



## Study the enhance role of Garlic and Curcumin on Hematological parameters in male rabbits

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### Abstract

Garlic (*ALLIUM SATIVUM*) is considered one of the twenty most important vegetables, with various uses throughout the world, either as raw vegetable for culinary purposes, as also an ingredient in traditional and modern medicine. Further, it has been also proposed as one of the richest sources of total phenolic compounds among the usually consumed vegetables, whereas highly ranked regarding its contribution of phenolic compounds in human diet. Curcumin, an important constituent of turmeric, is known for various biological activities, primarily due to its antioxidant mechanism. The objective of this study was to evaluate the haematology of rabbits garlic and curcumin supplemented diets using 15 male rabbits garlic (1 mg/kg BW) curcumin (40 mg/kg BW), were orally administered by gavage alone or in combination. The tried measurements were given to rabbits each other day.

Results indicated that treatment with garlic and curcumin did not affect red blood cells (RBC), white blood cells (WBC), platelet count (PLT), hemoglobin (Hb), mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC). On the other hand increase RBC, WBC, PLT, Aim: The overall aim of this research was to ascertain the comparative of the garlic and curcumin on hematological parameters of male rabbits.

**Keywords:** Garlic, Curcumin, hematological parameters, Rabbits

### Introduction

Scientists are looking for safe choices: for example, phytochemicals, non-antibiotic prophylactics, and natural products for improving performance of animals. Several studies have been investigated the beneficial effects of garlic on human and animals, as antimicrobial, antiviral, antiparasitic and antioxidant properties [1], The majority of essential oils involves mixtures of phenolics and polyphenols, terpenoids, saponins, quinine, esters, flavone, flavonoids, tannins, alkaloids and nonvolatiles residues; however their concentration is variable. These compounds have many beneficial effects as antimicrobial, digestive system, enzyme stimulators antioxidants, anticoccidial and forimprove utilization of

nutrients by enhancing digestion, absorption and liver function[2]. The benefits of garlic, for human, include reducing the total plasma cholesterol, blood pressure and platelet aggregation [3].

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### Material and Methods

In this study, the effect of garlic and curcumin on hematological parameters, biochemical indices of male rabbits were investigated. Garlic and curcumin was purchased from were purchased from public market for medicinal herbs in Al-Bayda city.

Mature male New Zealand White rabbits age of 6 months were used. Animals were individually housed in cages and weighed weekly throughout 6-weeks experimental period. Feed and water were provided ad libitum. Rabbits fed pellets which consisted of 30 % berseem (*Trifolium alexandrinum*) hay, 25 % yellow corn, 26.2% wheat bran, 14 % soybean meal, 3 % molasses, 1 % CaCl<sub>2</sub>, 0.4 % NaCl, 0.3 % mixture of minerals and vitamins, and 0.1 % methionine. The vitamin and mineral premix per kg contained the following IU/gm for vitamins or minerals: vit A-4000,000, vit D<sub>3</sub>-5000, 000, vit E-16,7 g, K<sub>0.67</sub> g, vit B<sub>1</sub>-0.67 g, vit B<sub>2</sub>-2 g, B<sub>6</sub>-0.67 g, B<sub>12</sub>-0.004 g, B<sub>5</sub>-16.7 g, Pantothenic acid-6.67 g, Biotin-0.07 g, Folic acid-1.67 g, Choline chloride 400 g, Zn-23.3 g, Mn-10 g, Fe-25 g, Cu-1.67 g, I-0.25 g, Se-0.033 g, and Mg-133.4 g (Rabbit premix produced by Holland Feed Inter.

Co.). The chemical analysis of the pellets [19] showed that they contained 15.8 % crude protein, 11.3 % crude fiber, 3.7 % ether extract, 7.2 % ash, 92.9 % organic matter and 62.4 % nitrogen free extract % as DM basis. Fifteen mature male rabbits were randomly divided into four equal groups (each three rabbits) as follows: - Group I: Rabbits were used as control daily for 6 successive weeks. - Group II: Rabbits were treated with garlic. Garlic was given daily by gavage at a dose of 40mg/kg B.W, [20] which dissolved in corn oil for 6 successive weeks. - Group III: Rabbits were treated daily with curcumin by gavage at a dose of 1 mg/kg B [21]. The blood samples were collected in two tubes: one containing EDTA (anti-coagulant) and the other containing Heparin (anti-coagulant). Noncoagulated blood by EDTA was tested shortly after collection by Particle counter (from ERMA INC.-Tokyo. Model PCE-210) for measuring total leukocyte counts (TLC), total erythrocyte count (TEC), platelet count (PLT), haemoglobin (Hb), packed cells volume (PCV), mean cell volume

(MCV), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration (MCHC).

### Statistical analysis

Data were analyzed according to [22]. Statistical significance of the difference in values of control and treated animals was calculated by F test with 5% significance level. Data of the present study were statistically analyzed by using Duncan's Multiple Range Test [23].

### Results and Discussion

Table 1 and Figures 1 to 7 represent the hematological parameters of male rabbits treated with garlic and curcumin. Results indicated that treatment with garlic and curcumin did not affect red blood cells (RBC), white blood cells (WBC), Haematocrit (HCT), platelet count (PLT), hemoglobin (Hb), mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC). On the other hand increase RBC, WBC, PLT, Hb, MCV, MCH, and MCHC.

**Table 1: Changes in red blood cells (RBC), white blood cells (WBC), haematocrit (HCT), platelets count (PLT), hemoglobin (Hb), mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC) of male rabbits treated with garlic and curcumin**

Parameter	Control	Garlic	Curcumin
RBC ×10 <sup>6</sup> (μl)	6.47±0.050 <sup>a</sup>	6.26±0.105 <sup>ab</sup>	6.05±0.109 <sup>b</sup>
WBC ×10 <sup>3</sup> (μl)	8.59±0.13 <sup>a</sup>	8.48±0.20 <sup>ab</sup>	7.89±0.24 <sup>b</sup>
HCT×10 <sup>3</sup> (μl)	40.45±0.264 <sup>a</sup>	41.08±0.477 <sup>b</sup>	42.56±0.329 <sup>b</sup>
PLT ×10 <sup>3</sup> (μl)	287.97±5.826 <sup>a</sup>	468.19±22.194 <sup>b</sup>	326.88±7.550 <sup>b</sup>
Hb (g/dl)	12.62±0.13 <sup>c</sup>	13.36±0.18 <sup>b</sup>	14.16±0.15 <sup>a</sup>

<b>MCV (fl)</b>	68.43 ±0.40 <sup>c</sup>	72.86 ± 0.79 <sup>b</sup>	75.25 ± 0.60 <sup>a</sup>
<b>MCH (pg)</b>	22.55 ±0.13 <sup>b</sup>	24.20 ±0.51 <sup>a</sup>	23.19 ±0.51 <sup>ab</sup>
<b>MCHC (dl)</b>	33.10 ± 0.19 <sup>a</sup>	33.20 ± 0.077 <sup>a</sup>	32.59 ± 0.135 <sup>b</sup>

Values are expressed as means ± SE; n = 5 for each treatment group. Mean values within a row not sharing a common superscript letters (a, b, ab, c) were significantly different, p<0.05.

The importance of garlic is due to its use not only for culinary but also for therapeutic and medicinal purposes in both traditional and modern medicine. It is consumed either as raw vegetable (fresh leaves or dried cloves), or after processing in the form of garlic oil, garlic extracts and garlic powder with differences in chemical composition and bioactive compounds content between the various forms [24]. The general increase in PCV, RBC, WBC, and Hb of rabbits fed garlic and curcumin supplemented diets indicates that garlic and curcumin may contain blood forming factors that may have stimulated more blood production by the rabbits fed supplemented diets than those fed unsupplemented diets.

This also suggests that these herbs may have helped in boosting the immune system of the rabbits. Garlic treatment increased the number of RBCs, WBCs counts and Hb concentration in male rabbits [25]. Garlic significantly prevented the reduction of RBCs caused by lead intoxication in rabbits. However, [26] *et al* reported that rabbits treated with garlic showed insignificant reduction in RBCs count.[27] suggested that garlic contains some constituents that may play a role in the function of organs related to blood cell formation such as thymus, spleen, and bone marrow to stimulate more blood production.

In addition, [28] suggested garlic compounds might have a stimulatory effect on some haematopoietic growth factors (cytokines) which interact with specific receptors on the surface of haematopoietic cells, regulating the proliferation and differentiation of progenitor cells and the maturation and functioning of mature cells. Chemical components of garlic seem to act as

active oxygen scavenger competes with hemoglobin in the RBCs for oxygen resulting in tissue hypoxia, which in turn stimulates the kidney to form and secrete erythropoietin.

The end-product of metabolism of garlic in the body may also step up Hb synthesis and RBC production by their indirect effect on erythropoietin [27]. Also, garlic contain natural sulfur compounds which act as antioxidant active substances that implies the antioxidant action of garlic sulfhydryl groups on RBCs counts [29]. Moreover, [30] reported that several vitamins like vitamin B1, B2, B6, B9, C and E are present in garlic have a role in RBCs formation, maturation and in hemoglobin biosynthesis, absorption and utilization.

Regarding effect of garlic on WBCs count, [12] reported garlic might help in boosting the immune system of the rabbits. [31] suggested the anti-infection properties of garlic that stimulate immune functions. Also, garlic possess some important phytochemicals such as flavonoids, steroidal glycosides, alkaloids, saponins, tannins, phenolics, pectin and amino acids, with their biological and physiological roles to stimulate the immune system and organs related to blood cell formation particularly the bone marrow [32].

Curcumin in turmeric can accelerate the emulsification of fat by stimulating the production of bile [33]so that the digestion of fat will be more optimal. Optimized fat digestion will indirectly increase the provision of substrates for β-oxidation or fat metabolism which eventually enhances the production of succinyl-CoA through Krebs metabolic cycle [34].Considering succinyl-CoA is one of the materials needed for hemoglobin (heme in particular) synthesis [35], enhancedsuccinyl-CoA production was therefore most likely to be followed by the increase of hemoglobin synthesis.

The principal component of erythrocytes is hemoglobin, which makes up about one-third of the erythrocytes content [36]. Thus, enhanced hemoglobin concentration due to turmeric extract should be followed by the enhanced erythrocytes concentration. Hematocrit measures the percentage of the volume of whole blood that is made up of red blood cells [36]. Hematocrit is strongly affected by red blood cells concentration in the blood. Thus, alongside with the

concentration of erythrocytes, turmeric having significant effect ( $P \leq 0.05$ ) on hematocrit level (Table 4) could be accepted.

In disagreement with the present results, [37] showed that turmeric and cinnamon either alone or together did not change levels of hematocrit. Similarly, [38] reported no changes in hemoglobin and hematocrit values of broilers fed up to 8 g/kg turmeric powder. The normal PCV indicates the absence of normocytic anemia which is reportedly characterized by normal MCV and MCH and only detected by a decreased number of RBCs or PCV [39].

The result is corroborated by the normal RBCs which further elucidated the absence of hemolytic anemia and depression of erythropoiesis. The normal hemoglobin concentration for all the experimental rabbits is probably an indication that these feed additives supplement supported hemoglobin synthesis, [40] is among other factors, primarily affected by protein intake or may be due to iron deficiency and its improper utilization for the formation of hemoglobin [41]. [42] reported that normal range of values for Hb indicated that the vital physiological relationship of hemoglobin with oxygen in the transport of gases (oxygen and carbon dioxide) to or from the tissues of the body has been maintained and was normal.

### Conclusion

Treatment of rabbit with garlic and curcuminas verbal organization for 6 weeks enhance the hematological parameters.

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