

Hematological Changes in Blood of Smokers of Cigarettes and Nargyle

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Abstract

The current study aimed at determining the effect of smoking cigarette and Narghile at some of bloody variables and Vitamin D in a sample of young smokers aged 20-35 in Ramadi. The study included complete blood count (C.B.C) tests including: Total White Blood Cell and Red Blood Cell Count, determination of the concentration of total hemoglobin and calculation of Platelet Count. Calculation of RBC Indicators: "mean corpuscular hemoglobin" (MCH), "Mean Corpuscular Hemoglobin Concentration" ("MCHC") and Mean red blood Cell Volume (MCV). The study also evaluated the concentration of vitamin D.

Results showed that: A rise in the number of white blood cells and red blood cells, as well as a high concentration of hemoglobin and platelet count in smokers. An increase in the volume of red blood cells, mean hemoglobin concentration, and Mean Corpuscular Hemoglobin Concentration in smokers' blood. Decreased concentration of vitamin D.

Key Words: Complete Blood Count, RBCs indices, Smokers, Cigarettes, Narghile

Introduction

Smoking is most of the leading causes of cancer throughout the body and is one of the causes of global confirmed deaths. Many studies have found that smoking is a major cause of many human diseases ⁽¹⁾.

It is a global problem that causes 6.4 million deaths in 2015 and is expected to increase to 8.3 million by 2030 ⁽²⁾.

Tobacco contains organic substances such as alkaloids, nicotine, and other substances that have the same nicotine effect as arsenic, mercury, lead, cadmium, chromium, polonium and beryllium ⁽³⁾.

These substances negatively affect the physiological and biochemical functions of the body directly ⁽⁴⁾.

Cigarette smoking and narghile are one of the most important risk factors for heart disease and atherosclerosis, which accelerates the development of heart disease, which ends in death because of the Cigarette contained in the toxic substances whose cumulative effect appears over time ⁽⁵⁾.

Cigarette smoking is a significant proportion of myocardial infarction (MI). This is three times higher in non-smokers and the mechanism of effect is not fully known ⁽⁶⁾.

Despite the lack of knowledge of the mechanism in which smoking affects the rate of increase in the incidence of various heart diseases, but the containment of tobacco to thousands of toxic chemicals and harmful to health in general is the cause of the disease ⁽⁷⁾.

Smoking is a factor in causing neoplastic neoplasms and leads to infertility in men. Nicotine is also a substance that causes vasoconstriction, which leads to diminished blood vessels and reduced blood flow ⁽⁸⁾.

Smoking is a link between blood variables and cases of myocardial infarction (MI) as well as Coronary Heart Disease (CHD) by increasing the viscosity of the blood and associated with cases of narrowing of the blood vessels, which causes the breakdown of platelets and the release of enzymes into the bloodstream causing thrombosis. ⁽⁹⁾.

Smoking causes osteoporosis, because it reduces the absorption of calcium from the small intestine as well as

increases the toxic substances of the bones and affects the metabolism of hormones and vitamins, including vitamin D.⁽¹⁰⁾

The researchers note that there is a very strong association between smoking and cellular blood changes. This change leads to the stimulation of various heart diseases, including atherosclerosis and cardio-vascular disease⁽¹¹⁾.

Vitamin D is known as the sun’s vitamin because the sun’s rays contain UV-B, which converts the 7-dehydroxy cholesterol into 25-dehydroxy cholesterol, known as D3 or vitamin D subcutaneously⁽¹²⁾.

Vitamin D plays an important role in bone building as well as a large cycle in many functions including immunosuppression and enzyme activation.⁽¹³⁾

In order to clarify the health effects that affect Cigarette and narghile smokers and because of the spread of the phenomenon of smoking narghile in Iraqi society, the current study aimed at studying the effect of smoking cigarettes and narghile on a number of blood variables and vitamin D. in males.

Results

Concentration of vitamin D:

The results of the current study presented a decrease in the concentration of vitamin D in the two groups of smokers of narghile and cigarette compared to the control group. The average vitamin D concentration in the serum of the three groups (30.9, 10.9, 13.3 ng / ml respectively) was significant in vitamin D concentration in the three studied groups at the probability level ($P < 0.05$). Figure (1) shows the effect of smoking for Cigarette and narghile on the concentration of vitamin D in studied groups.

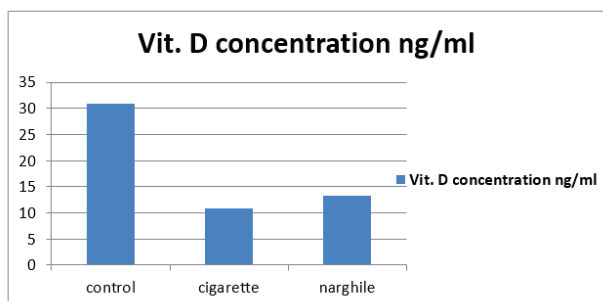


Figure 1) Vitamin D concentration in studied groups.

The least significant differences (LSD) showed significant differences in the concentration of vitamin D in the three studied groups ($P < 0.05$).

Complete Blood Count CBC

white blood cells WBCs count:

The results of the current study presented an rise in the number of white blood cells in the two groups of smokers accorded to the control group. The average number of white blood cells in the control group and the group of cigarette smokers and the narghile smokers was $(7.1, 8.6, 8.9) \times 10^3 \text{ cell / mm}^3$.

The analysis of variance showed significant differences in WBCs count in the three studied groups at the probability level ($P < 0.05$.) Figure 7 shows the average number of white blood cells in the studied groups.

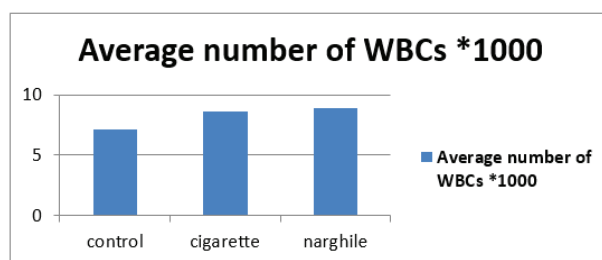


Figure 2): Average number of white blood cells in studied groups.

The LSD test showed significant differences in white blood cells count at $P < 0.05$).

Red blood cells RBCs count:

The results of the current study showed an increase in the number of red blood cells in the two groups of smokers accorded to the control group, with the average number of red blood cells in the control group and the group of cigarette smokers and narghile smokers $5.3, 6.9, 7.0) \times 10^6 / \text{mm}^3$.

The results showed a significant difference in the number of red blood cells in the studied groups at the probability level ($P < 0.05$). Figure 8 shows the average number of “red blood cells” in the studied groups.

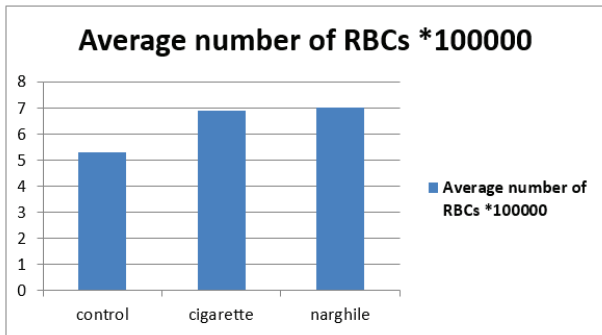


Fig. 3): Average number of “red blood cells” in studied groups.

The LSD test showed significant differences in the number of red blood cells in the three studied groups at the probability level (P<0.05).

Concentration of hemoglobin:

The results of the present study showed a high concentration of hemoglobin in the two groups of smokers compared to the control group with mean concentration of hemoglobin in the control group and the group of cigarette smokers and the group of narghile smokers (14.1, 15.2, 15.9) g / 100 ml, respectively.

The results of the variance analysis showed significant differences in mean hemoglobin concentration in the studied groups at the P <0.05). Figure 9 shows the average concentration of hemoglobin in the studied samples.

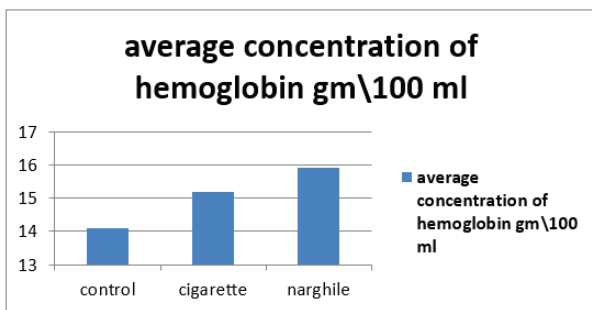


Figure 4) shows the average concentration of hemoglobin in the studied groups.

The LSD test showed significant differences among the studied groups in mean Hb concentration at P <0.05).

Mean Cell Volume (MCV).

The results of the current study showed an increase in the size of red blood cells in the two groups of smokers compared with the control group, with mean red blood cell count in the control group and the group of cigarette smokers and the group of narghile smokers

(82.72, 88.56, 95.31) vimto liter respectively.

The results of the variance analysis presented significant differences in the mean values of the red blood cell in the studied groups at the probability level (P <0.05). Figure 10 shows the average volume of the “red blood cell” in the studied groups.

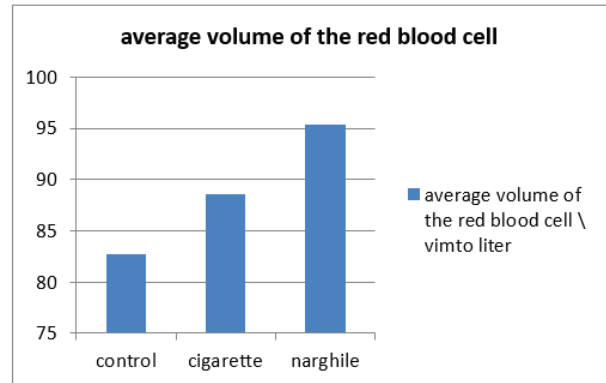


Fig. 5): The average volume of “red blood cells” in studied groups.

The LSD test showed significant differences between the studied groups in the average values of the red blood cell volume (MCV) at the probability level (P <0.05).

Mean concentration of hemoglobin MCH:

The results of the present study showed an increase in the average concentration of hemoglobin in the two groups of smokers compared with the control group. The average concentration of hemoglobin in the control group and the group of cigarette smokers and the group of narghile smokers was 26.4, 38.6 and 40.5 pg / ml respectively.

The results of the variance analysis presented significant differences in mean hemoglobin concentration values in the studied groups at the probability level (P <0.05). Figure 11 shows the average concentration of hemoglobin in the studied groups.

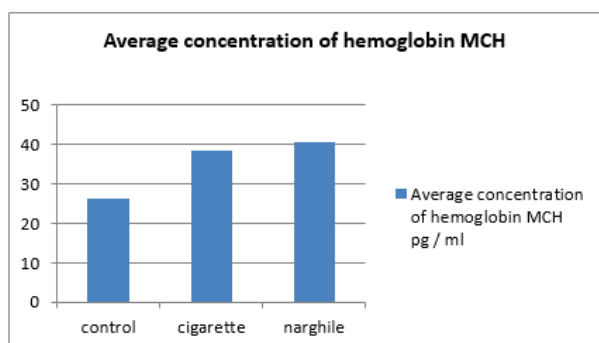


Fig. 6): Average concentration of hemoglobin MCH in the studied groups.

Results of LSD showed significant differences in mean hemoglobin concentrations in the studied groups at the $P < 0.05$.

Mean concentration of Hemoglobin Concentration MCHC:

The results of the current study presented significant differences in the mean values of the Hb concentration in the studied groups accorded to the control group. There was an increase in the values of the average concentration of Hb in the two groups of smokers accorded to the control group with the average concentration of Hb in the control group and the group of cigarette smokers and the group of narghile smokers was (31.5, 39.1, 38.5%) respectively.

The results of the variance analysis presented significant differences in the mean values of the serum hemoglobin concentration in the studied groups at the probability level ($P < 0.05$). Figure 12.3 shows the average concentration of Hb in the studied groups.

Platelets Count (Plts):

The results of the current study presented an increase in the number of platelets in the group of smokers accorded to the control group. The average number of blood "platelets" in the control group and the group of cigarette smokers and the group of narghile smokers was 254000, 341000, 359000 / mm^3 , respectively.

The results of the variance analysis presented significant differences in mean blood platelet counts in the studied groups at the probability level ($P < 0.05$). Figure 13-3 showed the average number of platelets in the studied groups.

Discussion

Smoking is a global problem. One of the leading causes of death is Cigarette smoking is. According to the "WHO" estimates that (2.4 billion) humans universal expended tobacco in burning, mastication, absorption or dropping. The "WHO" described that tobacco would be accountable for (10 million) deaths per year during the period 2020-2030, with 70% of deaths occurring in developing nations because of including at least 200 toxic substances and (80) known or supposed carcinogens, and large amounts of oxidants and free radicals that cause oxidative stress, lung oxidation and apoptosis⁽¹⁴⁾.

Cigarette smoking has most vital risk factors for atherosclerosis and increased deaths from chronic heart disease (CHD). Although the exact mechanism of the role of tobacco smoke in the atherosclerosis process is still not fully understood, many of the chemicals among the thousands present within tobacco smoke produce harmful and toxic effects on health⁽⁵⁾.

There are many naturally occurring organelles in the cell that are rich in alkalis, which are tobacco and are rich in nicotine and some other toxic metals that have nicotine-like chemical activities in tobacco. These are arsenic, mercury, lead, cadmium, chromium, polonium and beryllium. The most important chemical components found in cigarettes are "tar"⁽³⁾.

The most common way of "tobacco" consumption is Smoking, and the resulting vapors are inhaled. Risk substances (nicotine) are absorbed over and done with the pulmonary vesicles in the lungs and chemical reactions at the nerve endings, dopamine and epinephrine will free, which are often associated with pleasure. Therefore, a large number of people continue to smoke in developing countries. Cigarette smoking is a known risk factor for many diseases such as the respiratory tract, heart, blood vessels and tumors, and also affects male fertility functions. Nicotine acts as a vasoconstriction, which means that the blood vessels become narrower and reduce blood flow.⁽¹⁵⁾

Smoking is a cause of cancer, heart disease, stroke and is also closely associated with stomach ulcers, (gum, sudden infant death, and metabolic) syndromes. Consumed of cigarette has a major adverse effect on various body systems especially on the "cardiovascular system". Smoking in various forms is a major risk factor for "atherosclerosis" and "coronary heart disease".⁽¹⁶⁾

Smoking is one of the most common and widespread addictive practices, affecting human behavior. Smoking is increasing rapidly throughout the developing global and is one of the greatest threats to present and future global health. Approximately (20%) of all “coronary heart disease” losses can be recognized to smoking. Cigarette smoking is a important risk factor for “coronary artery disease”, “arteriosclerosis” and disorders of peripheral vascular. ⁽¹⁷⁾.

Cigarette smoke is a risk factor for peripheral vascular disease, coronary arteries, and cerebral blood vessels. In general, a one to three-fold increase in the risk of MI was observed among current cigarette smokers.

Although smoking has a severe and chronic effect on blood standards, however, there is a lack of studies on the influence of cigarette smoking on blood in humans and animals. Over the earlier decade, it has been suggested that cigarette smoking has an effect on blood features and also leads to death. “White blood cells” has been detected nearly as high in smokers. There are some studies on the effect of smoking on platelets. In addition, data from several studies were not compared to non-smoking as control groups. Showed a high percentage of average volume of ‘MPV’ in the smoker, which reduced after the smoker prevent from smoking. Though, no effect on “MPV” by smoking. In the light of this study, we compared the total number of “white blood cells” (WBC), “Platelets” (PLT), Platelet Crit (“PCT”), Average Platelet Size (“MPV”), Platelet Distribution (“PDW”) (P-LCR) for both smokers and non-smokers ⁽¹⁴⁾.

A strong correlation was found between cigarette smoking, arteriosclerosis and cardiovascular disease. Several studies have considered that endothelial injury is a major initial event in causing cardiovascular disorders. However, the exact pathophysiology of the harmful effects of smoking on the lining is not very clear. Potential mechanisms for smoking damage include increased thrombocytopenia and inflation, changes in lipid and lipoprotein levels, changes in hemostasis, increased enumeration and neutrophil activation ⁽¹⁸⁾.

In addition, smoking has been associated with the metabolism deformation of vitamin D. However, most studies have been conducted on the relationship between smoking and osteoporosis in postmenopausal women or elderly men after prolonged exposure to the toxic agent, and there is little information on the effect of smoking

on bones in young people ⁽¹⁰⁾.

Vitamin D deficiency is common all over the global; even in areas close to the equator where it is assumed that exposure to sunlight is high. Furthermore to its known effects on calcium balance, “vitamin D” has a variety of functions, including immunological and anti-inflammatory effects. Many diseases have been related with “vitamin D” deficiency, including cancer and inflammatory diseases, although precise mechanisms are still under clarification. Previous epidemiological studies have shown a causal link between lung function and “vitamin D” levels. In lung-related lung diseases, lung destruction is partially mediated through inflammation, oxidative stress, and increased protease. Many of these processes are formed by “vitamin D”. Furthermore, studies in the laboratory and animal models suggest that cigarette smoke may affect with the anti-vitamin D effects. ⁽¹⁹⁾.

Conflict of Interest: There is no conflict of interest among the authors.

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Ethical Clearance: This study is ethically approved by the Institutional ethical Committee.

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