



Research Article

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SHORT-TERM FEEDING EFFECTS OF ORIGANUM SYRIACUM. CRUDE EXTRACT ON BLOOD CONSTITUENTS IN RATS

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ABSTRACT

This study was carried out to investigate the effect of the whole crude extract of *Origanum syriacum* L. "Syn. *Majorana syriaca* (L.) Rafin" on different biochemical parameters in blood using animal model. The aerial parts of *Origanum syriacum* L. were extracted with petroleum ether, chloroform, methanol and water, all these extracts were combined to prepare the whole extract then administrated orally in two doses 100mg/kg and 400mg/kg. The results obtained indicate that the extract showed a significant decrease in LDL-cholesterol, triglycerides and glucose in both doses, while a non-significant increase of urea and HDL-cholesterol was observed as compared to normal saline treated controls. This study showed that the whole extract of *Origanum syriacum* L. possess a potential pharmacological activity in lowering the major lipid profile parameters in which we have reported for the first time.

Keywords: *Origanum syriacum*, *Majorana syriaca*, HDL-cholesterol, LDL-cholesterol, Cholesterol, Triglycerides.

INTRODUCTION

Many diseases can be caused by malnutrition or an imbalance in the diet, such as cardiovascular diseases, diabetes, obesity or hypercholesterolemia¹.

The abnormalities of lipid and lipoprotein are very common in the universal population, and considered to be a high risk factor for cardiovascular disease due to the effect of cholesterol, Which is the most important lipid related to atherosclerosis.

Huge number of synthetic drugs has been synthesized to treat various cardiovascular diseases and hypercholesterolemia; the high cost of these new drugs could limit their use in economically compromised countries, so an alternative of these synthetic drugs became more urgent in these countries.

Origanum syriacum L. (Syn. *Majorana syriaca* (L.) Rafin) is a plant that grows in eastern Mediterranean and west Asia, it is the most popular herbs among Middle East, the plant has erect and rigid stems; wooly canescent and glandular, leaves are short petiolate to sessile, corolla white, it is the essential element of the so called "Za'atar"(which is also spelt **satar**, **zahatar** or **zatr**), which is a mixture of spices used as a condiment with Middle Eastern origins. The name of the condiment shares the Arabic name of the herb used as the main ingredient, this herb is consumed alone or in combination with other herbs, the most common way is to grind it and to consume it entirely alone.

The chemical components of *Origanum syriacum* L. were reported²⁻⁷. The plant contains an essential oil containing mainly thymol and carverol, Monoterpen glucosides, phenols

including gallic acid, rosmarinic acid, caffeic acid, apigenin, naringenin and luteolin-7-*O*-glucoside, previous studies have confirmed certain activities for this plant, such as neurological activities due the inhibitory effect of acetylcholinesterase⁸, in vitro antioxidant⁹ and antimicrobial activities of the essential oil¹⁰. The insecticidal property of essential plant oil against the mosquito *Culex pipiens molestus* was reported¹¹.

This study was undertaken to investigate the effect of the consumption of *Origanum syriacum* L whole extract on different blood constituents in rats, which includes glucose, Urea, HDL-cholesterol, LDL-cholesterol, Triglycerides and total cholesterol.

MATERIALS AND METHODS

Plant Material

The plant material was collected in April 2016 during the flowering stage, the plant was identified by Dr. Ammar Bader, Al-Zaytoonah University of Jordan, and a voucher specimen was deposited in the Herbarium of the laboratory of Pharmacognosy in the same university (voucher specimen number Zay-JO 2016-1).

100 g of the air dried and powdered plant was successively extracted with: petroleum ether, chloroform (CHCl₃), methanol (MeOH) and water (H₂O), by exhaustive maceration yielding 3.2 %, 4 %, 6.3 % and 10.9 % respectively. All dry extracts were dissolved in a small amount of their original solvent of extraction then they were combined together to make a whole extract of the plant, the sum of these extracts was dried completely by the rotary evaporator. Stock solution was made by suspending the whole extract with gum Arabic 0.5% p/w.

Animal Groups

Animals were bred in the animal care center of the Faculty of Pharmacy, Al-Zaytoonah University of Jordan and were provided free access to food and water throughout the experimental duration. Rats were maintained in a 12 hrs light-dark cycle under constant humidity and (22 ± 2 °C). Principles of laboratory animal care as described in the European Community guidelines were followed. All experiments were approved by the Animal Welfare Committee of the University

The animals were classified into 3 groups of 8 rats each. The controls group rats were given 2 ml of saline orally per kg body weight and the experimental rats received a dose of 100 and 400mg of the extract per kg body weight orally each day for 20 successive days after that animals were anaesthetized with diethyl ether and blood was collected from renal artery. The blood samples were immediately centrifuged (3000 rpm for 10 min) and the serum was used for the parameters analysis by an enzymatic method with an automated analyzer (Model Erba XL-300, Mannheim, Germany).

DISCUSSION

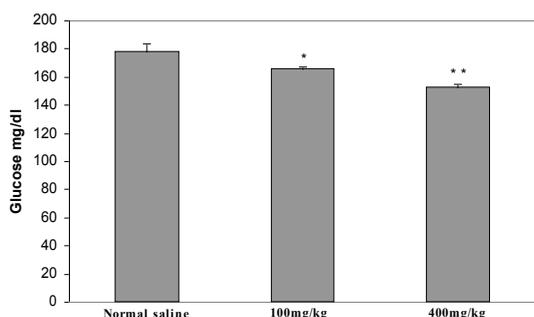


Figure 1: Circulating level of Glucose in control, low dose (100mg/kg) and high dose (400mg/kg) of *Origanum syriacum* L. extract treated rats
*P < 0.05, **P < 0.005, as compared with normal saline treated rats.

Statistical Analysis

The data expressed as mean ± S.E.M were analyzed by student's t-test. Differences below the 0.05 level (P < 0.05) were considered significant.

RESULTS

Intragastric administration of *Origanum syriacum* L showed a significant decrease in glucose level (Figure 1) both in low dose (100mg/kg, P<0.05) and more significance in high dose (400mg/kg, P<0.005) as compared to normal saline treated controls. Urea level showed a slight increase in both doses (Figure 2), while there was a slight increase in HDL-cholesterol with no significance and a significant decrease of LDL-cholesterol in both low and high doses (table 1), triglycerides has showed a significant decrease in both doses (P<0.0005), while cholesterol decreased slightly in high dose only compared to normal saline treated controls (Table 1).

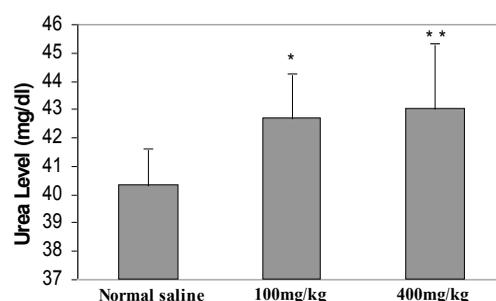


Figure 2: Circulating level of Urea in control, low dose (100mg/kg) and high dose (400mg/kg) of *Origanum syriacum* L. extract treated rats
*P < 0.05, **P < 0.005, as compared with normal saline treated rats

Table 1: Circulating levels of HDL-cholesterol, LDL-cholesterol, Triglycerides and total cholesterol in control, low dose (100mg/kg) and high dose (400mg/kg) of *Origanum syriacum* L. extract treated rats

	Normal saline treated Control	Low dose of the extract 100mg/Kg	High dose of the extract 400mg/Kg
HDL mg/dl	63.33 ± 1.7	64.0 ± 2.27	64.33 ± 2.06
LDL mg/dl	18.17 ± 1.01	12.67 ^b ± 0.95	16.00 ^a ± 0.52
Triglycerides mg/dl	98.00 ± 6.59	50.00 ^c ± 1.93	59.66 ^c ± 2.08
Cholesterol mg/dl	80.67 ± 1.93	80.67 ± 3.60	78.33 ± 1.71

^aP < 0.05, ^bP < 0.005, ^cP < 0.0005 as compared with normal saline treated rats.

Our data shows no effect of thyme on cholesterol, but a slight decrease was observed at high dose (400mg/kg), this lowering effect of thyme treatment concomitant with an increase in the level of HDL-cholesterol in low and high thyme dose and a significant reduction of both glucose and triglycerides. The observed decrease in plasma cholesterol concentration may be attributed to the increase in cAMP concentration that has an inhibitory effect on cholesterol synthesis¹². Our observation can

be explained by the fact that rosmarinic acid is one of the major component of thyme has the ability to increase cAMP¹³.

The observed reciprocal relationship between plasma HDL-cholesterol and plasma triglycerides after high dose of thyme are in support of recent data demonstrating HDL-cholesterol to vary reciprocally with plasma triglycerides concentration and directly with lipase¹².

The lowering effect of thyme on plasma glucose concentration can be explained by the action of rosmarinic acid which has antihyperglycemic effect by its ability to inhibit porcine pancreatic amylase activity^{14,15}.

Thyme seemed to slightly affect plasma urea at both high and low doses, the decrease in the urea level might be due to hypoglycemic effect of rosmarinic acid that could activate gluconeogenesis with subsequent increase in urea level¹⁶.

CONCLUSION

Our study showed the beneficial use of *Origanum syriacum*, since this plant is used extensively by many people in different regions of the world. Thus, the present study is a maiden attempt where the extract showed a lowering effect on different major lipid profile parameters.

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