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Antihyperlipidemic of Moringa Oleifera Leaves Against the Hyperlipidemia and Hematological Effects That Induced by Bisphenol A

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Abstract: Current work aimed to estimate the leaf extract effect of *M. oleifera* against hyperlipidemia and hematological effects that induced by Bisphenol A. 44 adult male rats using in work and the experience contain : (4 animals in each): Group of control received (oral dose) 1 ml distilled water. Group of adult rats male received (oral dose) 5 $mg.kg^{-1}$ BPA. Group of rats male received (oral dose) 10$mg.kg^{-1}$ BPA.Group of rats male received (oral dose) BPA (5mgUsing a stomach tube, 100 mg.kg-1 of moringa oleifera were administered. Male rats in a group were given an oral dosage of BPA (5mg). Using a stomach tube, 200 mg.kg-1 of M. oleifera were administered. BPA was given to a group of adult rats (oral dosage) (5mg). Using a stomach tube, 300 mg.kg-1 of M. oleifera were administered. Male rats in a group were given an oral dosage of BPA (5mg). Using a stomach tube, 400 mg.kg-1 of M. oleifera were administered.Male adult rats in a group got an oral dosage of BPA (10mg). Using a stomach tube, 100 mg.kg-1 of M. oleifera were administered. Male rats in a group received (oral dose) BPA (10mg) was administered via stomach tube. 200 mg.kg-1 of M. oleifera Male adult rats in a group were given an oral dosage of BPA (10mg). Using a stomach tube, 300 mg.kg-1 of M. oleifera were administered. Male adult rats in a group were given an oral dosage of BPA (10mg) Using a stomach tube, 400 mg.kg-1 of M. oleifera were administered.. Findings showed significantly ($P \leq 0.05$) increased in total cholesterol (TC), triglyceride (TR) and decreased levels of high density lipoprotein (HDL) and hematological parameters (Hb, PCV and RBC) in Bisphenol-A groups. After using extract of *Moringa oleifera* lipid profile back normal and no significant ($P \leq 0.05$) variances contrast for group of compare.

Key words: Hematological parameters; *M. oleifera*; lipid profile

Introduction:

The Moringa oleifera plant, which is common in Asia and Africa, is a member of the Moringaceae family [1-2]. The most crucial nutrients needed for optimal health are contained in Mr. Oleifera's book [3-6]. The Mr. Oleifera book is full of minerals and vitamins, including iron and vitamins A and C, which are crucial for iron metabolism. Also, Mr. oleifera has added value in solving the problem of various malnutrition conditions because it contains all the essential amino acids used in the building walls of polypeptides necessary for the cell growth process. [3, 7]. Otherwise, It is founded that vitamin A has significant in various functions such as vision, reproduction of human,

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growth of embryonic, enhancement the immune competence and the proliferation and differentiation of the cell [8]. The leaves of M. oleifera also contain a variety of bioactive substances, including different kinds of tannins, terpenoids, saponins, with various kinds of flavonoids and glycosides that have therapeutic properties.These compounds have been demonstrated impacts of antioxidants activities, antimicrobial activities and anti-carcinogenic ability [9-10]. The phenolic compounds and flavonoids in leaf of *M. oleifera* have significant activity in regulation of lipid [11]. These substances bind the bile acids in the liver and prevent the release of cholesterol esterase from the pancreases, reducing the amount of cholesterol absorbed, resulting in reducing the total plasma cholesterol levels [12]. A bisphenol is a chemical in the form of polycarbonate or epoxy resin and is an estrogenic component that is often used in the production of many consumer products such as food and beverages. [13].

Materials & methods

Animal model

44 adult male rats, (wt.: 150-180mg with age: 3-7Mon) obtained from Veterinary College/ University of Tikrit /Iraq.

M. oleifera leaf powder

Powdered M. oleifera leaf kept at 4 °C. 350 ml of distal water were used to extract 15 g of powder, which was filtered using Whatman paper. To make a liquid concentrate, the mixture was evaporated, and it was kept in a glass at -20 °C until it was needed. [14].

Group of Animals

44 albino rats male using for current work and the experience contain the following groups (4 in each group):

A. Group of control received (oral dose) 1 ml distilled water.
B. Group of adult rats male received (oral dose) 5mg.kg^{-1} BPA (Alpha Chemica . India).
C. Group of adult rats male received (oral dose) 10 mg.kg^{-1} BPA.
D. Group of adult rats male received (oral dose) BPA (5mg) were given by using a gastric tube *M. oleifera* 100 mg.kg^{-1}.
E. Group of adult rats male received (oral dose) BPA (5mg) were given by using a gastric tube *M. oleifera* 200 mg.kg^{-1}.
F. Group of adult rats male received (oral dose) BPA (5mg) were given by using a gastric tube *M. oleifera* 300 mg.kg^{-1}.
G. Group of adult rats male received (oral dose) BPA (5mg) were given by using a gastric tube *M. oleifera* 400 mg.kg^{-1}.
H. Group of adult rats male received (oral dose) BPA (10mg) were given by using a gastric tube *M. oleifera* 100 mg.kg^{-1}.
I. Adult rats male received (oral dose) BPA (10mg) *M. oleifera* 200 mg.kg^{-1} were given by using a gastric tube.
J. Group of adult rats male received (oral dose) BPA (10mg) *M. oleifera* 300 mg.kg^{-1} were given by using a gastric tube.
K. Group of adult rats male received (oral dose) BPA (10mg) *M. oleifera* 400 mg.kg^{-1} were given by using agastric tube.

Lipid profile

Total cholesterol (TC)

Allain described an enzymatic method for measuring cholesterol in the blood as follows [15] using (BioLabo kit/France/ spectrophotometer):

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$$\text{Cholesterol} + O_2 \xrightarrow{\text{Cholesterol Oxidase}} \text{Cholesten 4 one 3 on} + H_2O_2\ HH_2O_2$$

$$2H_2O_2 + \text{Phenol} + \text{4-Aminoantipyrine} \xrightarrow{\text{Peroxidase}} \text{Quinoneimine} + 4H_2O$$

$$\textbf{Conc. of cholesterol} = \frac{\text{Abs (Test)}}{\text{Abs (Standard)}} * \text{Concentration of Standard (200mg/dl)}$$

The amount of triglycerides in the blood is calculated using (BioLabo kit/ France/ spectrophotometer) according to the principle mentioned below:

$$\text{Glycerol} + \xrightarrow{\text{Glycerokinase}} \text{Glycerol - 3 - Phosphate} + \text{ADP}$$

$$\text{Glycerol - 3 - Phosphate} \xrightarrow[\text{oxidase}]{\text{Glycerol - 3 – Phosphate}} \text{Dihydroxyaceton Phosphate}$$

$$2H_2O_2 + \text{Parachlorophenol} + \text{4 amino} \xrightarrow{\text{Peroxidase}} \text{Quinoneimine} + 4H_2O$$

$$\textbf{Conc. of Triglyceride} = \frac{\textbf{Abs (test)}}{\textbf{Abs (Blank)}} * \textbf{Concentration of Standard (200 mg/dl)}$$

High density lipid (HDL)

The amount of HDL in the blood is calculated using (BioLabo kit/ France/ spectrophotometer) according to the principle mentioned below:

$$\text{Cholesterol ester} + H_2O \xrightarrow{\textbf{cholesterol esterase}} \text{cholesterol} + \text{RCOOH}$$

$$\text{Cholesterol} + O_2 \xrightarrow{\textbf{cholesterol oxidase}} \text{cholestenone} + H_2O_2$$

$$H_2O_2 + \text{indicator} \xrightarrow{\textbf{POD}} \text{dye} + H_2O$$

Hematological parameters

Hematological parameters of each rat was evaluate by using Hemolyzer 5 instrument, these include: RBC, HGB and PCV.

Statistical Analysis

Values are presented using one-way ANOVA, followed by LSD test. Study data are presented as mean ± SD. Statistical significance was set at the $P \leq 0.05$ level [16].

Results And Discussion

Lipid profile

The TC level showed a significant difference ($P \leq 0.05$), while the TC level showed a higher level ($P \leq 0.05$) in the BPA group (5 mg and 10 mg) compared to the control group. After using Moringa oleifera, TC returns to normal level as shown in picture (1). The TR level showed a significant difference ($P \leq 0.05$), while the TR level showed a significant increase ($P \leq 0.05$) in the BPA group (5 mg and 10 mg) compared to the control group. After using Moringa oleifera, the TR

ratio returns to normal as shown in Figure (2). The amount of HDL showed a significant difference ($P \leq 0.05$), while the ratio of HDL showed a significant decrease ($P \leq 0.05$) in the different BPA groups (5 mg and 10 mg) compared to the control group. When using Moringa oleifera, the HDL ratio was normal and there was no significant difference ($P \leq 0.05$) different from the control group, as shown in the figure. (e 3).

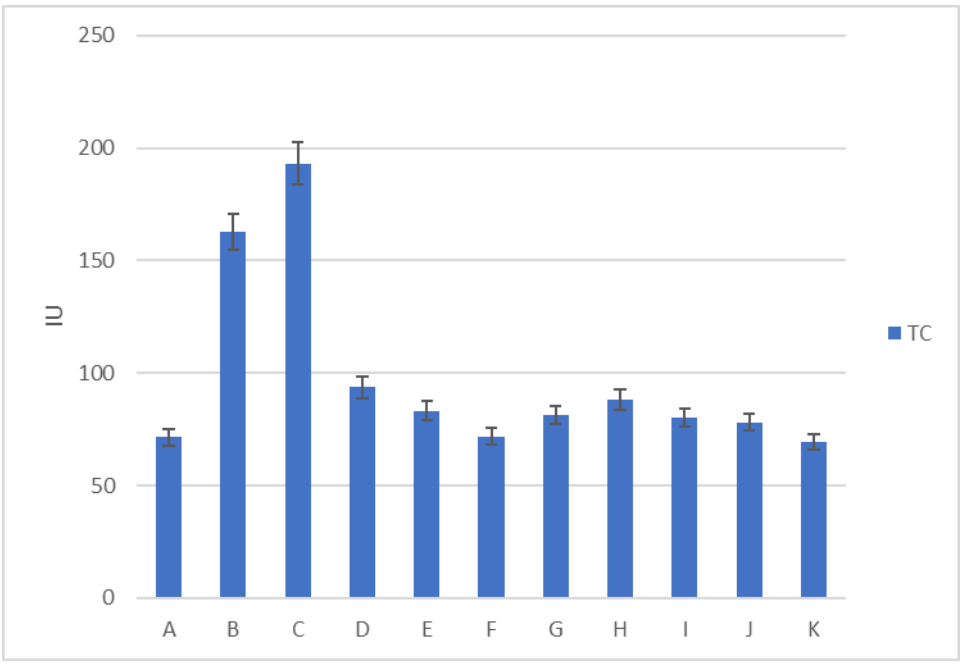

Figure (1): levels of TC studied groups.

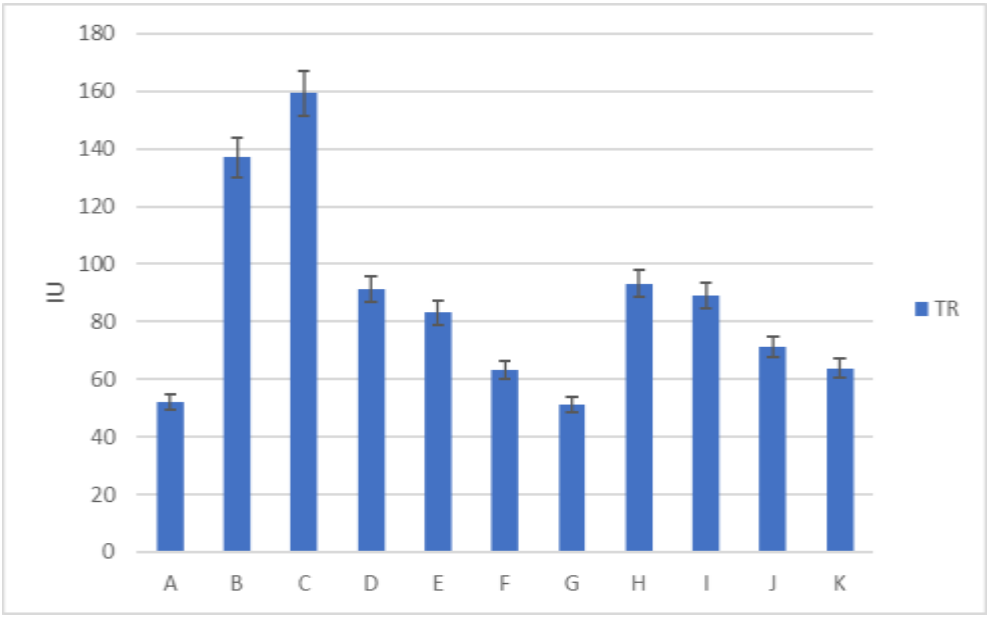

Figure (2): levels of TR studied groups.

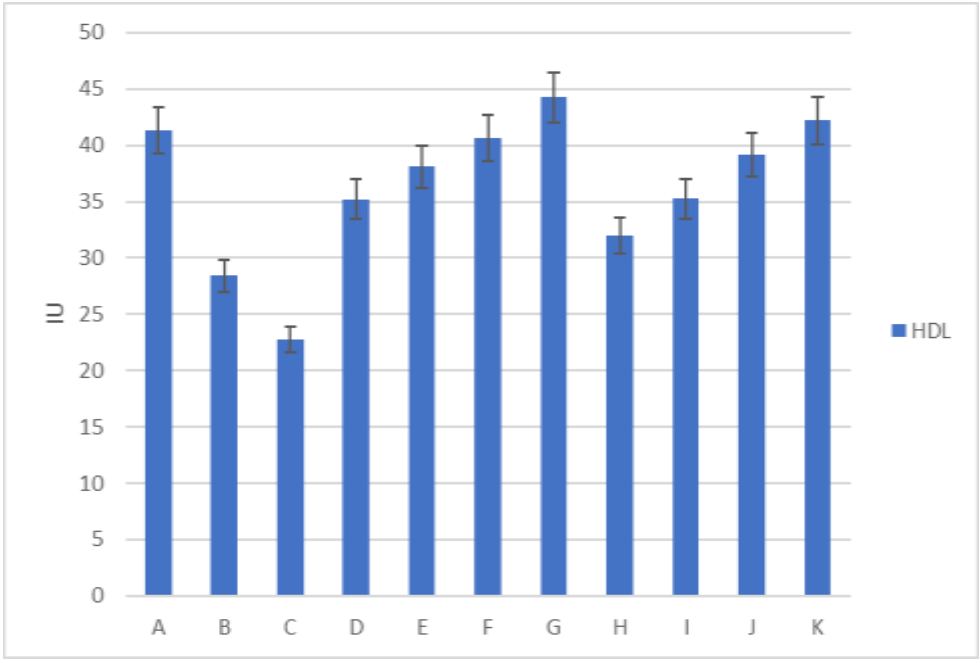

Figure (3): levels of HDL studied groups.

Hematological study

The Hb level showed a significant difference ($P \leq 0.05$), while the Hb level showed a significant difference ($P \leq 0.05$) in the BPA (5 mg and 10 mg) group compared to the control group. When Mr. oleifera, the Hb level returns to normal, as shown in picture (4). The PCV level showed a significant difference ($P \leq 0.05$), while the PCV level showed a significant decrease ($P \leq 0.05$) in the Bisphenol-A group of variances (5 mg and 10 mg) different from the control group. When used with M. oleifer, PCV levels were back normal and without any difference contrast with group of control as shown in figure (5). RBC ratio showed significantly ($P \leq 0.05$) differences, where RBC counts exhibited significant ($P \leq 0.05$) reduce in BPA groups (5mg and 10mg) variances contrast with group of control. After using *M. oleifer*, RBC counts back normal and no significantly ($P \leq 0.05$) variances contrast with control group as shown in figure (6).

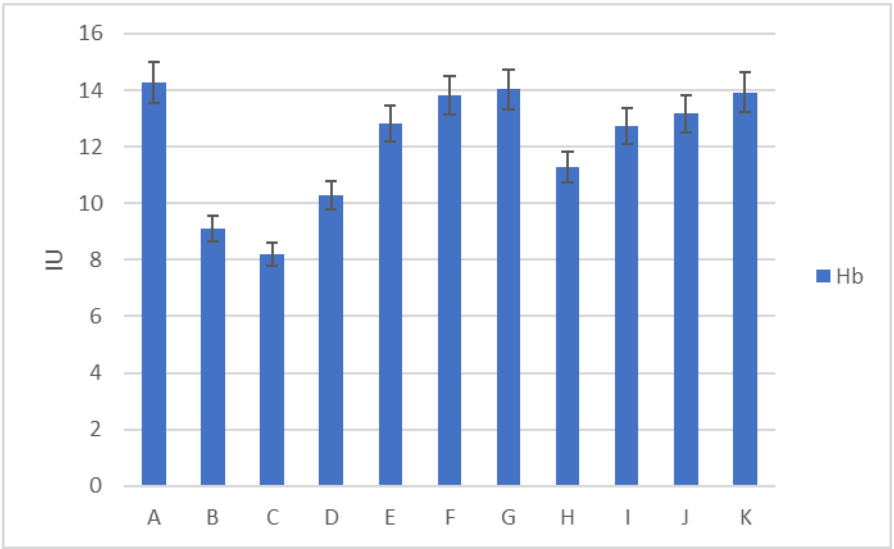

Figure (4): levels of Hb studied groups.

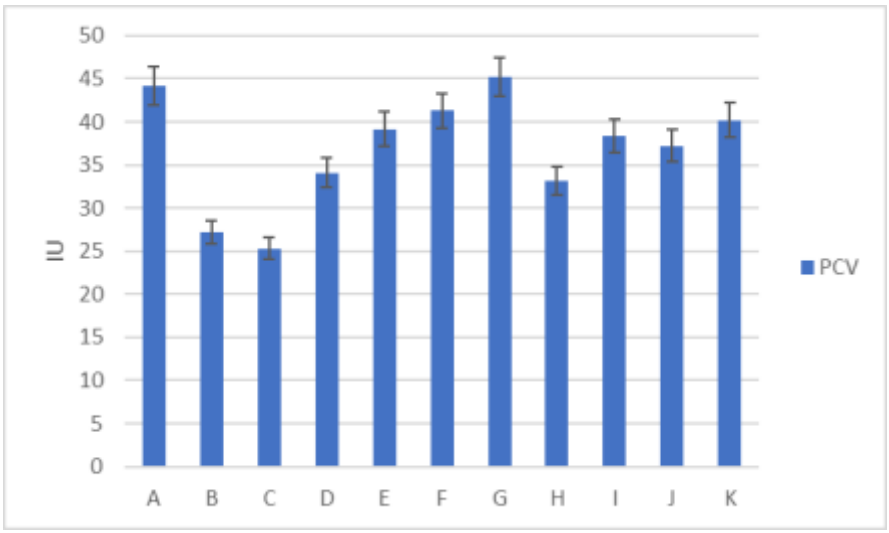

Figure (5): levels of PCV studied groups.

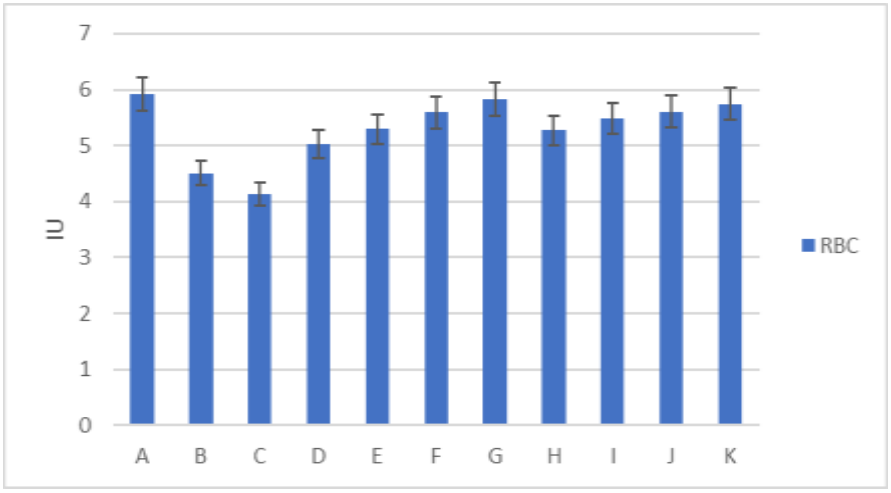

Figure (6): levels of PCV studied groups.

Discussion

The current findings showed significant (P≤0.05) differences, where lipid profile exhibited significantly (P≤0.05) increase in BPA groups (5mg & 10mg) contrast with control. The current outcome of this study agree with [17] revealed that 0.5 and 2 mgkg-1 of BPA for 4 weeks enhanced levels of cholesterol, levels of triglyceride and lowered level of HDL in albino male rats. As opposed to that, [18] reported that oral consumption of 10 mg of BPA for four weeks caused a significant increase in total cholesterol, triglyceride levels and a decrease in HDL levels in male albino rats. [19] reported that different amounts (5, 50, 500 and 5000 µg/kg) of BPA received (oral dose) for 28 days did not cause any significant changes in cholesterol levels, triglyceride levels and reduction in HDL levels. 'to make a man. an albino rat. Also, [20] reported that the administration of 2.5 µg/l of BPA to albino mice for 8 weeks and 10 months after birth caused a significant increase in cholesterol levels. In contrast, it was discovered in the current investigation that BPA generated hematological alterations that improved in M. multiple. ROS hemolysis brought on by BPA is responsible for the drop in RBC count and Hb. The antioxidant capabilities of M. oleifera were responsible for the improvement in these parameters' levels in the M. oleifera group. The current findings support [21],

which found that the BPA-treated group's Hb concentration and red blood cell count were significantly lower than those of the control group..

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