

Effect of *Angelica archangelica* Extract on Histopathologic Changes in Mice Blood

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Abstract: The Garden Angelica (*Angelica archangelica*) in the past time was used as an hematopoiesis plant. With this point that the importance of hematopoiesis and use of herbal medicines instead of chemical medicines that have side effects, this research has studying the effect of *Angelica archangelica* hydroalcohol extract on the blood parameters in mice. About 40 mature mice were divided into 5 groups. The control group did not receive any extract, the placebo group received 0.5 cc normal saline every other day and 3 treatment groups received extract with (50, 100, 200) mg/kg/2 days doses that was used IP injection. Then the blood samples were taken from the mice. Study blood parameters show that the extract markedly increased the total number of white blood cells in groups 1-3. The number of red blood cells increased significantly in group 3 compared with the control group but 1 and 2 groups have not increased significantly compared to control group. This extract was caused change in the hematocrit, hemoglobin and as for the index of red blood cells (MCV, MCH and MCHC) that have not statistical significant. The extract of *Angelica archangelica* can effective in hematopoiesis with increase the number of red blood cells and support the immune system with increase the number of white blood cells.

Key words: Angelica extract, blood parameters, mice, blood cells, hemoglobin, Iran

INTRODUCTION

From long time ago, herbal medicine was used in medical and its cure effects has been proved. Angelica is one of herbal medicine that was used as an effective medicine in traditional medicine as an hematopoiesis plant.

The botanical name of this plant is *Angelica archangelica* and is a 2 years old plant with 1-3 m high. Angelica is unique amongst Umbelliferae for its pervading aromatic odour, a pleasant perfume, entirely differing from Fennel, Parsley, Anise, Caraway or Chervil. Even the roots are fragrant for thousands of years, this plant was used mainly in China for women suffering extreme pain or bleeding during their period and corrects hot flashes during menopause (Mir Haidar, 2005).

Angelica is a good remedy for colds, coughs, colic, fevers, indigestion, rheumatism, reduce blood pressure, expectorant, diaphoretic and tonic (Flok, 2000; Zargari, 1985). To consider the medicinal effect that mentioned in this research, the effect of injection interperitoneal Angelica root hydroalcoholic extract in various doses with use of mice was studied.

The objective of this research consist of; to investigate of Angelica extract instances such as number of red blood cells, changes in balance of hemoglobin and hematocrit. The study and measurement of factors such

as MCV, MCH and MCHC and of course to determine the most effective dose to creative probable changes.

MATERIALS AND METHODS

Experimental animals: Experimental samples in this study were Balb/C spices mice from with the weight 30 ± 3 g that was prepared from Isfahan University.

Condition of keeping samples: In this study, the adult male mice were separated from the laboratory mice in the nest animal of the Isfahan University and were placed separately in the cages. The samples placed in the laboratory conditions for 2 months. Within in this time and in the period of injection, the samples were profited from the similar food and water, constant temperature ($28-32^{\circ}\text{C}$) and natural photoperiod.

Distribution of experimental samples: A week before starts the injections, the mice were randomly divided into 5 groups. Every of groups placed separately in the cage. In every cage, were placed 8 numbers of small laboratory mice (totally 40 numbers). Groups under analyze include:

Group 1 (control): For reach to amounts of base CBC and compare of this group in similar condition with treatment groups but without any injection during the experiment.

Group 2 (placebo): For assurance of absence of effect of injections in conclusion of experiment and compare of it with control group, amount of 0.5 cc normal saline was injected to this group in similar condition with experimental treatments.

Group of treatment 3: Conclude of 8 mice that received 0.5 cc Angelica extracts every other day in 20 days with dose of 50 mg/kg/2 days (totally 10 injection).

Group of treatment 4: Conclude of 8 mice that received 0.5 cc Angelica extract every other day in 20 m days with dose of 100 mg/kg/2 days (totally 10 injection).

Group of treatment 5: Conclude of 8 mice that received 0.5 cc Angelica extract every other day in 20 m days with dose of 200 mg/kg/2 days (totally 10 injection).

RESULTS AND DISCUSSION

This study investigated separately the blood parameters such as white blood cells and red blood cells, mean of hematocrit and MCH, MCV and MCHC for 50, 100, 200 mg/kg/2 days doses.

White blood cells counting: Comparison of mean white blood cells was shown in experimental groups and control group with Duncan test and insurance level >95% ($p < 0.05$) that mean of number of white blood cells has significant difference in experimental group 3 (treatment with 50 mg kg⁻¹ doses), 4 (treatment with 100 mg kg⁻¹ doses), 5 (treatment with 200 mg kg⁻¹ doses) with the control group.

Red blood cells counting: Comparison of mean red blood cells was shown in experimental groups and control group with Duncan test and insurance level >95% ($p < 0.05$) that mean of red blood cells in experimental group 5 (treatment with 200 mg kg⁻¹ dose) has significant difference with another groups that show more increase in red blood cells number in this group to another groups.

Hematocrit, Hemoglobin, MCH, MCV and MCHC: Comparison between mean of factors hematocrit, hemoglobin, MCH, MCV and MCHC in experimental groups and control group with use of Duncan test and in insurance level >95% was not shown.

As Fig. 1 has shown mean of white blood cells numbers has significantly increased in every three test groups to control group. The result was obtained at this study is similar with Marco *et al.* (2006). This team cured the mouse who has been suffering from leucopenia

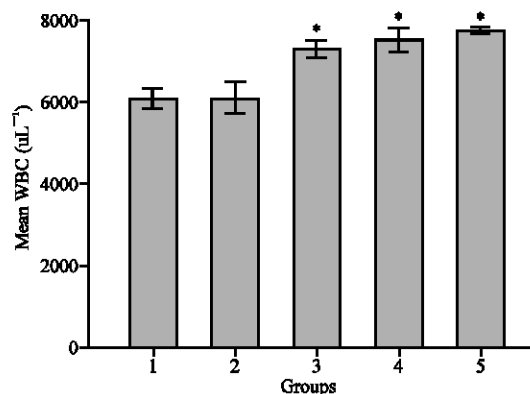


Fig. 1: Results of investigation of white blood cells number (Error bars; ± 1.00 SE; difference is significant)

(decrease white blood cells) with use of cyclophosphamide. In this study after use of Angelica increased significantly white blood cell that has been decreased in mice (Marco *et al.*, 2006). Another research accomplished in this connection by Chang *et al.* (2009). This team separate Mono Nuclear Cells (MNC) of bone marrow and increased the Angelicato it until investigate the effect and the mechanism of Angelica on MNC. They conclude that Angelica cause proliferation of the MNC by activation the MAPK (p38, EPK1/2) protein (Chen *et al.*, 2006). Hematopoiesis is the result of increasing and differentiation contemporary and continually of the cells that creates from the stem cells. With attention to research that performed and also the mechanism of hematopoiesis increasing the number white blood cells due to Angelica extract can probably be these reasons.

With the effect of stem cells (pleuripotential and multi-potential stem cells) enhance mitosis deviation. The effect on the committed progenitor cells and enhance mitosis division on them. Also, create CFU-GEMM after divisions of the myeloid stem cells that are the part of progenitor cells divide and create other committed progenitor cells such as (CFU-GM, CFU-Baso and CFU-Eo) that they are under the effect of Granulocyte monocyte colony stimulating factor, IL-3 stem cell factor (csf), FLT-3l was stimulated and proliferated and with this point probably Angelica extract cause has been generate GM-csf by effect on the chromosome number 5 the T lymphocyte, endothelium and fibroblasts and this component case enhancement white blood cells related to this class by effect on cfu-GEMM and stimulation mitosis divide (Sarker and Nahar, 2004). As it is shown in Fig. 2, the mean of red blood cells number increase at every three groups to control group but at the dose of 200 mg kg⁻¹ significantly increased. This result is similar to research

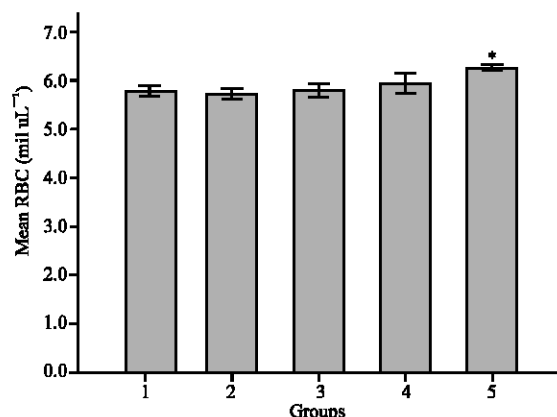


Fig. 2: Results of investigation of red blood cells number (Error bars ± 1.00 SE; difference is significant)

results of the study that was accomplished in China by Wang and Zhu (1996). They studied the effect of AP on the proliferation and differentiation of hematopoiesis progenitor cells and mechanism of the hematopoiesis. They concluded that may enhance hematopoiesis by stimulating directly and/or indirectly macrophages, fibroblasts in hematopoietic inductive microenvironment and muscle tissue to secrete some HGF (Wang and Zhu, 1996).

In addition, the results earned on this research is similar to experiment results by Hatano *et al.* (2004). They studied the effect of Angelica water-soluble extract on hematopoiesis (Hatano *et al.*, 2004). But have a little difference between the way of experiment by Hatano and this research because they used 5-Fluorouracil (5 FU) to mice (8-12 weeks old female) and they studied the effect of Angelica extract after assurance of anemia in mice. Also, they administered the extract at 50 mg kg⁻¹ activated erythroid progenitor cells in bone marrow on day 10th, increased the percentage of peripheral reticulocytes in red blood cells on day 15th and led to the recovery of red blood cell count to a value that was almost equal to the basal level on day 20th.

CONCLUSION

The study shows that the polysaccharids in Angelica promote hematopoiesis by activating immature erythroid cells and the hematopoietic effect was achieved by high dose Angelica (Chen *et al.*, 2006). By Wang *et al.* (2007) was confirmed the effect of Angelica extract on

erythropoietin generation and as the result of probably the extract has been increased the number erythrocytes by increasing erythropoietin (Chang *et al.*, 2009). The Angelica extract at 200 mg kg⁻¹ effective on hematopoiesis and cause increase the red blood cells in addition effective on immune system strengthening by increasing number of white blood cells.

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