

Haematological parameters change in *Gallus gallus domesticus* infected with cestode parasite.

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Abstract

The study deals with the haematological parameters in *Gallus gallus domesticus* (Linnaeus, 1758) which is naturally infected with cestode parasites. In spite of the fact that the haematological value of birds (*Gallus gallus domesticus*) are of clinical significant rates than commercial importance. The total erythrocytes and leukocyte count, haemoglobin and haematocrit value, mean corpuscular volume and differential leukocyte count were determined. There is a significant decrease in erythrocytes count and haemoglobin concentration, haematocrit value. While the total leukocyte count was increase in the infected as compare to the normal *Gallus gallus domesticus*. The obtained result collectively indicate the change in haematology of *Gallus gallus domesticus* infected with cestode parasites. The haematological parameters of the infected bird *Gallus gallus domesticus* shows high infection cause macrocytic anemia, lymphocytosis due to deficiency of related factors.

Keywords: Cestode parasite, *Gallus gallus domesticus*, Haematological parameters.

INTRODUCTION

Parasitism may induce lower growth (Evans, 1974[7]; Ranzani-Parva and Silva Souza 2004 [13]) and haematological alteration (Sopinska, 1985 [15]; Yokoyama et. al 1996 [21]; Ruane et. al, 2000 [14]; Martins et al; 2004).

The South-east Asian region is recognized as the natural habitat of the red jungle fowl (*Gallus gallus*), the ancestor of the domestic fowl. Although the haematology of the domestic chicken and other avian species has been studied and documented (Lucas and Jamroz, 1961[10]), no haematological study has been made on the jungle fowl. Haematological studies are important in diagnosing the structural and functional status of the body. Haematology is the study of blood, and its different components. The vertebrates are inevitable subjected to various kinds of stresses that may lead to down regulation of immunity. Hence, to start the development of infection and diseases may occur. (D.B. Bhure, S.S. Nanware, 2011[6]). Various workers studied haematological investigation of some animals due to parasitic infection. (i.e.) on *pigeon* (Shinha D.P., 1974 [17]), on *Great tit* (Ots I et al., 1998[12]), on local duck (Datta et al., 1994 [5]) of Assam, of normal and infected *Capra hircus* (H.J. Wankhede 2007[8]) by nematode infection and on normal and infected *Columba livia* (D.B. Bhure 2010) parasitized by helminthic infection.

MATERIALS AND METHODS

Host Examination

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Twenty hosts (*Gallus domesticus*) were examined and blood was collected through the branchial wing vein and examined for parasitemia. Then the hosts (*Gallus domesticus*) were dissected and the intestines were examined for cestode infection. Out of which sixteen were found heavily infected and four were normal.

Blood sample

The blood collected were kept in a bottle containing anticoagulant Solution Ethylenediamine Tetra Acetic Acid i.e. EDTA. Determination of haematological parameters Red blood cell count (RBC) packed cell volume (PCV), haemoglobin (Hb) concentration, white blood cell (WBC) count and the differential leukocyte count were done by the standard procedure deserted by (Benjamin, M.M. 1985[3]) and using the routine methods. (Talib V. H. and Khurana S. K. 1995 [19]). From the value of PCV, Hb and RBC count the mean corpuscular volume (MCV) mean corpuscular hemoglobin concentration (MCHC) were and (MCH) main corpuscular hemoglobin were estimated.

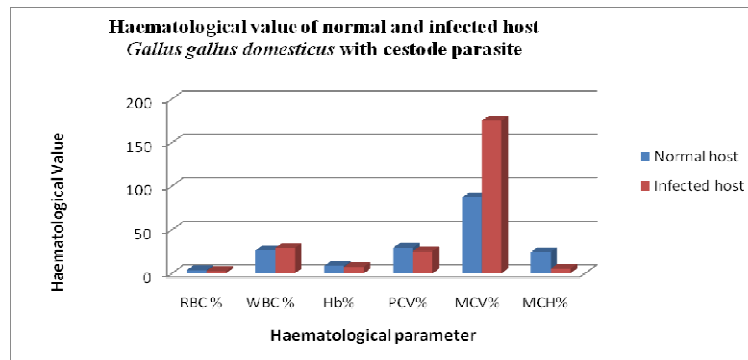
Statistical analysis

The level of significant differences between the mean values of the infected and control stages were determined using students t-test at $p < 0.05$ (STEEL & TORRIE 1982 [16]). Were all parameter calculated as:

$$MCV = \frac{PCV \times 1000}{RBC \text{ count}}$$
$$MCH = \frac{Hb \text{ Value}}{RBC \text{ count}} \text{ Express in Picogramm's}$$

Table 1. Showing haematological status *Gallus gallus domesticus* for normal and infected with cestode parasite (*Raillietina*, Fuhman, 1920 and *Cotugnia*, Diamare 1893)

| Sl No. | Parameters | Normal Host | Infected Host |
|--------|----------------------------|-------------|---------------|
| 1. | RBC (x10 ⁶ /u1) | 3.5±0.5 | 2.6±0.2 |
| 2. | WBC (x10 ³ /ml) | 26.2±1.5 | 29.2±0.22 |
| 3. | Hb(g/l) | 8.5±0.4 | 7.2±0.2 |
| 4. | PCV | 29.5±1.4 | 25.4±1.2 |
| 5. | MCV% | 86.9±14.3 | 175±7.9 |
| 6. | MCH(pg) | 24.3±4.2 | 5.0±2.5 |

Graphical representation of haematological value of normal and infected host *Gallus gallus domesticus* with cestode parasite (*Raillietina*, Fuhman, 1920 and *Cotugnia*, Diamare 1893)

RESULTS AND DISCUSSION

The data on the hematological values of *Gallus gallus domesticus* both normal and infected with cestode parasites are presented in tables 1.

The result of this study indicate that cestode parasite affect the blood parameter of *Gallus domesticus* a significant reduction in the level of local chicken (*Gallus domesticus*) especially considering the fact that PCV, RBC count Haemoglobin concentration show significant changes when compare with the Normal. The implications in the reduction of the parameter lead to anaemia, which may be functionally defined as a decreased oxygen- carrying capacity of the blood. a very interesting feature that accounts for infected birds show restlessness and different types to helminthes produce different types of changes in haematological parameters in birds (Natt M. P. and Herrick C. A. 1952 [11]) which is quite comparable to those in mammals including man.

The role of globins in tissue repair and blood clotting, result in their increase during parasitic infection. The similar finding also recorded of blood parameters from *Capra hircus* infected with nematode infection (H.J. Wankhede, K.M. Shaikh, 2007[8]). Increase in WBC count, MCV while decrease in RBC count from normal and infected *Columba livia* (D.B. Bhure, S.S. Nanware 2010[6]).The parasite infects domestic chickens, penguins, ducks, canaries, falcons, pigeons and several marine avifaunas (Brossy, 1992[2]; Bui et al., 2005[4]; William, 2005 [20]; Schultz and Whittington, 2005 [18]). In the infected birds, the clinical disease is associated with fever, depression, anorexia, loss of body weight, dyspnea, hepatomegaly, splenomegaly, ocular haemorrhage, haemolytic anaemia, haemoglobinuria, leukocytosis, lymphocytosis, hypoalbuminaemia, nephritis, fatty liver, oedema of the lungs, hydropericardium and occlusion of capillaries of the brain (Jordan and Pattison, 1998[9]; Aiello, 1998:[1] William, 2005 [20]). Mortality in bird due the disease may be up to 90 % (Jordan and Pattison, 1998[9]).

CONCLUSION

The entire study reveals that the intensity of cestode infections is responsible for altering the haematology of hosts and shows the relationship of infection with the haematological alterations. It is further speculated that Due to the cestode infection the occurrence of deficiency of Vitamin B12, may result in formation of large but few RBC. This type of results shows formation of anaemia i.e. macrocytosis, anisocytosis, and poikilocytosis. Conclusively it can be said that due to tapeworm infection there is change in blood parameters of *Gallus gallus domesticus*.

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REFERENCES

- [1] Aiello, S. E. 1998. The Merk Veterinary Manual. 8th Edition, National Publishing, Philadelphia.
- [2] Brossy, J. J. 1992. Malaria in wild and captive Jackass penguins, *Spheniscus demersus*, along the southern African coast. *Ostrich*, 63: 10 – 12.
- [3] Benjamin, M. M. 1985. Out line of veterinary clinical pathology 3rd ed. Kalyani Publisher New Delhi. Pp 5-316.
- [4] Bui, A. A., Jidda, M. S. And Yahaya, K. 2005. Prevalence of blood parasites of domestic pigeons in Maiduguri, Nigeria. *International Journal of Biomedical and Health Sciences*, 1: 21 – 24.
- [5] Datta et al., 1994. Haematological values of local duck of Assam in relation to sex. *Ind. Vet J.* (71) 1048-1082

- [6] D.B. Bhure, S.S. Nanware, S.P. Kardile and R.M.Dhondge 2010. Haematological parameters of *Columba livia* infected with helminth parasites in Aurangabad District, (M.S.) India. *The Ecosphere, An International Biannual Journal of Environment and Biological Sciences*. Vol.1 No.1 Pp 133-135.
- [7] Evans, W.A. 1974. Growth, mortality and haematology of cutthroat Trout experimentally infected with the blood fluke *Sanguinicola klamathensis*. *J. Parasitol*, 83: 575-583.
- [8] H.J. Wankhede, K.M. Shaikh, M.S. Nirmale, Y.R. Reddy and V.K. Dongare 2007. Nematode infection and its haematological manifestation in *Capra hircus*. *Nat. Jr. of Life Science*, 4 (3): 63-66
- [9] Jordan, F. T. W. And Pattison, M. 1998. Poultry Diseases. 4th Edition, WB Saunders, London. *Life Science*, 4 (3): 63-66
- [10] Lucas. A.M. And Jamroz. C. 1961. *Atlas of Avian Haematology*. United States Department of Agriculture, Washington.
- [11] Natt M. P. and Herrick C. A. 1952. A New blood diluent for counting the erythrocytes and leucocytes of the chicken. *Poultry Sci.* (3) 735-738.
- [12] Ots I et al., 1998. Health impact of blood parasites in breeding great tits. *Oecologia* (116) 441-448.
- [13] Ranzani-Paiva, M.J.T and Silva Souza 2004. Co-infestation of gills by different parasites groups in the mullet, *Mugil platanus* Gunther, 1880 (Osteichthyes, Mugilidae): Effect of relative condition factor. *Braz. J. Biol.*, 64: 677-682.
- [14] Raune, N.M., Nolan, D.T., Rotlant, J., Costello, E.J., and Weendellar, S.E 2000. Experimental exposure of rainbow trout *Oncorhynchus mykiss* (Walbaum) to the infective stages of the sea louse *Lepeophtheirus salmonis* (Kroyer) influences the physiological response to an Acute Stressor. *Fish and Shellfish Immunol.*, 10: 451-463.
- [15] Sopinska, A. 1985. Effects of physiological factors stress and diseases on hematological parameter of carp, with a particular reference to the leukocyte patterns. III. Changes in blood accompanying branchionecrosis and bothriocephalosis. *Acta Ichthyologica et Piscatoria, Milano*, 15:141-165.
- [16] Steel R. G. D, Jh. Torrie 1982. Principle and procedure of statistics, 3rd ed Mc graw hill Kogakusha.
- [17] Shinha D.P. And Sircar M 1974. Haematological investigation on pigeon. *Annal Zoology*, (10)1-11.
- [18] Schultz, A. And Whittington, P. 2005. High prevalence of avian malaria infection to avifauna at Cape Receife, Eastern Cape, South Africa. *Ostrich*, 76: 56 - 60.
- [19] Talib V. H. And Khurana S. K. 1995. Haematology for students New Delhi. CBS – Pub p 415.
- [20] William, R. B. 2005. Avian Malaria: clinical and chemical pathology of Plasmodium gallinaceum in the domestic fowl, *Gallus gallus*. *Avian Pathology*, 34: 29 – 47.
- [21] Yokoyama, H., Danjo, T and Ogawa, K. 1996. Hemorrhagic anemia of carp associated with spore's discharge of *Myxobolus artus* (Myxozoa: Myxosporidia). *Fish Pathol.*, 31: 19-23