

Hyperlipidemia that Induced in Male Rats and Role of Flavonoids Extract of *Quercus infectoria* in Treatment

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Abstract

The aim of the study demonstrates flavonoids of *Quercus infectoria* as anti-hyperlipidemia. 20 adult male rats used and divided to four equal groups (each group consist 5 rats); rats received ad libidum, rats were given normal water containing 0.5% of hydrogen peroxide and 1% of cholesterol in the feed for 60 days for induction of hyperlipidemia. Hyperlipidemia rats treated with (50mg/kg/daily) flavonoids, fourth Hyperlipidemia rats treated with (100mg/kg/daily) flavonoids. The results show non-significant changes ($P < 0.05$) in levels of HMG-raductase compare with control group. in hyperlipidemia rats, levels of malonedialdehyied (MDA) show significant increase ($P < 0.05$) in and significant decrease ($P < 0.05$) in levels of glutathione (GSH) and catalase compare with control group. While, after using flavonoids extract in treatment, the results showed non-significant changes ($P < 0.05$) in HMG-raductase, MDA, GSH and catalase compare with control group. It was concluded that flavonoids extract of *Q. infectoria* extract has been a protective effect in rats with hyperlipidemia.

Keywords: *Quercus infectoria*; hyperlipidemia; HMG-raductase.

Introduction

The plant *Quercus infectoria* Olivier (Family-Fagaceae) grows as a shrub or small tree, diclinous and monoecious. It is about 2.5 m in height with many spreading branches(1). The various *Quercus* species originated in Iran, Iraq and Turkey, but are now widespread and particularly common in Asia Minor, Europe and North Africa. Galls are irregular plant growth, which is stimulated by the reaction between plant hormones and powerful growth regulating chemicals produced by insects or mites(2). The Gall of *Q. infectoria* is described in detail in ethnobotanical and literature to possess various pharmacological actions such as analgesic, antidote, anti-inflammatory, antipyretic, antiseptic, antistomatitis, deodorant, derivative, desiccant, expectorant, germicidal, hypnotic, hypoglycaemic, powerful astringent, sedative, styptic, tonic, tonic to teeth and gum, and wound healing(3,4). Flavonoids and the other phenolic compounds are commonly known as plant secondary metabolites that hold an aromatic ring bearing at least one hydroxyl groups. More than 8000 phenolic compounds as naturally occurring substances from plants have been reported(5,6). Its broad spectrum, its biological properties and multiple applications have

given rise to interest in investigating their characteristic according their origin. A lot of studies indicate that flavonoids and phenols in propolis can be able to scavenge free radicals in the human body(7-9). So the aim of study is detection of flavonoids role that extracted from *Q. infectoria* against hyperlipidemia in male rats.

Materials and Method

Flavonoid extraction methods

Flavonoid extract was prepared by immersing 100 gm of dried material of *Q. infectoria* in 500 ml ethyl alcohol (100%) for 24 hrs at room temperature using magnetic stirrer(10-12). The mixture was then filtered using Whatman No. 1 filter papers and the process was repeated using the remaining residue with 300 ml ethanol alcohol to ensure the complete extraction in each time. The two filtrates were added and treated with 100 ml lead acetate (1%) for 4 hrs for precipitation. The mixture was filtered, then a mixture of 250 ml acetone and 30 ml of concentrated HCl was added to the precipitate, and filtered. The resulting pellet was finally lyophilized (Freeze- dried) at -50o C under vacuum for 12 hrs. The extract was dissolved in ethyl alcohol, the extraction process was repeated for 1 hr, filtered to produce red

filtrate. Finely, the filtrate was placed in a clean and dry Petri dish away from light at room temperature until deep redbrown powdered was obtained.

Animal model

Twenty adult male albino rats used in this study, (wt 150-200 gm with age 3-65 month) and obtained from Science college/ Baghdad University, and ensure its normal and there isn't any infection.

Experimental design

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

I. Rats (negative group) were received standard pellet diet only for seven days and then killed to comparison with other groups.

II. Rats (positive group) were given normal water containing 0.5% of hydrogen peroxide (Saudi *Hydrogen Peroxide Company* (SHPC)) and 1% of cholesterol in the feed for 60 days.

III. Rats with hyperlipidemia and treated with (50mg/kg/daily) flavonoids, and then killed.

IV. Rats with hyperlipidemia and treated with (100mg/kg/daily) flavonoids, and then killed.

Prepare of blood solution

The blood collects from rats by cardiac puncher, under anesthesia, and put in test tubes. After clotting, the tubes were centrifugation for 10 min to obtain sera. The serum was taken and stored by deep freezing until used.

Measurements

Determination of HMG - CoA Reductase Concentration

The concentration of the HMG-CoA Reductase enzyme estimated using My Biosource analysis kit. using Elisa technology.

Plasma Peroxidation levels (MDA), Glutathione (GSH) and Catalase

MDA (malonedialdehydied), was measured based on the colorimetric reaction with thiobarbituric acid (TBA) using spectrophotometer⁽¹³⁾. GSH level estimated bymixed 2.3 ml buffer with 0.2ml of the sample and then added 0.5ml of 5,5-dithio-bis-(2-nitrobenzoic

acid) (DTNB). The mixture was analyzed by spectrophotometer⁽¹⁴⁾. Catalase was measured by using the procedure of Biovision-USA kits. All parameters were done on liver extract.

Statistical analysis

The Data were analyzed using a statistical Minitab program. A statistical difference between the means of the experimental groups was analyzed using one-way analysis of variance (ANOVA).

Results & Discussion

HMG reductase

The levels of HMG reductase in positive group show non-significant increase ($P < 0.05$) compared with control group. The levels of HMG reductase in third and fourth groups show non-significant decrease ($P < 0.05$) compare with control group as shown in figure (1).

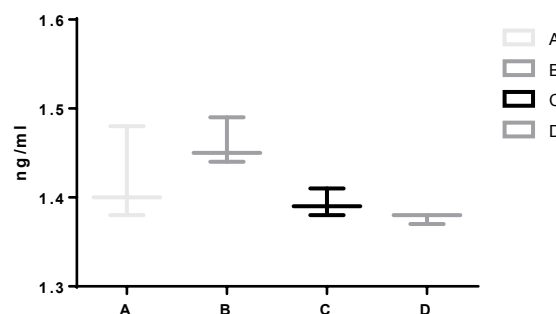


Figure (1): levels of HMG reductase

In terms of the enzyme HMG-CoA reductase, the results showed that the concentrations of the enzyme in the group given high cholesterol diet decreased but no significant differences found with the control group. The slight decrease in enzyme concentrations that were not significant with the group could be explained by the fact that the concentration of cholesterol inside the cells is regulated by Internal construction and taking from outside (via diet). Internal construction is done by hepatic HMG-CoA reductase feedback, while the external source is controlled by LDL receptors⁽¹⁵⁾. About the role of flavonoids to slightly decrees of HMG-reductase may back to its affect lipid metabolism through inhibition of acyl coenzyme A: cholesterol O-acyltransferase and 3-hydroxy- 3-methylglutaryl-coenzyme A (HMG CoA) reductase in rats⁽¹⁶⁻¹⁷⁾.

MDA, GSH and catalase

The levels of MDA (increase), GSH (decrease)

and catalase (decrease) in positive group show high significant changes ($P < 0.05$) compared with control group. The levels of MDA, GSH and catalase in third and fourth groups show non-significant changes ($P < 0.05$) compare with control group as shown in figures (2-4).

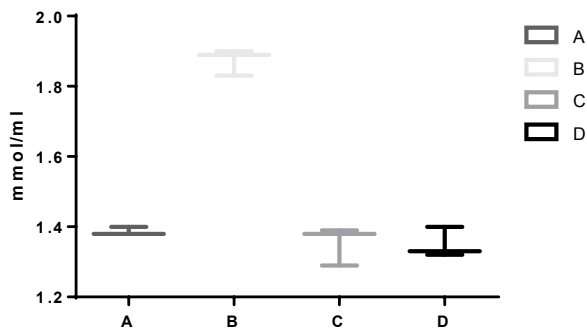


Figure (2): levels of MDA

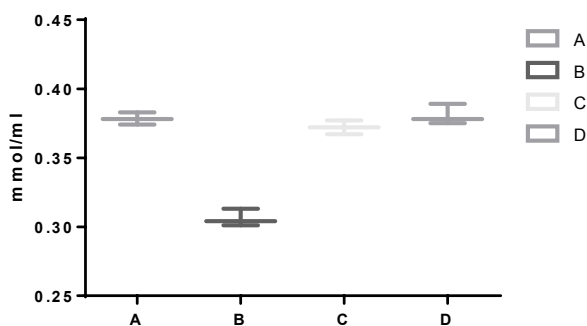


Figure (3): levels of GSH

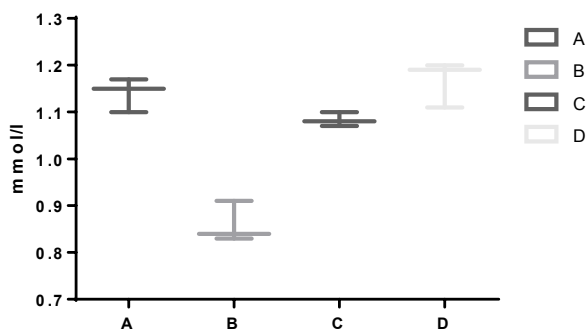


Figure (4): levels of catalase

About the role of hyperlipidemia to increased MDA levels and decreased the levels of GSH and catalase. Anwer et al, referred that the elevated level of LPO is attributed to the enhanced production of ROS⁽¹⁸⁾. After treatment with flavonoids extract the MDA levels decreased and GSH and catalase levels increased that may back to they protect against oxidative damage by directly neutralizing reactive oxidants⁽¹⁹⁾. Al-Jumaily et al, referred that the flavonoids pure of Iraqi propolis

has led to a reduction of the inhibitory effect as well as for damage to the work of the liver and there by protect members from free radicals and inhibit the liberation of these ROS⁽²⁰⁾.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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