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The effect of smoking and its period on the concentrations of the metals (Zn, Mn, Cu, and Fe), and its relationship with changes on glucose levels, total cholesterol levels, and blood pressure when compared with non-smokers

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ABSTRACT

The study was conducted at the scientific research laboratories of the University of Mosul. It included (60) random samples of men aged 22-60 years. The samples were divided into two groups: Firstly, smokers included (41) samples which were subdivided into two categories depending on the period of smoking; category I (24 samples) included samples who smoked more than (15) years, and category II (17 samples) included samples who smoked for less than (10) years. Secondly, anon-smoking group that contained (19) control sample. Some of the biochemistry standards were measured (glucose, total cholesterol, blood pressure, zinc, manganese, iron, and copper) for each sample and comparison of the category of smokers with the control, the comparison of the group of smokers (category II) with the control was also compared with the first and second smokers group. The results of the current study indicated when comparing first category of smokers with the control indicated that smoking affected the high level of cholesterol in the blood serum. There was a moral difference (P < 0.05) compared with the control. Also, the high levels of glucose in the second category of smokers observed a moral difference (P < 0.05) while the mental differences (p > 0.05) were lacking in glucose level when compared the first and second categories. The total cholesterol ratio indicated the results when compared the first category of smokers with the control to a high cholesterol level and the existence of moral differences (P < 0.05). Also, the high level of total cholesterol showed a moral difference (P < 0.05) between the second group of smokers compared with the control, the high level of cholesterol also has a moral difference (P < 0.05) when compared smokers to both categories. Systolic blood pressure rate did not record any difference between totals and remained within normal rates and there were no mental differences (P > 0.05) in comparison of totals. The blood pressure of the diastolic group found an increase in the first category of smokers compared with the Control (P < 0.05) and there was also a high level of hypertension in the second category and the control showed difference (P < 0.05). The comparison between the first and second categories of smokers also indicated a high rate. The inputting pressure was existence of the moral difference (P < 0.05). For zinc, manganese, iron, and copper ion levels, the study showed when comparing the first category of smokers with the control low zinc level in smokers compared with the control there is a moral difference (P < 0.05) while no moral difference (p > 0.05) is registered among the smokers category for, in the first and control of in manganese level, the higher ratio copper was the mental differences (P < 0.05) in the first category of smokers compared to the control, and a higher level the of in the first category of smokers compared with the control group. The ion ratios when comparing the second category of smokers with the control were decreasing in zinc levels read a moral difference of (P < 0.05). Also, no moral difference (P < 0.05) was recorded among smokers category II and control for Manganese level. The concentration of copper in the second category of smokers also did not register a moral difference (P < 0.05). The iron level was high when smokers category II compared with the Control P < 0.05). When comparing first and second category of smokers, the results of the ion concentrations showed no difference in zinc concentration. Manganese for the moral differences (P > 0.05) While the copper rise was observed when the first category of smokers compared with the second category

difference mental (P < 0.05). The iron has a higher concentration in the second category than the first category, with a moral difference (P < 0.05).

Keywords: Smoking, glucose, total cholesterol, metal concentration.

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INTRODUCTION

Smoking is one of the bad habits that plague the societies of the world, which lead to the death of millions of people annually World Health Organization (WHO) report, there are about 2.4 billion people worldwide consumed tobacco in the form of estimates smoking chewing, snuffing or dipping. WHO also estimated that tobacco-related deaths will amount 8.3 million in 2030 and one billion deaths during the 21st century [13] CIGARETTE SMOKE CONTAINS MANY TOXIC AND CARCINOGENIC COMPOUND HARMFUL TO HEALTH (10). The reason is due to The number of chemical compounds that a smoker is exposed to when smoking a cigarette, estimated to reach4800, including tar, nicotine, carbon monoxide, polycyclic aromatic hydrocarbons and others[15] the tobacco smoke may lead to oxidative damage of lungs especially by causing accumulation of neutrophil in the lungs8. Smoking is responsible for every six cases of death[2] It is widely known that smokers have higher risk for cardiovascular diseases, hypertension, inflammation, stroke, clotting disorder, and respiratory diseases. Moreover, cigarette smoking accelerates pathogenesis in different types of cancer such as lung, pancreas, breast, liver, and kidney[4]coronary heart disease is one of the important causes of mortality in human beings. Cigarette smoking is one of the independent risk factors for coronary heart disease. Smoking increases mortality nearly five times between age group of 30-40 years [7] Passive smoking substantially reduced CFVR in healthy nonsmokers. This finding provides direct evidence that passive smoking may cause endothelial dysfunction of the coronary circulation in non-smokers[6].

Also, smoking alters brain chemistry. When compared to non-smokers, smokers brain cells- specifically brain cell receptors- have shown fewer dopamine receptors. Brain cell receptors are molecules[5] detrimental effects of smoking, there are no routine laboratory tests used for early detection of biochemical derangements in cigarette smokers. Simple investigations like lipid profile, hepatic enzymes, inflammatory markers uric acid and hematological counts may give clues about the possible complications of smoking in the near future[12] Nicotine biochemically alerts the liver to release sugar into the blood serum High sugar levels in the blood calles pancreas to act. The pancreas releases insulin to bring down the excess blood sugar[16] Electrolytes are minerals found in the bloodserum (plasma) and other body fluids that carry electric charges. Electrolyte balance is necessary for normal of cells and organs Cigarette smoking affects the proportions of these minerals [1].

The purpose of this paper is to show the effect of dichotomies and time period on the zinc and manganese ion ratios and their effect on total cholesterol, sugar, iron, and copper ion ratios and the association of these changes in the physiological diseases among smokers and their comparison with nonsmokers.

MATERIALS AND METHODS

The study was conducted in the research laboratories at the University of Mosul for the period included (60) random sample of healthy adults of smokers and non-smokers (control), respectively (41) and (19) The smokers group was divided into two categories (15>) years of smoking (24) sample and the second category (> 10) years of smoking (17)sample person.

Blood samples were collected from the volunteers in the morning while they were in fasting mode. The samples were placed in test tubes free of anticoagulant. The size of the samples taken from each volunteer was 3 cm^3 of blood. The centrifugation was then carried out for 15 minutes, cycle/minute for the stream.

1 - Determination of the level of glucose in the serum:

The serum glucose level was measured using the enzymatic method using reagents from the French company Biolabo and the use of the U.V1800 Shimazu of Japanese origin.[14]

2 - Measuring the level of total cholesterol in the serum:

The total cholesterol level in the serum was measured using the enzymatic method from the French company Biolabo, and the U.V1800 used Japanese Shimazu origin.[14]

3 - Measuring the levels of ions in the serum (zinc, manganese, iron,and copper):

After dilution on serum samples, the absorption method was used to calculate the level of ions using the atomic absorption device.[18]

Statistical analysis:

The groups mean ± S.D was calculated for each analysis and significant difference between means evaluated using the student t-test, with $P<0.05$ considered as statistically significant

RESULTS AND DISCUSSION

Table (1) showed that levels of glucose , total cholesterol and diastolic blood pressure in Stream were within the normal range in nonsmokers significantly increased in smokers group(A) ($P<0.05$) compared to nonsmokers There was no significant difference in systolic blood pressure($p>0.05$).

Table (1):The effect of smoking on the levels of glucose and total cholesterol and blood pressure in the blood of smokers (A) compared to control

blood pressure		Total cholesterol level mg/dl	Glucose level mg/dl	Number	Categories
Diastolic	Systolic				
88.75±5.16	128.70±25.44	185.84±38.65	±19.9596.75	24	Smokers(A)
81.31±2.80	125.26±5.12	167.30±28.65	82.31±14.56	19	non-smokers

Significant difference from the control group at a probability level ($P<0.05$)

Table (2) showed that there was a decrease in zinc concentration compared with control group, while copper and iron concentration was higher in smokers (A) compared to control ($P<0.05$) l. No significant difference was observed in the concentration of manganese ($P>0.05$)

Table (2): The effect of cigarette smoking on zinc, manganese, iron, and copper ions levels for smokers is category A compared to control

Copper level ppm	Iron level ppm	Level of manganese ppm	Zinc level ppm	Number	Categories
1.32±2.70	4.05±1.97	1.55±1.03	0.45±0.23	24	Smokers(A)
0.557±0.22	3.00±2.08	1.05±1.07	1.05±0.55	19	non-smokers

Significant difference from the control group at a probability level ($P<0.05$)

Table (3) showed that levels of glucose and total cholesterol and diastolic blood pressure in thestream were within the normal range in nonsmokers significantly increased in smokers group(B) ($P<0.05$) compared to nonsmokers There was no significant difference in systolic blood pressure.

Table (3): The effect of smoking on the levels of glucose and total cholesterol and blood pressure in the blood of smokers (B) compared to control

blood pressure		Total cholesterol level mg/dl	Glucose level mg/dl	Number	Categories
Diastolic	Systolic				
83.82±3.76	125.00±5.30	181.15±52.77	±18.8896.35	17	Smokers(B)
81.31±2.80	125.26±5.12	167.30±28.65	82.31±14.56	19	non-smokers

Significant difference from the control group at a probability level ($P<0.05$)

Table (4) showed that There was a decrease in zinc concentration compared with control group, and iron concentration was higher in smokers (B) compared to control (P<0.05). No significant difference was observed in the concentration of manganese and copper (P>0.05)

Table (4):The effect of cigarette smoking on zinc, manganese, iron and copper ions levels for smokers is category(B) compared to control

Copper level ppm	Iron level ppm	Level of manganese ppm	Zinc level ppm	Number	Categories
0.60±0.29	6.04±10.36	1.46±1.18	0.65±0.43	17	Smokers(B)
0.55±0.22	3.00±2.08	1.05±1.07	1.05±1.07	19	non-smokers

A significant difference from the control group at a probability level (P<0.05).

Table (5) showed that levels total cholesterol and Diastolic blood pressure in Stream were significantly increased in smokers group (A) (P<0.05) compared with Smokers (B) There was no significant difference in systolic blood pressure and glucose (p>0.05).

Table (5):Effect of the period of smoking on the levels of glucose and total cholesterol and systolic and diastolic blood pressure of class (A) compared to category (B)

blood pressure		Total cholesterol level mg/dl	Glucose level mg/dl	Number	Categories
Diastolic	Systolic				
1.32±2.70	4.05±1.97	1.55±1.03	0.45±0.23	24	Smokers(A)
83.82±3.76	125.00±5.30	181.15±52.77	±18.8896.35	17	Smokers(B)

Table (6) showed that levels of Copper and Iron in Serum were significantly increased in smokers group(A) (P<0.05) compared Smokers(B) There was no significant difference in zinc and manganese level (p>0.05).

Table (6): Effect of the period of smoking on the levels of on zinc, manganese, iron, and copper ions class (A) compared to category (B)

Copper level ppm	Iron level ppm	Level of manganese ppm	Zinc level ppm	Number	Categories
1.32±2.70	4.05±1.97	1.55±1.03	0.45±0.23	24	Smokers(A)
0.60±0.29	6.04±10.36	1.46±1.18	0.65±0.43	17	Smokers(B)

The effect of smoking on the levels of zinc, manganese, copper and iron ions [3,17,9,22,8] effect of these changes ionic concentrations on cholesterol levels [19,8].Effect Changes in concentrations of ions in smokers at the level of glucose in the serum of smokers [9]. In addition to the effect of changes caused by smoking at the levels of ions, which in turn are working to change the rates of blood pressure, especially diastolic pressure due to high levels of cholesterol [20] the change in level of ions concentrations smokers and non-smokers and also it depended on the time period of smoking and work compared to the results of the period and the impact of smoking on the ionic changes in blood of smokers serum. The results showed that smoking will cause a decrease in the concentration of zinc ion in the blood compared with non-smokers. The results also showed a difference between smokers depending on the period of smoking leads to an increase in total cholesterol and this is consistent with previous studies, thus contributing to an increased risk of coronary heart disease [19,17]. In glucose levels coinciding with a low concentration of zinc ion in the blood of smokers can be explained as well(hIAPP) is a highly amyloidogenic protein found in islet cells of patients with type II diabetes. Because hIAPP is highly toxic to beta-cells under certain conditions, it has been proposed that hIAPP is linked to the loss of beta-cells and insulin secretion in type II diabetics[20] Results showed no significant difference in the concentration of manganese between smokers and non-smokers, as well as when comparing smokers.

The results showed an increase in the concentration of copper ion compared to smokers and non-smokers [8], as well as a comparison between the categories of smokers. The results showed that, when comparing smokers with non-smokers, there was no significant difference in the concentration of copper for smokers. However, there was no significant difference in the copper concentration of the second group compared with non-smokers .The increase in level of copper ion affects High

levels of total cholesterol and this is consistent with previous studies [9] It was observed that the percentage of copper in the first group of smokers compared with non-smokers increased in the ratio of glucose, where previous studies have indicated the effect of high copper on glucose ranges reactive oxygen species (ROS) are induced under diabetic conditions and are likely associated with the development of type 2 diabetes. It is also known that ROS production is facilitated in the presence of copper ion through the Fenton reaction. The aim of this study was to examine the involvement of copper ion in the pathogenesis of type 2 diabetes[3]. The results indicated a high concentration of iron ion in smokers category I and II compared with the control of group, when the iron high in the serum effect to increase the total cholesterol [9] The effect of high concentrations of iron on the level of glucose in the blood of smokers compared with non-smokers and this is indicated by previous studies on the seriousness of the increase in the proportion of iron and its impact on the beta cells producing insulin and thus will affect the levels of glucose and this is applicable to the results of the study[11] The relationship between the ion concentrates with each other is different, leading to positive and inverse relationships. This study is consistent with previous studies[21] Smoking plays a negative role in the balance of ions.

CONCLUSION

Smoking is a major factor in the difference of ionic balance of the internal environment of the body. This difference is caused by physiological dysfunction of the body and its consequent changes in glucose levels cholesterol and blood pressure make smokers more likely to develop diabetes, arteriosclerosis and heart disease due to increases in total cholesterol and blood pressure compared to nonsmokers.

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