

## Effect of *Zeravschania membranacea* alcoholic extract on some components of complement system and serum IgM in rat

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**Abstract.** *Zeravschania membranacea* is an indigenous plant of Iran that grows in north and west mountains of Iran and has medicinal uses in traditional medicine. This plant is more susceptible to grow at high altitude and stony regions. Leaves and stem of this plant are mainly used as salad vegetable and flavoring vegetable. Its essence is used in cookery, energetic production and cosmetics. It has been said that plant powder keep mosquitoes away from animal's lair and stables. Essence is used to protect fruits and vegetables against infections provided by pathogenic funguses. We also decided to investigate effects of *Z. membranacea* alcoholic extract on some components of complement system and serum IgM in rat. In this study extract at concentrations of 200 and 400 mg/kg was fed to animals in two treatment groups for 30 days and third group as whiteness received no compound. In this study after measuring complement system components it was observed that alcoholic extract increases CH50 significantly in both treatment groups. Also it caused a relative increase in IgM amount in both treatment groups.

**Key Words:** Traditional medicine, complement activity, CH50, aromatic plant, *Foeniculum vulgare*.

**Introduction.** *Zeravschania membranacea* is an aromatic plant belonging to Umbelliferae family on his scientific name *Foeniculum vulgare* that grows in mountainous regions of Iran and has pharmaceutical uses (Garg et al 2011; Özbek et al 2004; Sadrefozalayi & Farokhi 2014). This plant is sedative, carminative, fungicide, mucolytic, useful for chest pains and anthelmintic (Özbek et al 2004; Yasa et al 2005). This plant is a local drug for habit of, backache, colic, kidney failure, spasm, problems during childbirth, aerophagia, menopause and toothache (Sadrefozalayi & Farokhi 2014; Yasa et al 2005). It has been stated that seeds help to treat liver and spleen problems, condyloma acuminata, and palatine uvula tumors (Hartwell 1971). Residuum remained after extraction contains 14 – 22 % protein and 12 - 18.5 % fat. Fat oil contains 4 % palmitic acid, 22 % oleic acid, 14 % linoleic acid and 60 % petroslink acid. Tocopherol contains 50 - 60 mg essence, 75 % gamma-tocotrienol (that contains high amount in plant research), 7.9 % alpha- tocopherol and 5 – 6 % gamma-tocopherol (Ivanov et al 1979). Essence of this plant prevents growth of pathogenic funguses in fruits (Duke et al 2002; Kim et al 2002).

In this research, we investigated effects of *Z. membranacea* alcoholic extract on some components of complement system and serum IgM in rat.

**Material and Method.** This study was conducted in 2013 in the Islamic Azad University of Shahrekord Branch laboratory. Some components of the complement system (C<sub>3</sub>-C<sub>4</sub>-CH50-C<sub>1</sub> inhibitor) and IgM were measured in Al-Mahdi Medical Diagnostic Laboratories of Shahrekord, Iran. Sample of *Z. membranacea* plant leaves were collected and alcoholic extract of the mentioned plant was prepared in the laboratory. Drying and extraction of

*Z. membranacea* was performed in the Medicinal Plant Research Center. After cutting, extraction was performed by using alcoholic distillation method by the rotary device (British pharmacopeia 1988).

In this research 30 female white wistar rats prepared from Laboratory Animals Breeding Center of universities laboratory with weight range of  $215 \pm 15$  g, were maintained in standard cages and had access to food and water. According to ethical code available in university and by considering ethical issues relating animals it was tried to avoid any case including annoyance, unnecessary use of animals or even losses during the testing. Rats were divided into three classes of ten and then extract dose was determined through preliminary experiments in groups 1 and 2 and the control group received no compound (Hartwell 1971). The group 1 and the group 2 received 200 mg/kg and 400 mg/kg respectively of *Z. membranacea* alcoholic extract and the control group received no compound. Prescription of extract in groups continued for 30 days and after completion of this period, animals were anesthetized intraperitoneally with 100 mg/kg of ketamin hydrochloride and 16 mg/kg of 2 % xylazine and blood sample was collected by the Cardiac Puncture Technique (Sumiko et al 2001). Then its serum was separated by centrifugation for 200 rpm and components of complement system and IgM were measured. All experiments were carried out under ethical guidelines of the Islamic Azad University of Shahrekord Branch, for the care and use of laboratory animals.

Findings were statistically analyzed by the SPSS software 18.0 (SPSS Inc., Chicago, IL, USA) and significance levels ( $p < 0.05$ ) were compared by means of the Dunnett test.

**Results and Discussion.** Amount of serum  $C_3$ ,  $C_4$ , CH50,  $C_1$  inhibitor and IgM in groups showed in table 1.

$C_3$ : serum  $C_3$  amount in group 1 was  $0.52 \pm 0.20$  mg/dL that did not show a significant difference than control group ( $0.61 \pm 0.59$  mg/dL) but shows a relative decrease. Serum  $C_3$  amount in group 2 was  $0.66 \pm 0.17$  mg/dL that did not show a significant difference than control group ( $0.61 \pm 0.59$  mg/dL) but showed a relative increase than control group (Figure 1).

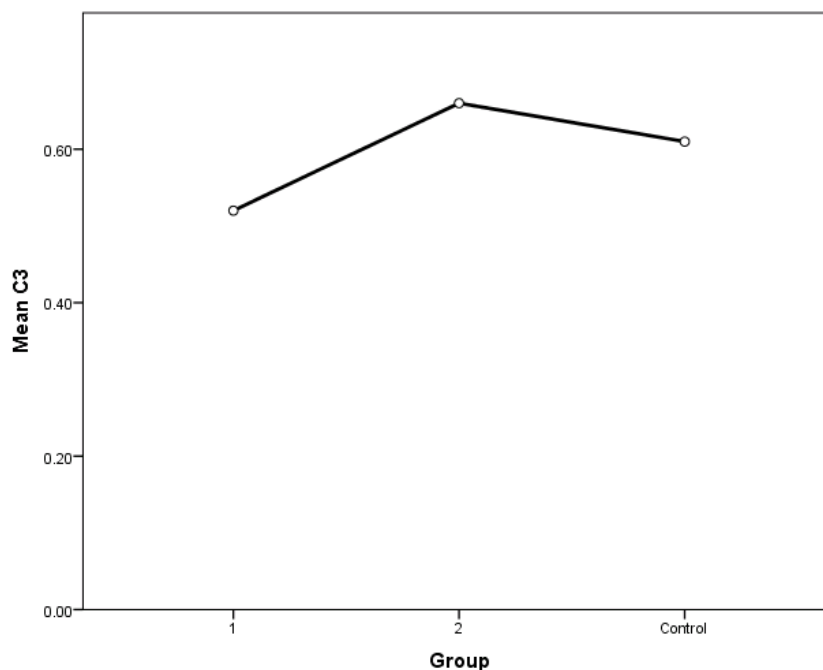


Figure 1. The effect of *Zeravschania membranacea* alcoholic extract level of  $C_3$  of rat blood serum.

Table 1

The *Zeravschania membranacea* alcoholic extract effect on some components of complement system and IgM in rat serum

Specification	<i>Zeravschania membranacea</i> alcoholic extract utilization (SD ± Mean)	C <sub>3</sub> (SD ± Mean)	C <sub>4</sub> (SD ± Mean)	CH50 (SD ± Mean)	C <sub>1</sub> inhibitor (SD ± Mean)	IgM (SD ± Mean)
Control	-	0.61 ± 0.59 <sup>a</sup>	0.09 ± 0.054 <sup>a</sup>	5.1 ± 1.3 <sup>a</sup>	0.05 ± 0.01 <sup>a</sup>	0.23 ± 0.02 <sup>a</sup>
Group 1	200 mg/kg	0.52 ± 0.30 <sup>a</sup>	0.10 ± 0.3 <sup>a</sup>	12 ± 2.4 <sup>b</sup>	0.04 ± 0.003 <sup>a</sup>	0.27 ± 0.007 <sup>a</sup>
Group 2	400 mg/kg	0.66 ± 0.17 <sup>a</sup>	0.07 ± 0.007 <sup>a</sup>	12.2 ± 2.3 <sup>b</sup>	0.06 ± 0.03 <sup>a</sup>	0.39 ± 0.07 <sup>a</sup>

In each column numbers that have similar letters the difference is not significant (p<0.05).

C<sub>4</sub>: amount of serum C<sub>4</sub> in group one was  $0.10 \pm 0.03$  mg/dL that did not show significant decrease than control group  $0.09 \pm 0.054$  mg/dL but shows a relative increase. amount of serum C<sub>4</sub> in group two was  $0.07 \pm 0.007$  mg/dL that didn't show significant difference than control group but shows a relative decrease ( $p > 0.05$ ) (Figure 2).

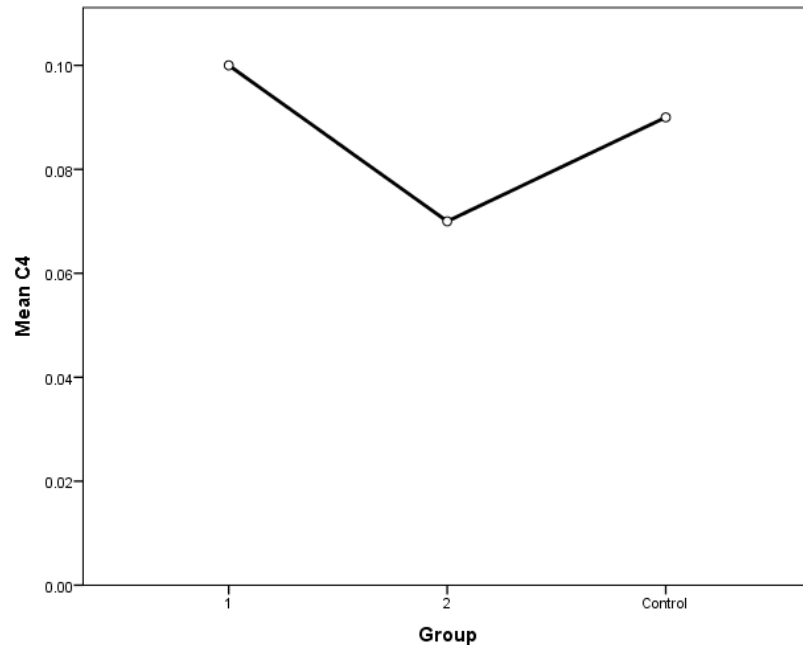


Figure 2. The effect of *Zeravschania membranacea* alcoholic extract level of C<sub>4</sub> of rat blood serum.

CH50: serum CH50 amount in group 1 was ( $12 \pm 2.4$  %) that showed a significant increase than control group ( $5.1 \pm 1.3$  %). amount of CH50 in group two was ( $12.2 \pm 2.3$  %) that shows a significant increase than control group ( $p < 0.05$ ) (Figure 3).

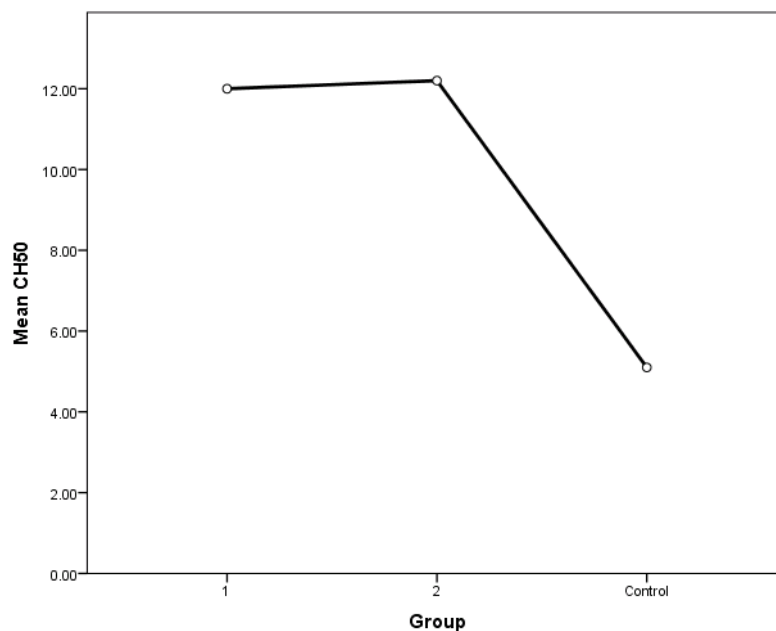


Figure 3. The effect of *Zeravschania membranacea* alcoholic extract level of CH50 of rat blood serum.

C<sub>1</sub> inhibitor: amount of serum C<sub>1</sub> inhibitor in group one was 0.04 ± 0.003 g/L that did not show significant decrease than control group 0.05 ± 0.01 g/L but shows a relative decrease (p>0.05) amount of serum C<sub>1</sub> inhibitor in group two was 0.06 ± 0.03 g/L that shows a relative increase than control (p>0.05) (Figure 4).

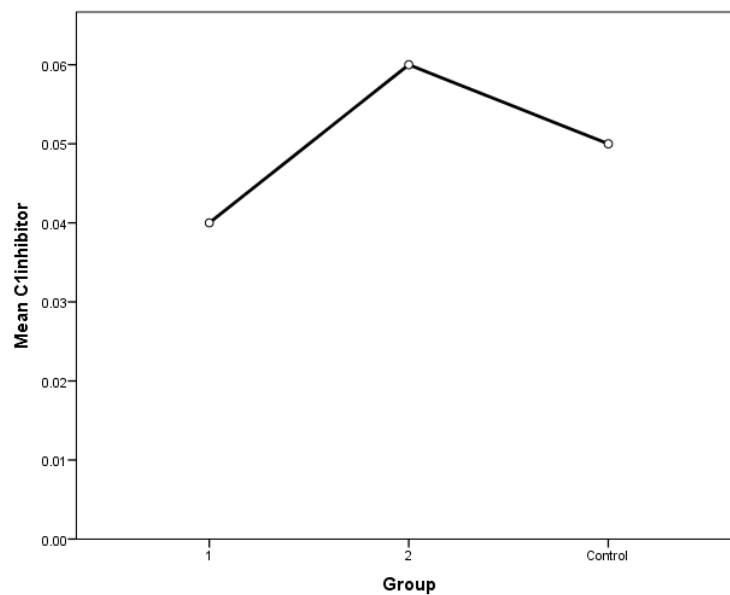


Figure 4. The effect of *Zeravschania membranacea* alcoholic extract level of C<sub>1</sub> inhibitor of rat blood serum.

IgM: amount of serum IgM in group one was 0.27 ± 0.07 g/L that did not show significant difference than control group 0.23 ± 0.02 g/L but shows a relative increase (p>0.05) amount of serum IgM in group two was 0.39 ± 0.07 g/L that shows a relative increase than control group (p>0.05) (Figure 5).

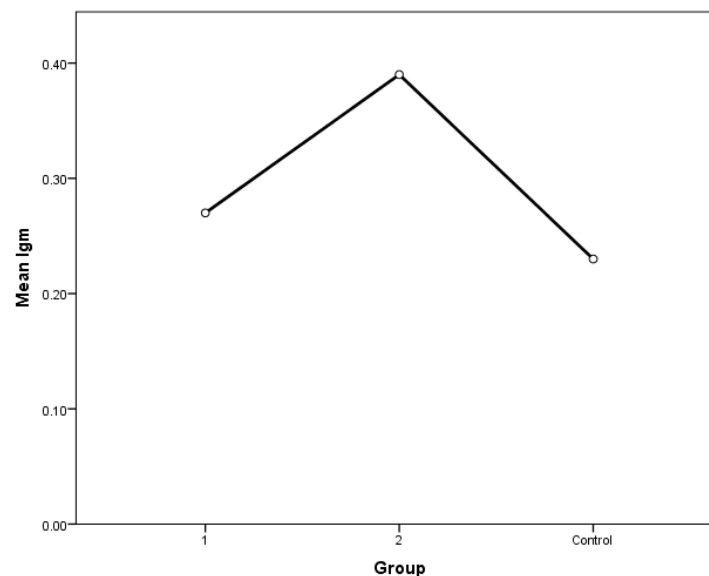


Figure 5. The effect of *Zeravschania membranacea* alcoholic extract level of IgM of rat blood serum.

Results obtained from the effect of *Z. membranacea* alcoholic extract on components of complement system and IgM have been stated in table 1. As observed in table Z.

*membranacea* alcoholic extract of has had limited effect on amount of complement system factors in such a way that amount of these components has not shown significant difference than control group. Different studies have been performed on antibacterial effect of *Z. membranacea* essence and extract. In a study performed in Turkey, the most antibacterial effect of plant essence has been observed on *Staphylococcus aureus* (Soylu et al 2009). Plant essences are of natural compounds that can be used as preservative in food products. Plant essences and extract obtained from aromatic plants like *Z. membranacea* have antibacterial, antifungal, antioxidant properties, can increase serum proteins affecting anticancer immune system and control pathogens growth and poison production by microorganisms (Tajkarim et al 2010). It has been shown in study of Salehi Surmaghi (2010) that *Z. membranacea* extract is valuable resource of antioxidant compounds and effective purifier of oxidants. In study conducted by Bobadilla et al (2005) effect of food share containing different amount of plant proteins on defense mechanism in fish was studied and results showed that activity level of complement factor lateral pathway in group that their food share contained 50 % plant protein has significant increase than other groups that can be to some extent due to simulation of complement factor productions.

**Conclusions.** In present study also *Z. membranacea* extract created a significant increase in CH50 amount of complement system in both treatment groups than control group ( $p < 0.05$ ). Also a relative increase was observed in IgM amount in each treatment group than control group that obtained results, conform conducted studies by researchers. In conclusion, pharmaceutical plants like *Z. membranacea* can cause increase in amounts of some complement system components and totally increase in immune system activity and improvement.

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