



THE EFFECT OF CURCUMA LONGA RHIZOME EXTRACT ON BLOOD CELLS OF MICE: AN ANIMAL TRIAL

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ABSTRACT

Background: The aim of this study is evaluate the effect of hydroalcoholic extract of Turmeric (*Curcuma longa*) rhizome on blood factors. In traditional medicine, turmeric has been used to treat anemia and strengthening the immune system.

Objectives: In this study, the effect of hydro alcoholic extract of Turmeric rhizome on red blood cells count, white blood cells count, hematocrit, and erythrocyte sedimentation rate (ESR) were studied in mice.

Methods: This animal trial and cross-sectional study was performed in 2015. Animals were tested in five groups of 7 each. Doses of 200, 400, 600 mg per kg of turmeric extract every day for thirty days were fed through oral feeding to different groups of adult male mice with weighing 20 g to 25 grams. Data was analyzed using SPSS 17 software and presented as mean \pm SD.

Results: The results of this study showed that the extract of turmeric rhizome increases red blood cells counts, white blood cells count, hematocrit and percentage of neutrophils and monocytes, but it is ineffective on the erythrocyte sedimentation rate (ESR). The highest response was observed at the dose of 400 mg/kg.

Conclusion: According to the results of this study, it appears that using continuously of turmeric can be relieving anemia and strengthening the immune system.

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Introduction

Curcuma Longa, named Tumeric in Latina, from the family of Zingiberaceae, is an indigenous herb found in tropical regions of Asia and Africa, and is one of Indian traditional condiments that have been used in the field of medicine in Egypt and India for six thousand years.¹⁻⁴ *Curcuma longa* with swelled and yellow colored rhizomes and stems of 1-1.5 meters, has petals

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coloured green to yellow which are accompanied by leaves on stem's base [1-5]. The rhizome is the part of use in many fields. *Curcuma longa*, by the view of Arabic traditional medicine, is named bile cannabis [2,4]. *Curcuma longa* is produced in China, Pakistan, Indonesia, India, South America and Africa [2]. *Curcuma longa* is not grown in Iran, but in the field of traditional medicine, it is applied to relieve toothache and arthralgia and treat anemia [2,4,6] *Curcuma longa* has a bitter and spicy taste and is of use as flavor in cooking and its oil extract is of application in perfume industry [3,5].

Curcuma longa's extract is antioxidant, antifungal, anti-parasitic, anti-inflammatory, ant cancerous and anti-flatulence [3,5,7]. Several studies support the fact *Curcuma longa* is beneficial in decreasing the rate of bowel cancer, [8,9] renal carcinoma, pancreatic carcinoma and uterus cancer [10-16]. In addition, in Chinese medicine it has benefited in treating complications such as hemorrhoids, localized fungal infections. Jaundice and hepatitis and is used as a painkiller in the form of ointment.³ Following the studies carried out in medical center of Chicago University in 2011, the efficacy of *Curcuma longa* in hindering the proliferation of blood cancer cells has been accounted [17]. In addition, based on a survey implemented in the university of Texas in 2009, *Curcuma longa* has the benefit to inhibit apoptosis [18]. *Curcuma longa* is combined of curcuminoid derivatives such as curcumin and desoxy curcumin.³ curcumin, chemically named as Difeouloymethane and formulated as C₁₂H₂₀O₆, 21-desmethoxy curcumin, bis desmethoxy, is the main component of *Curcuma longa* colour [19-22].

Curcuma Longa's essence components consist of Germacran, Guaiene, Bisabolen, Turmerone and Croton [3]. Other derivatives such as volatile oil, fructose, arabinose, starch and glucose are found in *Curcuma Longa* [10-19].

Objectives

There has not been any report on *Curcuma longa*'s extract effect on blood factors, this study is determined to evaluate the effectiveness, and in case of favorable results, this herb could aid in treating anemia. In this study the effect of *Curcuma longa* on blood factors, RBC count, WBC count, HCT and ESR has been evaluated.

Materials

This animal trial and cross-sectional study was performed in 2015.

Drying step

Rhizomes were collected, and recognized and confirmed by the pharmacognosy group of the University of Tehran. Then under standard conditions, away from sunshine, moist and microbial contamination, the herb was dried. The dried samples were then pulverized using an electrical mill.

Extract preparing step

The dried and ground samples were then dampened in percolator machine using water and alcohol with the ratio of 1:2 by applying pressure for 24 hours. The extract produced was refined by using filters as micro pore filters and was the dried in the temperature of 30-40 degrees centigrade in a place exempt from microorganisms. To evaluate the injection dose, LD50 was primarily determined with the amount if 10g/kg and regarding the LD50, the effective dosage was the ascertained.

Mice retaining condition

In this study, a group of adult male mice with breed of Balb/c weighing 20-25 gram was used. The mice were kept in temperature of 23 degrees centigrade, with the daylight intermittence of 12 hours and complete availability of food and water. The mice were selected randomly and divided into 5 groups of 7: group 1 as the control group maintained their normal daily food, group 2 as the witness group were all injected normal saline, group 3 were given a dose of 200 milligram, group 4 were injected a dose of 400 mg and group 5 received of dosage of 600 milligram.

Blood sample preparing and dissection

2 hours after the last drug application, the mice were anesthetized with the application of ether and dissected and blood samples of their heart were then taken. Afterwards, some blood evaluation tests such as CBC, HCT and ESR were carried out.

It should be mentioned that all the moral considerations regarding experiments on animals have been taken care of as per the animal experiments in Helsinki statement of ethical principles (2008 version).

Statistical routines

The results were then statistically analyzed by using the software SPSS17. To scrutinize the results, P=0/01 and P=0/05 were assumed as limits of statistical deduction and the histogram was drawn using Excel software.

Results

Dosages of 400 and 600 milligram/kg induced a substantial raise in RBC count.

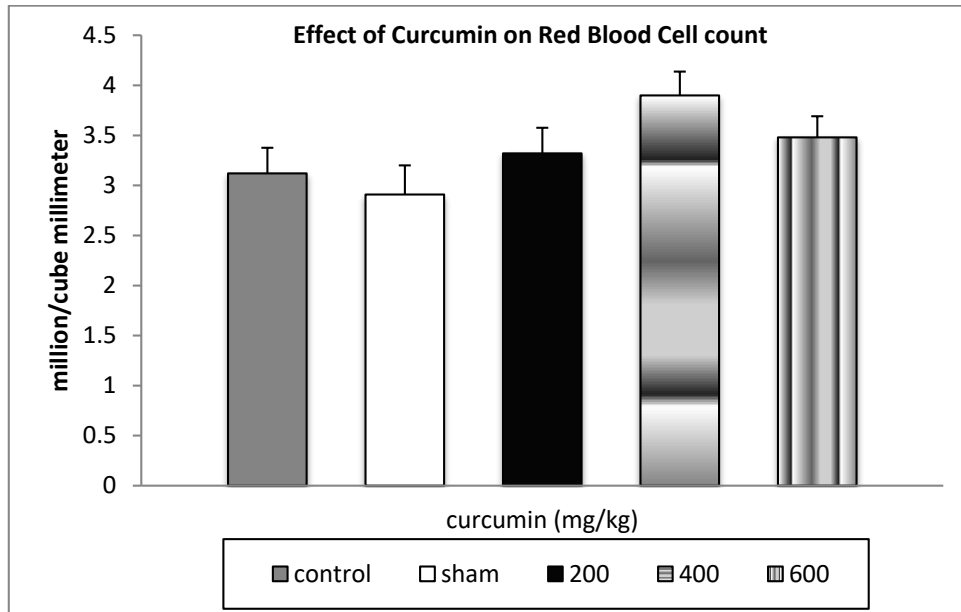


Figure 1: effect of extract *Curcuma longa* rhizome over number of RBC with dose 200, 400, 600 mg/kg weight (n=7) continue at up ever column introducer Mean±SE. $p < 0.01$, $p < 0.05$

Dosages of 400 and 600 milligram/kg induced a remarkable raise in WBC count.

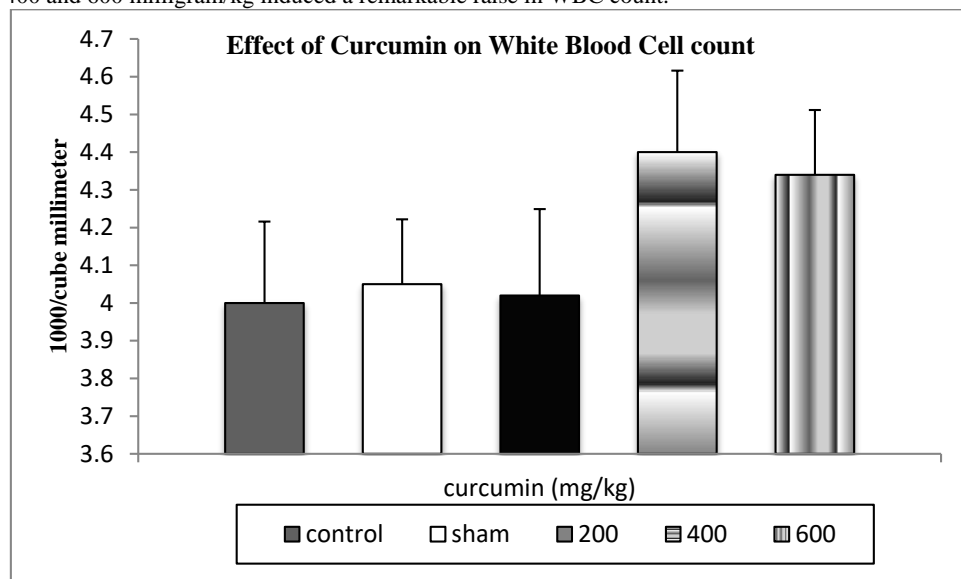


Figure 2: effect of extract *Curcuma longa* rhizome over number of WBC with dose 200, 400, 600 mg/kg weight (n=7) continue at up ever column introducer Mean±SE. $p < 0.01$, $p < 0.05$

Dosages of 400 and 600 milligram/kg induced a noticeable raise in hematocrit.

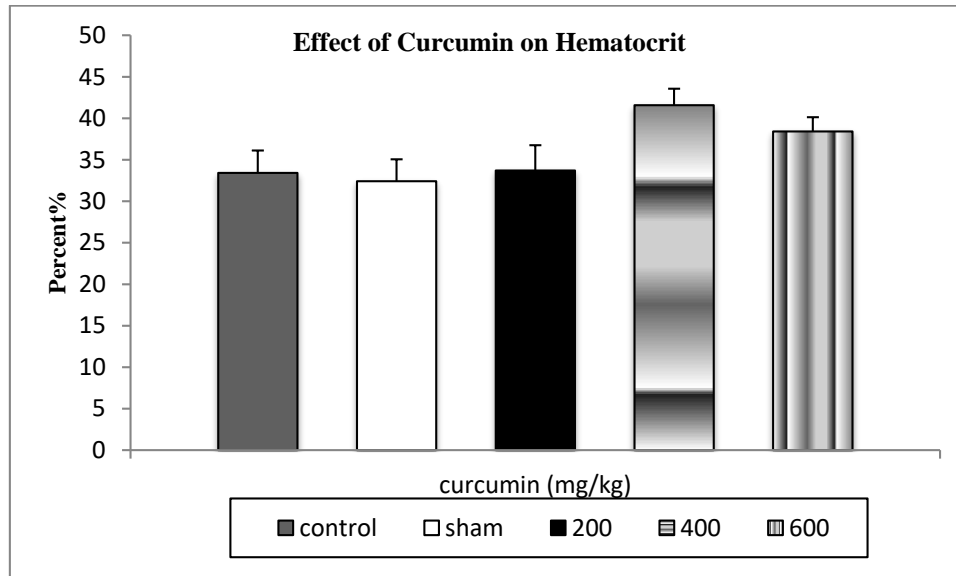


Figure 3: effect of extract *Curcuma longa* rhizome over number of Hematocrit with dose 200, 400, 600 mg/kg weight (n=7) continue at up ever column introducer Mean±SE. $p < 0.01$, $p < 0.05$

Discussion

Appraising the results, the increase in blood factors and hematocrit related to the application of *Curcuma longa* rhizome extract, is dose dependent, regarding that the highest response was due to application of 400mg/kg. Surveys have been implemented to show the efficacy of *Curcuma longa* in treating several diseases in human and animal samples. *Curcuma longa* is a potent anti-inflammatory and antioxidant agent

In addition, its application is recommended in the treatment course of diseases like cancer, Alzheimer, Rheumatism [7-17]. Several studies claim that Curcumin, a component of Curcuma, accounts for its effectiveness. Peroxide production inhibition, noticeable decrease and increase of respectively LDL and HDL levels in serum, anti-inflammatory and anti-cancerous benefits are all listed as Curcumin's profitable effects [22]. Curcumin stabilizes lysosomal membrane and eliminates heavy oxygen radicals. These findings exhibit that Curcumin's efficacious effect in inhibition of oxidative stress-dependent diabetes. Some other studies show a raise in insulin levels in groups' mice given a dosage of Curcumin. Curcumin stimulates Langerhans cells and regulates anomalies of metabolisms, diminishes complications of diabetes by increasing insulin secretion³. Recent studies claim that the LD50 of Curcuma rhizome extract is equal to 10g/kg, deducing its low toxicity levels, and showing that the dosages applied in this study were all safe. Scientists have proven the effects of 400 mg/day comparable with efficacy of Phenylbutazone 1200 mg/day. Phenylbutazone is effective in treating inflammation and arthritis.

Through this study we also perceived additive consequences in CBC, and that the optimally responded dosage is 400 mg. a 30-day application of this dosage will induce an increase in CBC and therefore hematocrit within physiological borders, which agrees to prescription of this herb in the field of traditional medicine in order to strengthen immune system and relieve anemia. Ultimately, for a more precise recognition of Curcuma rhizome extract, it is highly recommended that more evaluation tests be followed up, and the effects on blood cells and thrombotic and immune factors be evaluated.

Acknowledgement

There is no conflict of interest to declare.

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