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Study the Protective Role of Vitamin (B6 and B12) on the Some of the Blood Physiological, Biochemical Parameters and Histological Induced by Treatment of Sodium Fluoride Male White Rat

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Abstract

The study was conducted in the Faculty of Pharmacy / Karbala University for the period from 12/2018 to 7/2019. The first group was orally injected with a saline solution with a concentration of 0.9 ml and was considered as a control group. The second group was injected with sodium fluoride at a concentration of 20 mg / kg body weight (Positive), while the third group was injected with sodium fluoride with the same previous concentration with vitamin B6 leaves Group G was also injected with sodium fluoride with the same previous concentration with vitamin B12 at a concentration of 25 µg / kg body weight. In the fifth group, sodium fluoride and vitamins B6 and B12 were injected with the same concentrations mentioned above with 1 mg / kg body weight. Ml of each of the solutions above and for all groups where the duration of the dosage lasted 21 days and once a day. a significant decrease in the ratio of body weight, red blood cells, hemoglobin, hematocrit, high density lipoprotein and glutathione peroxidase, whereas white blood cells, platelets, cholesterol, triglycerides, low density lipoproteins and Malondyaldehyde increased significantly in the sodium fluoride treatment group with control group.

Keywords: *vitamin (B6 and B12) , blood physiological , biochemical parameters*

Introduction

Vitamins are organic compounds essential for improving the functioning of the human body including biotin, folic acid, niacin, pantothenic acid, riboflavin, thiamine, vitamin A, pyridoxine, copolamine, vitamin C, vitamin D, vitamin E and vitamin K. The body needs small amounts and is obtained from a healthy diet [22] . As for the importance of water-soluble vitamins, vitamin B6 had a role in the prevention of cardiovascular disease [16] , immunological functions and memory diseases [43] and kidney stones. In addition, it may also be useful in the treatment of gastrointestinal diseases such as premenstrual syndrome (PMS) [55], side effects of oral contraceptives, nausea and vomiting during pregnancy [(26,52)], depression and carpal tunnel syndrome. Vitamin B12 also helps prevent certain diseases, especially neural tube defects [32], cardiovascular disease [37], cancer [14], depression, Alzheimer's disease and dementia [12].

Fluorine is a rare natural element and is often found in the soil and is flammable, calcined, toxic, with fluorine compounds forming about 0.08% of the earth's rocks [42]. Fluorides in general are highly toxic to cells and tissues of the body because they cause calcium deposition. They also cause high blood pressure, respiratory failure and general paralysis. They also have a relationship to cancer. They inhibit the effectiveness of the enzyme necessary for protein synthesis and DNA synthesis. Medical research on the effect of fluoride ion on the human was found to be cancer of the treated cells. It was also found that mice injected with additional doses of fluoride ion had liver cancer [23].

Material and Methods:

Blood tests

The Automated Cell Counter (Sysmex-800, Japan) is used to calculate the blood count of different blood cells.

The sample (tube containing the blood and anticoagulant) is injected into the designated area of the

device. The blood parameters of WBC, red blood cell count (RBC), platelet count (PLT), hematocrit ratio (HCT), and hemoglobin level (Hb) are estimated by using a small amount of sample Blood and with high accuracy and short period of time.

Measure serum cholesterol level:

According to what he described [7]

Measuring the concentration of high-density lipoprotein cholesterol (HDL-c):

It was measured according to what he described [31].

Measuring the concentration of low-density lipoprotein cholesterol LDL-c.

Its concentration is calculated according to the following equation [18]:

Concentration of LDL = total cholesterol - (triglyceride / 5 + HDL concentration).

Assay of Glutathione Peroxidase (GPx) Activity: [39]

Measuring the concentration of malondyaldehyde (MDA) in the serum.

According to what he described [51].

Result and Dissection

Change blood standards

The results of Table (1-1) showed a significant decrease (P <0.05) in the number of red blood cells (RBCs) of G2 and G3 compared with the control group G1 and the other groups G4 and G5., G4, G5 when compared with G2.

In terms of hemoglobin Hb, there was a significant decrease (P <0.05) in G2 and G3 compared to control group G1. When comparing groups G3, G4 and G5 among them except control group G1 with G2, <0.05) for hemoglobin.

In terms of hematocrit HCT, P <0.05 was also observed in G2 and G3 compared with G1. When comparing G3, G4, G5 with G1, G2 with significant G (P) <0.05) for the hematocrit ratio.

The results of the white blood cell count (WBC) differed with the previous results. A significant increase was observed (P <0.05) in groups G2, G3, G4 but did not reach the level of significance in group G5. When comparing totals except G1 with G2, Moral decline (P <0.05).

The number of platelet plaques was significantly higher (P <0.05)

Table (1) Shows different blood standards in different treatments

Study Groups	Standard Error ± Mean				
	PLT	WBC	HCT	HGB	RBC
control	24.95±292.20	0.80±9.82	0.70±36.66	0.30±14.02	0.21±6.37
NaF	46.67±734.80 ab	0.37±14.14 ab	0.88±27.98 a	0.21±9.70 ab	0.26±2.98 ab
vitamin NaF+B6	49.67±453.20 Bc	0.58±12.74 abc	1.35±31.32 abc	0.47±11.96 abc	0.20±5.33 bc
vitamin NaF+B12	28.35±307.80 B	0.43±11.96 ab	1.05±34.16 b	0.44±13.36 b	0.22±6.23 b
vitamin NaF+B6+B12	20.78±302.40 Bc	0.51±10.88 bc	1.68±37.24 bc	0.82±14.72 bc	0.34±6.34 bc
LSD	106.014	1.651	3.488	1.463	0.746

a significant difference between the treated groups with control below the probability level of 0.05

b, c significant difference between the treated groups below the probability level of 0.05

The results of the present study showed a significant decrease in the number of red blood cells and the proportion of hemoglobin and hematocrit (which is the proportion of the volume of red blood cells packed to the full volume of blood) while increased the proportion of white blood cells and platelets. Reduced numbers of red blood cells, hemoglobin and packed red blood cells may be due to deficiencies in hematopoietic factors (iron, folic acid, folate B9 and vitamin B12), which are essential factors for normal blood formation and crucial for the manufacture of DNA. In the cellular divide, a deficiency of vitamin B12 and folic acid will cause dysfunction in the process of cell multiplication, especially in the red blood cell manufacturing system, leading to anemia (17, 40).

The results of the microscopic examination of the tissue sections of the liver, kidneys and rats treated with sodium fluoride have enhanced the morphological growth of white blood cells and platelets, which can explain why this was reported [44] when exposure to high concentrations of substances and compounds increases the number of pellets The white blood of lymphocytes increases due to the immune system's sense of fluorine ion as a defense against inflammatory processes in the liver, kidneys, spleen and bone marrow.

Our current findings agree with many previous studies that the interaction of toxic substances (sodium fluoride) with red blood cells may affect their ability to carry Hb and thus reduce its content. [25] reported a slight increase in WBC values, while our results did not agree with what [29] observed a decrease in white blood cell count.

B6, B12, G3, G4 and G5 were treated to modify the levels of blood parameters studied by having an important role in the formation of red blood cells [54] and in the synthesis of hemoglobin, which is important for red blood cells to transport oxygen and therefore increase the proportion of hematopoietic as the amount of percentage volume (%) of red blood cells in the blood.

Vitamin B6 deficiency has an important role to play in the weakness of the immune system and resistance to inflammation, as it reduces the body's ability to secrete white blood cells responsible for regulating the functions of the immune system.

Change in the values of cholesterol, triglycerides, high-density lipoproteins and low-density lipoproteins

Table (1-2) showed elevated cholesterol. In the G2 group was significantly higher (P <0.05) than the control group G1, while the rest of the groups were between high and low, not reaching the moral level.

When comparing the G3, G4, and G5 groups with the G2 poisoning group, they observed a significant decrease (P <0.05).

TG triglycerides in G2 were significantly higher (P <0.05) and G3, G4, and G4 were higher than G1, but did not reach the moral level.

When comparing the results in the same groups with the G2 poisoning group, a significant decrease was observed (P <0.05).

The low HDL ratio was also significantly decreased (P <0.05) in the G2 poisoning group for the control group. The other G3, G4 and G5 groups were also high but slightly higher than the G1.

When comparing the results of the same groups with the G2 poisoning group, the increase was significantly higher (P <0.05).

There was also a significant increase in LDL (P <0.05) in the G2 poisoning group from the G1 control group. It was also observed that the results of the other values were slightly higher, not reaching the moral level.

When comparing the results of these groups G3, G4, G5 with the G2 poisoning group, the results were significantly lower (P <0.05).

The results of the present study showed a significant increase in the concentration of cholesterol, triglycerides and LDL with a significant decrease in HDL level in males of adult rats treated with sodium fluoride at a concentration of 20 mg / kg compared to G1 control group. In his study of the blood and tissue effects of sodium fluoride in local rabbits.

The results of the present study differed with the results of the study of [50] with low blood cholesterol level in pigs treated with sodium fluoride at a concentration of 150 mg / kg body weight.

While the treatment groups G3, G4, G5, sodium fluoride, vitamin B6 and B12 were separated once and again, they led to a marked improvement in the values of cholesterol and triglycerides. If LDL levels are high, they are deposited on the walls of the blood vessels, leading to narrowing and reducing their elasticity,

which leads to blockage. As a result, there is a problem in blood flow, which is called atherosclerosis. When it occurs in the arteries that feed the heart, it increases the risk of heart attack. It is worth mentioning here that HDL helps to prevent the deposition of LDL cholesterol on the walls of the blood vessels and take it out of the circulatory system as vitamin B12 contributes to the reduction of cardiovascular disease and levels Low-density lipoprotein, high blood pressure, low levels of high-density lipoprotein, obesity and diabetes [33].

The role of both vitamin B6 and B12 as antioxidants and in the repair of hepatic tissue cells will thus rid the body of excess cholesterol. Its role in liver cell repair leads to the liver's return to its normal state, secretion and regulation of the levels of important lipoproteins necessary for blood plasma [6, 49].

Table (2) Shows different levels of lipid profile in different treatments

Study Groups	Standard Error ± Mean			
	LDL	HDL	TG	Cho
control	5.74±102.99 a	1.82±33.66 a	1.03±46.13 a	6.26±145.87 a
NaF	6.18±182.97 ab	1.63±18.92 ab	3.40±69.17 ab	8.04±177.71 ab
vitamin NaF+B6	6.37±108.32 b	2.26±28.80 b	4.22±55.58 ab	5.05±128.36 ab
vitamin NaF+B12	6.50±104.01 b	3.15±30.22 b	2.48±52.89 b	5.52±144.81 bc
vitamin NaF+B6+B12	6.38±107.92 b	2.33±29.10 b	4.54±49.29 b	5.32±146.88 bc
LSD	1.651	3.488	1.463	0.746

a significant difference between the treated groups with control below the probability level of 0.05.

b, c significant difference between the treated groups below the probability level of 0.05.

Change in the values of Glutathione Peroxidase GPX and Malondyaldehyde.

The decrease in the ratio of Glutathione peroxidase decreased significantly (P <0.05) in the G2 group compared with G1 control group, as well as in the other groups G3, G4, G5 but the decrease did not reach the moral level.

When comparing the results of these groups with the G2 poisoning group, it was significantly higher (P <0.05), approaching the G1 control group.

Figure (1) Shows different levels of Glutathione peroxidase in different treatments.

a significant difference between the treated groups with control below the probability level of 0.05.

b, c significant difference between the treated groups below the probability level of 0.05.

(P <0.05) in G2 and P <0.05 in G3 and G4 were also significantly higher in the G5 group but decreased to Moral comparison with G1 control group.

When compared with G2, the G3, G4 and G5 groups were all significantly reduced (P <0.05).

Figure(2) Shows different levels of Malondyaldehyde in different treatments.

a significant difference between the treated groups with control below the probability level of 0.05.

b, c significant difference between the treated groups below the probability level of 0.05.

Conclusion

The results showed a significant decrease in the ratio of body weight, red blood cells, hemoglobin, hematocrit, high density lipoprotein and glutathione peroxidase, whereas white blood cells, platelets, cholesterol, triglycerides, low density lipoproteins and Malondyaldehyde increased significantly in the sodium fluoride treatment group with control group.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the College of Education for Girls University of Kufa, Iraq and all experiments were carried out in accordance with approved guidelines.

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