



## Effect of *Echinacea purpurea* Hydro Alcoholic Extract on the Blood Parameters in Mice

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(Received: 5 November 2011;

Accepted: 8 September 2012)

AJC-12117

This study attempts to study the effects of *Echinacea purpurea* hydro alcoholic extract on the blood parameters in little laboratory female mice (Balb/C species). Forty eight mature female mice were divided randomly into 6 groups. The control group did not receive any extract, the placebo group received 0.5 cc normal saline every other day and 4 treatment groups received extract with (50, 100, 200, 300) mg/kg/2 day doses that was used interperitoneal injection. Then the blood samples were taken from the whole mice. The results were analyzed SPSS in the case that  $p < 0.05$ . The study of blood parameters showed that the extract increased markedly in the total number of white blood cells in each 4 groups in comparison to control group. The number of neutrophils decreased significantly in each 4 groups in comparison to control group, but the significant differences wasn't noticed in monocytes. The number of red blood cells increased significantly in groups 1, 2 in comparison to the control group, but in groups 3, 4 there is no significant differences. In this manner, this extract was caused change in the mean of hematocrite, hemoglobin and the index of red blood cells (MCV, MCH, MCHC) there is no significant differences. Moreover, the number of platelet has a meaningful increase in group 1 in comparison to control group and in groups 2, 3, 4 have decreased significantly. The extract of *Echinacea purpurea* can support the immune system by increasing the number of white blood cells and can be effective in hematopoiesis by increasing the number of red blood cells.

**Key Words:** *Echinacea purpurea*, Blood parameters, Mice.

### INTRODUCTION

*Echinacea purpurea* is a plant and its general name is Echinaceae. This plant belong to Compositae and Asteraceae and originates from North America. The different part of the plant, the root and aerial part has much therapeutic characteristic, some of them are acceleration of welfare injuries, annihilation of bacteria and viruses, cold cure, blood toxemia, bronchitis, sinusitis, snake biting<sup>2,3</sup>. *Echinacea purpurea* is a medicine for body fenesive system and in combined form it is presented in the market other herbs for establishment of body immune system<sup>4,5</sup>.

The study shows that the effect of *Echinacea purpurea* in establishment of body immune system is related to the composition of plant polysaccharide like echinacin and echinocside<sup>6</sup>. The oral use of *Echinacea purpurea* in fleshy chickens and pigs and addition of its purified polysaccharide to the planting of immune cells cause a significant increase in the number of immune cells and phagocytes in cells<sup>7,8</sup>.

In this study, the effect of inner peritonitis injection of hydro alcoholic extraction of aerial part of *Echinacea purpurea* in diffe-rent doses was surveyed with lab mice. The privilege of inner peritonitis in comparison to oral use is assurance of

entrance of identified dose in the animal body. The aim of this study is the identification of the *Echinacea purpurea* extraction effect on white cells, Hemoglubin density and the index of red cells (MCV, MCH, MCHC) and identification of the most effective dose for the probable changes.

### EXPERIMENTAL

Balb/C mice with weight  $30 \pm 5$  g from the pharmacy college of Isfahan university were used. 50 mice were transported to the animal room of Payam-e-Noor Isfahan University and were kept in separated cages. the mices were cared for 40 days until the attained puberty and the significant weight in lab conditions

**Division of experimental species:** Ten days before the beginning of injection, the samples were divided into six groups randomly. Every group were located in separated cages. In every cage eight small mice (plural 48) from race were located. The average weight in each group were  $30 \pm 5$ .

**Experimental groups: Control group:** For attaining of blood parameters quantity the group was kept without injection in similar condition with treated group in test time. For the assurance of the effect of not injection and the result of test and the comparison with the control group, 0.5 mL normal saline

was injected. In treated groups 1, 2, 3, 4 everyone contained eight mice 0/5 cc extraction of hydro alcoholic *Echinacea purpurea* in range of mg/kg/2 day 50, 100, 200, 300 in 20 days.

For surveying of blood factors and counting of globules and platlets after the end of the course, suction of blood from the hearth was done and was transmitted to the tubes that were contained EDTA (anticoagulation of blood).

**Statistic tests:** In this study, the average comparison of data which was the conclusion of test with the use of analysis of one way varians test and Duncan test and in assurance of 95 %  $p < 0.05$  and by the use of SPSS software was done.

## RESULTS AND DISCUSSION

The average of number of white cells in control and experimental group and it's comparison in  $p < 0.05$  showed that there is a significant increase between the average experimental group 1, 2, 3, 4 and the control group (Fig. 1). The polysaccharides are completely soluble in body liquid and have padgan characteristic<sup>3</sup>. Since the polysaccharide molecule weight is high, *Echinacea purpurea* and their solubility in water, these polysaccharide accompanying with alchamid in achinacea has a characteristic for immune stimulant system<sup>9</sup>.

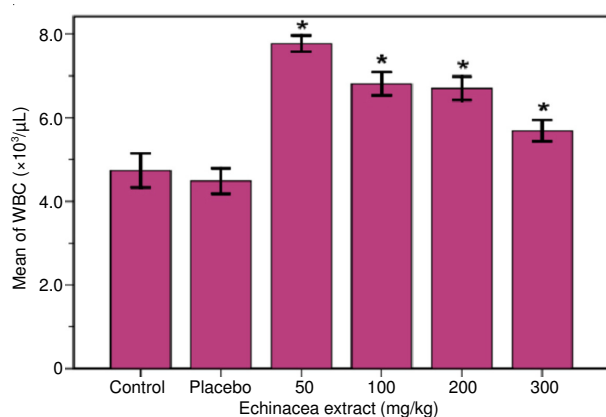


Fig. 1. Obtained results the number of white cells that was affected by the injection of hydro alcoholic extraction of *Echinacea purpurea*

In surveying of the lymphocyte average per cent in control group and experimental group and its comparison between the average of four experimental group. Treatment with experimental group 50, 100, 200, 300 mg/kg and control group significant increase was shown  $p < 0.05$  (Fig. 2). IgG reinforce the hormonal immune and an the other side with macrophage stimulation of increases the production of cytokines and specially increases the volume of  $\gamma$ -interferon it also support the lymphocyte T increasing, so increases the immune cells<sup>6</sup>.

The average comparison of neutrophile per cent between experimental group and control in  $p < 0.05$  level shows that average of neutrophile per cent in experimental groups 1, 2, 3, 4 with control group shows a significant decrease (Fig. 3). The purified polysaccharide from cell planting which was increased to immune cells in culture or injected to the mice showed stimulation effects on immune system. These effects are the increase of phagocytes neutrophile and macrophage explosion oxidative<sup>4</sup>.

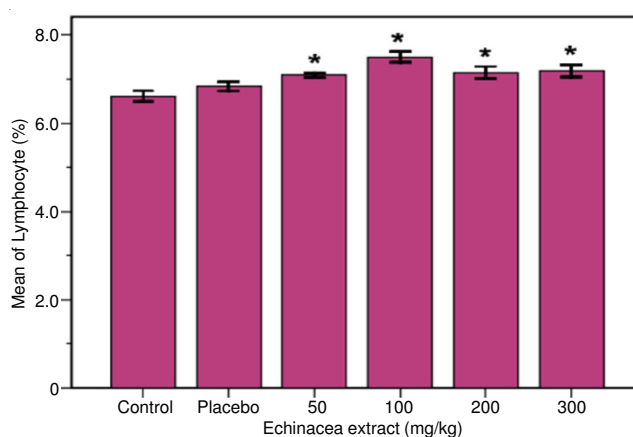


Fig. 2. Obtained results of the number of lymphocytes affected by hydro alcoholic extraction of *Echinacea purpurea*

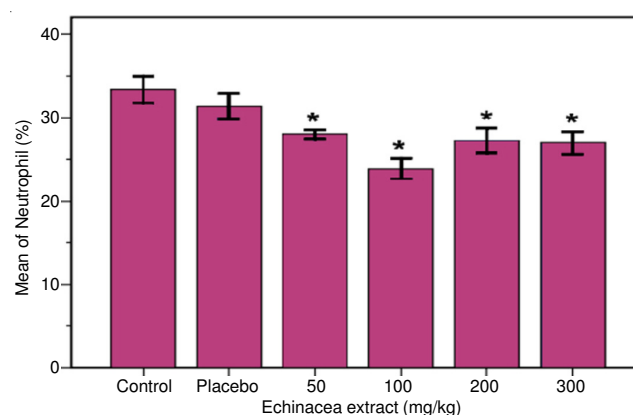


Fig. 3. Obtained results of the neutrophile number effected by the injection of hydro alcoholic extract of *Echinacea purpurea*

It should be noted that using *Echinacea purpurea* for a long time or using its high density cause immune suppression, hence only low does of *Echinacea purpurea* can increase the phagocytes and high dose increase the number of white globule and fagocytos activity<sup>11</sup>.

Mishima *et al.*<sup>12</sup> indicated that *Echinacea purpurea* extraction has increased the number of lymphocyte till 40 %. This study showed that using of *Echinacea purpurea* increase the CD and T cells.

The per cent average of monocyte in control group and experimental group identified the average of experimental group to the control group does not show a significant difference.

After studying and counting the number of red cells and average comparison the number of cells in experimental group and control group by using of Duncan test in assurance level higher than 95 % ( $p < 5$  %) the result showed that the average number of cells in experimental group increased significantly (Fig. 4).

Studying of hematocrit average prevent, average of cell volume (MCV), average of cell hemoglobin (MCH), the density average of hemoglobin cells (MCHC), level ( $p < 0.05$ ) by use of Duncan test identified that there is no significant change in experimental group and control group.

The number of neutrophil in experimental groups 1, 2, 3, 4 in comparison to control group has decreased. There is a

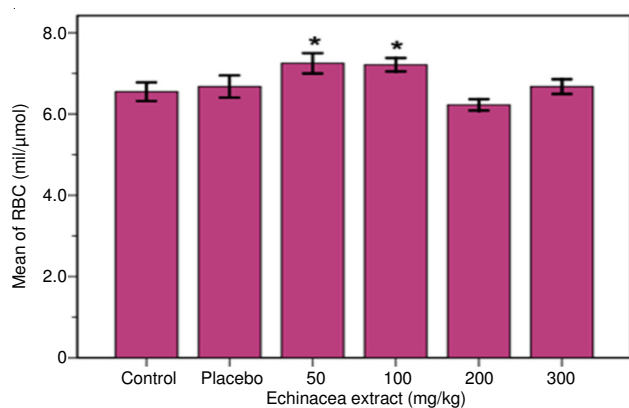


Fig. 4. Obtained results of the number of red cells effected by the injection of hydro alcoholic extract of *Echinacea purpurea*

similarity between the result of present research and O'Neil *et al.*<sup>14</sup>. They showed that increasing of root extraction of standard *Echinacea* with Ekinokoside 40 % in healthy horses can increase neutrophils phagocytes and causes stimulation of neutrophyle immigration from circulation to the tissue<sup>14</sup>.

Purified polysaccharide of *Echinacea purpurea* stimulate the macrophage activity and increase the phagocytes activity in lab mouse<sup>5</sup>. Allen<sup>15</sup> reported the phagocytes stimulation in treated chickens by the part of *Echinacea purpurea* roots. Bauer *et al.*<sup>16</sup> reported the phagocytes in mice after treatment with alcoholic extract increases.

Bohmer *et al.*<sup>7</sup> showed that the volume phagocytes in fleshy chickens and breeding pigs with completed food with *Echinacea purpurea* has a significant increase and as a result the number of blood neutrophyle decreased<sup>7</sup>.

*Echinacea* venous injection increases the reaction CRP<sup>5</sup> so one of the probable result in neutrophyl decreasing in for experimental groups in comparison to control group and the increasing of C protein is reaction acceptor so, It cause the increase in phagocytose in tissue.

In this study, the number of red globule in experimental group 1, 2 in comparison of control group has a significant increasing in other groups no significant difference as shown.

The obtained result for the number of red globule in this study is equal with the obtained result of O'Neil *et al.*<sup>14</sup>. In a study the showed that using of *Echinacea purpurea* extract increases the red globule<sup>6</sup>.

It seems *Echinacea* extract in different density and examined in mg/kg (100, 200, 300, 50) by increasing in mean number of lymphocytes and volume of neutrophyl phagocytes causes reinforcement in stimulation of immune system but this effect is more in lower density in addition in low density 50, 100 mg/kg cause increasing in mean of red globule. This study showed that injection of hydro alcoholic extraction of *Echinacea purpurea* in inner peritoneum in mouse affects on blood parameters and emphasize the effect of stimulation of immune system the result of this study shows the effect of *Echinacea purpurea* extraction depends on its dose.

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