

Effect of Rosmarinus Officinalis Aqueous Extract on Some Biochemical Parameters and Histological Characteristics of Aorta in Hyperlipidemia Male Rats

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Abstract: The present study was aimed to investigate *Rosmarinus officinalis* aqueous extract activity in male rats with hyperlipidemia. Twenty adult albino male rats were used and divided into following groups (each group consist 5 rats); negative group received ad libidum, positive group was given normal water containing 0.5% of hydrogen peroxide and 1% of cholesterol in the feed for 60 days for induction of hyperlipidemia. Third group rats with hyperlipidemia and treated with (50mg/kg/daily), fourth group rats with hyperlipidemia and treated with (100mg/kg/daily), The results showed high significant increase ($P < 0.05$) in levels of cholesterol and triglyceride and significant decrease ($P < 0.05$) in levels of HDL in positive group compare with control group. Oxidative stress factor in an infected group significant increase ($P < 0.05$) in levels of MDA (malonedialdehydied) and significant decrease ($P < 0.05$) in levels of glutathione (GSH) compare with control group. On the other hand, diameters of aorta artery show significant increase ($P < 0.05$) compare with control group. While, after using *Rosmarinus officinalis* aqueous extract in treatment, the results showed non-significant changes ($P < 0.05$) in lipid profile, MDA, GSH and diameters of aorta artery compare with control group. It was concluded that *R. officinalis* extract has been a protective effect in rats with hyperlipidemia.

Keywords *Rosmarinus officinalis*; hyperlipidemia; lipid profile; malonedialdehydied; glutathione.

I. INTRODUCTION

Rosmarinus officinalis, L. originating from the Mediterranean region is an aromatic plant from the Lamiaceae family (Nieto et al., 2018), and is commonly known as rosemary (Andrade et al., (2018). Besides the culinary uses due to the characteristic aroma, this plant is also widely employed by indigenous populations, where it

grows wild (Jardak et al., 2017). Plant products are widely used in testing because of their low toxicity and great medicinal value (Elmhdwi et al., 2018). The rosemary extract contains different classes of polyphenols including phenolic acids, flavonoids and phenolic terpenes. These molecules exhibit potent antioxidant activities that reduce lipid peroxidation, inhibit the production of reactive oxygen species, and suppress inflammation, and contain flavonoids, phenols, volatile oil and terpenoids (Colica et al., 2018). Rosemary is appreciated for its therapeutic in folk medicine uses for example as antidepressant, hepatoprotector, antidiabetic, antiangiogenic, anti-inflammatory and antitumor (Zhang et al., 2012; Ayoob , 2017) . Hyperlipidemia is a heterogeneous group of disorders characterized by an excess of lipids in the blood stream, the term hyperlipidemia refers to increased concentrations of lipids (triglycerides, cholesterol, or both) in the blood (Karam et al., 2018) . . Hypercholesterolemia may be installed via high-fat diet or in individuals with physiological changes, such as deficiencies in the number of functioning LDL-cholesterol receptors [Musial et al., 2013]. So, the present study aimed to investigate *Rosmarinus officinalis* aqueous extract activity in male rats with hyperlipidemia.

II. MATERIALS AND METHODS

Animal Model

In this study twenty adult male albino rats, (wt 200-250 gm with age 4-6 month) obtained from Veterinary college/ Kirkuk University, and kept on a standard pellet diet for two weeks to ensure its normal and there isn't any infection.

Aqueous extraction

The stock solution of 20% plant extract was prepared by using 100 ml of boiling water plus 10 gm of leaf powder

and the mixture was left for 3 hr. after that the mixture was filtered by using whatman no.1 filter paper, then the solution was centrifuged at 10000 rpm for 10 min, the supernatant was placed in oven at 45°C to dry, after that 2 gm of the dried powder was taken and mixed with 100 ml of sterilized distilled water (Atala and Muhammed, 2017).

Experimental Design

Twenty adult male albino rats were used and divided as follow (each group consist five rats):

- Normal rats were received standard pellet diet only and normal saline.
- Hyperlipidemic rats were given (orally) normal water containing 0.5% of hydrogen peroxide and 1% of cholesterol in the feed for 60 days.
- Hyperlipidemic rats with treated (orally) with (50mg/kg/daily) extract, and then killed.
- Hyperlipidemic rats with treated (orally) with (100mg/kg/daily) extract, and then killed.

Biochemical Measurements

Total cholesterol, triglycerides and high density lipoprotein (HDL) levels were determined using standard kits of biomereix kit, France. Malondialdehyde (MDA) is determination based on formation of colored complex upon reaction with thiobarbutyric acid. The detection was recorded at (500 nm). Glutathione was measured according to method of (Burtis and Ashwood, 1999).

Histological Study

Aorta from each groups were fixed with formalin 10% solution , embedded with paraffin. After routine processing, paraffin sections of each tissue were cut into 7 μ m thickness and stained with haematoxylin and eosin (Humason, 1972)

Statistical Analysis

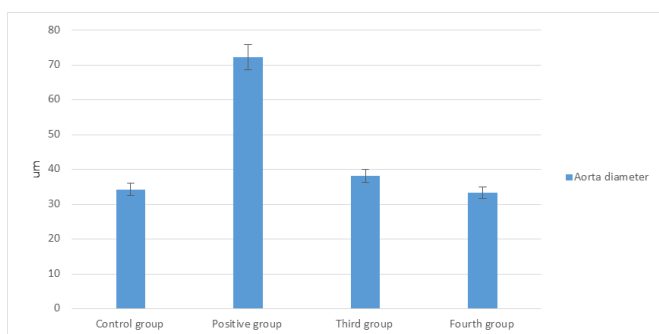


Figure (3): Aorta diameter in all groups.

All data were coded and entered using the program statistical package for social sciences (SPSS) version 12 under windows XP. Descriptive data was summarized using mean, standard error (SE). student s t-test was used to estimate differences between groups. P values < 0.05 were considered statistically significant.

III. RESULTS

Total cholesterol (TC), Triglyceride (TG) and HDL

The results indicated a high significant ($P < 0.05$) increase of TC and TG of second group compare with control group. While, there was a significant ($P < 0.05$) decrease of HDL in second group compare with control group. The levels of TC, TG and HDL in third and fourth groups show non-significant changes ($P < 0.05$) compared with control group as shown in figure (1).

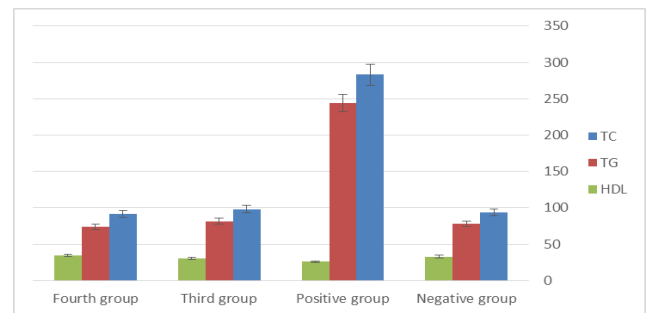


Figure (1): levels of total cholesterol and triglyceride

MDA and GSH

The results indicated a high significant ($P < 0.05$) increase of MDA of second group compare with control group. While, there was a significant ($P < 0.05$) decrease of GSH in second group compare with control group. The levels of MDA and GSH in third and fourth groups show non-significant changes ($P < 0.05$) compared with control group as shown in figure (2).

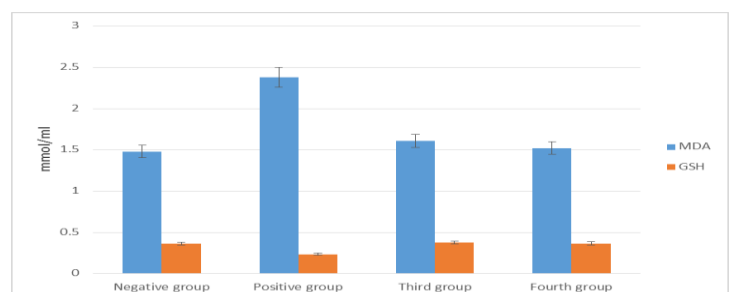


Figure (2): levels of MDA and GSH in all groups.

Aorta diameters

Aorta diameter in positive group show high significant increase ($P < 0.05$) compare with control group. Aorta diameter. In third and fourth groups show non-significant changes ($P < 0.05$) compared with control group as shown in figure (3).

IV. DISCUSSION

The results of present study show activity role of *R. officinalis* extract to reduce the effect of hyperlipidemia on lipid profile, aorta diameters and oxidative/antioxidant factors. In study carried out by referred that *R. officinalis* extract significantly reduced elevated cholesterol levels

that were induced by the high-fat diet (HFD) (Ibarra et al., 2011), that is in agreement with results of present study. Al-Sheyab et al., (2012) demonstrated clearly the hypolipidemic activity of *R. officinalis* species. The lipid profile (TC, HDL, LDL and TG) showed significant reduction in rosemary-fed mice as compared to the HC mice. On the other hand, significant elevation of the HDL was observed in rosemary-fed mice as compared to the HC mice. On the other hand, *R. officinalis* L. plant extracts have the ability to decompose free radicals by quenching active singlet oxygen and by trapping and quenching radicals before they reach a cellular target (Moreira et al., 2005), that explain the role of *R. Officinalis* extract to regulate the oxidative/antioxidant factors. Also, Rosemary is also capable preventing of lipid peroxidation process that is caused by oxidative stress (Bulbul et al., 2012). In addition to reducing the amount of reactive species in the body, rosemary has been found to increase the activity of antioxidant enzymes (Afonso et al., 2013; Rafie et al., 2017).). About the thickness of aorta and the role of *R. officinalis* extract, rosemary extract prevented weight gain by limiting the lipid absorption in the intestine. This was made possible through the inhibition of pancreatic lipase activity (Ibarra et al., 2011). Finally, the third study found rosemary extract to inhibit lipid synthesis through the suppression of diacylglycerol acyltransferase (DGAT) (Cui et al., 2012), that may explain the ability of rosemary extract to prevent the accumulation of lipid in tissues.

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