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Hematological and Biochemical Changes in Albino Rats Receiving Aqueous Extract of *O. basilicum* Leaves

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Abstract

The present study had been designed to determine The effect of oral administration of aqueous extract of *0ccimum basilicum* leaves on some Hematological and biochemical parameters and on the level of blood proteins(total protein , albumin and immunoglobulin) of adult rats . 20 adult albino rats (10 males and 10 females) weighting between 100-150 g obtained from the disease free stock of the animal house ,biology Department, University of Babylon were used for the study The rats were divided according to sex into four groups with five rats each, as follows: Group Mc (Male control group receiving distilled water); Group Fc (Female control group receiving distilled water); Group Mt (Male test group receiving aqueous extract of *O. basilicum* leaves); Group Ft (Female test group receiving aqueous extract of *O. basilicum* leaves). There was increase in the amount of hemoglobin, PCV and neutrophils levels ($P > 0.05$). lymphocytes level was decreased on administration of the extract in both male (58.17 ± o.81) and female (60.76 ± 0.36) Serum biochemical results showed significant increase of serum total protein , albumin and immunoglobulin .

Introduction

Epidemiological evidence increasingly suggests that consumption of a diet rich in fruit, vegetables, and cereals has a protective effect against certain forms of chronic diseases (1; 2,3) It is well-known that most speises, especially those belonging to the Lamiaceae family, possess a wide range of biological and pharmacological activities with potential health beneficial effects. Since ancient times, they have been used to improve the flavour and the organoleptic properties of various types of food. *Ocimum basilicum Linn.* also known as basil, belongs to the genus *Ocimum* (Lamiaceae) which contains up to 150 species of herb and shrubs in the tropical regions of Asia, Africa, and Central and South America (4). It is a popular perennial widely cultivated herb prominently featured in Italian (5; 6). In addition, it is traditionally used in alternative medicine and natural therapies such as supplementary treatment of stress, asthma, and diabetes in India.

In Siddha In China, it is used to treat a variety of infectious diseases (7). It is used for treating pimples on the face and it is used in the pharmaceutical industries for its spasmolytic, carminative, hepatoprotective, diuretic and stimulating properties, and perfumes and cosmetics industries for its pleasant odour (8,; 9; 10 ,6). These medicinal importances of plants have been attributed to their phytochemical content. Thus phytochemical analysis of plants is predicated by the need for drug alternatives of plant origin, made imperative by the high cost of synthetic drugs. For example, L. owariensis leaves have been reported to contain various secondary plant metabolites of medicinal value including saponins, tannins, alkaloids and flavonoids (11). These

secondary plant metabolites extractable by various solvents exhibit varied biochemical and pharmacological actions in animals within the recent decade, a good number of medicinal plants have been reported to be employed in folk medicine in the treatment of anaemia. Among these plants include Tel ferbrifugum, Sorghum bicolor, Jatropha curcas, Flacourtia flavenscens, Ageratum conyzoides and Brillantasia feira occidentalis, Combretum dolichopetalum, Allinu assalonicum, Bougainv spectabilis, Psorospermum nitens. In addition, basil has been shown to possess the innate ability to increase immune proteins in serum **and effects** on some **hematological parameters** (12; 13; 14) .

In fact, the antimicrobial activity has formed the basis of many applications, including food preservation, pharmaceuticals, alternative medicine, and natural therapies (7).

2.0 MATERIALS AND METHODS

2.1 COLLECTION OF PLANT SAMPLE

Fresh leaves of *Ocimum basilicum* (scent leaf) were purchased from Hilla market(4) .

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2.2 EXPERIMENTAL ANIMALS

A total of 20 adult albino rats (10 males and 10 females) weighting between 100-150 g obtained from the disease free stock of the animal houseBiology Department, University of Babylon were used for the study. The rats were divided according to sex into four groups with five rats each, as follows: Group Mc (Male control group receiving distilled water as placebo); Group Fc (Female control group receiving distilled water as placebo); Group Mt (Male test group receiving aqueous extract of O. basilicum leaves); Group Ft (Female test group receiving aqueous extract of O. basilicum leaves).

2.3 DRUGADMINISTRATION

Mt and Ft groups received 200 mg/g body weight oral daily doses of aqueous extract of *0ccimum basilicum* leave using tubes and syringes this lasted for aperiod of 4 weeks. The aqueous extract prepared by take 50 g from leaves which boiled in water and left in water for 3 days. After that the size was completed to 100ml by distal water so the final concentration of the extract is 50%. The aqueous extract is filtered by used filter paper No.42. Rats in the control groups, Mc and Fc, were administered, by oral gavages, with 5 ml of distilled water (placebo).

2.4 COLLECTION AND ANALYSIS OF BLOOD SAMPLE

All the animals were anaesthetized with chloroform vapor, twenty-four hours after last day of extract. Administration and dissected for blood collection. Blood samples were collected by cardiac puncture into two sets of plane and EDTA-treated sample bottles, respectively. The blood in the plane sample bottles were allowed to clot, after 3 hours. The clotted blood samples were spun in a bench top centrifuge to obtain sera the serum samples were separated into another set of plane sample tubes. The separated serum samples were stored in the refrigerator until required for estimation total protein. The whole blood collected into EDTA-treated sample bottles were used for hematological testes.

2.5- Estimate the PCV.

Method is used to estimate the PCV is Microhaematorit using Capillary tubes Container .EDTA (15)

2.6. Estimate of total protein in the serum.

Used Biuret method to estimate the total protein in blood serum (16) as used kit fitted from Randox a British company.

2.7: Estimate albumin in serum.

Was estimated using the method serum Bromocresol Green Method (17) as used kit fitted from Randox a British Company.

2.8. Estimate globulins in serum:

Estimated level globulins arithmetic According to the following law **.**

Globulin con. (G/100ml)= total protein con. – Albumin **con. (g/100ml)**

2.9. Estimate lymphocytes and neutrophil.

Used Dye exlusion test to estimate the cell count. According to the following law.

Viable cell count= No. of viable cell\(No. of viable cell+ No. of dying cell) × 100. (18).

2.10. STATISTICAL ANALYSIS

The results obtained from this study were analyzed by one-way analysis of variance (ANOVA), followed by Students t-test to evaluate the significance of the difference between the mean value of the measured parameters in the respective test and control groups. A significant change was considered acceptable at $P < 0.05$. Results of the biochemical estimations are reported as Mean + SD.

3.0 RESULTS

TABLE 1. THE EFFECT OF AQUEOUS EXTRACT OF O.BASILICUM LEAVES ON SOME HAEMATOLOGICAL INDICES 0f RATS

The groups	Hb **(g/dl)**	**PCV (%)**	**NEUTROPHILS(%)**	**LYMPHOCYTES (%)**
Mc	8.9±0.12	26.76±0.63	35.60 ± 18.06	62.97±0.61
Mt	11.63±0.52	31.93±1.31	37.80 ± 12.54	58.17 ± o.81
FC	12.86±0.28	32.93±1.79	26.70±1.77	63.12 ± 0.53
Ft	14.76±0.55	39.30±2.33	28.40 ±1.15	60.76 ± 0.36

Mc =Male control; Mt = Male test,treated with the extract;
Fc = Female control; Ft = Female test, treated with the extract.
Means with the same superscript at the same column do not show any significant difference (P> 0.05).

TABLE 2. THE EFFECT OF AQUEOUS EXTRACT OF O.BASILICUM LEAVES ON SOME BIOCHEMICAL INDICES

Groups	**TOTAL PROTEIN(g/dl)**	**ALBUMIN (g/dl)**
Mc	82.30±7.80	35.40 ±7.80
Mt	90.60±10.60	43.20 ±7.05
Fc	79.40±14.32	38.40 ±2.95a
Ft	92.40±16.12	44.00 ±7.38

Mc = Male control; Mt = Male test,treated with the extract;
Fc = Female control; Ft = Female test, treated with the extract.

TABLE3 . THE EFFECT OF AQUEOUS EXTRACT OF O.BASILICUM
LEAVES ON immunoglobulins concentration

Groups	Immunglobulins (g/ml)
Mc	2.19±.10
Mt	3.78±0.2
Fc	2.41±0.13
Ft	2.98±0.16

DISCUSSION:

The results of this study also indicated that the extract of *O. basilicum* leaves may possibly serve as an acceptable blood booster in an anemic condition or prophylactic purpose. Although the specific mechanism(s) through which the extract facilitated the increase in these hematological indices was not ascertained in this study, this action is assumed to be a direct effect of the extract on the haematopoietic systems. It is possible that the extract contains such constituent(s) that can interact and stimulate the formation and secretion of erythropoietin, hematopoietic growth factors/committed stem cells. Also, it has been reported that rapid synthesis of blood cells can be enhanced by the stimulations of hematopoietic growth factor and erythropoietin systems (19).

Moreover, the hematopoietic potential of the leaf extract of *Ocimum basilicum* may be related to its antioxidant activity. It has been shown that flavonoids inhibit peroxidation of polyunsaturated fatty acids in cell membranes (20).
In this study there are useful indices of evaluating the toxicity of plant extract in animals (21, 22, 23).
Assessment of haematological parameters can be used to determine the extent of deleterious effect of extracts on the blood of an animal. It can also be used to explain blood relating functions of a plant extract or its products (24). Lymphocytes are the main effector cells of the immune system (25). The decreases in the lymphocytes in this study may affect the effector cells of the immune system. The significant increase in the neutrophils by the extract could possibly suggest the extract has the ability of enhancing the ability of the blood component to phagocytose. The biochemical indices monitored in the serum and other secretory substances of the liver and kidney

can be used as 'markers' for assessing the functional capacity of the liver (21). These parameters of organ function if altered will impair the normal functioning of the organs.

There was significant effect in the serum levels of albumin and total protein This suggest that the secretory ability and normal functioning of the liver in relation to these substances was not affected.(26)

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التغيرات الدموية والكيموحيوية في جرذان البينو التي اعطيت المستخلص المائي لاوراق الريحان (O.basilicum)

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الخلاصة:

صممت الدراسة المقدمة لتحديد تأثير المستخلص المائي لأوراق الريحان على بعض المعايير الدموية وعلى مستوى بروتينات الدم (البروتين الكلي، الألبومين، الاميونكلوبيولين) للجرذان البالغة.استخدم عشرين جرذ بالغ من نوع البينو (عشرة ذكور وعشرة إناث) يتراوح وزنها من 100-150 غرام تم الحصول عليها من البيت الحيواني في كلية العلوم\ قسم علم الحياة في جامعة بابل. قسمت الجرذان اعتمادا على جنسها إلى أربعة مجاميع في كل مجموعة خمس جرذان كالأتي مجموعة السيطرة للذكور(تم أعطاء مجموعة من الذكور الماء المقطر كسيطرة) ومجموعة السيطرة للإناث (تم أعطاء مجموعة من الإناث الماء المقطر كسيطرة) ومجموعة ذكور الاختبار(مجموعة من الذكور تم إعطاءها المستخلص المائي لأوراق الريحان) ومجموعة إناث الاختبار (مجموعة من الاناث تم إعطاءها المستخلص المائي لأوراق الريحان). بينت الدراسة بأنة هناك زيادة في كمية الهيموكلوبين وحجم مضغوط الخلايا ومستوى كريات الدم البيضاء العدلة .بينما قل مستوى الخلايا اللمفية للحيوانات المعاملة (الذكور و الإناث). أظهرت نتائج الاختبارات الكيوحيوية التي أجريت للمصل زيادة في البروتين الكلي و الألبومين والكلوبيولينات المناعية.