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Research Article

THE EFFECT OF HYDROALCOHOLIC EXTRACT OF DRACOCEPHALUM KOTSCHYI ON ELECTROPHORETIC PATTERN AND BLOOD IMMUNOGLOBULINS OF LABORATORY MICE

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Abstract:

Dracocephalum kotschyi is one of the medicinal plants that is involved in the treatment of many diseases and contains flavonoids, monoterpene, terpenoids, phytosterol and beta-caryophyllene compounds. This study was carried out to investigate the effects of *Dracocephalum* extract on blood immunoglobulins of female mice (Balb/C race). Fifty mice were divided into five groups: control, placebo, and extract groups at doses of 50, 100 and 200 mg/kg of body weight. Hydroalcoholic extract was injected intraperitoneal every two days for 20 days. Biochemical blood tests were performed using protein electrophoresis. The indices evaluated were albumin, beta-globulin, alpha-1-globulin, alpha-2-globulin, gamma-globulin, and the ratio of albumin to globulin. Results showed increased levels of albumin in the 50 mg/kg and 200 mg/kg groups, alpha-1 in 50 mg/kg group and alpha-2 in all groups. Beta-globulin was significantly decreased in 50 and 100mg/kg groups compared to the control group. Gamma globulin amount was decreased in 50 mg/kg but increased by 100 and 200 mg/kg groups. The ratio of albumin to globulin was significantly decreased in 100mg/kg group compared to control group. According to the results, the extract can affect blood proteins, dose dependently and it has different effects at different doses, which emphasizes the proper use of herbs.

Keywords: hydroalcoholic extract, *Dracocephalum kotschyi*, immune system, laboratory mice**Corresponding author:****Mehrdad Modaresi,**Associated Prof., Department of Physiology,
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INTRODUCTION:

The use of medicinal plants for the treatment of diseases is as old as the history of human life. Humans had no choice but to resort to plants throughout history. People have been using herbs for centuries to improve their health. Plants have historically been used as food or medicine to treat or prevent diseases. Traditionally, the plants were mostly consumed fresh, brewed or boiled. Today, in addition to mentioned uses, these plants are used as raw materials for many chemical derivatives. In most cases, the treatment effect is related to a particular substance in the plant and to achieve the desired effect, a certain concentration of the substance is considered. It should also be noted that the active substances of various plants have different amounts depending on the climatic conditions of growth environment. Medicinal herbs refer to a wide range of herbs that are used to treat or prevent diseases. The scope of this area is determined by the national culture, laws and regulations and scientific developments of each country. Any plant can be considered as a medicinal plant in the traditional medicine of the countries [1].

Today, societies are turning to herbal remedies due to greater wealth, diversity in consumption culture, adverse effects of chemical drugs, increased confidence in medicinal plants and environmental pollution. *Dracocephalum kotschyi* is one of the endemic plants of Zagros region especially Esfahan and Chaharmahal va Bakhtiari provinces which is subject to extinction and is diminishing daily because of its value and importance. It is used as an important medicinal plant to relieve rheumatic and joint pain. The organs of this plant have flavonoid, monoterpene, terpenoid, phytosterol and beta-cariophyllene compounds [2]. The presence of a compound called "xanthomicrol" in the leaves of this plant is responsible for the main anti-cancer properties of this medicinal plant. The main constituents of this plant include limonene, Verbenone, alpha-terpineol, perryll alcohol and caryophyllin [3]. According to researches, therapeutic effects of plant's essential oils are comparable to that of hyocin and indomethacin. The therapeutic effects of this plant include reducing fever and joint pain and rheumatism; memory enhancing; treating multiple sclerosis, accelerating blood flow; and treating vertigo, tinnitus, and headaches [4]. It also plays a role in strengthening the immune system [5]. Limonene, one of the main components of the essential oil of the plant, is effective as an angiotensin converting enzyme

inhibitor, antitumor, antiviral, bactericidal, cancer prevention agent, anti-candida, fungal growth inhibitor, antispasmodic and analgesic. Geraniol is also one of the compounds found in the extract of the plant that inhibits the growth and synthesis of polyamines in human cancer cells [4]. Medicinal herbs are believed to be important sources of chemicals with effective therapeutic effects. The desire to use herbal remedies is increasing these days and is becoming a public culture. This plant in Iran is called by various local names such as Aghbash, Golbaghchogh, and Badranjbouyeh grows in rocky cold regions with altitudes of 2300 to 3000 meters above sea level. Various sources have reported that this species is on the verge of extinction. *Dracocephalum* is often found in the highlands. Unfortunately, the true value of this species is not known and even most people are unaware of this plant and its medicinal effects [5]. This study was carried out to investigate the effects of *Dracocephalum* extract on electrophoretic pattern and blood immunoglobulins of laboratory mice.

MATERIALS AND METHODS:

Syrian laboratory female mice were prepared (30±5 g) and divided in five groups with ten members in each group. Samples were kept in separate cages for one month with free access to natural light, food and water and 28-32°C temperature. This situation continued during the injection period. All injection was done intraperitoneal for twenty days every other day.

Treatments were:

- Control group: without any injection, in order to achieve the level of blood parameters and immune factors
- Placebo group: received normal saline to ensure that injections would not affect the results
- Three experimental groups: received ten injections each containing 0.5 cc of 50, 100, and 200mg/kg doses of extract in peritoneum.

Injections were done intraperitoneal using 1cc insulin syringe between the hours of 10-12. At the end of injections, blood samples were taken and changes in electrophoretic pattern and blood immunoglobulins were evaluated [6].

Obtained data were analyzed using SPSS program, one-way variance analysis and Duncan test at 5% probability level.

RESULTS AND DISCUSSION

The results of the effect of *Dracocephalum* extract on the electrophoretic pattern of blood proteins are as follows:

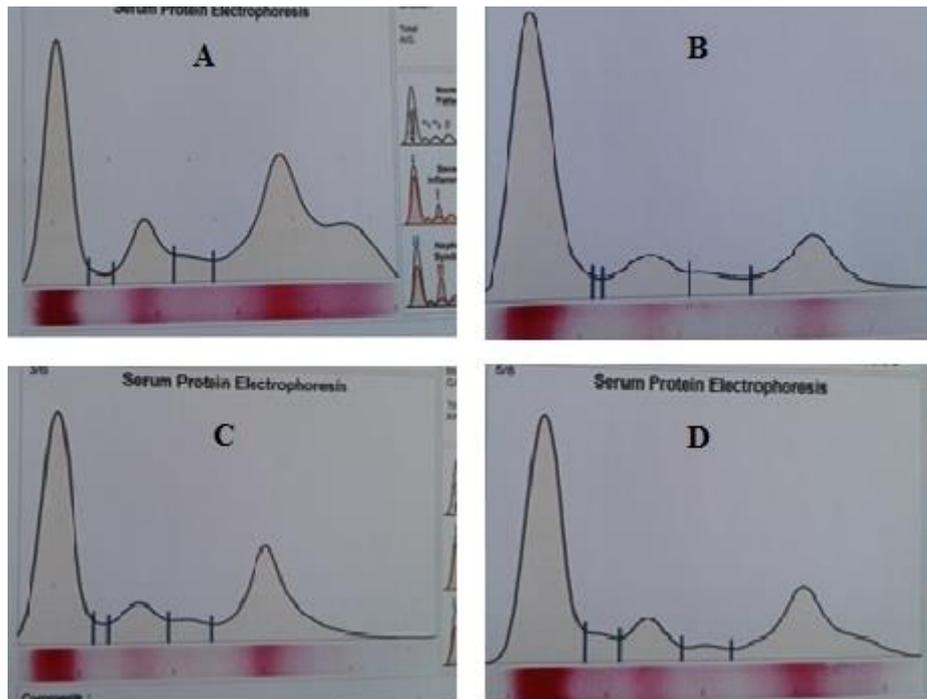


Figure 1: Electrophoretic pattern of control (A), 50 mg/kg (B), 100 mg/kg(C) and 200 mg/kg (D) groups

Mean comparison results of serum albumin showed significant increases in 50 and 200mg/kg groups in proportion to the control group ($p < 0.05$) but 100mg/kg group was not significantly different from control group (Figure 2).

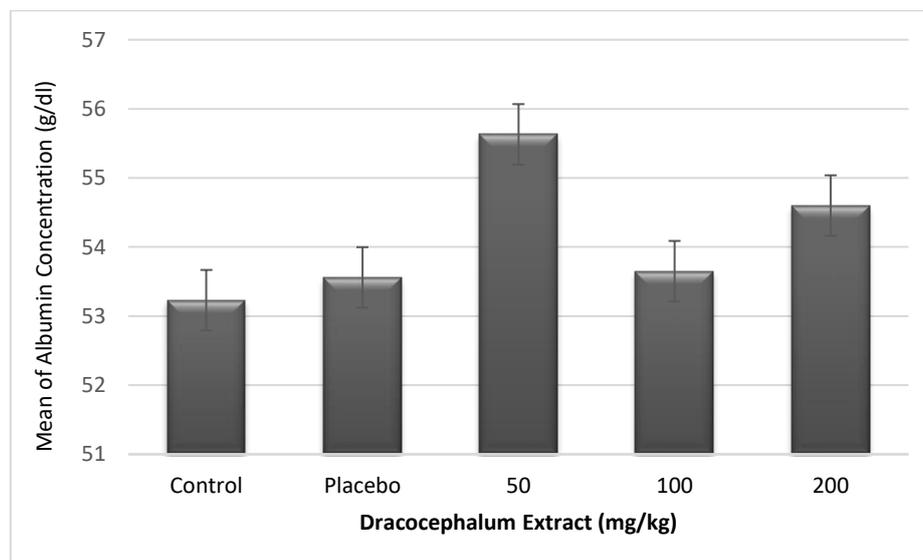


Figure 2. Mean comparison results of albumin concentration

According to Figure 3, the amount of serum alpha-1 was significantly increased by 50 mg/kg group ($p < 0.05$) but 100 and 200mg/kg groups did not increase this trait.

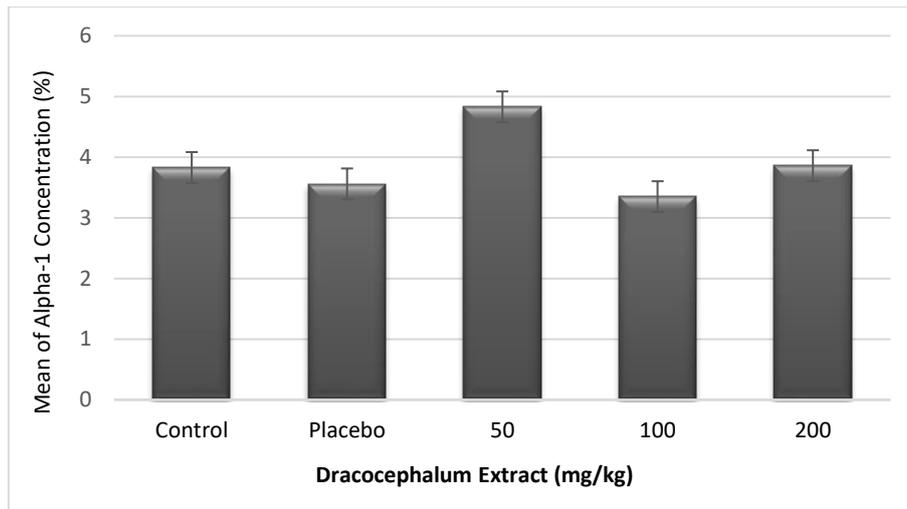


Figure 3. Mean comparison results of serum alpha-1 globulin

All treatment groups increased the level of alpha-2 globulin compared to the control group significantly ($p < 0.05$). Figure 4 shows the results:

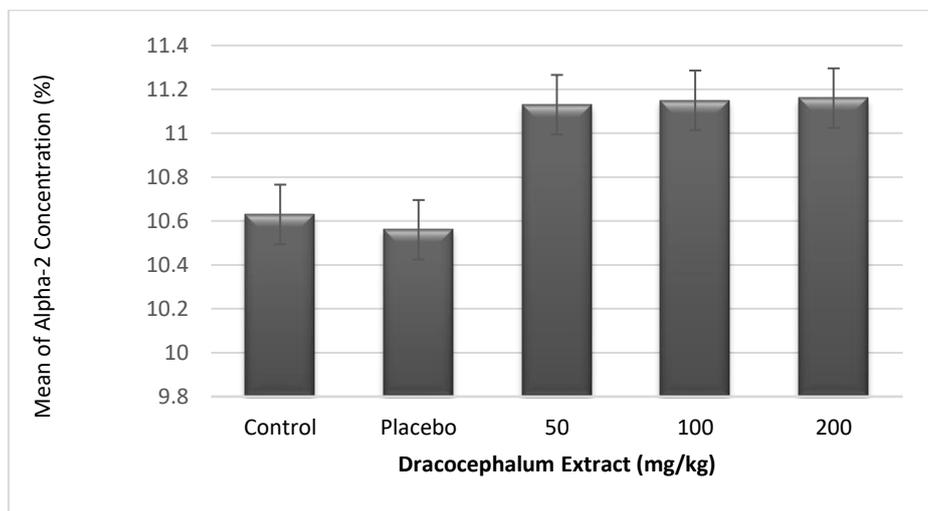


Figure 4. Mean comparison results of alpha-2 globulin

Beta-globulin concentration was significantly decreased by 50 and 100mg/kg groups ($p < 0.05$) but 200mg/kg groups did not change this trait.

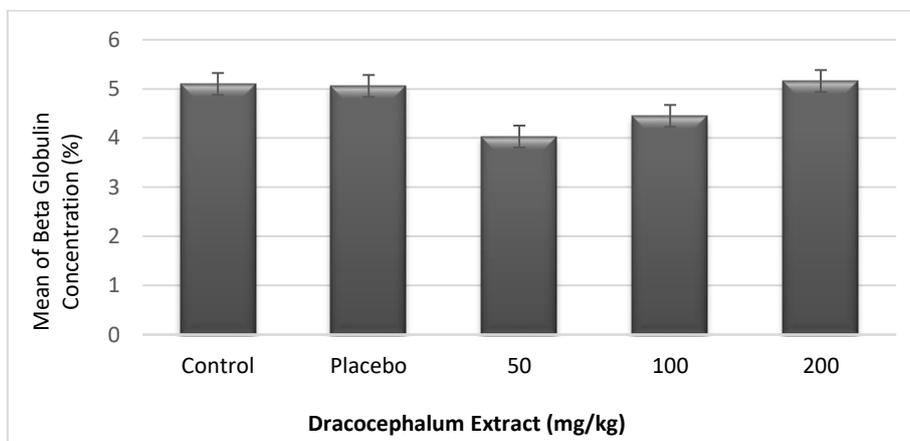


Figure 5. Mean comparison results of Beta-globulin

Concentration of gamma globulin was decreased significantly by 50 mg/kg group compared to the control group, while 100 and 200 mg/kg groups increased it significantly ($P < 0.05$). Based on the results, Albumin to Globulin Ratio was not changed by 50 and 200mg/kg groups but 100 mg/kg group decreased it significantly ($P < 0.05$).

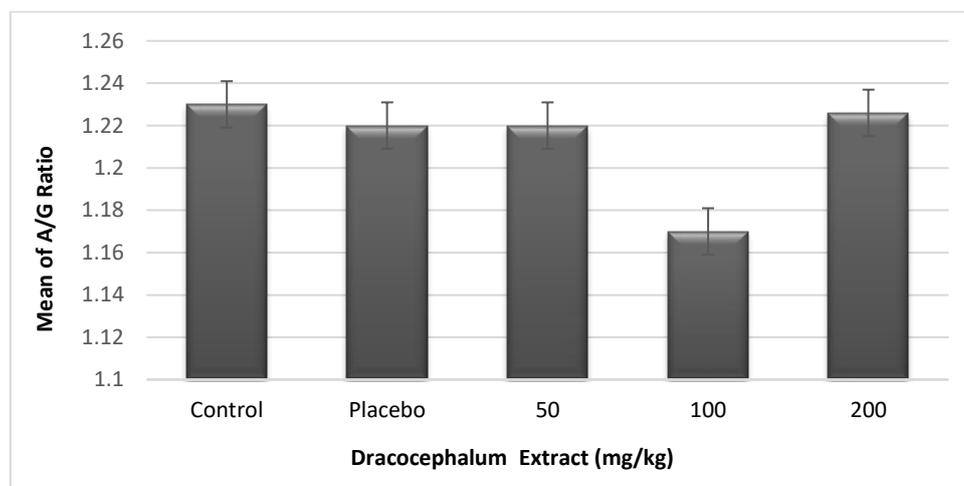


Figure 6. Mean comparison results of Albumin to Globulin Ratio

Enhancing the immune system has many beneficial effects on the body. For example, it can be considered in protocols for wound healing and regeneration of damaged tissues, coping with infectious diseases such as influenza, food poisoning and the prevention of cancer. Strengthening the immune system can even reduce the severity of seasonal allergies. Using natural products to boost the immune system is a turning point in the era when human nutrition depends on chemicals.

According to Figure 2, 50 and 100mg/kg groups had significant higher albumin in proportion to the control group ($p < 0.05$). The results are in agreement with the results of the research on black caraway. Mice injected with black caraway extract had significant increases in their albumin levels [7]. Sultan et al. (2008) reported that chicks who received anise seed in their daily diet had significant increase higher albumin levels [8]. In another study, black seed, Dracocephalum and black elder were examined and mice treated with black seed had a significant increase in the blood albumin [6]. Albumin is synthesized in liver cells by poly ribosomes attached to the granular endoplasmic reticulum and is the most abundant protein in plasma. Probably, due to the positive effect of this extract on the liver, albumin has been increased [9]. Increased albumin content shows dose-dependent increase of liver activity by the extract.

According to Figure 3, the amount of alpha-1 globulin was significantly increased by 50 mg/kg group ($p < 0.05$) but other groups did not increase this trait. This is in agreement with the results of Modarresi (2011) on black caraway which mice injected with the extract had significant higher albumin levels. Alpha-1-antitrypsin is the most

important component of alpha-1 – globulins which its deficiency is associated with a type of liver disease; thus, increased alpha-1-globulin increases liver activity [6]. Alpha 1 - antiproteinase is the most important component of alpha-1 – globulin which its deficiency is associated with emphysema and some kind of liver disease. An increase in alpha-1-proteinase is observed in response to acute inflammation. Increase of this enzyme can be indicative of improved liver function.

Alpha-2- globulin concentration was significantly increased in this study (Figure 4). The results are in agreement with the results of the research on black caraway. Mice injected with black caraway extract had significant increases in their Alpha-2- globulin levels [6]. The major proteins in the alpha-2-globulin band include alpha-2-macroglobulin and haptoglobin. Haptoglobin plays a role in the absorption of free hemoglobin and prevents the excretion of hemoglobin and other iron stores through the urine.

According to Figure 5, Beta-globulin concentration was significantly decreased by 50 and 100mg/kg groups which contradicts the study of Pashaii on black caraway. In that study, there was an increase in beta-globulin of the experimental groups [10].

Concentration of gamma globulin was decreased significantly by 50 mg/kg group, while 100 and 200 mg/kg groups increased it significantly. Golchoobian (2010), reported a significant increase in gamma globulins by 200 mg/kg group of nettle extract but Sultan et al. found a decrease in gamma globulin levels [11, 8].

CONCLUSION:

Given the increase in alpha-1 globulin and albumin in the experimental groups, it can be concluded that increasing amounts of Dracocephalum may have affected the content of these compounds via altering the glomerular permeability. Therefore, it can be concluded that this plant may be able to alter the glomerular filtration rate of blood proteins. The amount of gamma globulin was increased which can be due to the presence of flavonoid compounds in the plant. These results confirm that flavonoids are capable of inducing the immune system. Flavonoids are likely to have a potent effect on the immune system due to their antioxidant properties and the accumulation of free radicals.

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CONFLICT OF INTEREST

The authors contributing to the present study and to this very manuscript have no conflict of interests to declare.

REFERENCES:

1. Ajj, Ahmed, Abdul, Wadud, Nasreen, Jahan, Alia, Bilal, Syeda, Hajera, Efficacy of *Adiantum capillus veneris* linn in chemically induced urolithiasis in rats. *Journal of Ethnopharmacology*. 2013; 146: 411-416.
2. Ghasemidehkordi N. Iranian Herbal Pharmacopoeia. First edition. Ministry of health and medical education. Tehran; 2002: 647 - 54.
3. Dastmalchi K, Damien Dorman HJ, Kos-ar M, Hiltunen R. Chemical composition and in vitro antioxidant evaluation of a water soluble Moldavian balm (*Dracocephalum moldavica* L.) extract. *LWT-Food Sci Technol*. 2007; 40: 239-248.
4. Gu HF, Chen RY, Sun YH, Xing JG. Studies on chemical constituents in herbs of *Dracocephalum moldavica*. *China J Mater Med* 2005; 30: 671-679.
5. Polilaityee V, Venskutonis PR. Antioxidative activity of purple peril (*Perilla frutescens* L.), Moldavian dragonhead (*Dracocephalum moldavica* L.), and Roman chamomile (*Anthemis nobilis* L.) extracts in grape seed oil. *J Am Oil Chemist Soc* 2000; 77: 951-956.
6. Modaresi M. A comparative analysis of the effects of garlic, elderberry and black seed extract on the immune system in mice. *J Anim Vet Adv*. 2012; 11(4): 458-461.
7. Modaresi M, Mohajer M. 2015. The Effect of Garlic Extract on Spermatogenesis and Sexual Hormones in Heat-Stressed Male Mice. *zumsj*. 23 (101), 88-97.
8. Soltan, M.A, Shewita, R.S. and El-Katcha, M.I, Effect of Dietary Anise Seeds Supplementation on Growth Performance, Immune Response, Carcass Traits and Some Blood Parameters of Broiler Chickens, *International Journal of Poultry Science*, 2008; 7(11): 1078-1088.
9. Shahbazi, Parviz, Maleknia, Nasser, *General Biochemistry*, University of Tehran, Volume I, 2008.
10. Pashaei M, Modaresi M, Nazem H. The effects of *Adiantum capillus veneris* hydro alcoholic extract on plasma proteins and blood electrophoretic pattern in mice. *Indo american journal of pharmaceutical sciences*, 2018; 5(9): 8440-8445.
11. Modaresi m, Golchoobian H. Effect of Hydro-Alcoholic Extract of Nettle on Immune System in Mice. *Asian Journal of Chemistry*. 2012; 24(5): 2339-2341.