The effects of hydro-alcoholic extract of *Artemisia dracunculus* L. (Tarragon) on hematological parameters in mice

Mehrdad Modaresi[1], Mahnaz Alasvand Zarasvand[2*], Mahboobeh Madani[2]

1. Department of Physiology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran
2. Department of Microbiology, Falavarjan Branch, Islamic Azad University, Isfahan, Iran

***Corresponding author:**Tel: +98 9132161138 Fax: +98 3136500833
Address: Department of Microbiology, Falavarjan Branch, Islamic Azad University, Isfahan, Iran
E-mail: mahnaz_alasvand@yahoo.com
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Abstract

Introduction: *Artemisia dracunculus* L. (Tarragon) is one of the plants that uses as meal and remedy for a long time, and possesses many medicinal properties. In traditional medicine also has mentioned to its beneficial properties. A number of researches through in vitro and in vivo studies showed the pharmacological properties of this plant. This study was done for determining the effect of hydro-alcoholic extract of *A. Dracunculus* L. on some hematological parameters among mice.

Materials and methods: In this study, 40 male mice were divided into five groups: a control, a placebo, and three treatment groups that were injected with 50, 100, and 200 mg/kg doses of hydro-alcoholic extract of tarragon every other day for 20 days. At the end of injections, the levels of WBC, RBC, lymphocytes, monocytes, and neutrophils were measured. Statistical analysis was done using SPSS software and analysis of variance (ANOVA) test.

Results: The obtained results showed that there was no significant difference in amounts of WBC, RBC, and monocytes in the treatment groups in comparison with the control group. Lymphocytes showed significant decrease in groups of 100 and 200 mg/kg doses than the control group. The level of neutrophils showed significant increase in two treatment groups (100 and 200 mg/kg) than the control group.

Conclusion: It can be concluded that the hydro-alcoholic extract of tarragon stimulates the production of neutrophils in this study which can be used as an immunostimulating agent.

Keywords: *Artemisia dracunculus* L., Blood parameters, Hydroalcoholic, Mice

Introduction

Plants and their derivations have shown beneficial therapeutic effects such as; anti-oxidant, anti-inflammatory, anti-cancer, anti-microbial and immunomodulatoty properties (1). Herbal medicines are used by about 60% of the world people in many countries (2). Nowadays, people are interested in using herbal medicine because of some reasons such as side effects of chemical drugs; increasing resistance of microorganisms to many drugs especially antibiotics, and high costs of producing chemical drugs (3). Plants are complementary and alternative medicine due to their ability for producing secondary metabolites such as; proteins, flavonoids, alkaloids, steroids, and phenolic compounds which are used to recover health and cure many diseases (4). For instance, flavonoids in many kind of

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plants have been shown possess anti-allergic, anti-inflammatory, anti-cancer, anti-oxidant, and anti-carcinogenic activities (5). *Artemisia dracunculus* L. (Tarragon) is the plant that classified as Kingdom: Plantae, Division: *Magnoliophyta*, Class: *Magnoliopsida*, Order: *Asterales*, Family: *Asteracea*e, Genus: *Artemisia* L., Species: *Artemisia dracunculus* L (6), is a perennial plant with a woody rhizome. Important bioactive compounds are essential oils, cumarins, flavonoids, and phenolic acids. The main compounds of essential oils are estragol (methyl chavicol) that the content varies from 40 to 60%, and methyl eugenol (7). Therapeutic properties of tarragon like anti-pyretic, anti-febrile effects, and facilitate respiration were noted by Abu Mansur, Avicenna, and Ibn Baitar (8). In traditional medicine A.dracunculus is used to improve malfunctioning digestive, anti-insomnia, anti-epileptic, anti-inflammatory, anti-microbial, flush toxins from body, anesthetic for teeth-ache, anti-spasmodic and treatment carminative. In vivo pharmacological effects of tarragon have been shown some properties such as; hepatoprotective activity, anti-hyperglycemic action, hypolipidaemic action, anti-oxidant activity, anti-hypoxic activity, and neurotropic activity (7, 9,10). Blood parameters like red blood cells, white blood cells, neutrophils, monocytes, and lymphocytes are vital cells in blood circulation, so any increase or decrease in concentration of these cells affect the immunity and the health constitution of the body. Considering the therapeutic properties of tarragon and the basic roles of the mentioned blood parameters, the effect of hydroalcoholic extract of A. dracunculus L. was investigated on hematological parameters in mice.

Materials and methods

Animals: In this study, 40 male mice (30 ± 5g) were provided from Pasteur Institute of Iran and kept in special cages. The mice were housed in a standard condition under 12:12h light / dark period at 24 ± 5°C with free access to water and food. In order to adapting to the new environment, they were kept for a month and then the injections were performed. Approval for this study was given by the Ethical Committee of Islamic Azad University, Falavarjan Branch.

Preparation of extract: After identifying tarragon in Isfahan Center for Research of Agricultural and Natural Resources the leaves were separated, dried in the shade and powdered by electrical grinder. An amount 50g of the powder was moved to a sterile Erlenmeyer and ethylalcohol was added until the mixture was suspended. Then the mixture was shaken by a shaker for 48 hours. Afterwards the mix was filtered by filter paper. The obtained liquid was heated in an oven at 40°C until the alcohol evaporated. The residual was pure extract. At the end, by adding a definite amount of normal saline, three doses of extract; 50, 100, and 200 mg/kg were prepared and refrigerated at 4°C for injections.

Experimental conduct: The mice were divided into five groups of eight members in each group. The first group was considered as control, the second group as a placebo (which received 0.5 ml normal saline every other day), the third, the fourth, and the fifth groups were received 50,100, and 200 mg/kg doses of hydroalcoholic extract via intraperitoneal (i.p) injection every other day for 20 days.

Blood analysis: After the final injections, the mice were anaesthetized and killed by cervical decapitation. Blood samples were collected from cervical artery using heparinized tubes and then centrifuged and analyzed by Cell Counter (PCE 210 ERMA) to determining amounts of RBC, WBC, lymphocytes, neutrophils and monocytes.

Statistical analysis

Statistical analysis was performed by SPSS software. One-way analysis of

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variance (ANOVA) followed by the Tukey post hoc test was used to compare mean values of quantitative variables among groups. The criterion for statistical significance was $P < 0.05$.

Results

Table 1 shows the levels of RBCs, WBCs, monocytes, lymphocytes, and neutrophils in three treatment groups in comparison with the control group. The levels of RBC and WBC in the treatment groups have no significant changes comparing with that of the control group ($P < 0.05$). Amounts of monocytes slightly increased in two treatment groups (100 and 200 mg/kg doses). The levels of lymphocytes in two treatment groups (100 and 200 mg/kg doses) showed significant decrease comparing with the control group ($P < 0.05$). The levels of neutrophils in two treatment groups; 100 and 200 mg/kg doses showed significant increase than the control group ($P < 0.05$).

Table 1. The results of effect of hydroalcoholic extract of tarragon on blood cells in five experimental groups (n=8).

	Treatment groups				
	Dose 50 mg/kg	Dose 100 mg/kg	Dose 200 mg/kg	Placebo	Control
WBC	2487.50±331.39	2350.00±160.37	2387.50±155.26	2437.50±118.77	2275.00±116.49
	117.17	56.69	54.89	41.99	41.18
RBC	5.59±.33	5.71±.34	5.9875±.38	5.5625±.05	5.8750±.31
	0.12	0.34	0.13	0.02	0.12
Monocyte	1.87±.99	3.50±1.60	2.75±1.03	1.87±.83	2.50±.53
	.35	1.60	0.37	.29	0.19
Lymphocyte	62.12±2.47	51.25±3.28*	49.25±3.65*	61.62±1.85	59.50±.53
	0.87	1.16	1.29	0.65	0.19
Neutrophil	36.00±2.67	45.25±2.38*	48.00±3.74*	36.50±1.20	38.00±.76
	0.94	0.840	1.32	0.42	0.27

* Statistically significant difference compared with control group ($P< 0.05$). Data are shown as mean ± SD and standard error.

Discussion

Plants and plant extracts have potential to influencing health and cure some diseases. As was described, *A. dracuculus* L. has remarkable pharmaceutical properties. In this study hydroalcoholic extract of tarragon showed different results on blood parameters because of having various secondary metabolites. In our study the levels of RBC and WBC had no significant changes in the treatments groups. The extract of *Crocus sativus* and safranal on guinea pigs had shown WBCs in blood was increased. Which was attributed to safranal (11). Ladokun et al, had shown administration of extract of Vicum album (mistletoe) decreased RBC, and increased WBC in rats. Reduction of RBCs had been assumed to be associated with perturbed haemopoeisis and destruction of RBCs, and increase in WBCs was due to containing agent that stimulated the proliferation of leucocytes (2). Blood monocytes develop in the bone marrow and also they may remain in the circulation for long periods. After entering into tissue, monocytes differentiate into tissue macrophages. Macrophages and their circulating precursors, called monocytes, play a basic role in innate and adaptive immunity. They also are important effecter cells for the elimination of foreign substances (12). In the results of this study was showed that the amounts of monocytes slightly increased in two treatment groups (100 and 200mg/kg doses), however, it was not statistically significant. Increasing doses of the extract in this research may cause significant changes in the amount of monocytes. Effect of hydroalcoholic extract of

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Ziziphus jujube in Balb/c mice had shown the percentages of monocyte and lymphocytes decreased, and it had been attributed to being triterpenoides in jujube fruit (13). The levels of lymphocytes in the two treatment groups showed significant decrease. Immunomodulatory activity of flavonol glycosides from *Euphorbia microsciadia Bioss* had shown that anti-proliferative activity of lymphocytes was due to inhibiting of protein kinase C (PKC) enzyme. This enzyme plays an important role in the T-cell activation (14). Amirghofran et al, had shown the extract of various medicinal plants caused lymphocyte inhibitory effects at high doses and it seems to inducing of apoptosis (15). The levels of neutrophils in two treatment groups showed significant increase. Immunomodulatory effect of aqueous extract of *Erigeron floribundus* (Kunth) leaves stimulated increase of neutrophils and lymphocytes in rabbit blood (16). Immunological effects of *Teucrium polium* on neutrophil had shown an increase in the neutrophils activity and improvement in their functions (17). Phagocytic cells such as neutrophils and macrophages are important groups which belong to innate immunity system. Innate immunity provides the early line in defending against microorganisms and foreign substances. Production of neutrophils are stimulated by G-CSF (granulocyte colony-stimulating factor) (18). Our results suggest that *A. dracunculus* L. might be effective on neutrophils proliferation as a result of affecting G-CSF and consequently boosts the cell-mediate innate immunity.

Conclusion

In conclusion, a. dracunculus L. (Tarragon) may be recommended for use as immunostimulant in normal and immunocompromized system for protection against various bacteria, viruses, and many diseases due to an increase in the neutrophil cells and boost innate immunity. However, isolation and purification of tarragon components are also needed to find out the effective component(s) and related mechanism(s) of this approach. In addition, investigation of other extracts of tarragon (aquatic, acetonic, etc.) on blood parameters and other infections and diseases are strongly recommended.

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Conflicts of interest

None of the authors have any conflicts of interest.

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