Hemopoietic Activity of the Beetroot Ethanolic Extract of *Beta Vulgaris* (Shamandar) in Albino Rats

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**Abstract**

Beta vulgaris known locally as shamandar, the aim of this study is to demonstrate the hembiotic effect of the ethanolic extract of beetroot of the plant. The study was prepared to investigate the effect on hemoglobin (Hb), red blood cell count (RBC) “, packed cell volume (PCV) “, mean corpuscular hemoglobin (MCH) “, mean corpuscular volume (MCV)”, and mean corpuscular hemoglobin concentration (MCHC) “by using 50 albino Swiss rats. Five groups of rats (each 10) were fed orally with different doses of beetroot extract of Beta vulgaris (200, 400, 800, 1600 mg/kg body weight and control), for sixteen days. Blood samples were collected from the rats by ocular bleeding, and analyzed for the determination of the hembiotic parameters. It is concluded from the study , that the beetroot ethanolic extract of beta vulgaris elevate the blood parameters in a dose dependant manner , which support the folklore use of the juice of the shamandar to treat anemia.

**Keywords:** *Beta vulgaris, Shamandar, Beetroot, Albino Rats, Blood Picture, anemia.*

**Introduction**

The uses of folic medicine mainly depends of the consuming herbs and medicinal plants by peoples, and rolling a wild important field in patient treatment in third world developing countries in the last few years .According to this, medicinal plants and herbal remedies are a rich source for the uses in medical therapy [1].

All plant forms and parts are used for traditional medicines; these include leaves, flowers, fruits, seeds, nuts and roots [2]. The different parts of the medical plants and remedies of herbs consist of more than one of the active ingredients that consumed therapeutically and can be as an important source(s) for the development and synthesize drugs of new pharmacologically active drugs [3].

Therefore, medicinal plants are plants that contain medicinal products as their active ingredients. They are used commercially in modern medicine and pharmacology [4].

The folic medicine usually refers to the following fields: the birth attendance, use of acupuncture, healing of mental attitude, and traditional treating pathways [5]. The oldest health care procedure which is growing fast according to the medical properties and history background of the countries is the herbal and plants used in medical treatments [6].

The vegetable plant *Beta vulgaris* beetroot is called shamandar in the local market and be long the family Amaranthaceae. It has been used locally and fically in traditional medicine for curing lots of varieties of diseases. The most common phytochemical ingredients in the beetroot of *Beta vulgaris* are: Betaine and betalain and applied in researches to investigate its pharmacological and physiological effect [7]. The investigated uses of beetroot claimed therapeutically include; antitumor, carminative, emmenagogue, and hemostatic and renal protective...
properties and is a potential herb used in cardiovascular conditions [8]. Beetroot is known to be a powerful antioxidant [9]. The local uses in ancient time of beetroot mainly associated with sex hormone enhancement in human as aphrodisiac. To remove and reduce the kidney and bladder stones and to improve the sexual weakness beetroot juice was used as herbal remedy in folic medicine [10].

Recently, athletes widely use beetroot as a natural source of gaining energy in their trainings [11, 12]. The father of medicine “Hippocrates” recommended the uses of the leaves of beetroot in fast wounds healing [13]. New researches indicated by Hindawi Publishing Corporation Mediators of Inflammation “that Beta vulgaris extracts (root) possess antihypertensive, hypoglycemic, antioxidant [14], anti-inflammatory, and hepatoprotective activities [13, 15, 17].

The extract obtained from beetroot of B. vulgaris has shown powerful multi organs tumor suppressing action in recent new laboratory animals researches [10, 18, 19]. The oxygen blood carrier from the other parts of the body and releases the oxygen to be used and burn nutrients to initiate energy for the functions of the body also collecting the carbon dioxide produce by the body back to the lungs is maintained by hemoglobin [20].

Packed cell volume (PCV) is the percentage of the concentration of red blood cells in blood. It is normally about 45% for men and 40% for women [21]. This research work was aimed at investigating the effects of ethanol fresh roots extract of Beta vulgaris on the hemoglobin level and packed cell volume in albino rats.

Materials and Methods

Materials

Thirty albino rats were obtained from University of Baghdad, College of Science. The fresh beetroots of Beta vulgaris were bought from the normal market in Baghdad city, Iraq. They were authenticated by the Iraqi National Herbarium in Abu-Ghraib, Baghdad, Iraq.

Methods Extraction of Plant Material

1 kg fresh of Beta vulgaris roots were cutted into tiny pieces, and were exhaustively macerated by soaking in 70% (1.5 L) ethanol, such procedure were repeated daily for three times. The alcoholic extract gained was exposed to reduced pressure under rotary evaporator to be concentrated and complete drying.

Acute Toxicity Test

Oral root is usually performed for the detection of acute toxicity. The dried powder of beetroot extract was mixed with with sterile water, the solution were given to the groups lab rats in various doses, 200-4000 mg/ kg body weight of the rats orally .The groups of rats examined every half hour for first 4 hours in the first day of extract feeding to detect the clinical signs of toxicity, same was applied for the next 73 hrs and the next 14 days for any deaths and mortality [22].

Haematological tests

Five groups, 10 of each male albino rats were performed in this experiment as follows for 16 days:-

First group (control) fed orally with 0.5 ml of 0.9 % normal saline

Second group were fed orally with 200 mg/kg weight of extract of beetroot

Third group were fed orally with 400 mg/kg weight of extract of beetroot

Forth group were fed orally with 800 mg/kg weight of extract of beetroot

Fifth group were fed orally with 1600 mg/kg weight of extract of beetroot

After sixteen days, blood was collected from the experimental rats by ocular bleeding (0.5ml) to determine the parameters expressed in this study such as: Packed cell volume (PCV), Hemoglobin levels (Hb concentration) and red blood cell counts (RBC counts) . Microhaematocrit technique was applied to measure the packed cell volume through Hawksley microhaematocrit centrifuge and spinning for 5 min at 12,000 x g before measuring I with the hematocrit reader [23]. The count of RBC was investigated by the hemocytometer method. Reichert’s haemoglobinimeter were applied to
measure the level of hemoglobin colorimetrically [24].

**Statistical Analysis**

Student –t-test was applied to analyze the results obtained which is expressed as Mean ±SEM “P value of 0.05 or less 0.001 was statistically significant “.

**Results**

The data obtained from the acute toxicity test showed that no death or mortality was found after 1-3 days from oral feeding of the extract, which indicate that the oral feeding of beetroot extract is safe and non-toxic. Table 1- express the effect of various doses of the ethanolic extract of Beta vulgaris beetroot on different blood parameters.

**Packed Cell Volume**

The data obtained from the study shows that upon increasing the dose accept the dose 200 mg/kg of body weight of beetroot extract of shamandar , the PCV value in the animal groups used was continuously increased significantly compared to control group “.

**Hemoglobin Concentration**

Table 1: The hematological changes parameters of ethanolic extract of beetroot of Beta vulgaris

<table>
<thead>
<tr>
<th>Treatment (mg/kg)</th>
<th>PCV% ± S.E.</th>
<th>Hb(kg) ± S.E.</th>
<th>RBC 10^9/mm^3 ±S.E.</th>
<th>MCV±S.E x 10^6 (FL)</th>
<th>MCH ± S.E x 10^4 (Pg)</th>
<th>MCHC (g/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Saline</td>
<td>38.7±1.87</td>
<td>12.46±0.28</td>
<td>4.43±0.25</td>
<td>94.6±0.8</td>
<td>25.56±0.1</td>
<td>32.11±0.1</td>
</tr>
<tr>
<td>Extract 200</td>
<td>38.1±2.06</td>
<td>12.94±0.6</td>
<td>4.64±0.28</td>
<td>91.32±0.6</td>
<td>29.12±0.4</td>
<td>31.52±0.6</td>
</tr>
<tr>
<td>Extract 400</td>
<td>42.81±0.6</td>
<td>13.95±0.14</td>
<td>4.81±0.9</td>
<td>93.40±0.7</td>
<td>31.8±0.71</td>
<td>34.64±0.08</td>
</tr>
<tr>
<td>Extract 800</td>
<td>45.4±0.9</td>
<td>15.91±0.21</td>
<td>5.34±0.04</td>
<td>90.91±0.05</td>
<td>33.91±0.07</td>
<td>32.78±0.02</td>
</tr>
<tr>
<td>Extract 1,600</td>
<td>47.9±0.51</td>
<td>17.10±0.06</td>
<td>5.83±0.08</td>
<td>84.64±0.19</td>
<td>27.9±0.12</td>
<td>31.8±0.02</td>
</tr>
</tbody>
</table>

NS = values not significantly different from control; *= values significantly different from control P < 0.05 ; **= values significantly different from control P < 0.001.

**Discussion**

The data obtained from this research work indicate that the ethanolic extract of Beta vulgaris beetroot mainly affect the blood parameters and as a dose dependent scheme to elevate the concentration of haemoglobin, RBC count , and PCV in Swiss albino rats, whereas small or low doses of the ethanolic extract (200 mg/kg body weight ) increases the blood parameter somehow but not significantly compared to control which fed up with normal saline .There was a statistical significant elevation in almost all blood parameters upon feeding the animal groups with the beetroot extract in a dose ranges from 400-1600 mg/kg body weight. PCV parameter shows a statistically significant increment only within almost high dose ranges of the ethanolic extract of the beetroot of shamandar, the same conclusion is observed with hemoglobin concentration and red blood cell counts, which is mainly due to the high concentration of the active constituent (s) in the highest doses of the extract and from these findings , it is concluded that the individuals should take the copious amount of the extract of shamandar to proceed or achieve a maximal effects. The traditional medical practitioners prescribe more than one of plants or herbs with shamandar such as Khaya spp, native Natrona and other substances “to obtain best results in improving the hem biotic
parameter and increase the formation of blood cells properties [25, 26, 27]. The hembiotic parameters such as MCH “, MCV, MCHC , are always related to RBC, in same manner Hb and PCV values are correlated to RBCs population “. In the data found in this research almost all the hem biotic parameters are affected with the beetroot extract of B. vulgaris , which gives a clear idea that the Hb incorporation into RBC together with alteration of RBCs osmotic fertility and morphology “ [28.29]. It could be concluded from the research, that the enhancement or improvement of the hembiotic parameters after the feeding with the beetroot of shamandar after the improvement of the wellbeing of the patient and considered as a best antiabortive agent [30]. Further studies are required to possess the mode of action of the extract together with the consideration of chemical composition and the active ingredients that possess these pharmacological and physiological activities.

References
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