Uric Acid Antioxidant in Elderly Smokers & Its Relationship with Duration & Quantity of Smoked Cigarettes

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ABSTRACT

Objective: To determine serum uric acid anti oxidant in elderly smokers and its relationship with duration of smoking and quantity of cigarettes smoked.

Study Design: Case control study

Place and Duration: Department of Physiology, Isra University, Hyderabad, during June 2013-November 2014

Material and Methods: 251 cigarette smokers and 100 never smoker controls were selected through non-probability purposive sampling according to inclusion and exclusion criteria The subjects were divided into; controls and cases- the smokers. Blood samples were collected in Eppendorf tubes and processed on automated hematoanalyzer. Uric acid was measured on Roche chemistry analyzer. The Data was analyzed on SPSS version 21.0 using one student`s t test, Chi square test and Spearman's correlation. A p-value of =0.05 was taken statistically significant.

Results: Mean ± SD age was noted as 57± 10.5 and 59 ± 11.5 years respectively (p = 0.91) in smokers & non smokers. Serum uric acid in smokers and controls was noted as 4.91±0.35 and 3.8± 0.91 mg/dl respectively (p=0.0001). Serum uric acid was negatively correlated with number of cigarettes (r= -0.618, p=0.0001). Association of duration of smoking with uric acid was found to be non significant (r= -0.26, p=0.81).

Conclusion: Decreased uric acid in smokers indicates that the cigarette smoking increases the oxidative stress. Uric acid was inversely associated with number of cigarette smoked per day.

Key words: Uric acid, Smoking, Elderly smokers, Sindh

INTRODUCTION

Smoking is a practice in which a substance, most commonly tobacco, is burned and the smoke is inhaled. This is primarily practiced as a route of administration, as combustion releases the active substances in cigarettes such as nicotine and them available for absorption through the lungs. Smoking is one of the leading causes of preventable death globally.[1] It has been suggested that smoking related disease kills one half of all long term smokers but these diseases may also be contracted by non-smokers. A 2007 report states that about 4.9 million people worldwide each year die as a result of smoking.[2] Smoking has been shown as a risk factor for atherosclerosis development and its complications including cerebral & cardiovascular diseases (CVD).[2-4]

As cigarette smoke contains superoxide and reactive nitrogen species that readily react with various biomolecules, it has been hypothesized that some of the adverse effects of smoking may result from oxidative damage to endothelial cells, which results in nitric oxide shortage.[5,6] Therefore imbalance between oxidants and antioxidants may play an important role in the

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90

susceptible smoker.[7] In addition cigarette smokers have increased inflammatory responses that further enhance their oxidative stress.[8] Since in humans, uric acid is the most abundant aqueous antioxidant, accounting for up to 60% of serum free radical scavenging capacity and is an important intracellular free radical scavenger during metabolic stress including smoking[9,10], therefore, measurement of its serum level reflects the antioxidant capacity. The study was conducted to evaluate the effects of smoking on uric acid anti oxidant in elderly population at our tertiary care hospital.

MATERIAL & METHODS:

A case control study was conducted at Isra University from June 2013- November 2014. A total of 251 cigarette smokers and 100 never smoker controls were selected through non-probability purposive sampling according to inclusion and exclusion criteria. The subjects were divided into; controls and cases (the smokers). Voluntary male smokers of age =50 years who looked healthy were included in study protocol. Smokers with diabetes mellitus, renal disease, gout and taking drugs were excluded. Data was collected on pre structured proforma.

Blood sampling: Blood samples were collected under aseptic conditions; skin over the vein was cleaned by 70% alcohol, 5ml blood sample was collected using sterile disposable syringes then specimens were transferred to Eppendorf containers and incubated at room temperature for 30 minutes and centrifuged at 6000 rpm for 5 minutes, the serum separated in a plain container and were stored at 20^0C.

Serum uric acid: The serum uric acid levels were measured by Roche chemistry analyzer, USA using enzymatic method at Research Laboratory of Isra University Hyderabad.

Ethics approval was sought from review committee of institute. Verbal consent was taken from volunteer participants. The Data was analyzed on SPSS version 21.0 (IBM incorporation, USA) using student`s t test, Chi square test and Spearman's correlation. Spearman's correlation (r) was used to analyze

correlation of serum uric acid with duration of smoking and quantity of cigarettes smoked. A p-value of =0.05 was taken statistically significant.

RESULTS:

The mean ± SD age was noted as 57± 10.5 and 59 ± 11.5 years r respectively (p = 0.91) in smokers & controls. Serum uric acid in smokers and controls was noted as 4.91±0.35 and 3.8± 0.91 mg/dl respectively (p=0.0001) (Table-1). Serum uric acid was negatively correlated with number of cigarettes (r= -0.618, p=0.0001), and was found inversely proportional with number of cigarettes per day (Table-1 & graph-2). Correlation of duration of smoking was not observed with uric acid (r= -0.26, p=0.81) as shown in graph 2.

Table-I: Uric Acid in Cigarette Smokers & Controls

	Controls	Smokers	P-value
Age (years)	57+10.5	59+11.5	0.91
Uric Acid (mg/dl)	4.91+0.35	3.8+0.91	0.0001

Table-2: Uric Acid in Cigarette Smokers Per Day

Cigarette	Uric Acid (Mean ± S.D)
< 5 cigarettes/day	5.1 + 0.47
6-10 cigarettes/day	4.8 + 0.45
11-15 cigarettes/day	3.9 + 1.2
> 15 cigarettes/day	3.1 + 0.89
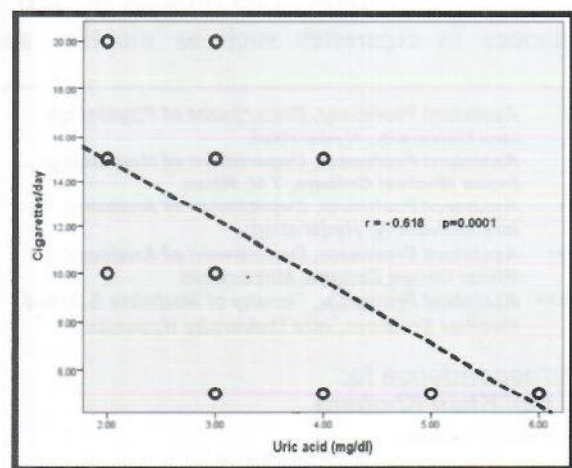
Graph I.: Spearman's Correlation of Uric Acid & Cigarettes Smoked Per Day
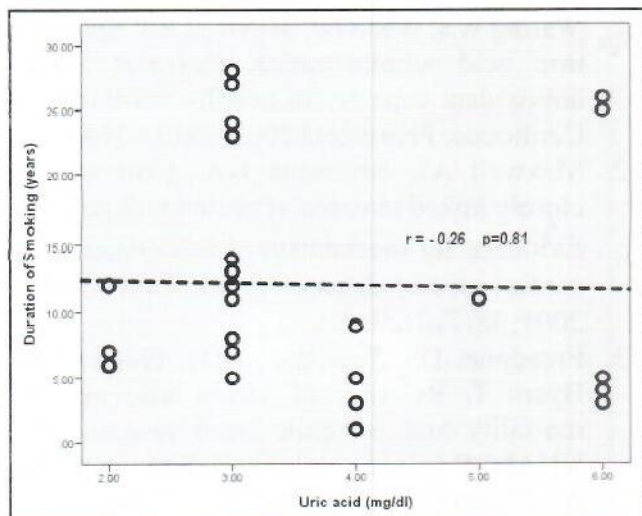
Graph 2. Spearman's Correlation of Uric Acid & Duration of Smoking

DISCUSSION:

Although there is some evidence suggesting that the increase of serum uric acid is protective against CVD since uric acid acts as an endogenous antioxidant,[11,12] many epidemiological studies have suggested that high serum uric acid is a risk factor for CVD[13,14].

The present is the first study reporting serum uric acid anti oxidant in elderly smoking population. In present study, serum uric acid level in smokers significantly lower than the controls (p=0.0001) and showed significant negative correlation with smoking status. Serum uric acid was found to be negatively correlated with number of cigarettes (r= -0.618, p=0.0001) but not with the duration of smoking (r= -0.26, p=0.81). The finding is in agreement with previous study that showed low serum uric acid in regular smokers.[5]

The findings of present are in agreement with a recent study reported from Sudan. The study concluded that the smoking increases oxidative stress and reduces natural uric acid anti oxidant levels.[15] However, present study did not observed an association of uric acid with duration of smoking, which is inconsistent to previous study.[15] High serum uric acid concentrations might be protective in situations characterized by increased cardiovascular risk and oxidative stress as smoking, and by reducing its level it increases susceptibility to oxidative damage and accounts

for the excessive free radical production.[16] Therefore, the possibility that uric acid confers protection against the development of atherosclerosis, in view of its antioxidant properties, has been recognized. Previously it had been reported that alteration may occur to concentrations of normal endogenous antioxidant including uric acid by chronic smoking, and recently the viability of administering uric acid in solution has been established.[11,15]

As shown in this study, smoking results in a reduced supply of circulating antioxidants in the body, which may be due to the creation of an extra demand for antioxidants through oxidative stress, this effect is directly correlates with amount of nicotine used per day by smokers.

The limitations of present study include; firstly we could not reached to non smokers as having history of passive smoking ever in past and secondly dietary factors which might had affect the serum uric acid both in smokers and never smoker controls.

The present study suggest further studies to be conducted with large sample of smokers along with confounding factors as diet, ethnicity, race, etc to authenticate the findings.

CONCLUSION:

The present study reports a decrease in serum uric acid in smoker compared to controls. Decreased uric acid in smokers indicates that the cigarette smoking increases oxidative stress. Uric acid was inversely associated with number of cigarette smoked per day. Public campaigns must be conducted to make awareness of quitting cigarette smoking.

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