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ERYTHROPOIETIC ACTIVITY OF *VITIS VINIFERA* IN NEW ZEALAND WHITE RABBITS

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Article Info

Abstract

Background:

The knowledge of traditional herbal drugs provides the leads for safer and cheaper herbal medicines. A number of modern pharmaceuticals have been obtained from herbal medicines.

Vitis vinifera, or grapes, have been used medicinally since many decades... Traditionally, several diseases have been treated, using different parts of *Vitis vinifera.* In this study, we assessed the erythropoietic activity of *Vitis vinifera* in New Zealand White rabbits.

Material and method: Automated Huma count Plus, Hematology analyzer model # 6400/S, Human Germany was used to analyse the samples of blood. RBC count, hematocrit, hemoglobin (Hb), and mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) were assessed. The juice was given orally by gavage at the two doses of 4 mL/kg and 8 mLkg.

Result: The results of the analysis reveal that erythrocyte count was significantly increased in treated groups when compared with the saline-treated group. Similarly, hemoglobin levels and hematocrit levels were also significantly increased in treated groups when compared with the saline-treated group.

Conclusion: *Vitis vinifera* juice has shown a significant erythropoietic activity in New Zealand White rabbits. The increase in the level of hemoglobin and erythrocyte counts by *Vitis vinifera* juice might be related to the antioxidant properties of its constituents and its nutritive potential.

Keywords:

Erythropoietic activity, Vitis vinifera, Hemoglobin, Erythrocyte count, Hematocrit.

Introduction:

The worldwide demand and the sales of herbal medicines have increased significantly (Vetrichelvan & Jegadeesan, 2002). The people of Pakistan have an exceptionally rich convention in the utilization of therapeutic plants for the treatment of different sicknesses. In Pakistan, traditional healers are more in number as compared to allopathic physicians (Haq, 2004). It is a fact that many of classic herbal drugs have lost much ground to modern medicines, but others have gotten the attention of researchers and practitioners of modern era (Etaware, 2015; Roy, 2022). No doubt, there has been a great advancement in the field of modern medicines, but herbal drugs are still in practice of modern practitioners (Devasagayam, 2007)

The knowledge of traditional herbal drugs provides the leads for safer and cheaper herbal medicines (Patwardhan, 2005; Heinrich, 2002). A number of modern pharmaceuticals have been obtained from herbal medicines (Tamboura, Sawadogo, Kaboré & Yameogo, 2000).

A late study of the therapeutic writing demonstrates that a lion's share of clinical research on plant medications in the 21st century includes modernization and globalization, concentrating on the safety and efficacy (Liu & Wang, 2008). The medicinal value of *Vitis vinifera* has been recognized for over 6000 years (Ziskind & Halioua, 2007). The most seasoned records of the consumption of grape items by individuals backtrack to 3500–2900 B.C (Bowers, 1999). *Vitis vinifera* is highly grown natural product in the world on account of its utilization in wine manufacturing (Ali, Maltese, Choi & Verpoorte, 2009). A number of scientific studies have been carried out to validate the use of grapes in traditional medicine. However, there is the need for scientific research on the pharmacological activities of grapes to establish its role in neurological diseases and inflammation (de Almeida Sousa, 2024, Zhou DD, 2022).

Materials and Methods:

The collection of plant and preparation of juice:

Fruits of *Vitis vinifera*, White Kishmish variety, were bought from local markets, Karachi, Pakistan. After authentication, fresh juice was obtained by squeezing the fruits in a muslin cloth. Every day, fresh fruit was used to obtain the juice. The yield was approximately 80-100 ml/100 g.

Animals' selection:

Male New Zealand White rabbits (1200 to 1500 g) were selected for this study. Standard metallic wire gauge cages were used for the housing of the rabbits. The animals were provided with standard rabbit chow and water *ad libitum*.

Division of rabbits into different groups:

Division of rabbits into different groups was carried out in the following manner.

Group I: Normal control, given normal saline 8 ml/kg, *p.o.*

Group II: Treatment group, given VVJ 4 ml/kg, *p.o;*

Group III: Treatment group, given VVJ 8 ml/kg, *p.o;*

Dose:

Vitis vinifera juice and normal saline were administered through oral route. The dosing was carried out once daily at 10 a.m. for 60 days.

Sample collection:

After 7, 15, 30 and 60 days of dosing, the blood samples of 5 mL were collected by cardiac puncture. The blood was taken in ethylenediaminetetraacetate (EDTA) K3 tubes for hematological study.

Analysis of hematological parameters:

Automated Huma count Plus, Hematology analyzer model # 6400/S, Human Germany was used to analyse the samples of blood. RBC count, hematocrit, hemoglobin (Hb), and mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) were assessed.

Results:

Effect of V*itis vinifera* juice on erythrocyte count in rabbits:

The means of treated groups (VVJ 4 ml/kg and VVJ 8 ml/kg) were compared with the means of the normal control (saline-treated) group using Newman-Keuls *Post hoc* test. The results of the analysis reveal that the erythrocyte count was significantly increased in treated groups when compared with the saline-treated group (Figure 1).

The test was conducted on 7th, 15th, 30th and 60th day of the study, that is, the animals were examined 4 times during the 60 days of the study.

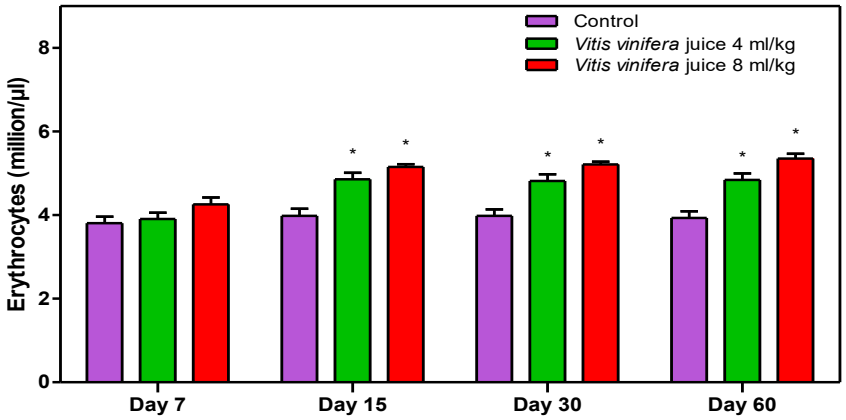

Figure 1. Effect of *Vitis vinifera* juice on erythrocyte count in rabbits.

Number of animals per group (n) = 10. The observations are given as mean ± S.E.M.
***P<0.001, **P<0.01, *P<0.05; ANOVA followed by Newman-Keuls test.

Effect of *Vitis vinifera* juice on hemoglobin levels in rabbits:

The means of treated groups (VVJ 4 ml/kg and VVJ 8 ml/kg) were compared with the means of the normal control (saline-treated) group using Newman-Keuls *Post hoc* test. The results of the analysis reveal that the hemoglobin (Hb) levels were significantly increased in treated groups when compared with the saline-treated group (Figure 2). The test was conducted on 7th, 15th, 30th and 60th day of the study, that is, the animals were examined 4 times during the 60 days of the study.

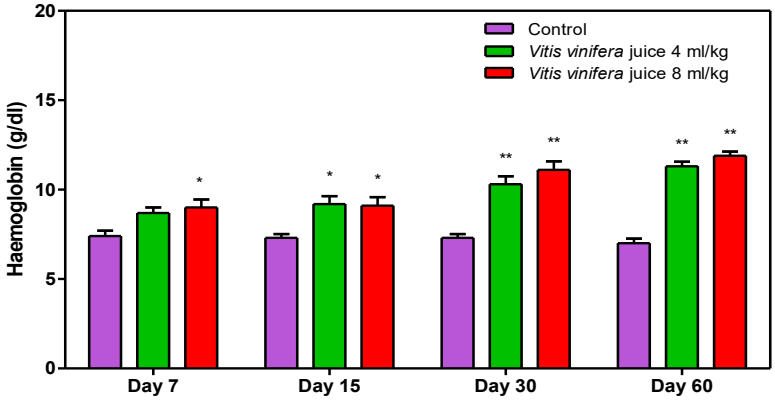

Figure 2. Effect of *Vitis vinifera* juice on hemoglobin levels in rabbits.

Number of animals per group (n) = 5. The observations are given as mean ± S.E.M.
***P<0.001, **P<0.01, *P<0.05; ANOVA followed by Newman-Keuls test.

Effect of V*itis vinifera* juice on hematocrit levels in rabbits:

The means of treated groups (VVJ 4 ml/kg and VVJ 8 ml/kg) were compared with the means of the normal control (saline-treated) group using Newman-Keuls *Post hoc* test. The results of the analysis reveal that the haematocrit (Hct) levels were significantly increased in treated groups when compared with the saline-treated group (Figure 3.40). The test was conducted on 7th, 15th, 30th and 60th day of the study, that is, the animals were examined 4 times during the 60 days of the study.

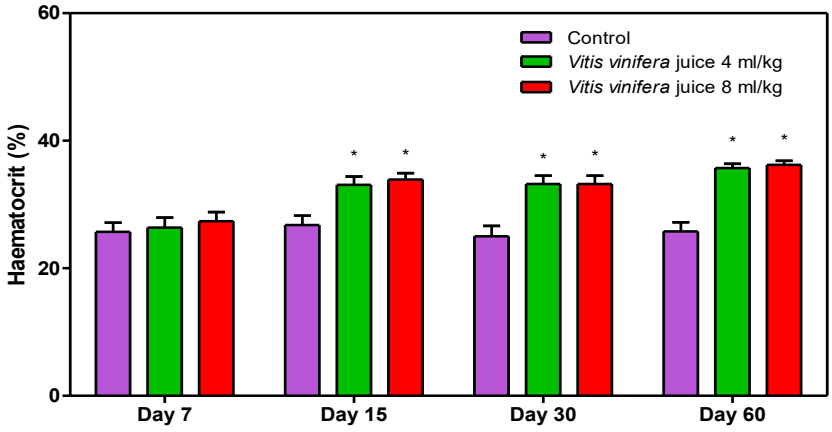

Figure 3. Effect of *Vitis vinifera* juice on haematocrit levels in rabbits.

Number of animals per group (n) = 10. The observations are given as mean ± S.E.M.

$^{***}P<0.001$, $^{**}P<0.01$, $^{*}P<0.05$; ANOVA followed by Newman-Keuls test.

Discussion:

The level of hemoglobin was increased significantly by *Vitis vinifera* juice. The erythrocyte counts were also increased significantly by the juice correlating the two parameters. The increase in the level of hemoglobin and erythrocyte counts by *Vitis vinifera* juice might be related to the antioxidant properties of its constituents (Tellone et al., 2014; Ambali, Ayo, Ojo & Esievo, 2010). The studies show that *Vitis vinifera* is a potential source of natural antioxidants. The antioxidative potential of *Vitis vinifera* juice might have protected erythrocytes against oxidative stress and thus their number has been increased correspondingly the level of hemoglobin has also been increased (Opara & Chohan, 2014). The increase in hemoglobin level and RBC count by *Vitis vinifera* juice may also be due to its nutritive potential and iron content. *Vitis vinifera* is traditionally used as a general tonic. The fruits are edible and considered as a good source of vitamin C and vitamin complex. So, it is possible that besides protecting the

erythrocytes, *Vitis vinifera* juice also increases the synthesis of RBCs and hemoglobin level (Sousa et al., 2014). The memory enhancing ability of *Vitis vinifera* juice might be related to its RBC count and hemoglobin level increasing effect because in order to enhance memory and learning, oxygen delivery is required which is correlated with RBC count and hemoglobin level. Since haemoglobin concentration is increased so the hematocrit value and mean corpuscular haemoglobin (MCH) also increased. Statistically, the increase in hematocrit value was significant while the increase in mean corpuscular haemoglobin (MCH) was insignificant. Mean corpuscular haemoglobin concentration (MCHC) was also insignificantly increased (Shah et al., 2009; Shah, Buchman, Wilson, Leurgans & Bennett, 2011).

Conclusion:

Vitis vinifera juice has shown a significant erythropoietic activity in New Zealand White rabbits. The increase in the level of haemoglobin and erythrocyte counts by *Vitis vinifera* juice might be related to the antioxidant properties of its constituents and its nutritive potential.

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