

Effect of Aqueous Extract of *Allium porrum* (leek) on Hematological Parameters in Albino Rats

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Abstract

The aim of this study is to evaluate The effect of aqueous extracts of *Allium porrum* leafs on hematological parameters in female albino rats . The study was conducted in laboratory of physiology and chemistry at the College of Veterinary Medicine /University of Kufa and laboratory of physiology of College of Dentistry / University of Kufa , between November 2012 to February 2012 on 15 female rats of a verage body weights (150 – 200) g were used for the study and randomly assigned into three study groups of five animals. The group 1 control received via oral route (4ml of distilled water) , while test groups 2 and 3 received 400 mg / kg body weight and 800 mg / kg body weight of *Allium porrum* extract via oral route respectively .The administration of aqueous extract of *Allium porrum* for 20 days .The results of this study was produced a significant ($p<0.05$) decrease in WBC counts in group2 versus group1(control) , but the decrease in WBC counts in group2 was not significant compared to control group. There was significant ($p<0.05$) increase in WBC counts in group 3 versus to control group and group2. There was a significant increase ($p<0.001$) in Granulocyte counts in group2 and group3 versus group1. While Lymphocyte and Monocyte count in group2 and group3 was significantly increased ($p<0.01$) when compared to the control group . There was increase significant ($p<0.05$) in group2 and group3 in RBC counts, platelet counts and P.C.V. levels in versus group1. There was no significant differences in HB levels in group2 and group3 compared to the control group. The study shows that *Allium porrum* extract serves as immune boosters ,blood tonics on compartments of blood (RBC, WBC and Platelets) . Studying extended about the effect of *Allium porrum* for cut nosebleed and mixed this plant with others medical plants to medicine the patient with trachea or lung diseases.

Keywords : *Allium porrum* , hematological parameters, Albino Rats.

Introduction

This is first study in Iraq and other countries according to opinion about using this plants *Allium porrum* ,(It is locally called leek)for the treatment of various diseases. A large percentage of the people depend on herbal medicines because the international commercial medicines are becoming increasing expensive and out of reach . Arabian were used the leek plant in several cases , if the leek extract is mixed with vinegar and kinder , that's stop the blood especially the epistaxis and stimulate the sexual craving .furthermore , if it is mixed with honey then lapped , it is good for all chest pain and lung disease . moreover , if it is eaten , it will clear the trachea . In addition, if the it's extract mixed with vinegar , kinder and a drop or flower ointment , then dropped in ear , it is useful to relieve the pain and boom attack. If it is dressed with sumac , it cuts the wart with and it's dressing is good to treat the ulcers (Akil, 2010) . *Allium porrum* belong as to Alliaceae family (Seberg , 2003)and its contain several vitamins , the most important is vit B6 (pyridoxal phosphate) ,vit B9 (folic- acid) ,C and E . Also contain saponin and flavonoids (Keampferol, Quercetin) (Iris , 2004) . Ibn sina d. 488 e has mentioned that the leek plants was cut nosebleed(Akil, 2010) , so the use of aqueous extracts of *Allium porrum* to study the effects of it in some hematological parameters in white rats .

Materials and Methods

Preparation of laboratory animals

The study included 15 female white rats type *rattus rattus* age ranged between 8-12 week, the animals were obtained from College of Veterinary Medicine / University of kufa. They were housed in Laboratory Animal Care Unite in the College of Veterinary Medicine / University of Kufa . Normal rat feed and tap water were provided *ad libitum* with 12- hours light / dark cycle .

Preparation of plant extract

Attended the aqueous extract warm for leek plants , according to method (Bairy *et al* 2005) , 1 hundred grams of the powder was extracted with 1000 ml of distilled water using Soxhlet extraction . The extract was slowly evaporated to obtain a total yielded . Weighed sample of the extract was then used to prepare test solution of the desired concentration to enable administration of appropriate doses of material .

Experimental design

The rats were randomly selected and assigned to three groups of 5 rats per cage . one group (control) was given ordinary distilled water at 1.0 ml / 100 g body weight (b.wt.) . the remaining 2 groups were given aqueous

extract of *Allium porrum* at 400 and 800 mg/kg b. wt. respectively .

Hematological analysis

The effects of the extract on packed cell volume (P.C.V.) hemoglobin (H.b) , red blood cell (R.B.C.) count , white blood cell (W.B.C.) ,granulocyte , lymphocytes , monocytes , and platelets were analyzed using an automated hematological analyzer counts (60, U.S.A , 2013)

Statistical Analysis

The results of experiments for the aqueous warm extract analyzed for two concentration (400, 800) mg/kg for a period of dosage (20) days after the replications five for each concentration, using design complete randomization factorial experiments with completely randomized design, this design has been used least significant deference (L.S.D.).

Results

Table (1) shows the results of the RBC count and some other hematological parameters in the experimental animals . There were increases in RBC counts of rats in group2 (4.02±1.44)×10⁶ cells per mm³ which received 400 mg / kg b.wt. of extract and group3(7.46±2.96)×10⁶ cell per mm³which received 800 mg / kg b.wt. of extract. the increase in RBC count of group2 and group3 was significantly different (p<0.05) when compared to group 1 (3.60±0.56)×10⁶ cells per mm³ of blood which served as control group . there was increase in packed cell volume in group 2 and group3 animals . the increase was significant (p<0.05) in group2 (34.00±1.41) % and group3 (37.00±11.31)% when compared to group 1 (34.99±0.01) % . there was no significant difference in blood hemoglobin concentration group2 (11.50±2.82) g / dl and group3 (12.75± 3.18)g /dl when compared to group1 (12.00±1.41)g /dl ,while that of group3 was higher compared to group2. There was increase in platelet counts in group2(5.73±1.27)×10⁵/mm³ and group3(7.40± 0.85) ×10⁵ /mm³ when compared to group1 (5.94±0.00).

Table (2) shows there was a decrease in WBC counts in group2 animals, but the decrease was not significant (p<0.05) in group2 (2.60± 0.84) ×10³ cell per mm³ of blood when compared to group1 (5.63±0.89) ×10³ cells per mm³ of blood . There was significant (p<0.05) increase in WBC counts in group 3 (4.95±1.62) when compared to control group. from the table , it is obvious that there was significant increase (p<0.001) in % Granulocyte counts in group 3 (27.50±3.67) and group2(23.40±1.13) when compared to group1 (25.3± 0.42) . As shown in the table , there was a significant increase (p<0.01) in % Lymphocyte counts in group2 (73.50±2.82) and group3(74.90±4.94) when compared to group1(64.80±1.41). Also, there was significant increase (p<0.01) in % Monocyte counts in group2(3.10±0.07) and group3(3.25±0.07) when compared to group1(0.70±0.00).

Table -1- Effect of the plant extracts on red blood cell (RBC)counts, packed cell volume (PCV), hemoglobin (Hb) concentration and platelet counts in rats .

| Group | Treatment | Dosage (mg/kg) | RBC (x10 ⁶ mm ³) | PCV(%) | HB(mg/dl) | Platelets |
|---------|----------------------|----------------|---|--------------------------|------------|------------------------|
| Control | Dist. water | 0 | 3.60±0.56 | 34.99±0.01 | 12.00±1.41 | 5.94±0.00 |
| Group2 | <i>Allium porrum</i> | 400 | 4.02±1.44* | 34.00±1.41* | 11.50±2.82 | 5.73±1.27 ^a |
| Group3 | <i>Allium porrum</i> | 800 | 7.46±2.96 ^a | 37.00±11.31 ^a | 12.75±3.18 | 7.40±0.85 |

Results are presented as Mean ±SE ;*P<0.05, significant as compared with group1 , a P<0.05, significant as compared with group2.

Table -2- Effect of the plant extracts on total and differential white blood cell(WBC)counts in rats .

| Group | Treatment | Dosage(mg/kg) | WBC (x10 ³ mm ³) | Granulocyte% | Lymphocyte% | Monocyte % |
|---------|----------------------|---------------|---|---------------------------|---------------------------|--------------------------|
| Control | Dist. water | 0 | 5.63±0.89 | 25.30±0.42 | 64.80±1.41 | 0.70±0.00 |
| Group2 | <i>Allium porrum</i> | 400 | 2.60±0.84 | 23.40±1.13 | 73.50±2.82 ^{***} | 3.10±0.07 ^{***} |
| Group3 | <i>Allium porrum</i> | 800 | 4.95±1.62* | 27.50±3.67 ^{**a} | 74.90±4.94 ^{***} | 3.25±0.07 ^{***} |

Results are presented as Mean ±SE ;*P<0.05,**P<0.001,***P<0.01 significant as compared with group1 , a P<0.001, significant as compared with group2.

Discussion

This is first study about using *Allium porrum* leaf extract and the effects of its on the formed elements (erythrocytes, leucocytes and thrombocytes) of blood have not been documented . The present study was therefore aimed at evaluating the effects of aqueous extract of *Allium porrum* on hematological parameters viz- RBC and WBC counts , PCV , Hb concentration , platelets and differential WBC counts.

In this study the observed increase in RBC counts and platelets counts in *Allium porrum* treated groups

may have been due to presence of quercetin ,kaempferl ,folic acid , vitB6 and vitB12 , these substances are known to have beneficial hematological and immunological properties : quercetin acts as protect blood vessels especially weak and fragile capillaries against damage (Asekun *et al* ,2004 ; Odukoya *et al* , 2007) . In adult vertebrates including man, stem cells in bone marrow give rise to RBC , platelets and various types of WBC . It can therefore be inferred that some of the active components in these plants act on the bone marrow to stimulate the production and differentiation of haematopoietic stem cells(Idown *et al* ,2009 ; Onome *et al* , 2013) . It is well known that PCV otherwise called haematocrit represents the percentage of RBC in blood. There is a direct relationship between erythrocytes , PCV and hemoglobin concentration (Schalm *et al* , 1975 ; Oluwole, 2001) . hence , an alteration in one parameter , alternately alters another .

There was no significant change in Hb concentration observed in this study and this is not in agreement with the increase in RBC count observed . The decrease in total WBC counts following oral administration of aqueous extract of *Allium porrum* in group2 is not in line with the normal physiological response following perception of a foreign attack by body defense mechanism ,the decrease observed may have resulted from supersession of leukocytosis by the extract and also from the suppression of their production in the bone marrow . However , there was a significant increase in Granulocyte , lymphocyte and monocyte counts may also be related to the chemical composition of the extract such as quercetin , flavonoid and vitamin (Yakubu *et al* 2007) .

Lymphocyte and monocyte is a common parameter which has been measured in several studies investigating the immunomodulatory effects of metabolites (Daniel and Clement , 2008).

Conclusions

1. Effect of Aqueous extract of *Allium porrum* for both concentration on Differential White Blood Cell count in Rats .
2. Effect of Aqueous extract of *Allium porrum* for both concentration on Red blood Cell count and Platelet count.

Recommendations

1. Study the effects of extract of *Allium porrum* as Anti- Oxidant material.
2. Study the effects of extract of *Allium porrum* on Cholesterol and Lipoproteins levels in the blood.

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