

Serum creatinine and uric acid levels in current adult male smokers versus nonsmokers

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Abstract

We performed a prospective study to evaluate the possible effect of smoking on oxidative stress subsequently on kidney working. This study included a smoker and nonsmoker cohort of 140 healthy men, all volunteers subjects aged 25 to 45 years free renal disease and another disease, with 65 of them being nonsmokers and the other being cigarette smokers. Blood specimen was collected to estimate serum uric acid and creatinine levels. There was a significant decrease in uric acid while there was a non-significant difference in creatinine level in the smoker group compared with nonsmoker between the two groups. Both creatinine and uric acid concentration were affected by the duration of smoking compared with the control group. Smoking leads to decrease uric acid, which acts as a valuable antioxidant against oxidative stress, but creatinine levels were independently associated with smokers compared with nonsmoker males.

Key words—Smoking, Uric acid, Creatinine, Adult male.

I. INTRODUCTION

Many things can stimulate stress between people, like a natural body response; various research pieces have considered that exposure to smoking can trigger stress, and prolonged stress worsens or increases the risk of inappropriate renal function and developing kidney disease (Su et al., 2021); therefore the kidney is a critical target organ for smoking-induced impairment (Taati et al., 2011); consistently nicotine is one of the toxic elements found in tobacco smoke and can be obtained by both active and passive smoking (de Borja et al., 2014) as well, Cigarette smoking is a recognized contributor to the development of atherosclerosis due to vascular endothelial damage caused by oxygen-free radicals such as radicals and reactive species (Huang et al., 2014) therefore Cigarette smoking causes an increase in the inflammatory process, which increases oxidative stress (Taati et al., 2020).

Uric acid is a degradation production from nucleic acids; the final results of the purine oxidation process act as a valuable

antioxidant, including against oxidative stress caused by chronic tobacco smoking (Haj Mouhamed et al., 2011; El Ridi & Tallima., 2017). Uric acid is the most considerable hydrophilic antioxidant now, consisting of up to 60% of serum-free radical - scavenging capacity (Maxwell et al., 1997), and is an essential intracellular potent antioxidant throughout metabolic stress, such as smoking (Phaniendra et al., 2015); thus, serum uric acid levels as a mirror for antioxidant capacity.

Creatinine is a byproduct material created by muscles that run throughout the bloodstream and is commonly excreted in the urine. (El Nahas & Bello., 2005). Creatinine concentration was taken as an indication for renal function, so its level in blood is characterized as a valuable guide to renal function state as reported by (The United States Renal Data System 2017).

The present study aimed to investigate how stress that generated from current and active smoking how may impact on serum uric acid and creatinine levels

II. SUBJECTS AND METHODS

This study took place at the University of Babylon in a scientific college for women from November to May 2021.

In this study, 140 male volunteers between the ages of 25 and 45 were separated into groups (group I and group II).

Group I, regarded as a control group, comprised 65 seemingly healthy nonsmokers, ranging from 25 to 45 years

Group II, the smoker group, which comprises 75 people who smoke cigarettes, has healthy ages ranging from 25 to 45 years.

An entire history was collected, involving name, age, and the mean number of cigarettes consumed per day (10 cigarettes per day), duration of smoking (1-15 years), dietary habit, past medical and drug history.

Blood samples were taken from both groups for calorimetric uric acid and creatinine measurements using Jaffes reaction kinetic method (Jung, 2008) at the biochemistry laboratory of a college of science for women.

The data were presented as means and standard deviations, for computation uric acid and creatinine level between control and study groups, an independent sample t-test was used, One-way ANOVA was used to estimate differences for clinical parameters depending on smoker period while comparison between smoker and nonsmoker Post Hoc analysis using Dunnett's test was employed. A p-value similar or lower than (0.05) represents a difference that is statistically significant.

III. RESULTS AND DISCUSSION

As shown in (table 1), no significant statistical differences in serum creatinine between groups ($P > 0.05$), while serum uric acid, when compared to the control group, was considerably lower in the smoking group [$p < 0.05$].

On the other hand, the period of smoking significantly changed the serum uric acid and creatinine concentration as revealed in (table 2), since a significant increased ($p < 0.05$) was noted in creatinine level was linked with increment smoking duration, while a significant reduction ($p < 0.05$) in uric acid concentration concern with an excess smoking period

Table1: Creatinine and uric acid level in smoking men as compared with nonsmoking

Parameters	Mean \pm SD	NO	Subjects	Sig and p value
Creatinine(mg/dl)	0.94 \pm 0.57	75	Smoker	P > 0.05 (0.09)
	0.72 \pm 0.40	65	Nonsmoker	
Uric acid(mg/dl)	2.12 \pm 0.73	75	Smoker	P < 0.05 (0.02)
	4.14 \pm 1.72	65	Nonsmoker	

Table 2: influence of smoking duration on uric acid and creatinine levels In comparison to the control group.

Variables	Duration time			Control 65
	1-5yrs A.25	6-10yrs B.26	11-15 yrs D.24	
Creatinine mg/dl	0.97 \pm 0.6	2.1 \pm 0.8†	3.55 \pm 0.9*	0.72 \pm 0.40
Uric acid mg/dl	3.3 \pm 1.3	2.9 \pm 0.6	1.6 \pm 0.3**	4.1 \pm 1.7

Mean as expressed as mean \pm SD, $p < 0.05$ vs (A, B and control group), $p < 0.05$ vs (A and control group), $p < 0.05$ vs (A and control group)

Reliably, another study found decreased blood uric acid in daily smokers (Haj Mouhamed et al., 2011); nevertheless, in the Korean population, smoking was closely connected with uric acid in females but not in males (Kim & Choe., 2019)

Cigarette smoke contains harmful substances such as reactive oxygen species, toxin material, and nicotine, subsequently generating oxidative stress (Yanbaeva et al., 2007); therefore, serum uric acid levels are lower during smoking may be owing to the reactive oxygen species and free radicals generated by smoking (Tsuchiya et al., 2002), Uric acid, on the other hand, may have a medical role as an antioxidant (Kim & Choe., 2019)

Smoking has a dose-dependent effect on uric acid with these processes, indicating that oxidative stress increases every cigarette smoked (Haj Mouhamed et al., 2011). Another study attributed that antioxidant decreased in current smokers

increases susceptibility to oxidative damage after exposure to smoke for five minutes (Tsuchiya et al., 2002). Accordingly, smoking duration was inversely associated with uric acid in smokers as the previous study indicated (Hanna et al., 2008); Consequently, high serum uric acid may be protective in settings defined by elevated cardiovascular risk and oxidative stress, such as smoking, while lowering it increases oxidative damage susceptibility and accounts for excessive free radical formation (Muiesan et al., 2016)

This suggests that smoking stress and renal function deficiency may be related, this may be a reason for creatinine level increases together with more smoking periods; as shown by a significant increase in creatinine level from five years to 15 years of smoking this may be explained that excess cigarettes substances accumulation can cause severe effects in renal tubules pH and lead to alteration in glomerular filtration rate. (Noborisaka et al., 2012)

This finding confirms study approached the relationship between smoking and creatinine level in which authors found creatinine levels significantly higher in active smokers (DULGER et al., 2011); besides this, most responders had normal stress levels, as the increase in stress hormone has a significant effect on the balance function of the body (Ladesvita et al., 2020). Stress hormone-like (adrenaline and cortisol) will interfere with the kidney's filtration, and a decline in glomerular filtration rate will result in a reduction in distal tubular flow rate, which will lead to a rise in creatinine reabsorption. (D. Pugh et al., 2019)

Finally, with more periods of smoking, the elevated value of creatinine has been shown; this observation is consistent with the findings of prior work. (DULGER et al., 2011)

CONCLUSION

Smoking is a more incredible source for oxidation stress, and reduced uric acid was attributed to reducing endogenous production being influenced adversely in glomerular filtration rate, afterwards elevation in serum creatinine level

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