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Estimation Of Some Minerals In Blood Of Smokers And Nonsmokers

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ABSTRACT

Cigarette smoking is a serious global public health issue, and rising tobacco smoking prevalence is a leading cause of premature death globally. The study aimed to measure the levels of Iron, Zinc and heavy metals (Lead, Mercury and Cadmium) in the smokers and compare it with the nonsmokers. Ninety-person aged 21-50 year included 60 smokers (cigarettes and hookah) and 30 healthy (control), smokers distributed into two groups according to the period of smoking, A1 (10-14 year) and A2 (15-20 year). 15 ml of venous blood separated to obtain serum. Serum diluted three times, and then used to measure the elements using a flameless atomic absorption spectrometer. The results of this study show that A1 and A2 have increase level of Iron and decrease level of Zink compare to healthy persons . The results also show increase level of Lead in the blood of A1 and A2 groups of smokers compare to healthy persons . Smoking is one of the leading causes of death worldwide.

Keywords : Smokers, Iron, Lead, Mercury, Cadmium, Zinc .

INTRODUCTION

Smoking is a serious global health risk, and rising tobacco prevalence is the leading cause of early mortality worldwide [1]. Cigarette smoke is a complex of chemical compounds, it is bound to aerosol particles or it is free in gas phase. Tobacco contain chemicals products can be condensed or react to produce extra compounds which then condensed to smoke. Cigarette smoke has approximately 7,357 chemical compounds from different classes [2]. Cigarettes contain carcinogens, irritants, carbon monoxide, and a variety of other chemicals that can cause tissue, protein, and DNA damage. Cigarette smoking raises hemoglobin concentration in a proportional way to the number of cigarettes smoked per day. Ferritin is a globular protein with 24 protein units that serves as the cell's principal internal iron storage protein, keeping iron soluble and nontoxic. It's also an acute-phase protein that's elevated in chronic inflammation and liver problems [3]. Serum ferritin is a useful indication of iron status that can be used to diagnose iron deficiency or iron overload. As a result, ferritin is one of the most important parameters in determining iron status balance. [4]. The nicotine induces a clot formation in the coronary arteries CA; it increases vascular endothelium dysfunction. Elevation in the carboxy-haemoglobin level may cause hypoxia, and sub-endo theliaoedema that alters the nature of vascular permeability and even accumulation of lipids [5]. Zinc is a fundamental trace element; it is important and essential to the structure and function of many of macromolecules, including enzymes that responsible on regulating many cellular processes and signaling

pathways. Zinc modulates immune response and improve antioxidants and anti-inflammatory activity [6]. Zinc is the second prevalent trace element after iron [7]. The ion form critically contribute in cell proliferation, differentiation, and apoptosis. Many of biological processes are zinc dependent like DNA synthesis, reproduction processes, vision and taste. Studies of [8] have shown that zinc has a role in safeguards DNA integrity and its deficiency can attenuate the function of zinc-dependent proteins that involving in the DNA damage response. Metals have a vital role for many physiological processes in human body, but also can destroy health when their concentration are not within the normal range. Heavy metals considered environmental pollutants and some of them are toxic even at very low concentrations [9]. Even essential trace elements in high concentrations can cause damage to health. The form in which an element can be ingested plays a critical role in it's restorability or toxicity [10]. Smoking one of the major source of exposure to cadmium [11]. Smokers have higher levels of cadmium in urine, blood and tissues more than non-smokers who may exposure to it due the diet [12]. Manufacturers of cigarette add a slogan to their advertisements in a phrase it's a main cause of diseases, but smokers still smoke despite the warnings. Reports mentioned serious environmental problem of Lead contamination and a significant increase in blood lead levels in occupational cohorts [13]. However, the mercury is a metal can be absorbed via the respiratory tract. Eighty percent of Mercury retained in the organism. Diffusion and absorption of the element into the semi-liquid layer of the respiratory tract pathway, in particular in the lungs, occurs with subsequent dis-solution in ependymal then enters into the bloodstream where it oxidized in red blood cells. Some amounts of mercury that remains in bloodstream may penetrate into brain cortex and placenta barrier, which can cause mercury deposition in embryo-brain and other tissues. The ratio of mercury concentration contained in red blood cells to that in blood plasma is about $2^{[14]}$.

MATERIALS AND METHODS

STUDY DESIGN:

The study is cross sectional study occur in Tikrit city from 17th January to 30th June , data collected from ninety patients and healthy recruitments aged 21-50 year. Distributed into two main groups. First is control group (30) samples of non-smokers and non-exposure to smoke. Second is (60) from smokers (cigarettes and hookah) distributed into two sub-groups according to the period of smoking A1(10-14) years and A2 (15-20) year, 15 ml of blood was drawn and after separating the serum was diluted three times where it was used to measure the elements using a flameless atomic absorption spectrometer.

RESULTS AND DISCUSSION

العناصر بوحدة (ppm)		Zn	Hg	Pb	Fe	Cd
مجموعة المدخنين حسب مدة التدخين	(14-10)	0.850±0.047	0.059±0.006	0.034±0.002	1.581±0.031	0.253±0.001
	(20-15)	0.812±0.023	0.071±0.008	0.038±0.005	1.812±0.062	0.350±0.004
مجموعة السيطرة		1.291±0.019	0.004±0.0001	0.003±0.0006	0.133±0.015	0.006±0.0002

Tobacco cigarette smoking is one of the most common causes of death worldwide. The effects of smoking on haematological markers are acute and chronic. The results also showed an increase in the iron concentration in

the blood of the GroupA2 (1.812±0.062) , and it was within normal limits in the GroupA1(1.581±0.031) compared with the control group, whose concentration was within normal levels also (0.133±0.015) , with a significant difference .The results of this study are confirm by other study in 2017 which show that Iron level increase in smokers compare to nonsmokers where inhaled carbon monoxide causes the synthesis of carboxyhemoglobin, which lowers the oxyhemoglobin level in smokers, resulting in an increase in hemoglobin concentration. [1] .

This study shows that Zink level is decrease in smokers in group which smoking for GroupA1(10-14)years (0.850±0.047) and decrease more in group which smoking for GroupA2(15-20)years (0.812±0.023) . Results of this study are confirm by other study which show that the mean serum zinc in smokers was lower than in the control group, according to this study, which indicated that high lead levels resulted in a relative zinc shortage. Because zinc is essential for the optimal activity of more than 300 enzymes, including those involved in the creation and repair of DNA and RNA, as well as tissue repair response, a drop in zinc levels as seen in smokers is likely to increase lead toxicity. This could have a negative impact on the exposed group's metabolism and immunological response[16].

The results of this study showed an increase in the level of mercury and lead, with no significant difference in the two groups of smokers according to the period of smoking (A1, A2) where mercury level was (0.059±0.006) in A1 and (0.071±0.008) in A2, compared to the control group (0.004±0.0001) while lead level was (0.034±0.002) in A1 and (0.038±0.005) in A2 , compared to the control group (0.003±0.0006) which showed their low levels with no significant differences in the results. Other study at 2007 confirm the results of this research that when comparing those who had been exposed for more than 10 years to those who had been exposed for less than 10 years, it was discovered that those who had been exposed for more than 10 years had greater blood lead levels [16]. Lead arsenate, which is used as an insecticide on tobacco, may raise the lead concentration of the cigarette. Blood lead levels have been documented to rise as a result of this. Tobacco contains lead as a preservative. [13]

The study also showed a high level of cadmium in the two groups of smokers, and its level in group A2 (0.350±0.004) was much higher than that of A1(0.253±0.001) with no significant differences compared to the control group, which showed its low level in the blood of non-smokers (0.006±0.0002) with no significant differences between the results. Cadmium readily pass into the bloodstream and may accumulate in specific organs, such as the kidney and liver[17]. Because of the antagonistic interactions between these elements, zinc deficiency is linked to an increase in Cadmium [18].

CONCLUSIONS

This study show that cigarrette smoking cause numerous effects on the minerals level in the body where it cause increase level of Iron and cause decrease level of Zink . This study on firms that tobacco is a notable source of many heavy metal pollutants particularly mercury and lead .

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