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Study the enhance role of Garlic and Curcumin on Hematolgical 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 hematolgical parameters of male rabbits.

Keywords: Garlic, Curcumin, hematolgical parameters, Rabbits

Introduction

Scientists are looking for safe choices: for example, phytobiotics, 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, saponines, quinine, esters, flavone, flavonoids, tannins, alkaloids and nonvoltiles residues; however their concentration is variable. These compounds have many benefical effects as antimicrobial, digestive system, enzyme stimulators antioxidants, anticoccidail 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 libtum. Rabbits fed pellets which consisted of 30 % berseem (Trifolium alexandrinum) hay, 25 % yellow corn, 26.2% wheat bran, 14 % soybean meal, 3 % molasses, 1 % CaCl2, 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 D3-5000, 000, vit E-16,7 g, K0.67 g, vit B1-0.67 g, vit B2-2 g, B6-0.67 g, B12-0.004 g, B5-16.7 g, Pantothinc acid-6.67 g, Biotein-0.07 g, Folic acid-1.67 g, Choline chloride400 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 for6 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 1and 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 $\times 10^6$ (µl)	6.47± 0.050 [a]	6.26± 0.105 [ab]	6.05± 0.109 [b]
WBC $\times 10^3$(µl)	8.59± 0.13 [a]	8.48± 0.20 [ab]	7.89± 0.24 [b]
HCT$\times 10^3$(µl)	40.45±0.264 [a]	41.08± 0.477 [b]	42.56± 0.329 [b]
PLT $\times 10^3$(µl)	287.97±5.826 [a]	468.19±22.194 [b]	326.88± 7.550 [b]
Hb (g/dl)	12.62± 0.13 [c]	13.36±0.18 [b]	14.16± 0.15 [a]

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

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 intoxification 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 haematopoetic 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 ß-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 erythrogenesis. 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.

Reference

1. CORZO-MARTíNEZ, M., CORZO, N. & VILLAMIEL, M. 2007. Biological properties of onions and garlic. Trends in food science & technology, 18, 609-625.
2. ZIARLARIMI, A., IRANI, M., GHARAHVEYSI, S. & RAHMANI, Z. 2011. Investigation of antibacterial effects of garlic (Allium sativum), mint (Menthe spp.) and onion (Allium cepa) herbal extracts on Escherichia coli isolated from broiler chickens. African Journal of Biotechnology, 10, 10320-10322.
3. CHAN, J. Y. Y., YUEN, A. C. Y., CHAN, R. Y. K. & CHAN, S. W. 2013. A review of the cardiovascular benefits and antioxidant properties of allicin. Phytotherapy Research, 27, 637-646.
4. PAREKH, J. & CHANDA, S. 2007. In vitro antimicrobial activity of Trapa natans L. fruit rind extracted in different solvents. African Journal of Biotechnology, 6.
5. ONYEAGBA, R., UGBOGU, O., OKEKE, C. & IROAKASI, O. 2004. Studies on the antimicrobial effects of garlic (Allium sativum Linn), ginger (Zingiber officinale Roscoe) and lime (Citrus aurantifolia Linn). African Journal of Biotechnology, 3, 552- 554.
6. FRIESEN, N., FRITSCH, R. M. & BLATTNER, F. R. 2006. Phylogeny and new intrageneric classification of Allium (Alliaceae) based on nuclear ribosomal DNA ITS sequences. Aliso: A Journal of Systematic and Evolutionary Botany, 22, 372-395.
7. SHETTY, S., THOMAS, B., SHETTY, V., BHANDARY, R. & SHETTY, R. M. 2013. An in-vitro evaluation of the efficacy of garlic extract as an antimicrobial agent on periodontal pathogens: A microbiological study. Ayu, 34, 445.
8. TAPIERO, H., TOWNSEND, D. M. & TEW, K. D. 2004. Organosulfur compounds from alliaceae in the prevention of human pathologies. Biomedicine & pharmacotherapy, 58, 183-193.
9. AMAGASE, H., PETESCH, B. L., MATSUURA, H., KASUGA, S. & ITAKURA, Y. 2001. Intake of garlic and its bioactive components. The Journal of nutrition, 131, 955S962S.
10. ANKRI, S. & MIRELMAN, D. 1999. Antimicrobial properties of allicin from garlic. Microbes and infection, 1, 125-129.
11. STERLING, S. J. & EAGLING, D. R. Agronomics and allicin yield of Australian grown garlic (Allium sativum). II International Symposium on Edible Alliaceae 555, 2001. 63-73.
12. ONU, P.N. AND AJA, P.M. (2011): Growth performance and haematological indices of weaned rabbits fed garlic (Allium sativum) and ginger (Zingiber

officinale) supplemented diets. Int. J. Food Agri. Vet. Sci., 1(1): 51-59.
13. FARAG, M. R., ALAGAWANY, M. M. & DHAMA, K. 2014. Antidotal effect of turmeric (Curcuma longa) against endosulfan-induced cytogenotoxicity and immunotoxicity in broiler chicks. International Journal of Pharmacology, 10, 429-439.
14. ALAGAWANY, M. M., FARAG, M. R. & KULDEEP, D. 2015. Nutritional and biological effects of turmeric (Curcuma longa) supplementation on performance, serum biochemical parameters and oxidative status of broiler chicks exposed to endosulfan in the diets. Asian Journal of Animal and Veterinary Advances, 10, 86-96.
15. SONI, K., LAHIRI, M., CHACKRADEO, P., BHIDE, S. & KUTTAN, R. 1997. Protective effect of food additives on aflatoxin-induced mutagenicity and hepatocarcinogenicity. Cancer letters, 115, 129-133.
16. BALASUBRAMANYAM, M., KOTESWARI, A. A., KUMAR, R. S., MONICKARAJ, S. F., MAHESWARI, J. U. & MOHAN, V. 2003. Curcumin-induced inhibition of cellular reactive oxygen species generation: novel therapeutic implications. Journal of Biosciences, 28, 715-721.
17. FöLDEŠIOVá, M., BALáŽI, A., CHRASTINOVá, Ľ. & CHRENEK, P. 2015. The effect of Curcuma longa dried powder in the diet on weight gain of rabbit does. Slovak Journal of Animal Science, 48, 43-48.
18. BASAVARAJ, M., NAGABHUSHANA, V., PRAKASH, N., APPANNAVAR, M., WAGMARE, P. & MALLIKARJUNAPPA, S. 2011. Effect of dietary supplementation of Curcuma longa on the biochemical profile and meat characteristics of broiler rabbits under summer stress. Veterinary world, 4, 15.
19. A.O.A.C. (1990, Official Methods of Analysis of the Association of Official Analytical Agricultural Chemists, 13th ed. Benjamin, Franklin Station, Washington, D.C.
20. PRAKASH, N., MALLIKARJUNAPPA, S. & WAGMARE, P. 2010. Effect of dietary supplementation of Pulvis Curcuma Longa on the voluntary feed intake, nutrient digestibility and Growth performance of Broiler rabbits under summer stress. Veterinary World, 3, 369.
21. WORLD HEALTH ORGANIZATION. (1980). International classification of impairments, disabilities, and handicaps: a manual of classification relating to the consequences of disease, published in accordance with resolution WHA29. 35 of the Twenty-ninth World Health Assembly, May 1976. World Health Organization.
22. STEEL, R. G. D., & TORRIE, J. H. (1960). PRINCIPLES AND PROCEDURES OF STATISTICS. PRINCIPLES AND PROCEDURES OF STATISTICS.
23. SAS (1982) SAS User1s Guide: Statistics. SAS Institute Inc., Cary, NC 584 pp.
24. LANZOTTI, V., SCALA, F., & BONANOMI, G. (2014). Compounds from Allium species with cytotoxic and antimicrobial activity. Phytochemistry Reviews, 13, 769-791.
25. Al-JOWARI, S.A. (2014): Effect of garlic powder (Allium sativum) on blood constituents in male rabbits. J. Al-Nahrain Univ., 17 (3): 132-137.
26. SULERIA, H.A.R.; BUTT, M.S.; ANJUM, F.M.; SULTAN, S. AND KHALID, N. (2013b): Aqueous garlic extract; Natural remedy to improve haematological, renal and liver status. J. Nut. Food Sci., 4: 252-258.
27. FAZIOLAHZADEH, F.; KERAMATI, K.; NAZIFI, S.; SHIRIAN, S. AND SEIFI, S. (2011): Effect of garlic (Allium sativum) on hematological parameters and plasma activities of ALT and AST of rainbow trout in temperature stress. Austr. J. Bas. Appl. Sci., 5(9): 84-90.
28. SAMSON, E.S.; OLASUNKANMI, A.K.; JOEL, J.S. AND ALFRED, F.E. (2012): Haematological and hepatotoxic

potential of onion (Allium cepa) and garlic (Allium sativum) extracts in rats. Eur. J. Med. Plants, 2(4): 290- 307.

29. ATTIA, M.H. AND ALI, S.H. (1993): Natural sulfur compounds as anti-lead active substances. Egypt. J. Med. Sci., 14: 327-334.
30. WILLIAM, H.C. (1999): Organic Minerals for Pigs. Biotech. Feed Industry, Proc. 15th Ann. Symp. pp. 51, Nottingham Univ. press, Nottingham, Leics, UK.
31. IRANLOYE, B. O. Effect of chronic garlic feeding on some haematological parameters. African Journal of Biomedical Research 2002:5:81 -82.
32. JEORG, H.G. AND LEE, Y.W. (1998): Protective effect of daily sulphide on Nnitrosodimethylamine-induced immunosuppression in mice. Cancer Letts., (11): 73-79.
33. Al-SULTAN, S. I. AND A. A. GAMEEL (2004). Histopathological changes in the livers of broiler chicken supplemented with turmeric (Curcuma longa). Int. J. Poultry Sci., 3: 333–336.
34. CUNNINGHAM, J.G. AND B.G. KLEIN (2007). Veterinary Physiology: 4th Ed. Saunders Elsevier 2007. pp: 347-447.
35. BUNN, H.F. AND B.G. FORGET (1986). Hemoglobin: Molecular, Genetic and Clinical Aspects. Saunders, Philadelphia.
36. REECE, W.O. (2009). Functional Anatomy and Physiology of Domestic Animals, 4 th Ed. Wiley-Blackwell.
37. BAGHBAN, K. P., M. DANESHYAR AND R. NAJAFI (2016). Effects of Cinnamon (Cinnamomumzeylanicum) and Turmeric (Curcuma longa) Powders on Performance, Enzyme Activity, and Blood Parameters of Broiler Chickens Under Heat Stress, Poultry Science Journal 4 (1): 47-53.
38. HOSSEINI-VASHAN, S. J., A. GOLIAN, A. YAGHOBFAR, A. ZARBAN, N. AFZALI AND P. ESMAEILINASAB (2012). Antioxidant status, immune system, blood metabolites and carcass characteristic of broiler chickens fed turmeric rhizome powder under heat stress. African Journal of Biotechnology, 11: 16118-16125.
39. COLES, E. H. (1986). Erythrocytes. In: Veterinary clinical pathology, 2nd ed. Saundal WB. Company, Philadelphia, London, Toronto. pp. 99-141.
40. SIROSIS, M. (1995).Veterinary clinical laboratory procedure. Mosby year book, Inc. St. Louis, Missouri, USA.
41. OGBUEWU, I.P., KADURUMBA, O.E., OKOLI, I.C. AND M.U. ILOEJE (2013).Effects of ginger rhizome powder supplements and sex on hematological indices of prepuberal rabbits. Journal of Agricultural Technology 2013 Vol. 9(1): 11- 19 Available online http://www.ijat-aatsea.com ISSN 1686-9141.
42. NJIDDA, A. A., J. U. IGWEBUIKE AND C. E. ISIDAHOMEN (2006).Haematological Parameters and carcass characteristics of weaning rabbits fed grade levels of molasses. Global Journal of Agric. Sci., 5(7): 167-172.

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