

THE EFFECTS OF *TEUCRIUM POLIUM* LEAVES ON HEMATOLOGICAL INDICES AND SOME BIOCHEMICAL PARAMETERS IN RATS

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ان تأثير خلاصة أوراق نبات التيوكريم بوليم قيمت على الفئران خلال فترة أسابيع من التعاطى وقد درست صورة الدم وبعض العوامل البيوكيميائية، وقد لوحظ نقص واضح فى كرات الدم الحمراء والهيموجلوبين وحجم الخلايا. ومع ذلك وجد أن بعض عوامل الدم مثل متوسط هيموجلوبين الخلايا وحجم الخلايا لم يتغير وقد لوحظ أن هناك نقص واضح فى الصفائح الدموية بينما كانت هناك زيادة واضحة فى كرات الدم البيضاء، أما عن الجلوكوز الموجود فى السائل الدموى لم يتغير بطريقة ملحوظة بينما نقص بدرجة ملحوظة الكوليستيرول الموجود فى السائل الدموى. أيضا لوحظ زيادة فى انزيم جلوتاميت اوكسالو اسيتات ترانس أمينيز وأيضا انزيم الفوسفاتيز القاعدى وانزيم اللاكتيت دى هيدروجينيز بينما نقص انزيم جلوتاميت بيروفيت ترانس أمينيز.

The effects of T. Polium leaves extract were evaluated on rats during three weeks of administration. Blood picture and some biochemical parameters were investigated. Significant decrease was demonstrated in red blood corpuscles (RBCs), hemoglobin (Hb), and packed cell volume (PCV). However, other blood indices, mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular volume (MCV) were not changed. There was significant decrease in the platelets (PLT), while white blood cells showed a significant increase. Serum glucose level change was insignificant while the level of serum cholesterol was significantly reduced. Significant increases were found in the serum activities of glutamate oxaloacetate transaminase (GOT), alkaline phosphatase (ALP) and lactate dehydrogenase (LDH) while glutamate pyruvate transaminase (GPT) was decreased.

INTRODUCTION

Teucrium polium L. is a widespread medicinal plant of the Lamiaceae family. It has multiple applications in folk medicine in many countries because of its hypoglycemic effects,^{1,2,3} anti-inflammatory and anti-ulcerogenic activities.^{4,5} Hypolipidemic effects on serum cholesterol and triglycerides have been reported.⁶ Other studied properties of *T. polium* include antihypertensive,⁷ anorectic,⁸ and promotion of wound healing effects.⁹ The effect on mitotic activity has also been studied.¹⁰ However, the effect of *T. polium* on hematologic indices has not been confirmed experimentally. On this basis, the present study was carried out in order to demonstrate the effect of the *T.*

polium leaves extract on the cell components of the blood and some biochemical parameters in rats.

EXPERIMENTAL

Plant material

The plant grows locally. Sample was obtained as dried plant from herbal store, identified by Department of Biological Sciences, University of Jordan.

Preparation of decoction

Three grams of the dried aerial parts collected in pre-flowering stage was boiled in 100ml of distilled water, the extract then was filtered and used in the experiment.

Animals

Healthy male Wistar rats (200-220 g) were used. The animals were housed under standard condition of temperature ($23^{\circ} \pm 1$), and about 70% humidity. They were given diet and water ad libitum. The animals were divided into two groups consisting of six rats each. The first group received single daily dose of (2.5 ml/kg) of the extract by intra-peritoneal route, for three weeks. The second group received distilled water and used as control. The animals were killed 24 hrs after last administration and blood was collected in plain vials for determining the biochemical parameters and EDTA-containing vials for blood examination.

Blood evaluation

All the measurements of the parameters were carried out by using a fully automated coulter counter.

Biochemical assays

The following parameters were evaluated after 3 weeks treatment. The activities of serum GOT, GPT, ALP, LDH,^{11,12,13} serum glucose and cholesterol levels^{14,15} were determined by using Boehringer Kits.

Statistical analysis

Data were presented as mean \pm SEM of six separate experiments. Statistical significance between control and treated groups was assessed by unpaired student's t-test.

RESULTS AND DISCUSSION

The results of the hematological and some biochemical parameters are presented in Tables (1) and (2) respectively.

Results in Table (1) indicate that there is a significant decrease in the erythrocytes count, Hb, and PCV content ($P < 0.001$) of treated animals after the period of treatment as compared with the control. There are no changes in the values of MCV and MCHC. This indicates that the Hb content of the RBCs is normal, and the reduction in Hb is due to decrease in the RBC count.¹⁶

The platelet count also showed significant decline. The reduction of RBCs and platelets counts can be explained by inhibition of both erythropoietic and thrombopoietic activities of the bone marrow.¹⁶

On the other hand, white blood cells exhibit a significant increase in the count ($P < 0.001$). This can be attributed to the reactive response due to the stress that affects the bone marrow and is demonstrated by the inhibition of erythropoiesis and thrombopoiesis.¹⁷ Previous study on the sub-chronic toxicity of *T. polium*¹⁸ has failed to demonstrate these hematological changes.

Teucrium polium treatment causes a significant decrease in the serum value of GPT ($P < 0.001$), while the level of serum GOT shows that there is no significant difference between the treated and control groups. Rasekh *et. al.* have demonstrated no changes in these

Table 1: The effect of the *T. polium* aqueous extract on hematological parameters in rats after 3 weeks of treatment.

Group	RBCs $10^6/\text{mm}^3$	Hb g/dl	PCV %	MCV fl	MCHC g/dl	MCH pg	PLT $10^3/\text{mm}^3$	WBCs $10^3/\text{mm}^3$
Control	7.616 ± 0.27	15.5 ± 0.7	45.5 ± 1.3	58.3 ± 0.7	33 ± 0.2	20.3 ± 0.1	449.33 ± 3.1	3.85 ± 0.3
<i>T.Polium</i>	$4.635 \pm 0.05^*$	$8.9 \pm 0.1^*$	$27.4 \pm 0.2^*$	55.6 ± 1.1	34.4 ± 0.3	20.6 ± 0.2	$274.5 \pm 1.7^*$	$5.45 \pm 0.1^*$

The values in the table are means \pm SEM of six separate experiments.

* $P < 0.001$ student's-t-test

Table 2: The effect of the *T. polium* aqueous extract on serum biochemical parameters in rats after 3 weeks of treatment.

Group	GPT U/L	GOT U/L	ALP U/L	LDH U/L	Glucose Mg/dl	Cholesterol Mg/dl
Control	43.13 ± 2.1	220.7 ± 12.2	84.7 ± 2	17.4 ± 5.9	93.7 ± 4.9	268.8 ± 15.9
<i>T. Polium</i>	26.40 ± 0.5*	209.5 ± 15.1	105.8 ± 3*	294.0 ± 19.9*	111.5 ± 5.2	138.3 ± 7.7*

The values in the table are means ± SEM of six separate experiments.

* P < 0.001 student's-t-test

enzymes in male rats but elevated in female rats in response to the extract of the plant.¹⁸ Transaminases (GPT and GOT) are good indices of liver and kidney damage respectively. In this work, the aqueous extract does not elevate the level of transaminases, and it seems to offer protection and maintain the function of liver.

Alkaline phosphatase and lactate dehydrogenase were significantly increased (P < 0.001) in the serum of animals injected with leaves extract of *T. polium*. High level of serum ALP has been reported with several diseases and disorders involving bone and congestive heart failure, while elevated LDH activity has been demonstrated in myocardial infarction, muscular dystrophy and generalized carcinoma.¹⁹

Treatment of rats with the aqueous extract of *T. polium* at dose of 2.5 ml/kg had no significant effect on the serum glucose level after the three weeks. Similar findings have been reported.¹

Serum cholesterol value was significantly reduced (P < 0.001) when compared to the control group. There was no significant change demonstrated in serum glucose. Garaibeh *et. al.* have demonstrated hypoglycemic effect 4 hours after *T. polium* extract administration.²⁰ The contradiction in the results is probably due to the time of blood sampling, which is 24 hours after the administration of the extract in this work.

Furthers studies are needed to identify the mechanisms responsible for these effects.

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