Effect of hookah smoking on some blood and biochemical parameters in serum of some men in Diwaniyah

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Abstract

The current study was conducted with the aim of knowing the effect of hookah smoking on some blood and biochemical parameters in the blood serum of some men in Diwaniyah governorate, where the study was conducted in the laboratories of Diwaniyah Teaching Hospital for the period from 1/2/2020 until 1/4/2020. Of men whose average age was between (30-35) years, and they were divided into two groups:

- The first group (control) 10 people who did not use any kind of smoking.
- The second group, 30 people, who smoked hookah.

And after completing sample collection, general regulations (WBC, RBC, Hb, PCV) and biochemical standards (cholesterol, glycerides, and proteins) the results showed regarding the hematological parameters that hookah smoking led to a significant increase in the number of white blood cells, hemoglobin concentration and the volume of packed cells, while there was no noticeable difference in the numbers of red blood cells. As for the biochemical parameters of blood, there was a significant increase in the concentration of total cholesterol and triglycerides when compared with the control group. As for the low LDL and very low VLDL lipoproteins, there was a significant increase when compared with the control group, while there was a non-significant decrease in the level of HDL high-density lipoproteins when compared with the control. In blood pressure and a decrease in body weight in smokers when compared with non-smokers.

Key words: hookah, hematological parameters, biochemical parameters, body weight, blood pressure.

1. Introduction

Tobacco is a commercial product obtained from dried yellow-brown leaves that have been collected, and this plant is grown in many countries around the world and according to data received from the World Health Organization (WHO) that there are 2.4 billion people around the world who consume tobacco and in various forms of smoking. (chewing, dipping, snuffing) The World Health Organization also estimates the proportion of tobacco-related deaths at about 8.3 million in 2030 and a billion people during the 21st century[1,2], the hookah is widely popular because it is considered a safe way to smoke tobacco [3,4], and it has several names such as hookah, bhang, narghile and others [2,5], and it has different designs. It is a classic device used to smoke tobacco attached to a bowl of water where smoke passes The heated substance through the water before it is inhaled, as many researchers have confirmed that the danger of the hookah lies in the hookah hose that is placed in the mouth and then pulls the smoke, which in turn contains more than 19 chemicals, and these substances by thermal decomposition are associated with the DNA and thus cause cancer and many Genetic mutations [6], and not changing the hookah water makes it a suitable environment for the reproduction of parasites and bacteria [7]. It has also been documented that many serious lung diseases, cancers and other health effects related to waterpipe smoking are less than smoking cigarettes, although there is evidence that hookah smoking is tantamount to smoking tobacco and has the same health effects [8-11]. Research that smoking a hookah for half an hour would destroy the body, through high blood pressure, increased heart rate, decreased lung function, and decreased oxygen levels in the blood, which causes fainting and brain damage [6,12].
Therefore, the aim of this study was to know the effect of hookah smoking on some blood and biochemical parameters, and then to explain the diseases resulting from it.

2. Materials and working methods

2.1. The study sample

The study was conducted in the laboratories of Al Diwaniyah Teaching Hospital for the period from 1/2/2020 until 1/4/2020. (40 samples) were used in the experiment and their average age ranged between (30-35) years and they were divided into two groups:

- The first group (control) included 10 people who did not use any kind of smoking.
- The second group included 30 people who smoked hookah.
- Collect blood samples.

Blood samples were drawn from venous blood in the two groups (smokers and non-smokers) using sterile medical syringes. The samples were divided into two groups, some of which were placed in tubes containing anticoagulant (EDTA) for the purpose of blood tests (WBC, RBC, Hb, PCV), while In the other group, blood was drawn and placed in tubes free of anti-coagulation, then placed in a centrifuge at a speed of 3000 rpm for the purpose of obtaining blood serum for biochemical tests, which included cholesterol, proteins and chlorides.

2.2. Working methods

2.2.1. Blood tests

Blood tests were performed using the Mythic Automated Blood Analysis System (Haemto).

2.2.2. Biochemical tests

1- Measuring the total cholesterol concentration in the blood serum.

The cholesterol concentration was estimated using the Dia Mond-Gordon Test Kit manufactured by the International Company for Medical Reagents.

2- Measuring the triglyceride concentration.

Using a ready-made test kit produced by the English Randox Company.

3- Measuring the concentration of total protein in the blood serum.

Using the analysis kit prepared from the French company Biomerieuc.

2.3. Statistical analysis

The results were subjected to statistical analysis to find out the significant differences between the rates of the studied criteria in the groups. The significant differences were determined at the level of probability (P <0.05) using the SPSS statistical program.

3. Results

3.1. First: the haematological criteria

The effect of hookah smoking on white and red blood cells, hemoglobin concentration, and compact cells volume.
The results of the statistical analysis in Figures (1,2,3) indicated that there was a significant increase in WBC, Hb and PCV (8.4), (15.4 and (42.9), respectively, while there was no significant difference in the number of red blood cells. (5.7) When compared to control, Figure (4).

Figure 1.  
Figure 2.  
Figure 3.  
Figure 4.  

3.2. Second: the biochemical parameters

- The effect of hookah smoking on total cholesterol, triglyceride and lipoprotein concentrations (VLDL, LDL, HDL).

Figure (5,6,7,8) shows a significant increase in the concentration of total cholesterol (184), triglycerides (200) and lipoproteins (VLDL, LDL), (110, (40.3) respectively in the blood of people.
Hookah smokers, but there was a non-significant decrease in HDL concentration (39.5) when compared with the control group (Figure 9).

**Figure 5.**

**Figure 6.**

**Figure 7.**

**Figure 8.**
Figure 9.

The effect of hookah smoking on body weight and blood pressure.

The results in Fig. (10) indicated that there was a significant decrease in the body weight of people smoking with hookah (75.5) when compared with the control, while there was a significant increase in the rate of blood pressure in smokers (Systolic pressure (140), Diastolic pressure (90)) [11]. When compared to control.

Figure 10.
4. Discussion

First: The effect of hookah smoking on blood parameters.

Hookah smoking is a growing social phenomenon all over the world [13]. Hookah smoke contains high levels of toxic compounds, including tar, carbon monoxide, heavy metals and other cancer-causing chemicals [14,15].

The current research results showed that there is a significant increase in the number of white blood cells in the blood of people who smoke hookah. The reason for the increase in the number of WBC may be due to nicotine, which stimulates the release of catolamines and thus increases the number of lymphocytes in the blood in addition to that cigarette smoke is an irritant to the respiratory tree and causes inflammation as it contributes raising the number of WBC, as the infections stimulate the bronchial passages, which leads to an increase in the factors causing inflammation of the blood [16], and many studies have shown that nicotine causes an increase in the solubility of Kit Ligand in line with the activation of stem cells, followed by an increase in the number of WBC [17]. The result of the current study with each of [18-21].

Whereas, high WBC counts are a sign of tissue damage caused by smoking and a factor in the development of cardiovascular disease through multiple pathological mechanisms [22,23].

The current results also showed that there is a significant increase in the concentration of Hb, PCV, and the reason for this increase may be due to an increase in the mass of red blood cells due to the counting of the blood supply with oxygen, thus reducing the binding of hemoglobin to oxygen (Hb-o) and increasing its association with carbon monoxide CO, as a result of that increases Pregnant Hb CO (Hb-CO) and this leads to blood poisoning (4) and the current research result agrees with [24,25].

Second: The effect of hookah smoking on biochemical parameters.

The results of the current study showed a significant increase in the concentration of total cholesterol, triglycerides and lipoproteins (VLDL, LDL), while there was a non-significant decrease in the value of (HDL).

Where many studies have shown that tobacco smoke contains more than 4000 compounds that have a negative impact on human health, including free radicals, nicotine and carbon monoxide, which is the most responsible for the harmful effects, as nicotine defeats the formation of a clot in the coronary arteries and weakens the activity of blood vessels and increases the imbalance of functions Endothelium and alters vascular permeability and lipid accumulation [12,26]. The reason for this may be attributed to
the obvious association of free radicals and peroxides resulting from hookah smoke with the physiological phenomenon such as the manufacture of prostaglandin and thromoxan, and it participates in causing various diseases, including atherosclerosis, cancers [27], gastroenteritis, gum disease and some autoimmune diseases [28,29], or it may be due to a decrease in the activity of the lipoprotein enzyme, which causes a state of hyperinsulinemia, and thus an increase in the proportion of both cholesterol and triglycerides [30], as the current research results showed The presence of an insignificant decrease in the level of (HDL) and the reason for this is due to the decrease in the level of estrogen [31], and the current research results agree with [32,33].

Third: The effect of hookah smoking on body weight and blood pressure.

The results of the current study showed that there is a significant decrease in the body weight of people who smoke hookah when compared with non-smokers, and there are many mechanisms that show the reason for the decrease in body weight in smokers, including the effect of nicotine, which is likely to cause an increase in the rate of metabolism prematurely causing loss of appetite Or reduce the absorption of calories [33,34], or it can reduce the efficiency of metabolism. The current research results agree with each of [35-38].

Smoking is also considered one of the most important known causes of high blood pressure and one of the most important long-term risk factors for arteriosclerosis, coronary artery disease, myocardial infarction and sudden death [39,40]. As a result of the current research, it was found that there is an increase in blood pressure and heart rate, despite the conduct of many Studies, however, the effect of smoking on blood pressure is still unclear [41]. However, in the current research, hypertension can be explained by several mechanisms, including endothelial dysfunction or due to atherosclerotic plaque formation [42,43], or arterial rigidity, and the current research results agree with [44-46]. There is also a limited number of studies stating that smoking has no effect on systolic and diastolic blood pressure [47].

References

[1] World Health Organization Report on the Global Tobacco Epidemic, 2009: Implementing smoke-free environments. WHO Press 2009;Geneva; Switzerland.
[2] Eissenberg T, Shihadeh A. Waterpipe tobacco and cigarette smoking: direct comparison of toxicant exposure. Am J Prev Med 2009;37(6):518-23.
[3] Shihadeh A, Eissenberg T. Tobacco smoking using a waterpipe: product, prevalence, chemistry/toxicology, pharmacological effects, and health hazards. Geneva, World Health Organization Study Group on Tobacco Product Regulation (TobReg), 2005
[4] Nakkash R, Khalil J. Health warning labelling practices on narghile (shisha, hookah) waterpipe tobacco products and related accessories. Tob Control 2010;19(3):235-9.
[5] Maziak W. The global epidemic of waterpipe smoking. Addict Behav 2011;36(1-2):1-5.
[6] Sajid KM, Chotachai K. and Mahmood R. (2008). Hookah smoking and cancer. Carcinoembryonic antigen (CEA) levels in exclusive/ever hookah smokers. Harm Reduction ; 5(19): 243–246.
[7] Shafigi YA, Mohammed FI and Hadidi KA. (2002). Hubble-bubble smoking levels of nicotine and cotinine in plasma, saliva and urine. Int J Clin Pharmacol Ther., 40 : 249-255.
[8] Hamada G et al. Pulmonary dysfunction from large airway versus small airways among waterpipe smokers [Poster presented at the 11th annual meeting of the Society for Research on Nicotine and Tobacco, March 2005].
[9] Hamada G et al. Is peak expiratory flow (PEF) a good indicator for assessing airway obstruction in waterpipe smokers? [Poster presented at the 11th annual meeting of the Society for Research on Nicotine and Tobacco, March 2005].
[10] Tobacco, March 2005).
[11] Kiter G et al. Water-pipe smoking and pulmonary functions. Respiratory Medicine, 2000, 94:891–894.
[12] Al-Fayez SF et al. Effects of sheesha and cigarette smoking on pulmonary function of Saudi males and females. Tropical and Geographical Medicine, 1988, 40:115–123.
[13] Ando M, Waki K, Seki N, Tamakoshi A, Suzuki K, Ito Y, and Nishino Y. (2003). Attributable and absolute risk of lung cancer death by smoking status: findings from the Japan Collaborative Cohort Study. Int J Cancer ., 105: 249-254.
[14] Kates FR, SallounRG, Thrasher JF, et al. Geographic proximity of water-pipe smoking establishments to colleges in the US. Am J Prev Med2016;50(1):ye9-e14.
[15] Gosselt LK, Johnson HM, Piper ME, et al. Smoking intensity and lipoprotein abnormalities in active smokers. J Clin Lipidol 2009;3(6):372-378.
[16] McCloskey SC, Patel BD, Hinchliffe SJ, et al. Siblings of patients with severe chronic obstructive pulmonary disease have a significant risk of airflow obstruction. Am J Respir Crit Care Med 2001;164(8 Pt 1):1419-1424.
[17] Calapai G, Caputi AP, Mannucci C, et al. Cardiovascular biomarkers in groups of established smokers after a decade of smoking. Basic Clin Pharmacol Toxicol 2009;104(4):322-8.
[18] Chang E, Forsberg EC, Wu J, et al. Cholinergic activation of hematopoietic stem cells: role in tobacco-related disease? Vase Med 2010;15(5):375-85.
[19] Alsultani, M., Abed, H., Ghazi, R., & Mohammed, M.A. (2020). Electrical Characterization of Thin Films (TiO2: ZnO)x (GO)y / FTO Heterojunction Prepared by Spray Pyrolysis Technique. Journal Of Physics: Conference Series, 1591, 012002. doi: 10.1088/1742-6596/1591/1/012002
[20] Friedman GD, Siegelaub AB, Selzter CC, et al. Smoking habits and the leukocyte count. Arch Environ Health 1973;26(3):137-43.
[21] Brent-Moore. (2005). Marijuana Associated With of reduced humoral and cell mediated immune responses. Some Respiratory Symptoms as Tobacco. J. General The occurrence of higher eosinophil counts in 4.2% of Internal Med.
[22] Moszczynski P.(2001).Immunological findings in cigarette smokers Toxicology Letters , 113(3):121-7.
[23] Loismaa A, Rontu R, Vuori I, et al. Blood leukocyte count is a risk factor for intima-media thickening and subclinical carotid atherosclerosis in middle-aged men. Atherosclerosis 2006;188(2):363-9.
[24] Madjid M, Awan I, Willerson JT, et al. Leukocyte count and coronary heart disease: implications for risk assessment. J Am Coll Cardiol 2004;44(10):1945-56.
[25] Roethig HJ, Koval T, Muhammad-Kah R, et al. Short term effects of reduced exposure to cigarette smoke on white blood cells, platelets and red blood cells in adult cigarette smokers. Regul Toxicol Pharmacol 2010;57(2-3):333-7.
[26] El-Nache, W., & Hammond, S. (2008). Exhaled carbon monoxide with waterpipe use in US students. JAMA: Journal of the American Medical Association , 299(1), 36-38.
[27] Drehée, H.A. (2017). The Impact of Cultivated Area and Price on Production of Rice in AL-Qadisiyah -Iraq During the Period (1990-2014) by Using VECM. Al-Qadisiyah Journal for agriculture science, Vol,7,No,1:123-135.
[28] Vince P, Alavanja M, Biffer P, et al. Tobacco and cancer: recent epidemiological evidence. J Nat Cancer Inst 2004; 96(2):99-106. 
[29] Gautam DK, Jindal V, Gupta SC, et al. Effect of cigarette smoking on the periodontal health status: A comparative, cross sectional study. J Indian Soc Periodontol 2011; 15(4):383-387.
[30] Harel-Meir M, Sherer Y, Shoenfeld Y. Tobacco smoking and autoimmune rheumatic diseases. Nature Clin Pract Rheumatol 2007; 3(12):707-715.
[31] Berliner JA and Heineke JW. (1996).The role of oxidized low density lipoproteins in atherogenesis. Free Radic Biol Med , 20: 707– 727.
[32] Venkatesan A., A., Hemalatha, Zachariah B and Sathiyapriya V. (2006). Effect Of Smoking On Lipid Profile And Lipid Peroxidation In Normal Subjects.Indian J Physiol Pharmacol , 50 (3): 273–278.
[33] Afrin L, Sultana R, Ferdousi S, Ahmed A, Amin MR.(2006). Evaluation of Serum Triglyceride and Total Cholesterol Status in Adolescent Smokers. J. Bangladesh Soc. Physiol., ,1:14-18.
[34] Perkins KA. Metabolic effects of cigarette smoking. J Appl Physiol. 1992; 72:401–409. [PubMed: 1559911]
[35] Perkins KA. Effects of tobacco smoking on caloric intake. Br J Addict. 1992; 87:193–205. [PubMed: 1554996]
[36] Pednakar MS, Gupta PC, Shkla HC, Hebert JR, Association between tobacco use and body mass index in urban indian population: implications for public health in India. BMC Public Health. 2006; 6:70–75. [PubMed: 16542418]
[37] Sanasa S, Abbas, Alaa J. Subaih and Yahya A. Saleh. (2020). The Effects of Biological and Chemical Agents on the Management of Main Pests in Tomato Plant. Al-Qadisiyah Journal For Agriculture Sciences, 10(2), 325-334.
[38] Bishop C, Parker GC, Coscina DV. Systemic nicotine alters whole-body fat utilization in female rats. Physiol Behav. 2004; 80:563– 567. [PubMed: 14741242]
[39] Chen H, Ross V, Steve B, Jessica J, Gary PA, Margaret JM. Effect of short-term cigarette smoke exposure on body weight, appetite and brain neuropeptide Y in mice. Neuropsychopharmacology. 2005; 30:713–719. [PubMed: 15508020]
[40] Auerbach O, Hammond EC, Garlinkel L. Smoking in relation to atherosclerosis of the coronary arteries. N Engl J Med. 1969;273:775-779.
[41] Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. Lancet. 2005;365:217-223.
[42] Narkiewicz K, Kjeldsen SE, Hedner T. Is smoking a causative factor of hypertension? Blood Press 2005;14:69-71.
[43] Halimi JM, Giraudeau B, Vol S, Cacès E, Nivet H, Tichet J. The risk of hypertension in men: direct and indirect effects of chronic smoking. J Hypertens. 2002;20:187-193.
[44] Bowman TS, Gaziano JM, Buring JE, Sesso HD. A prospective study of cigarette smoking and risk of incident hypertension in women. J Am Coll Cardiol. 2007;50:2085-2092.
[45] Li H, Srivivasan SR, Chen W, Xu JH, Li S, Berenson GS. Vascular abnormalities in asymptomatic, healthy young adult smokers without other major cardiovascular risk factors: the Bogalusa Heart Study. Am J Hypertens. 2005;18:319-324.
[46] Hayyawi W.A. Al-juthery and Estabraq Hilal Obaid Al-Maamouri. ( 2020). Effect of Urea and Nano-Nitrogen Fertigation and Foliar Application of Nano-Boron and Molybdenum on some Growth and Yield Parameters of Potato. Al-Qadisiyah Journal For Agriculture Sciences, 10(1), 253-263.
[47] Kim JW, Park CG, Hong SJ, Park SM, Rha SW, Seo HS, Oh DJ, Rho YM. Acute and chronic effects of cigarette smoking on arterial stiffness. Blood Press. 2005;14:80-85.
[48] Primatesta P, Falaschetti E, Gupta S, Marmot MG, Poulter NR. Association between smoking and blood pressure: evidence from the health survey for England. Hypertension. 2001;37:187-193.