I J R B A T, Special Issue (XI) Nov 2023: 169- 175
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCESS
e-ISSN 2347 – 517X
Original Article

INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY

HAEMATOLOGICAL CHANGE IN *GALLUS GALLUS DOMESTICUS* ((LINNAEUS)) INFECTED WITH *COTUGNIA* SP. FROM AMALNER AND CHOPDA REGION (M.S.), INDIA.

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Communicated : 09.08.2023	Revision : 26.08.2023 & 13.09.2023 Accepted : 22.09.2023	Published : 30.10.2023

ABSTRACT:
Helminthes parasite is the major concern in relation to animal. Helminthes parasite affects the nutrient status of host by causing increased nutrient loss, decreased food intake and nutrient absorption. The blood performs important functions like gaseous exchange, gathers the excreted material and defense mechanism. The research work carried out on the blood parameter and its alteration due to the cestode parasite *Cotugnia.* From the month June 2021 to May 2022, 10 numbers of host *Gallus gallus domesticus* intestine were collected. The total erythrocytes and leukocyte count, haemoglobin content, packed cell volume, Erythrocyte constant and differential leucocyte constant were determined. Significant variation in blood parameters of normal and infected *Gallus gallus domesticus* (Linnaeus) was observed. This study determines the haematological changes due to *Cotugnia* worm in naturally infected indigenous chickens *Gallus gallus domesticus*. Results of the study are expected to contribute towards and encourage usage of clinico-pathological parameter testing as a measure of poultry health status.

Keywords:- Haematology, Helminthes, *Cotugnia,* etc.

INTRODUCTION :

Helminthes parasite is the major concern in relation to animal Helminthes parasite affects the nutrient status of host by causing increased nutrient loss, decreased food intake and nutrient absorption (Edirishinghe & Tomkin, 1995). The metabolic process of the host depends on the food, feeding habits and the rich nourishment available in the gut of the host. These parasitic worms use this nourishment for their growth and development. The worm getting nutrition from the host's gut by highly specialized metabolically active body surface (Smyth and McManus, 2007). Gastrointestinal cestodes are the most pathogenic parasites in *Capra hircus* in tropical and subtropical areas. The Parasitism, especially by helminthic parasites, impairs health by causing inappetance, diarrhoea, anaemia and in severe cases death (Kumar et al., 2015a).The helminth infections of gastrointestinal tract of small ruminants not only cause direct adverse effect on the health leading to morbidity and mortality but also indirectly effect economically involving cost of treatment and control of parasites (Nwosu et al. 2007). Previous investigations made in different regions along the length of the strobila of tapeworm reveal regional differences in morphological and anatomical features (Andersen, 1975; Thompson et al., 1980), chemical composition (Roberts, 1961; Mettrick and Cannon, 1970; Rani et al., 1987a,b) nucleic acid levels (Bolla and Roberts, 1971; Mettric and Cannon (1970) and gene expression (Bo et. al., 2012). Literature reveals that the parasites able to adopt themselves to the parasitic mode of life, only due to protein .usually constitutes between 20 and 40 % of the dry weight have been reported (John barrett 1981). The higher content of lipid is found in older proglottids (Brand and Van T 1952).

Materials and Methods:

Sampling collection:

From the month June 2021 to May 2022, 10 numbers of host *Gallus gallus domesticus* (Linnaeus) were collected with body weight (250 ± 0.32) kg, from Amalner and Chopada region, Dist. Jalgaon, (M.S) India.

Blood analysis:

Blood samples can be obtained from the wing (brachial) vein where it runs over the muscles surrounding the humerus. Depending on the bird's size, a 21-23 gauge needle can be used with a syringe. Place the bird on a table on its side and gently extend the upper wing from the body. Antiseptic should be applied to clean the skin. Feathers located in the vicinity of the brachial vein can be removed with scissors to more clearly show the line of the vein from the abdomen to the wing. Insert the needle through the outer layers of the skin into the vessel, collect blood and after removing needle, apply pressure over the site for 30 seconds to seal the vein and minimize leakage of blood into surrounding tissue. (Phil Glatz et al., 2009) For haematological investigations blood samples were collected from all hosts in glass tubes containing EDTA and were properly labeled, for estimation of haematological investigation. Primary and secondary blood indices were determined as per methods described by Houston (1990). The Total red blood cell count (TRBCC) was performed manually on an Improved Neubauer hemocytometer using Hayem's fluid as diluents (Benjamen, 1985), total leukocyte count was estimated by the standard dilution technique using diluting fluid (4% glacial acetic acid and two drops of genital) (Talib and Khurana, 1995). In determining Haemoglobin concentration is estimated by Sahli method (Sahli, 1962). The haemoglobin concentration was converted to acid haematin by the action of 0.1 N HCl using 0.02 ml pipette. 20 ml of 0.1N HCl and 0.02 ml of blood sample were used to fill the graduated tube. The mixture was allowed to stand for 5 min before introducing few drops of distilled water till color match the standard. The determination of pack cell volume was done using method described by Wintrobe (1934). The 1 ml volume haematocrit tube sealed at one end were filled with host blood and set in centrifuge for 30 min at 4000 rpm.

The haematological Indices: Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin Concentration (MCHC), and Mean Corpuscular Haemoglobin (MCH) were calculated using the formula of Baker and Silverton (1982) given below:

$$MCV = \frac{PCV \times 1000}{RBC\ Count}$$

$$MCH = \frac{Hb\ Value}{RBC\ count}\ \text{Express in Picogrammes}$$

$$MCHC = \frac{Hb}{PCV \times 1000}$$

Differential leukocyte count was done by preparing blood smear and staining with “Leishman stain blue” by Mender method.

RESULTS AND DISCUSSION :

The above result obtained in *Gallus gallus domesticus*; it is clear that blood parameters either increase or decrease in the *Gallu gallus domesticus* infected with cestode parasites as compare to the normal host. From this study the significant variation in blood parameters of normal and infected *Gallus gallus domesticus* (Linnaeus). It was observed that statically significant decrease in RBCs count as healthy 2.18 – 4.12 and 1.18 infected one, hemoglobin percentage as 6.83 – 11.3 normal and 5.03 infected one. Haematocrit was statically significant decline in infected host such as 27 - 42 in normal and 23.5 in infected host. The MCHC observed significant decreases in infected condition such as 29 in normal and 26 infected

hosts. The WBCs counts recorded significantly higher in infected host than normal as 20.35 – 33.3 normal and 55 infected hosts. Significant decreases in MCV as 127 in normal and 110 infected one. The infected *Gallus domesticus* shows significant increases MCH 37 normal and 43.9 infected one. The percentage of differential leukocyte cell count showed an increase in lymphocyte [normal (48.9-58.4), infected (90.6)]; basophile [normal (0.7-2), infected (2.6)]; monocytes [normal (9.7-10.2) infected (11.7).Significant decrease in neutrophil [normal (29.5 – 37.3), infected (1.7) and eosinophil [normal (1.7), infected (0.9)] in infected *Gallus gallus domesticus*, in relation to that observed in normal range of host.

Discussion: In the present investigation, the haematological parameters studied of the *Gallus gallus domesticus* correlates with cestode parasitism. The haematological parameters were studied Viz. RBCs, Hb, WBCs, PCV, MCV, MCH, MCHC, Monocytes, Eosinophil, Neutrophil, Basophile and Lymphocyte from *Gallus gallus domesticus* infected with cestode parasites, our results show highly significant correlations between blood parameters and parasitic worm burden in *Gallus gallus domesticus*. The statistically significant changes were found between heavy infection of cestodes and haematological values in normal and infected host.

REFERENCES:

Anderson, K. 1975. Comparison of surface t opo g r aphy o f thr e e spe c i e s o f D i p h y l l o b o t h r i u m (C e s t o d a , Pseudophyllidea) by Scanning electron microscopy. Int. J. Parasit. 5: 293 – 300

B. V. Jadhav et. al., 2008. Biosystematic studies of Davainea shindei, n. sp. (Cestoda: Davainidae, Fuhrmall, 1907) from Gallus gallus domisticus. Natl Acad Sci Lett, Vol.31, No. 7-8, 2008.

Brand T Von, 1952. Chemical physiology of endoparasitic animals. Academic press, New York.

Brand T Von, 1966. Biochemistry of parasites. Academic press, New York.

Food and Agriculture Organization of the United Nations, 2010. [Last assessed on 20/08/2014]. Available from: http://www.faostat.fao.org/

Kemp A Vankits and Haljnimgem AJM, 1954. A colorimetric method for the determination of glycogen in tissue. Biochem. J. 646-648.

Kumar S, Jakhar KK, Singh S, Potliya S and Kumar K et al., 2015b. Clinico-pathological studies of gastrointestinal tract disorders in sheep with parasitic infection, Vet World, 8(1): 29-32.

Lowry, O.H., N.J, Rosenbrough,, A.L, Farr, and R.J. Randall,. 1951. Protein measurement with the Folin phenol reagent. J. Biol. Chem. 193:265-275.

Kemp, A, Vankits and Haunigen, AJM. A colorimetric method for the determination of glycogen in tissue. Biochem. J.1954, (56) 646-648

Mettrick, D.F. and Cannon, C.E. 1970. Changes in the chemical composition of Hymenol epi s diminut a (Cestoda: Cyclophyllidea) during prepatent development within the rat intestine. Parasitol., 61 : 229-243.

Nanware, Sanjay Shamrao and Bhure Dhanraj Balbhim. Studies on glycogen profile of cestodes of Capra hircus. International Multidisciplinary Research Journal.2011, Vol. 1(10): pp. 22-24.

Needham J. 1942. Biochemistry and Morphogenesis. Cambridge University Press. 785.

Nwosu CO, Madu PP, Richards WS. Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of

north-eastern Nigeria. *Vet Parasitol.* 2007; 144:118–124.

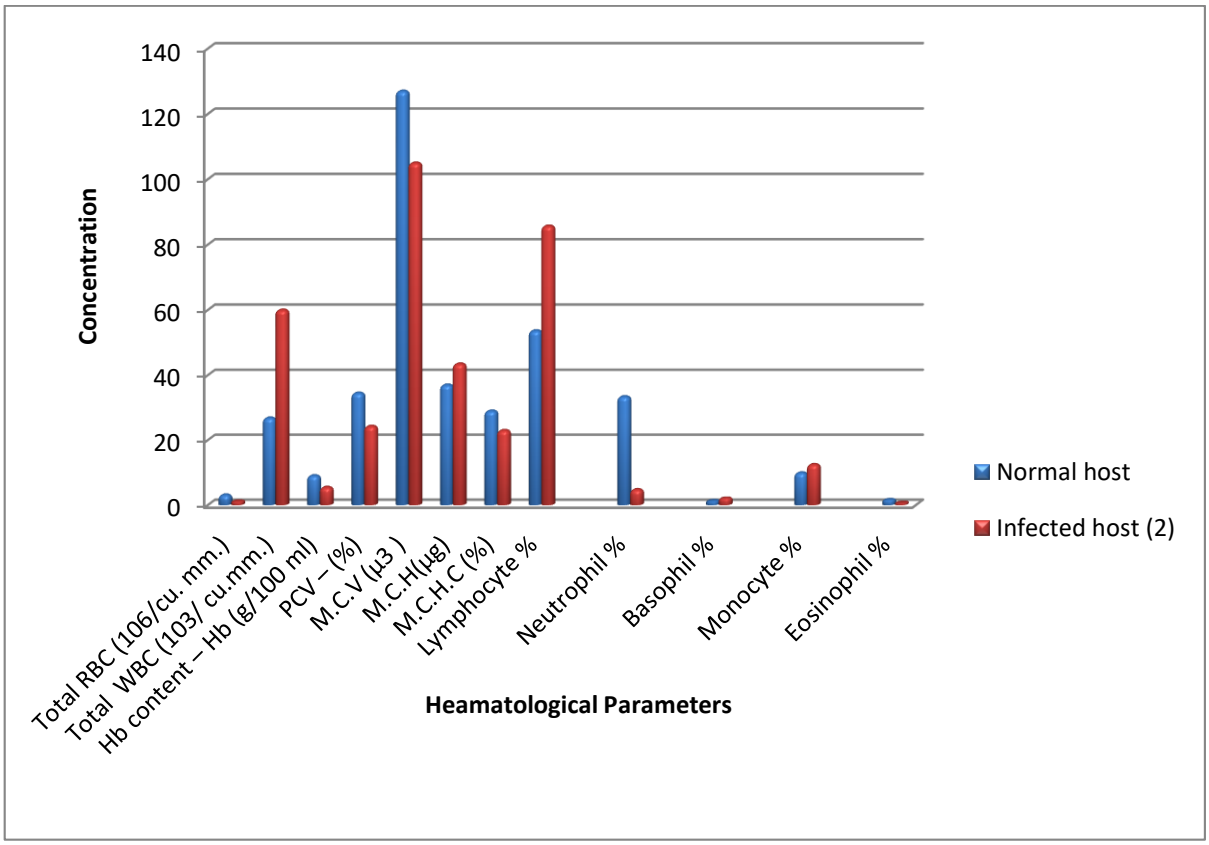
Roe, J.H. 1955. The determination of sugar in blood and spinal fluid with anthrone reagent. J Biol Chem. 212:335-43

Roberts L.S. 1961. The influence of population density on patterns and physiology of growth in Hymenolepis diminuta (Cestodea: Cyclophyllidea) in the definitive host. Exp: Parasitol 11:332 – 371.

Thompson, R .C.A., Hyton, A.R. and JueSue, L.P. 1980. An ultra-structural study of the microtriches of adult Proteocephales tidswelli (Cestoda: Proteocephalidea). Z. Parasitenkd. 64: 96-111.

Kemp, A, Vankits and Haunigen, AJM. A colorimetric method for the determination of glycogen in tissue. Biochem. J.1954, (56) 646-648

Hematological parameters		**Normal host**	**Infected host (2)**
Total erythrocyte count – RBC (10**6**/cu. mm.)		3.15	1.20
Total leukocyte count – WBC (103/ cu.mm.)		26.83	60
Hemoglobin content – Hb (g/100 ml)		9.07	5.5
Packed cell volume – (%)		34.50	24.3
Erythrocyte Constant	Mean Corpuscular Volume – M.C.V (µ3)	127	105
	Mean corpuscular Hemoglobin M.C.H(µg)	37	43.50
	Mean Corpuscular Hemoglobin Concentration – M.C.H.C (%)	29	23
Differential leucocyte Count (DLC)	Lymphocyte %	53.65	85.7
	Neutrophil %	33.40	4.8
	Basophil %	1.35	2.2
	Monocyte %	9.95	12.5
	Eosinophil %	1.7	0.7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Concentration
Total RBC (106/cu. mm.)
Total WBC (103/ cu.mm.)
Hb content – Hb (g/100 ml)
PCV – (%)
M.C.V (µ3)
M.C.H(µg)
M.C.H.C (%)
Lymphocyte %
Neutrophil %
Basophil %
Monocyte %
Eosinophil %
Heamatological Parameters
Normal host
Infected host (2)

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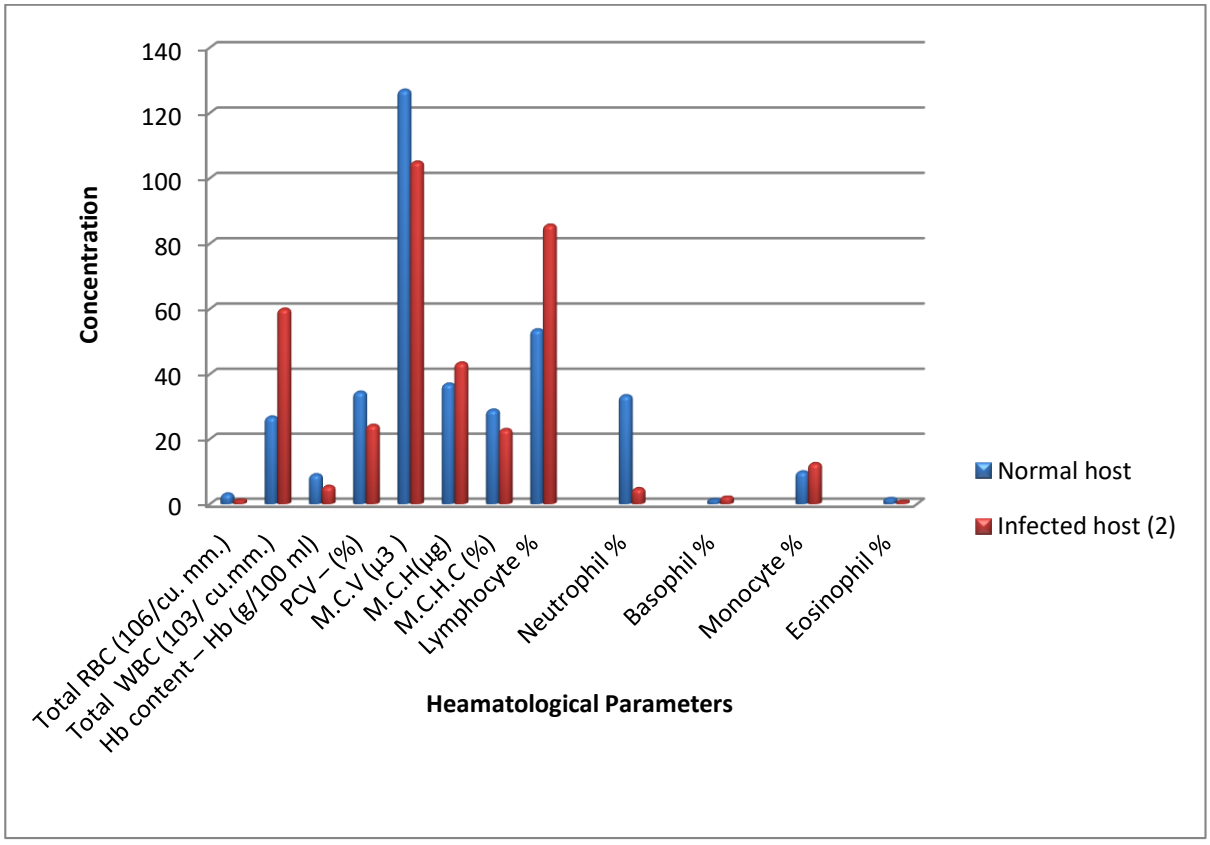
140
120
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Concentration
Total RBC (106/cu. mm.)
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Hb content – Hb (g/100 ml)
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M.C.H(µg)
M.C.H.C (%)
Lymphocyte %
Neutrophil %
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Heamatological Parameters
Normal host
Infected host (2)