

The effect of Hookah Smoking on Levels of Lipid Profiles and Some Heavy Metal Concentrations

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KEYWORDS

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ABSTRACT

The current study aimed to identify the effect of hookah smoking on the health of smokers of this type of smoking, as this phenomenon has spread widely in the recent period among all segments of society, especially among young men and women. Samples for the current study were collected from people who used this type of smoking from the month of December. 2023 until February 2024, with 95 samples., where some physiological variables were measured, which included (blood pressure, lipid profile and heavy metals) and it was compared with (30) blood samples collected from healthy people and non-smokers. As a control group. The results of the current study showed clear variations in the numbers, values, and concentrations of these variables studied under the current study. . Blood pressure among those who smoked this type of smoking increased by (52.63%). In terms of lipid profile, most of them showed an increase in their levels in the serum of these smokers, and also according to the type of flavor and the number of flavors. The highest increase in the level of total cholesterol and triglycerides in the serum of these smokers was (209.75) and (250.50), and in the mixed flavor, as for the number of flavors, it was Their highest levels were (241) and (290), respectively, when the number of traces was (more than 7) traces in the serum of hookah smokers. While the level of low-density lipoproteins showed its highest level of (119.95) in the serum of people smoking the mixed flavor in When it reached its highest level, it was (140) and in the serum of people who had a number of ages (more than 7) . while the level of very low-density lipoproteins showed its highest level, which was (51.70), in the serum of people who smoked the flavor of the mixture, while it reached its highest level. It is (62) and in the serum of people who have a number of ages (more than 7). While concentrations of lead and cadmium showed a bioaccumulation in the blood serum of these people who smoked hookah compared to the control group.provide insights into how effective each model is in identifying vulnerabilities.

1. Introduction

Environmental pollution is an abnormal and negative change in all dimensions such as chemical, physical and biological properties of any part of an ecosystem, such as air, water or soil, which may cause harmful effects on various forms of life. As for a polluted pollutant, it is any substance that causes harmful effects or discomfort in living organisms, and if that substance causes those effects, it can be called a pollutant. The substances causing pollution are two types: persistent pollutants and non-persistent pollutants. Persistent pollutants: those pollutants that remain persistent in the environment for a long time. of time without any change in its original form, for example pesticides, nuclear waste, plastic materials, etc. As for non-permanent pollutants, they are the opposite of permanent pollutants and they are divided into a simple form. If this process of breakdown is carried out by living organisms, then these pollutants are referred to as degradable pollutants. The most important types of pollution are air pollution, water pollution and soil pollution (Lu *et al.*, 2020). Air pollution is the presence of harmful substances in the atmosphere in quantities that negatively affect the environment, human health, and living organisms. This pollution results from the release of air pollutants from various sources, whether industrial or natural. Air pollutants include chemical gases that include nitrogen oxides, sulfur, and ammonia that are emitted from car engines and industrial factories, and suspended particles that consist of small particles in the air, which can be the result of From the combustion of fuel or industrial processes, as well as from air pollutants, persistent organic pollutants such as benzene and formaldehyde, which are emitted from gas stations and industrial processes. One of the most important effects of air pollution is the health effects that increase the incidence of respiratory diseases such as asthma and respiratory diseases, which cause deterioration of lung functions and increased In cases of premature death, and from the environmental effects of air pollution, which affects agricultural and forest plants and contributes to the acceleration of the phenomenon of climate change as a result of heat retention, and also the economic effects from the important effects of air pollution, which cause

additional medical costs for treating diseases related to air pollution (Zhou *et al.*, 2020; Machin *et al.*, 2019).

Smoking with a hookah (hookah) is an ancient habit of using tobacco that began many centuries ago. The exact origin of this custom is not known, but it was first documented in Egypt in the sixteenth century. Hookah smoking is an increasing health problem in most countries. It is called by several names, such as “hookah,” “hookah,” “water pipe,” and “Hubble bubble.” The prevalence of hookah smoking among young people is increasing significantly with the proliferation of clubs, bars and hotels throughout the country. Hookah smoking is common across all age groups and genders, and is particularly common among adolescents and young adults, even in higher educational institutions across the country (Kanmodi *et al.*, 2019). Multiple studies have shown that most people who smoke hookah were unaware of the negative social and health effects of hookah smoking. Hookah smokers believe that impurities, toxins and other harmful substances are filtered out by the hookah and that hookah smoking is non-addictive and harmless. This is not true as it contains dangerous substances such as nicotine and tar, which are known harmful substances that are also found in cigarettes. It also contains large amounts of heavy metals including cadmium, cobalt, chromium, lead and arsenic, which have been shown to have a carcinogenic effect on the body. In addition, the negative health effects of smoking shisha continuously for an hour are said to be equivalent to the effects of smoking 100 cigarette sticks (Cox, 2021).

Materials and working methods

1- Collecting samples

Venous blood samples, 95 samples, were collected from these people who frequented popular cafes to smoke hookah according to the questionnaire sheet and were divided based on the type of flavor used in the samples under the current study, which are:

The flavor of two apples

English flavour

Mint flavour

Mix flavour

Depending on the number of times the hookah is reused per day:

From 1-3 construction

From 4-7 construction

More than 7 construction

These samples were compared with 30 samples from healthy normal people and non-smokers as a control group. Blood samples of 10 ml were drawn from smokers, taking into account the exclusion of hemolysis blood samples to rule out an incorrect result.

2- Measuring blood pressure indirectly: if using a blood pressure monitor and stethoscope

3-Measurement of calcium and chloride ions: Measured using a radiometer of the type ABL800 FLEX of the same origin The American

4-Estimating the level of total cholesterol in blood serum

A ready-made analysis kit manufactured by Biolab-France was used to estimate the concentration of total cholesterol in blood serum based on the enzymatic method. It relied on the decomposition of cholesterol esters by the enzyme cholesterol oxidase and in the presence of the reagent 4-aminoantipyrine and phenol, and a complex was formed. Quinoneimine is pink in color, and its absorbance can be measured at a wavelength of 500 nm using a spectrophotometer.

5-Estimating the concentration of triglycerides in blood serum

A ready-made analysis kit manufactured by Biolab-France was used for determination. The level of triglycerides in blood serum was based on the enzymatic method. The reliance was on the decomposition of triglycerides by the enzyme lipase, which converts to glycerol-3-phosphate in the

presence of adenosine triphosphate (ATP) and the enzyme glycerol kinase. Then the triglyceride is oxidized. Phosphite, by the action of glycerol-3-phosphate oxidase, forming Dihydroxyacrtone Phosphate, and by the action of the peroxidase enzyme, the pink dye Quinoneimine is formed. The intensity of absorption can be measured at a wavelength of 500 nm using a spectrophotometer.

6-Estimating the level of high-density lipoprotein (HDL-c) in blood serum

A ready-made analysis kit manufactured by Biolab-France was used to estimate the level of high-density lipoproteins in blood serum. Only a reagent is used to treat the samples before determining the percentage of HDL cholesterol using a total cholesterol reagent. Low-density lipoproteins (LDL), very-high-density lipoproteins (VLDL) and chylomicrons are precipitated from the samples by phosphotungstic acid (PTA) and magnesium chloride. The HDL cholesterol obtained in the supernatant after centrifugation is then measured using a total cholesterol reagent.

7-Concentration of lead and cadmium:

Lead concentration was estimated using the method used by Abdirashed (2019)

2. Result and Discussions

1-The effect of hookah smoking on the blood pressure of people under the current study.

Figure (1) shows high blood pressure in people who smoke hookah in various flavors, as the percentage of people who have high blood pressure is (52.63%). Smoking is considered one of the most important known causes of high blood pressure and one of the most important long-term risk factors for the occurrence of many diseases, including atherosclerosis, myocardial infarction, and sudden death, In addition, there are many mechanisms that explain high blood pressure in these smokers, including endothelial dysfunction or atherosclerosis (Hussain and Hatem,2021).

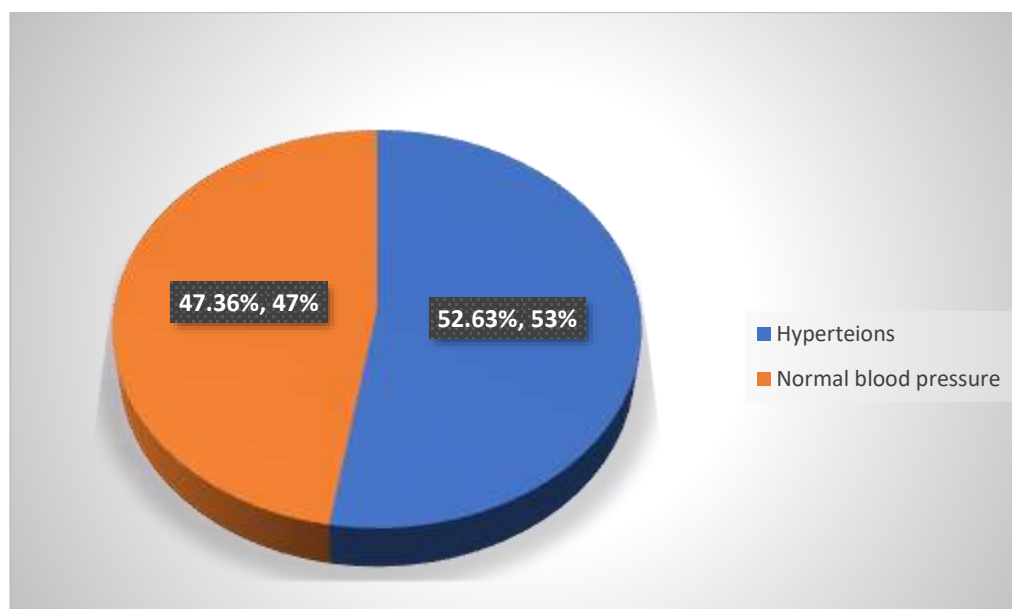


Figure (1): Blood pressure ratios (mm.Hg) for the people under the current study.

2-The effect of hookah smoking on lipid profile

2-1 Total cholesterol level

The results shown in Figures (2) and (3) showed that the cholesterol level showed a significant increase in the serum of people who smoked hookah with various flavors. The highest increase in cholesterol level was (187.67) and (209.75), respectively, and in the serum In people who smoked mint and mixed

flavor, the lowest level was (179.49), and in the serum of smokers of the two apple flavor, the increase in the level of cholesterol in the serum of these smokers was (183), (229), and (241), respectively. According to the number of reconstructions under the current study, as in Figure (3), compared with the control group.

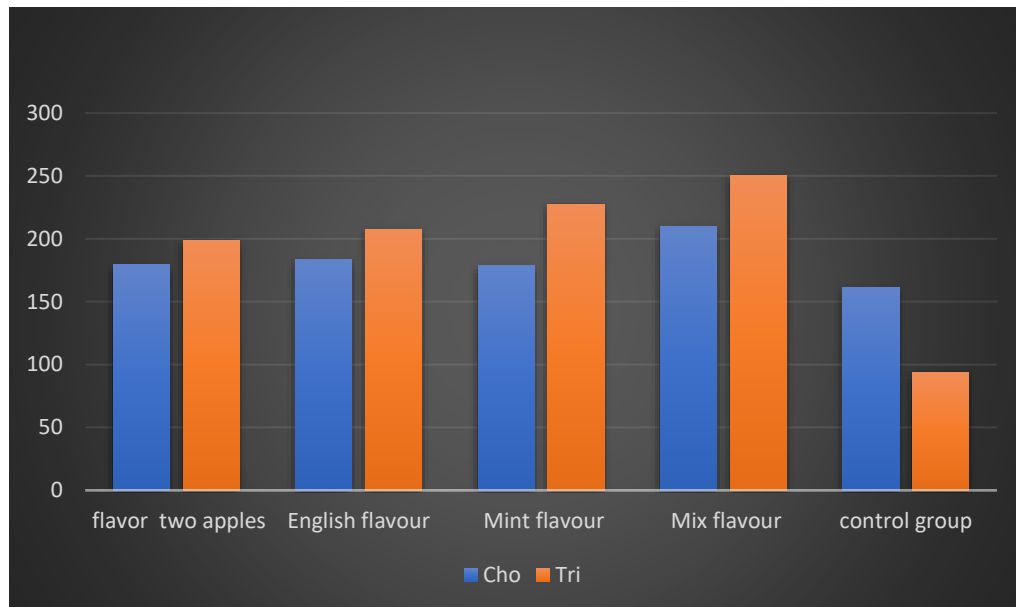


Figure (2): Concentration of total cholesterol and triglycerides (mg/100 ml) by type of flavors.

2-2 Level of triglycerides

The results shown in Figures (2) and (3) showed that the level of triglycerides showed a significant increase in the serum of people smoking hookah with various flavors , as the highest increase in the level of triglycerides was (227.50) and (250.50), respectively. The lowest level in the serum of people who smoked mint flavor and the mixture reached (198.89), and in the serum of smokers the two apple flavor. In terms of the number of traces, the increase in the level of triglycerides in the serum of these smokers reached (180), (264), and (290).) respectively and according to the number of reconstructions under the current study, as in the figure(3) Compared with the control group.

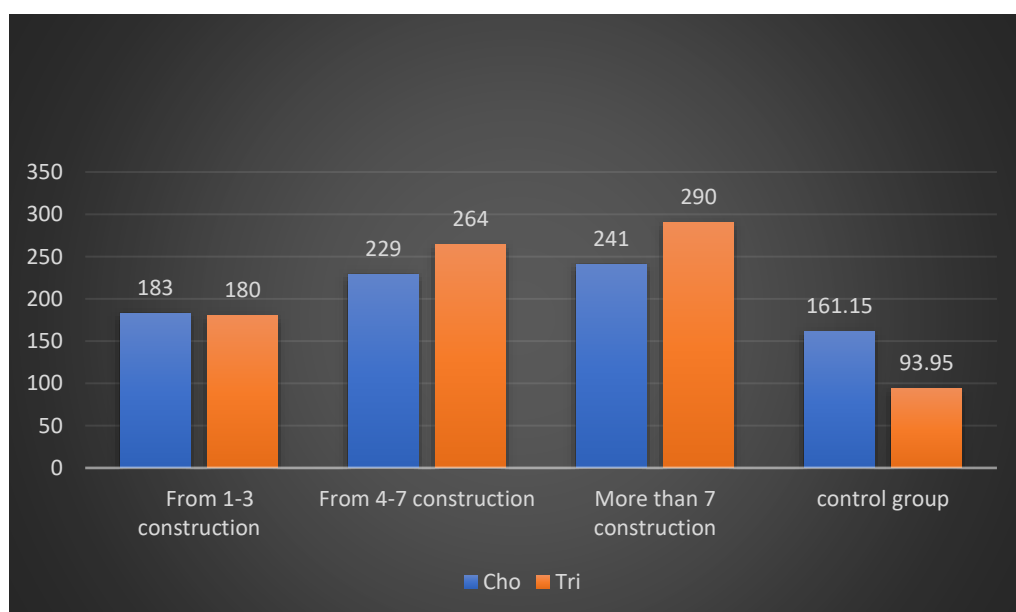


Figure (3): Concentration of total cholesterol and triglycerides (mg/100 ml) according to the number of reconstructions.

2-3 High-density lipoprotein level

The results shown in Figures (4) and (5) indicated that the level of high-density lipoproteins showed a significant increase in the serum of people smoking hookah with various flavors, as the highest increase in the level of high-density lipoproteins was (119.06) and (119.95) respectively, and in the serum of people who smoked mint and mixed flavor , it reached its lowest level of (108.31) and in the serum of smokers of the two apple flavor , as for the number of ages, the increase in the level of high-density lipoproteins in the serum of these smokers reached (109) and (138) and (140), respectively, depending on the number of reconstructions under the current study, as in Figure (5), compared with the control group.

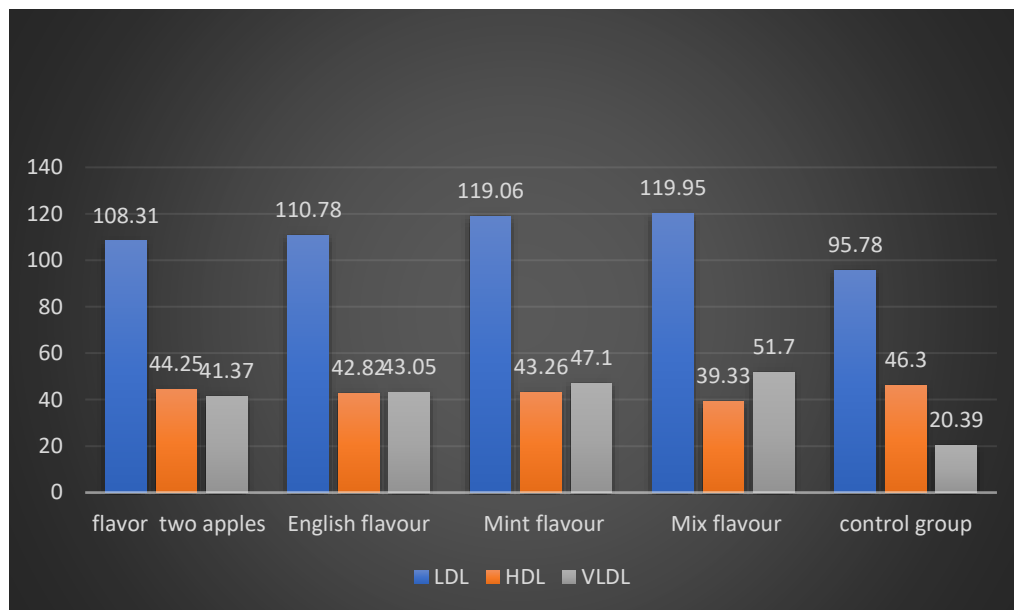


Figure (4): Concentration of LDL, HDL, and VLDL (mg/100 ml) by type of flavors.

2-4 Low-density lipoprotein level

The results shown in Figures (4) and (5) showed that the level of low-density lipoproteins showed a significant decrease in the serum of people smoking hookah with various flavors, as the highest decrease in the level of low-density lipoproteins was (43.26) and (39.33) respectively, and in the serum of people who smoked mint and mixed flavor, it reached its lowest level of (44.25), and in the serum of smokers of the two apple flavor , as for the number of ages, the decrease in the level of low-density lipoproteins in the serum of these smokers reached (40) and (37) and (31), respectively, according to the number of reconstructions under the current study, as in Figure (5), compared with the control group.

2-5 Very low-density lipoprotein level

The results shown in Figures (4) and (5) indicated that the level of very high-density lipoproteins showed a significant increase in the serum of people smoking hookah with various flavors, as the highest increase in the level of very high-density lipoproteins was (47.10) and (51.70) respectively, and in the serum of people who smoked mint and mixed flavor , it reached its lowest level of (41.37) and in the serum of smokers of the two apple flavor , as for the number of ages, the increase in the level of very high-density lipoproteins in the serum of these smokers reached (36.) and (52) and (62) respectively and according to the number of reconstructions under the current study as in Figure (5) compared with the control group.

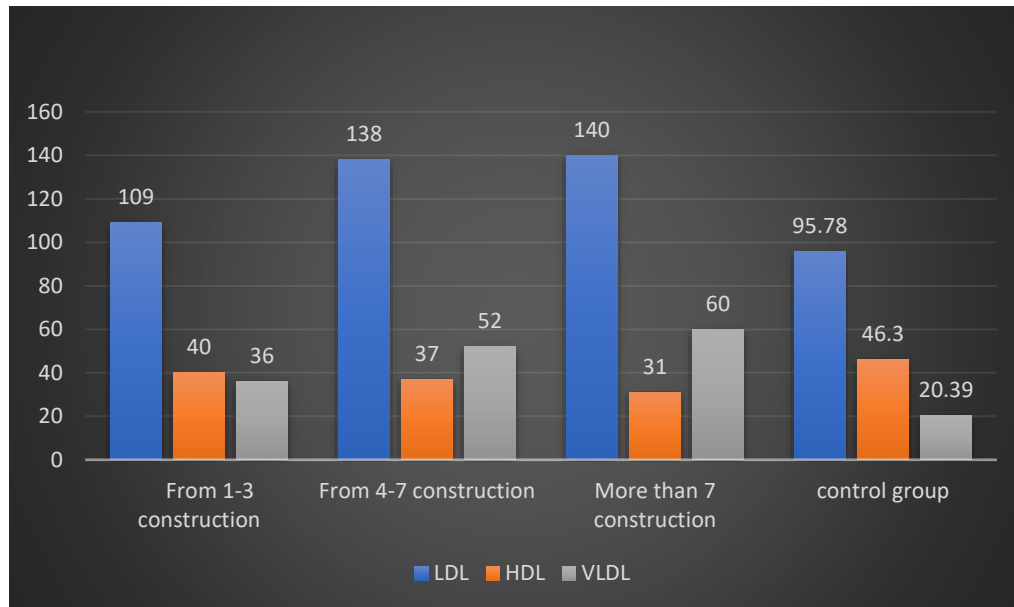


Figure (5): Concentration of LDL, HDL, and VLDL (mg/100 ml) according to the number of reconstructions.

The reason for the increase in the levels of types of fats in the blood serum of these people who smoke hookah is that smoking works through various mechanisms, all of which lead to a change in the concentrations of these fats. One of the most important of these mechanisms is nicotine, which works to stimulate the sympathetic nerves in the adrenergic gland, which leads to This accelerates the secretion of the catecholamine hormones (adrenaline and noradrenaline), and this will of course increase the effectiveness of the lipase enzyme and the concentrations of free fatty acids in the blood plasma. It leads to an increase in hepatic secretion of FFAs, triglycerides, and VLDL into the bloodstream.(Alkubaisy et al.,2019). There is also another mechanism, which is due to what is known as hyperinsulinemia in smokers, which leads to an increase in the levels of these fats in the blood, causing a decrease in the activity of the enzyme Lipoprotein lipase, or the reason may be attributed to the fact that smoking causes a decrease in estrogen levels, which in turn works to decrease the level of HDL. Or the reason for this increase in levels of types of fat may be the result of consumption of diets rich in fat in addition to working on a low diet and the presence of fiber in the diets of smokers compared to non-smokers .Studies have shown that tobacco smoke usually contains more than 4,000 multiple compounds, and these compounds have a negative impact on human health, including free radicals and CO gas, which is most responsible for the harmful effects in the blood serum of smokers, as nicotine nullifies the formation of clots in the body and increases From dysfunction of the lining of blood vessels and accumulation of fats, the reason is attributed to the association between free radicals and peroxides resulting from hookah smoke with the processes of manufacturing prostaglandins and thromoxane, and they also participate in the occurrence of various symptoms, including atherosclerosis, cancers, and some immune diseases (Hussain and Hatem, 2021).

The results of the current study were consistent with the study of Al-Gburi and Al-Graiti (2019), as this study found that smoking is associated with blood lipid disorders and high concentrations of these fats, and their high levels naturally cause atherosclerosis due to the interaction of smoking with other risk factors. The results were also consistent with the study of Alkubaisy and his group (2021), which indicates that smokers are more susceptible to coronary heart disease than non-smokers as a result of higher concentrations of types of fats. The results of an increase in the level of lipid profiles and a decrease in some of them were also consistent with the study of Ibrahim and his group (2022), which concluded that Increasing fat levels through the absorption of nicotine in the body leads to fat decomposition and the release of free fatty acids into the bloodstream. Moreover, this study found, with regard to the period of smoking, an increase in the levels of total cholesterol, triglycerides, and

harmful cholesterol, with a decrease in good cholesterol with an increase in the period of smoking the mixture.

3-Concentration of calcium and chloride ions

The results shown in Figures (6) and (7) showed that the calcium ion concentration showed a non-significant decrease in the serum of people smoking hookah with various flavors, as the highest decrease in calcium ion concentration was (1.08) and (1.14), respectively. In the serum of smokers, it was the flavor of English and mixed , while the lowest concentration was (1.04), and in the serum of smokers it was the flavor of two apples. , As for the number of traces, the decrease in the calcium ion concentration in the serum of these smokers was (0.97), (1.02), and (1.05).) respectively, according to the number of samples under the current study compared to the control group. While the chloride ion showed a significant and clear increase, it reached its highest level in the blood of smokers for the mint flavor (106.86) and its lowest level in the blood of smokers for the mint flavor (106.10). In terms of number reconstructions showed an increase of (106.13), (106.33), and (106.84), respectively, in the blood of these smokers, as shown in Figure (7), compared to the control group.

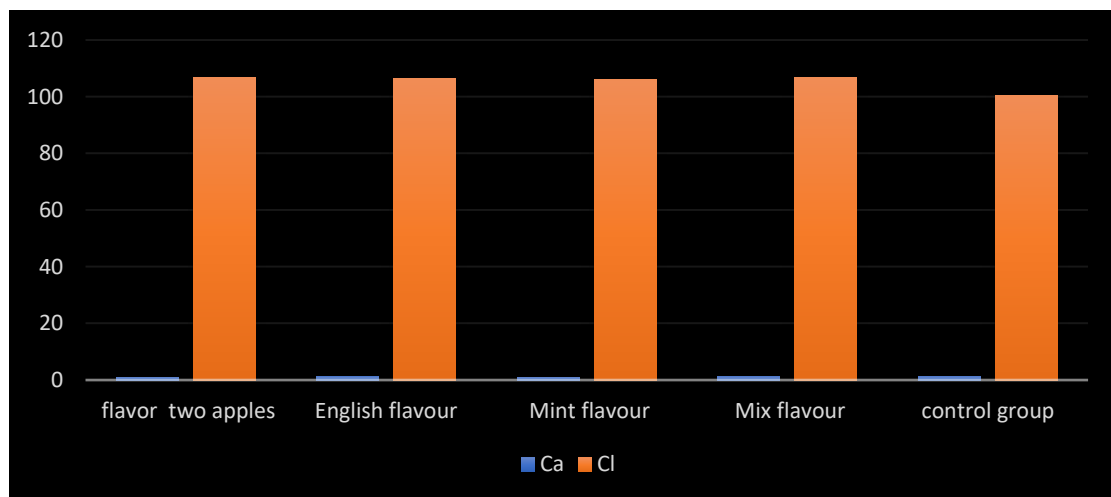


Figure (6): Ca and Cl ion concentration (mmol/L) according to the type of flavour.

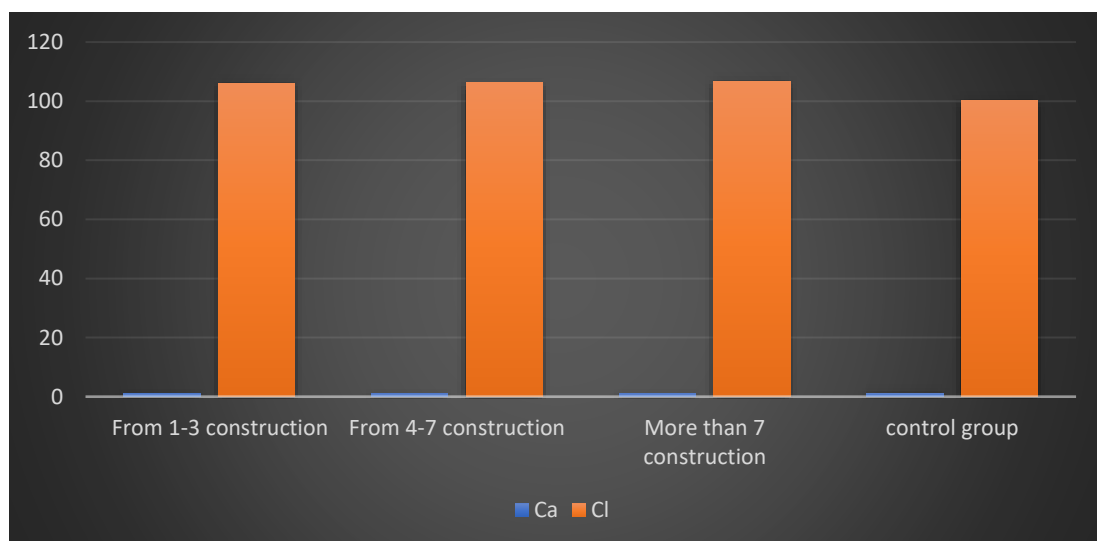


Figure (7): Ca and Cl ion concentration (mmol/L) according to the number of reconstructions.

There are several things that hinder the absorption of calcium, as these things are considered lifestyle matters, which have a major role in contributing to the body's inability to absorb calcium with high efficiency and in the necessary quantities that the body needs, including smoking, while the high chloride ion is attributed to the fact that it is found in the extracellular fluid and maintains It depends on the balance between positive and negative ions, and its concentration in the blood can be controlled

through the kidneys, as the results of this study indicate that the work of the kidneys is affected. Of course, this will reflect on the concentration of this ion in addition to the high blood pressure of these smokers under the current study, and this indicates the relationship between high ion concentration. Chloride and blood pressure (Michael and Alisa, 2022).

4- Concentration of lead and cadmium

The results shown in Figures (8) and (9) showed that the concentration of lead showed a non-significant increase in the serum of people smoking hookah with various flavors. The highest increase in lead concentration was (0.41) and (0.42) on Respectively, in the serum of people who smoked, the flavor of English and mixed , while the lowest concentration was (0.38), and in the serum of smokers for the flavor of two apples . As for the number of traces, the increase in the concentration of lead in the serum of these smokers reached (0.38), (0.39), and (0.40) respectively, according to the number of compounds under the current study compared with the control group. While the cadmium element showed a clear increase, it reached its highest non-significant increase in the blood of smokers for the mixed flavor (0.043) and its lowest increase in the blood of smokers for the two apple flavor (0.029). In terms of the number of stains, it showed a significant increase of (0.024), (0.025), and (0.031), respectively, in the blood of these smokers compared to the control group, as in Figure.(9)

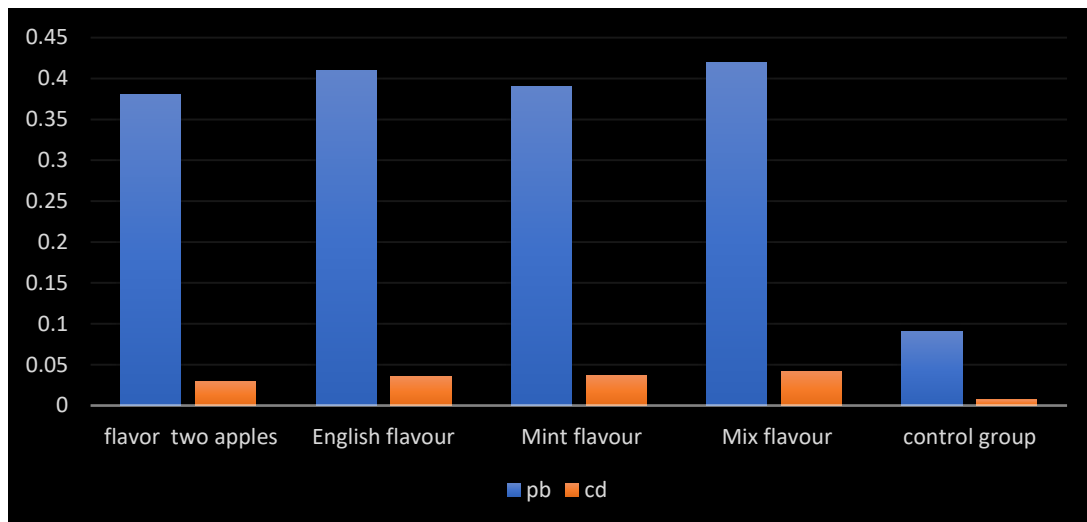


Figure (8): Concentration of lead and cadmium (ppm) according to flavor type.

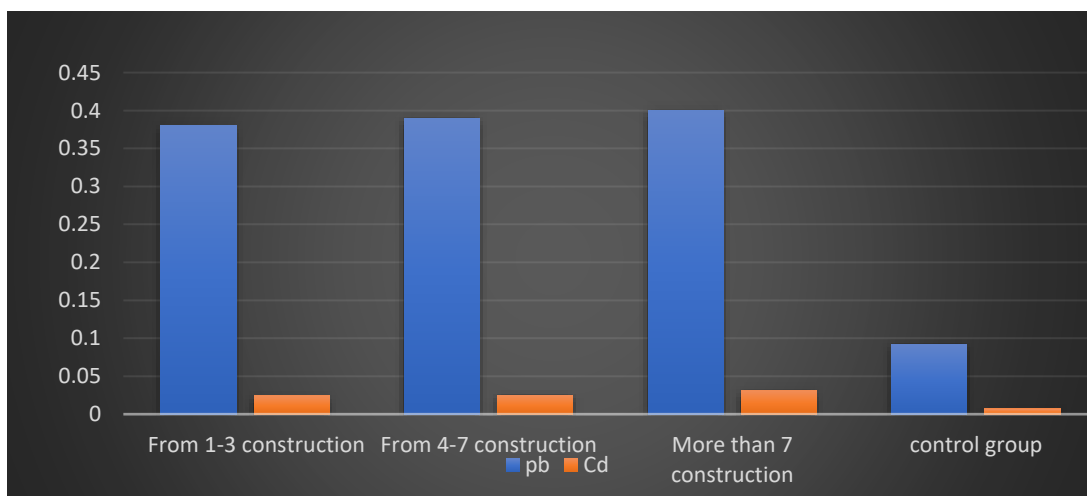


Figure (9): Concentration of lead and cadmium (ppm) and number of reconstructions.

Measuring the concentrations of heavy metals in the blood serum of these smokers is an important biological indicator of the effect of these metals on human health (Saleh *et al.* , 2020).

3. Conclusion

It has been proven that these substances enter the smoker's body and flow into it by measuring the concentrations of these substances that are included in the components of the smoke that the smoker inhales, as their concentrations are much greater than their concentrations in smoke-free air (Trasande et al., 2015), as studies indicate the presence of elements Lead and cadmium in hair and blood samples, as well as in the semen of people who smoke this type of smoking (Albajalan, 2019). Studies also indicated the presence of tobacco products in the smoker's body, and their concentrations appeared in smokers' blood, urine, and saliva, The results of this study were consistent with the results of the study (Saleh et al., 2020) indicating the presence of concentrations of cadmium in the blood of smokers, and these concentrations are proportional to the duration of smoking as well as the amount of smoking the smoker has.

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