Arch. Intern. Med.* 150, 31-43 .
10. Kuuuuusiosto, J., Mykkanem, L., Pyoralc, K. and Laakso, M. (1995) Hyperinsulinemic microalbumin. A new risk idicator for coronary heart disease. *Circulation* 91, 831-837.
11. Walanabe, N., Kamed, S., Ohkubo, A., Yamanake, M. and Oshawa, S. (1986) *Clin. Chem.* 32, 1551.
12. Barthers, M. and Bohmer, M. (1972) *Clin. Chem. Aeta.* 37, 193.
13. Schirmeister, J., Willmann, H. and Kiefer, H. (1964) *Disch. Med. Wascher* 89, 1018.
14. Talke, H. and Schubert, G.E. (1965) *Klin* 43, 174.
15. Tinder P. *Annals* (1969) *Clin. Biochem.* 6, 24.
16. Young, D.S. *et al.* (1975) *Clin. Chem.* 21, ID.
17. Bengmayer, H.V. (1974) *Methods of enzymatic Analysis.* A.P. Ny, 1196.
18. Gosling, P. and Beavers, D.G. (1989) Urinary albumin excretion and blood pressure in general population. *Clin. Sci.* 76, 39-42.
19. Winocur, P.H., Harland, Jo, Miher, M.F., Lahar, M.F. and Alberti, K.G. (1992) Microalbuminuria and associated cardiovascular risk factors in the community. *Atherosclerosis* 93, 71-81.
20. Brown, M.S. Goldstein (1983) *Jlthe hyperlipoproteininemias and other disorders of lipid metabolism* editors Harrison's principle of internal mdicine New York MC Graw Hill, 547-559.
21. Telmer, S., Christensen, J.S., Anderson, A.R. and Herup, J. (1984) Smoking habits and prevalence of clinical microangiopathy in insulin dependent diabetics. *Aeta. Med. Scand.* 215, 53-68.
22. Stegmayr, B. and Lithner, F. (1987) Tobacco and end stage diabetic nephropathy. *Br. Med. J.* 295, 53-68.
23. Muhilhauser, I., Sawicki, P. and Berger, M. (1986) Cigarette smoking as a risk factor for Macroproteinuria and proliferative retionopathy in type I (Insulin dependent) diabetes. *Diabetologic* 29, 500-502
24. Chase, H.P., Garg, S.K., Marshall, G., Berg, C.L., Harris, S., Jackson, W.E. *et al.* (1991) cigeratte smoking increases the risk of albuminuria among subjects with type I diabetes. *J.Am. Med. Asso.* (JAMA) 265, 614-617
25. Redehill, A., Fianco, Cerecedo A., Hemseu, A., Stensdotter, M. Pernow, J. and Lundberg, J.M. (1989) Cigeratte smoking Induced elevation of plasma neuropeptide Y levels in humns. *Clin. Physiol.* 9, 243-248.