



Influence of Smoking Duration on Cadmium Deposition in Blood and Scalp Hair among University Students in Jordan

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Dear Editor-in-Chief

I am writing to you about the effect of smoking duration on metals deposition in biological tissue, cadmium induces deleterious side effects in the human body such as renal dysfunction, vascular disorders and interstitial cell tumors in the testes in chronic metals exposure (1). *Cigarette smoking is one of the major causes for the progressive increase in mortality rate worldwide. Smoking is an exogeneous source of metals contamination in human body; a single cigarette contains 1.0–4.5 µg Cd and at least one tenth of the metal content of a cigarette is inhaled* (2).

In this study, our main goal was to explore the influence of smoking duration on cadmium deposition in both tissues of blood (as acute exposure indicator) and hair (as chronic exposure indicator) among university students in Amman, Jordan. The study was conducted on a group of 99 volunteers, 53 males and 46 females aged between 17 and 25 yr.

The study has been approved by the Faculty of Pharmacy and Medical Sciences at University of Petra. This study is conducted on the behalf of community awareness program against smoking habit and the students were voluntarily cooperated.

The study population was divided into three subgroups according to their smoking habits and duration; non-smokers, smokers for more than 1 and less than 5 yr and smokers for more than 5 yr. sampling process took place at University of Petra; Amman, Jordan, two biological samples were

obtained from each volunteer hair and blood. Sample preparation was carried out according to friel and Ngyuen, 1986 guidelines (3). Digested samples of hair and blood were analyzed using inductively coupled plasma-atomic emission spectroscope (PerkinElmer optima 2000) (Department of Health Sciences, University of Hail, Hail, Saudi Arabia).

Cadmium concentration in scalp hair and blood is illustrated in Table 1. There was a significant correlation between levels of H-Cd and B-Cd ($r=0.56$ $P < 0.05$).

Levels of both H-Cd and B-Cd were significantly higher levels in smokers than non-smokers group; there was an increase of 34% and 40% in levels of cadmium respectively. Cadmium concentrations were increasing in blood and hair with duration of smoking, this result demonstrate a significant statistical relation ($r=0.289$. $P < 0.05$, $r=0.303$ $P < 0.05$) respectively. Interestingly, levels of H-Cd and B-Cd have increased for smokers of 1 and less than 5 yr in comparison with non-smokers group a in ratio of 25%, 29% respectively. On the other hand, there was an increase in levels of H-Cd and B-Cd for smokers of more than 5 yr in comparison with smokers of 1 and less than 5 yr group in a ratio of 30%, 33%, respectively. Whereas, there was an a two fold increase in levels of H-Cd and B-Cd in a ratio of 47%, 52% respectively, for smokers of more than 5 yr in comparison with non smokers group.

Table 1: Mean cadmium concentration of hair and blood samples

		Mean Hair Cadmium \pm SD ($\mu\text{g/g}$)	Mean Blood Cadmium \pm SD ($\mu\text{g/L}$)
Smoking	N		
Non smoker	41	0.293 \pm 0.25 ^a	0.096 \pm 0.095 ^a
1-5 yr	39	0.387 \pm 0.34 ^a	0.135 \pm 0.133 ^a
> 5 yr	19	0.56 \pm 0.38 ^b	0.202 \pm 0.16 ^b
P value		< 0.05	< 0.05
Non smoker	41	0.293 \pm 0.25	0.096 \pm 0.095
Smokers	58	0.443 \pm 0.36	0.158 \pm 0.146
P value		< 0.05	< 0.05
Sex			
Male	53	0.473 \pm 0.37	0.164 \pm 0.15
Female	46	0.275 \pm 0.235	0.095 \pm 0.091
P value		< 0.05	< 0.05
All volunteers	99	0.38 \pm 0.33	0.132 \pm 0.13

These figures discern a healthy atmosphere in Amman and low level of contamination in university students of Petra; it could be explained due to the young age and the short duration of smoking period.

A positive correlation has been demonstrated between H-Cd and B-Cd for our study population with age ($r=0.59$ $P < 0.05$). In addition, there was an increase in cadmium levels in both hair and blood in smokers in comparison with non-smokers at the same age group ($r=0.237$, $P < 0.05$) ($r=0.269$, $P < 0.05$). Cadmium levels were higher in hair and blood of males than females ($r=0.267$ $P < 0.05$, $r=0.241$ $P < 0.05$). Baeklund et al. demonstrated higher levels in males than females (4). These levels of cadmium could not cause deleterious pathological disorders on the short term; nevertheless, the alarm bell should ring since the clinical manifestations may develop after 10 or 20 yr of smoking.

References

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