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Effect of Marshmallow *(Althaea officinalis)* Root Extract on Immune System in Mice

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Abstract: Marshmallow is a herbaceous perennial plant with many therapeutic uses in herbal medicine. In this research, effects of hydroalcoholic extract of marshmallow's root were studied on electrophoresis pattern of blood proteins. About 50 female mice were divided in 5 groups including control, placebo and 3 treatment groups. Hydro alcoholic extract (50, 100 and 200 mg kg^{-1}) was injected in peritoneum of mice every other day for 20 days. Blood samples were taken for studying electrophoresis pattern and immunity. Obtained data were analyzed using SPSS program at 5% probability level. According to results, beta globulin concentration was not affected by treatments. Albumin concentration was reduced in 50 and 100 mg kg^{-1} groups and the ratio of albumin to globulin was decreased in all experimental groups significantly. Gama globulin concentration of all experimental groups and α-1 globulin concentration of 100 mg kg^{-1} were increased significantly. Concentration of α-2 globulin was increased in 50 and 100 mg kg^{-1} groups significantly.

Key words: Blood proteins, marshmallow, immune system, mice, blood-samples

INTRODUCTION

Pharmaceutical plants are used in industry and pharmacy because of their therapeutic effects on human and livestocks. Number and diversity of pharmaceutical plants are amazing. According to previous researches, about 70000 plant species from lichens to trees have been used once at least for medicinal purposes (Braun and Cohen, 2005).

Marshmallow (*Althea officinalis*) is indigenous plant of East Mediterranean. This plant is a vegetative perennial plant with about 2 m height. Stem of marshmallow is covered by tiny grey fluffs. Leaves are serrated, broad and heart-like shaped. Large triple flowers are white to red or purple which appear in late summer. Due to beautiful flowers, Marshmallow is sown as ornamental plant. All parts of this plant are used in medicine.

Marshmallow has a lot of mucilage, starch, fat, essence, anthocyanin, altheine, dioxybenzoic acid and cyanidin. Some important known compounds of marshmallow's root are flavonides from poly phenol group, sacharids and mucins (Dugenci *et al*., 2003; Bone, 1993).

It has been shown lately that polysaccharides have anti-cough effects. Also, extant flavonides in marshmallow root induces endothelium dependent and independent arteries relaxation (Sutovska *et al*., 2009; Razavi, 2003; Bradley, 1992). Considering the role of pharmaceutical plants in traditional medicine and lack of scientific criteria to determine their dose, physiological effect of marshmallow's hydro alcoholic extract was studied on proteins of blood serum and their electrophoresis pattern.

MATERIALS AND METHODS

The study was conducted in research laboratory of Islamic Azad University (Shahrekord Branch). About 50 female mice from Balb/C race were kept for 35 days to adapt to environment. During this period, samples had free access to normal light, water and normal diet.

Experimental groups:

- Control groups; to have base amount of blood protein parameters this group was kept in similar condition of treatments but without injection
- Placebo group; to assure of lack of injections effect in results, 0.5 cc of normal saline was injected to members of this group
- Treatment groups (1-3); about 0.5 cc of hydro alcoholic extract of marshmallow was injected every other day in doses of 50,100 and 200 mg/kg/2 days for 20 days

Mice were kept in laboratory for 35 days to maturity and reach to desire weight. Samples were kept under 28-32°C temperature and normal light period. All treatment had free access to food and water. Samples were divided in 5 groups randomly (each group had 10 members) and received 10 injections in 20 days. Groups were control,

placebo which received 0.5 cc of normal saline in peritoneum for assurance from no effect injections in results. The rest groups were treatment groups which received 50,100 and 200 mg kg^{-1} of hydro alcoholic extract every other day.

Statistical analysis: Obtained data were analyzed using SPSS program (one way ANOVA) and mean comparisons were done using Duncan multi ranges test at 5% probablity level.

RESULTS AND DISCUSSION

Mean comparison of albumin and α-2 globulin amounts showed decrease in albumin amount of first and second groups whereas beta globulin did not show significant difference (Fig. 1).

Gamma globulin concentration of blood serum and also albumin to globulin ratio were increased significantly in all experimental groups. α-1 globulin was increased in second experimental group (Fig. 2). Considering the valuable role of pharmaceutical plant in treatment of diseases and dose dependent effect of them, determining the appropriate dose of herbal extracts is very important.

Albumin is the major protein of natural plasma which is synthesized in polyribosome attached to the endoplasmic reticulum membrane of liver cells. Synthesis of albumin shows liver action and is decreased in liver diseases (Harput *et al*., 2005).

The amount of this protein was decreased significantly in first and second experimental groups (50 and 100 mg kg^{-1}) which can be indicative of reduction in ions, fatty acids, metals and amino acids.

Increased glomerular capillary permeability in the nephrotic syndrome will increase the amount of α-2 macro globulin tenfold or even more by losing other small proteins (Dhuley, 1999). In electrophoresis pattern of this disease, researchers see reduction in albumin and α-1 globulin amounts and increase in α-2 macro globulin (Jayasekhar *et al*., 1997).

Using marshmallow's extract changed α-2 globulin amount significantly in 50 and 100 mg kg^{-1} groups. Reduction in level of serum globulin shows deterioration of immunoglobulin production. Although, decrease in serum levels is is a relatively insensitive indicator because of natural action of immune system, it has to fight antigens and the response of anti body must be evaluated to determine the inhibitory level of immune system (Modaresi, 2012).

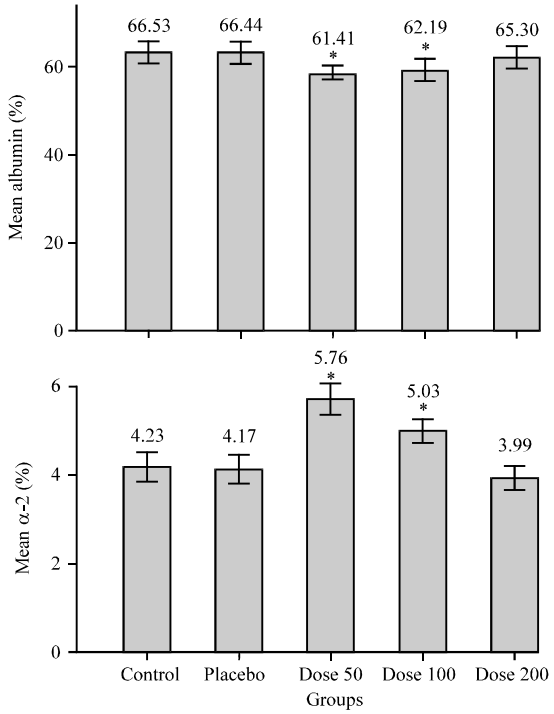

Fig. 1: Mean comparison of albumin and α-2 globulin concentration of studied groups. Error bar: 95% CI marshmallow root extract (mg kg^{-1}); *The mean difference is significant at the 0.05

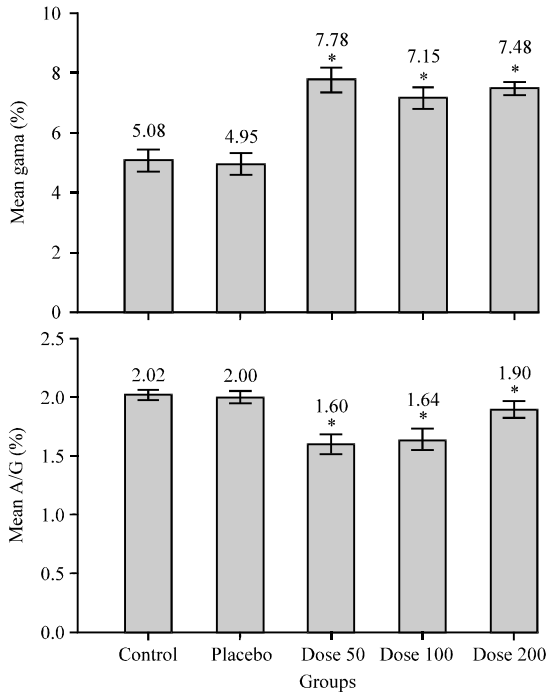

Fig. 2: Mean comparison of gamma globulin amount and albumin to globulin ratio in studied groups. Error bar: 95% CI marshmallow root extract (mg kg^{-1}); *The mean difference is significant at the 0.05

The amount of gamma globulin increased significantly in all experimental groups and this ratio is the best indicator of the colloidal osmotic pressure of blood. The root of marshmallow was effective on immune system by changing in blood proteins like albumin, α-1, α-2 and γ-globulin. Therefore, it can play an effective role in immune system of body and also in the pharmaceutical industry.

CONCLUSION

Results showed that marshmallow's extract affected immune indices and electrophoresis pattern of blood proteins, dose dependently.

REFERENCES

Bone, K., 1993. Marshmallow soothes cough. Br. J. Photother., 3: 93-95.

Bradley, P.R., 1992. British Herbal Compendium: A Handbook of Scientific Information on Widely Used Plant Drugs. British Herbal Medicine Association, Boamemouth, Pages: 239.

Braun, L. and Cohen, 2005. Herbs and Supplement An Evidence-Based Guide, Sydney. 2th Ed., Elsevier Mosby publishers, New York, Pages: 808.

Dhuley, J.N., 1999. Anti-oxidant effects of cinnamon (*Cinnamomum verum*) bark and greater cardamom (*Amomum subulatum*) seeds in rats fed high fat diet. Ind. Exp. Biol., 37: 238-242.

Dugenci, S.K., N. Arda and A. Candan, 2003. Some medicinal plants as immunostimulant for fish. J. Ethnopharmacol., 88: 99-106.

Harput, U.S., I. Saracoglu and Y. Ogihara, 2005. Stimulation of lymphocyte proliferation and inhibition of nitric oxide production by aqueous *Urtica dioica* extract. Phytotherapy Res., 19: 346-348.

Jayasekhar, P., P.V. Mohanan and K. Rathinam, 1997. Hepatoprotective activity of ethyl acetate extract of Acacia catechu. Indian J. Pharmacol., 29: 426-428.

Modaresi, M., 2012. A comparative analysis of the effects of garlic, elderberry and black seed extract on the immune system in mice. J. Anim. Vet. Adv., 11: 458-461.

Razavi, M., 2003. Medicinal Plant. Talash Publisher, Tehran, Pages: 104.

Sutovska, M., G. Nosa'ova, J. Sutovsky, S. Franova, Prisenznakova and P. Capek, 2009. Possible mechanisms of dose-dependent cough suppressive effect of *Althaea officinalis* rhamnogalacturonan in guinea pigs test system. Int. J. Boil. Macromol., 45: 27-32.