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Effect of Rosmarinus Officinalis Aqueous Extract on Some Biochemical Barameters 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 libidium, 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 showede 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 (malonedialdehyied) 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; malonedialdehyied; 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 amied to investgate 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):

A. Normal rats were received standard pellet diet only and normal saline.

B. Hyperlipidemic rats were given (orally) normal water containing 0.5% of hydrogen peroxide and 1% of cholesterol in the feed for 60 days.

C. Hyperlipidemic rats with treated (orally) with (50mg/kg/daily) extract, and then killed.

D. 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 biomereiux 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 µm thickness and stained with haematoxylin and eosin (Humason, 1972)

Statistical Analysis

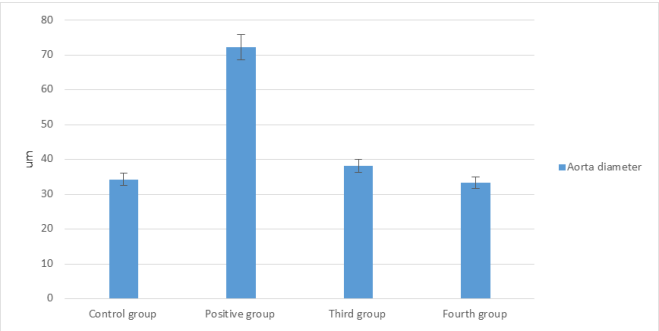

Figure (3): Aorta diameter in all groups.

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).

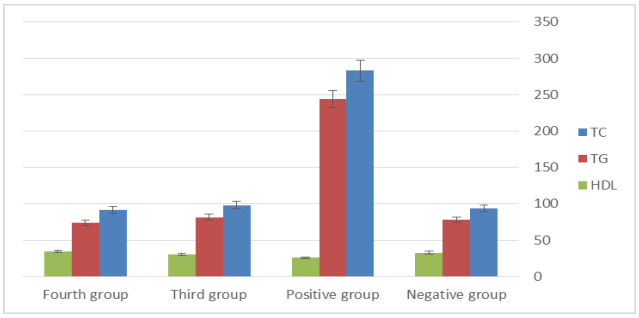

Figure (1): levels of total cholesterol and triglyceride

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).

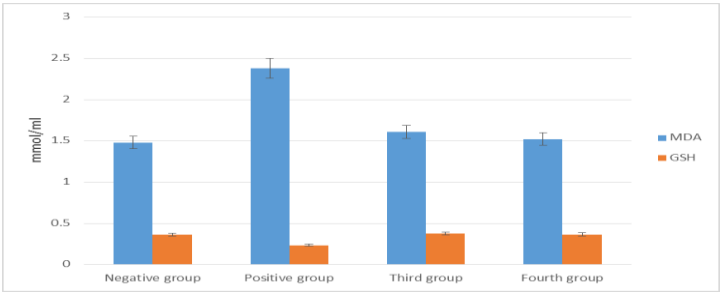

Figure (2): levels of MDA and GSH in all groups.

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.

V. REFERENCE

Afonso, M.S.; De O Silva, A.M.; Carvalho, E.B.; Rivelli, D.P. and Barros, S.B. (2013). Phenolic compounds from Rosemary (Rosmarinus officinalis L) attenuate oxidative stress and reduce blood cholesterol concentration diet-induced hypercholesterolemic rats. J. Nutr. Meta. 10: 10-19.

Al Sheyab, F.M.; Nizar, A.; Lina, S. and Rehan, B. (2012). The Effect of Rosemary (Rosmarinus officinalis. L) Plant Extracts on the Immune Response and Lipid Profile in Mice. J. Bio. Life Sci. 3(1): 37-58.

Amaral, G.P.; De Carvalho, N.R.; Barcelos, R.P.; Dobrachinski, F. and Portella, R.D. (2013) Protective action of ethanolic extract of Rosmarinus officinalis L. in gastric ulcer prevention induced by thanol in rats. Food ChemToxicol 55: 48-55.

Andrade, J.M.; Celia, F.; Catarina, G.; Diogo, L.; Catarina, P.R. and Patrıcia, R. (2018). Rosmarinus officinalis L.: an update review of its phytochemistry and biological activity. J. Future Sci. OA 1-11.

Atala, M.L. and Muhammed A.A. (2017). Antibacterial activity of Rosmarinus officinalis and Dodonaea viscosa leaves extracts against Escherichia coli and Staphylococcus aureus. Iraqi J. Sci. 58(3B): 1393-1397.

Ayoob, I. (2017). New semi-synthetic rosmarinic acid-based amide derivatives as effective antioxidants". Chemistry Select 2.31 (2017):10153-10156.

Bulbul, A.; Bulbul, T.; Biricik, H.; Yesilbag, D. and Gezen, S.S. (2012). effect of various levels of rosemary and oregano volatile oil mixture on oxidative stress parameters in quails. African Journal of Biotechnology 11: 1800-1805.

Burtis, C.B. and Ashwood, E.R. (1999). Tietz textbook of clinical chemistry, 3rd edition, W. B. Sauders Comp. Pp: 790.

Colica, C.; Laura D. R.; Vincenzo, A.; Antonino, D. L. and Ludovico, A. (2018). Rosmarinic Acid as Potential Anti-Inflammatory AgentJ. Rev. Rec. Cln. Tri. 13: 240-242.

Cui, L.; Kim, M.O.; Seo, J.H.; Kim, I.S. and Kim, N.Y. (2012). Abietane diterpenoids of Rosmarinus officinalis and their diacylglycerol acyltransferase-inhibitory activity Food Chemistry 132: 1775-1780.

Elmhdwi, M.F.; Mariam, M.A.; Naema, M.; Yusra, F.L. and Wejdan, K. (2018). Biochemical Studies on the Effect of Fixed Oil Extracted from Rosmarinus officinalis on Blood Lipid Level in Male Albino Mice. J Biomed Res Rev. 1(1): 43-49.

Humason, G.L. (1972). Animal tissue techniques. Freeman, W.H. (3th ed.) , San Francisco press. UAS.PP.641.

Ibarra, A.; Cases, J.; Roller, M.; Chiralt, B.A. and Coussaert A. (2011). Carnosic acid-rich rosemary (Rosmarinus officinalis L.) leaf extract limits weight gain and improves cholesterol levels and glycaemia in mice on a high-fat diet. British J. Nutr. 106: 1182-1189.

Ibarra, A.; Julien, C.; Marc, R.; Amparo, C. B.; Aurelie, C. and Christophe, R. (2011). Carnosic acid-rich rosemary (Rosmarinus officinalis L.) leaf extract limits weight gain and improves cholesterol levels and glycaemia in mice on a high-fat diet. British J. Nutr. 106: 1182–1189.

Jardak, M.; Elloumi-Mseddi, J. and Aifa, S. (2017). Chemical composition, anti-biofilm activity and potential cytotoxic effect on cancer cells of Rosmarinus officinalis L. essential oil from Tunisia. Lipids Health Dis. 16(1): 190-197.

Karam, I.; Ma, N.; Yang, Y.J. and Li, J.Y. (2018). Induce Hyperlipidemia in Rats Using High Fat Diet Investigating Blood Lipid and Histopathology. J Hematol Blood Disord 4(1):104-109.

Lazalde-Ramos, B.P.; Zamora-Perez, A.L. and Gutiérrez-Hernández, R. (2018). DNA protective effect of rosmarinus officinalis total extract in mouse peripheral blood. MOJ Toxicol. 4(2):75–79.

Moreira, M.R.; Ponce, A.G.; dell Valle, C.E. and Roura, S.I. (2005). Inhibitory parameters of essential oils to reduce a foodborne pathogen. LWT, 38: 565-570.

Musial, D.C.; Tânia, C.A.B.; Aline P.I.; Lívia, B. and Ana, C.B.B. (2013). Hypercholesterolemia and hepatic steatosis in mice fed on low-cost high-fat diet. J. Acta. Scien. Health Sci. 35(1): 23-27.

Nieto, G.; Gaspar R.Iand Julián, C. (2018). Antioxidant and Antimicrobial Properties of Rosemary (Rosmarinus officinalis, L.): A Review. J. Medicines. 5(98): 1-13.

Rafie, H.; Soheila, H. and Grant, E. (2017). Rosmarinus officinalis (Rosemary): A Novel therapeutic Agent for antioxidant, antimicrobial, anti-cancer, antidiabetic, antidepressant, neuroprotective anti-inflammatory and anti-obesity Treatment. J. Herb Med. 3(2): 8-14.

Zhang, Y.; Smuts, J.P. and Dodbiba, E. (2012). Degradation study of carnosic acid, rosmarinic acid and

rosemary extract (Rosmarinus officinalis L.) assessed using HPLC. J Agric Food Chem. 60(3):9305–9314.