

An Investigation on the Effect of Alcoholic Extract of *Physalis alkekengi* on Blood Indexes in Rats

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Abstract

Background: *Physalis alkekengi* by effective ingredients such as alkaloids, glucocorticoids and because of antioxidant property can play a role in homeostasis. The aim of this study was to examine the possible effects of fruit extract of *P. alkekengi* on blood homogram.

Materials and Methods: Forty male rats were divided to control, sham (normal saline) and experimental groups (highest, moderate and minimum doses of alcoholic extract). Then, the blood samples were taken in order to perform laboratory test by Sysmex analyzer, and were analyzed using ANOVA.

Results: Results showed that the number of red blood cells, hemoglobin, hematocrit increased and white blood cells decreased.

Conclusion: Fruit extract of *P. alkekengi* is probably effective in treatment of anemia.

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Introduction

Blood is an important tissue fluid of the body that is composed of two parts: plasma and cellular elements [1]. Since the changes in the number of blood cells cause diseases [2] and remedies and drugs for these diseases are less available, it is necessary to examine the traditional herbal medicine. *Physalis alkekengi* belongs to the Solanaceae family that grows in Europe and Asia. It has a diuretic and laxative fruit and its leaves are tonic and blood purifier [3-6] (Fig. 1). Among the effective ingredients of this family such as *Physalis Alkekengi*, we can mention alkaloids, glucocorticoids alcoholic substances, niacin (a powerful antioxidant), phytonutrients and vitamin C [4-7]. Therefore, the aim of this study is to evaluate the effect of the extract of the fruit of this plant on blood homogram.

Materials and Methods

The present study is an experimental research 40 male Wistar rats (with mean weight 180 ± 5 g) were divided into 5 groups of 8 rats including control group receiving no drug or substance, sham group receiving daily 0.2 mL normal saline, experimental groups receiving highest (0.4 g/kg), moderate (0.2 g/kg) and minimum (0.1 g/kg) doses of alcoholic extract per each. The drug was intraperitoneally (IP) injected for 21 days. After completion of this process, the blood samples were taken in order to perform laboratory test. The amount of factors determined by Sysmex CA 6000 (KX21N model, Japan). Average results were reported as the mean and standard error (Mean \pm SE) and SPSS-11.5 statistical software, one-way ANOVA followed by Tukey's test were used to do inter-group comparison, while considering $p \leq 0.05$ as the

significance level. Standard method of extraction was used to prepare the extract of *Physalis alkekengi* [8, 9].



Figure 1. *Physalis Alkekengi*

Table 1. The effect of different doses of the alcoholic extract of *Physalis alkekengi* on the blood indexes

| Parameters | White blood cells (10 ³ /mL) | Red blood Cells (10 ⁶ /mL) | Hemoglobin (g/dL) | Hematocrit (%) | Platelets (10 ³ /ml) |
|-------------------------|---|---------------------------------------|-------------------|----------------|---------------------------------|
| Control | 9.5±0.4 | 7.25±0.1 | 15.8±0.2 | 47.5±0.5 | 194±4.3 |
| Sham | 9.30±0.3 | 7.23±0.2 | 15.9±0.2 | 47.6±0.6 | 188±3.3 |
| Experimental (0.1 g/Kg) | 7.72±0.3* | 7.55±0.2 | 16.6±0.1 | 50.2±0.4* | 188±3.6 |
| Experimental (0.2 g/Kg) | 7.89±0.2* | 7.83±0.2 | 17.1±0.2* | 50.8±0.6 | 197±5.1 |
| Experimental (0.4 g/Kg) | 8.3±0.3 | 8.05±0.2* | 17.4±0.2* | 51.5±0.7* | 191±6.7 |

* Significant difference at with the control group ($p \leq 0.05$)

Results

The results show that none of this factors related to hemogram was not seen any the significant changes on in the sham group compared to the control group. If the experimental group, the number of red blood cells (RBC) (0.4 g/kg) and hemoglobin (Hb) level in groups (0.2, 0.4 g/kg) as well as the hematocrit (HCT) (0.1, 0.4 g/kg) increased significantly as compared to the control group, but the white blood cell count (WBC) (0.1, 0.4 g/kg) shows a significant reduction. The changes of these factors in other groups and also changes the amount of platelets is not seen significantly in all categories ($p > 0.05$) (Table 1).

Discussion

This study showed that the extract of this herb significantly increased the level of red blood cells, Hb, and HCT, as well as reducing the number of WBC (Table 1).

The studies on the effect of the extract of *Lycium barbarum* belonging to the Solanaceae family on blood homogram indicated that the extract of causes changes in the number of white blood cells, RBC, and the Hb marker due to having a carotenoids called xanthines (belonging to the Physalin family) [10]. Studies conducted on glycoalkaloids and solanine in ripe fruits of *Physalis alkekengi* and tomato showed that these compounds cause the number of white and red blood cells increase. Physalines existed in the hydroalcoholic extract of this herb have been effective on the inhibitory activity of macrophages and lymphocytes inhibition through reducing neutrophils infiltration and inhibition of the formation of cytokinins such as IL-6 and IL-12, and these activities will lead to the reduction of inflammation. Like glucocorticoids, physalines could reduce inflammation [5, 11]. Physalines weaken immune system and cause significant reduction in the conduction of lymphocytes, particularly mature T lymphocytes [12-14]. The studies on saponins existing in the extract of thyme herb showed that the low levels of saponins increases the intestinal permeability to molecules such as ferritin, and other nutrients such as folic acid which may be effective on

hemoglobin and hematocrit [10]. Due to the fact that alkaloids such as saponins and solanine glycoalkaloids are found more in the *Physalis alkekengi*, these alkaloids, especially saponins, can cause an increase in the Hb and HCT level, which is consistent with the results of this study [11]. *Physalis alkekengi* extract increases the thyroid hormones amount. This hormones increases amount of glucocorticoids hormones including cortisol. In addition of, the presence of glucocorticoids in the number of plants solanaceae is proven [12, 15, 16]. The cortisol decrease blood eosinophils and lymphocytes numbers, as well as with the destruction lymphoid tissues and cause of output the T cells and antibodies cells of the tissues. Cortisol increase rate of RBC and cause polycythemia [12]. So the decrease of white blood cell and increase the RBC does seem logical. The cortisol increases plasma and liver hepatic protein and hepatic enzymes and helps to oxidation of fatty acids and *Physalis alkekengi* extracts also created make all of these changes [5, 17, 18]. Possibly, *Physalis alkekengi* extract could be of therapeutic value for the treatment of anemia, which also needs to be examined further.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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