International Journal of Zoology Studies
ISSN: 2455-7269; Impact Factor: RJIF 5.14
Received: 18-04-2019; Accepted: 21-05-2019
www.zoologyjournals.com
Volume 4; Issue 4; July 2019; Page No. 46-48

Haemato-biochemical effect of Coccidia infestation in domestic duck

Shabeer Ahmad Shah[1], Fayaz Ahmad[2], Hidayatullah Tak[3]
[1] Research Scholar, Department of Zoology, University of Kashmir, Jammu and Kashmir, India
[2] Professor, Department of Zoology, University of Kashmir, Jammu and Kashmir, India
[3] Associate Professor, Department of Zoology, University of Kashmir, Jammu and Kashmir, India

Abstract
The haemato-biochemical values studied in 30 coccidia infected and 9 non-infected birds(control group) backyard domestic ducks of Kashmir Valley revealed that the infected birds had significantly lower mean total erythrocyte count(2.95 ± 0.05 vs 3.18 ± o.11 $\times 10^6$ /mm^3) and packed cell volume (38.80 ± 0.54 vs 42.65 ± 0.28 %), apparently lower haemoglobin concentration(9.45 ± 0.09 vs 13.53 ± 0.04 g/dl) and significantly higher mean total leucocyte count(16.47 ± 0.57 vs 13.17 ± 0.21 $\times 10^3$/mm^3) than the control group. The mean value of serum total protein was lower (6.23 ± 0.30 vs 7.24 ± 0.34 g/dl) in coccidian infected birds as compared to control group. Almost similar trend was observed in case of serum albumin (3.40 ± 0.40 vs 4.61 ± 0.23 g/dl) and serum globulin (0.88 ± 0.05 vs 1.20 ± 0.06 g/dl). These findings reflected anaemic condition with hypoproteinemia due to tissue damage and immune response in infected birds.

Keywords: haematology, serum biochemical values, coccidiosis, domestic duck

Introduction
Coccidiosis is one of the excessive imperative poultry diseases worldwide. High morbidity and mortality, decline in feed efficiency, body weight gain, entirely contribute to the economic importance [1]. The global cost of coccidiosis is in the region of 300 million dollars a year [2]. Coccidiosis comprises of a wide assortment of single cell parasitic creatures in the sub- kingdom Protozoa, phylum Apicomplexa. Twenty two coccidian species have been recorded in ducks including 11 *Eimeria* species, 4 of *Tyzzeria*, 4 of *Wenyonella* and 1 species of *Isospora*. *E. anatis*, *E. battakhi*, *E. abramovi*, *E. danailovi*, *E. saitamae*, *T. perniciosa* and *W.philliplevinei* have been reported in domestic ducks. A high pathogenicity especially for ducklings was demonstrated in *T.perniciosa* [3]. The diagnosis of coccidiosis is based on clinical signs, coprology and pathomorphological and pathohistological analysis [4]. In recent years, various biochemical and molecular methods have been used (5). Current understanding of avian clinical biochemistry is in early stages as compared with knowledge of biochemical investigation in mammals (6). The specific diagnosis of infection plays a key role in the prevention, surveillance and control of coccidiosis. The aim of present study was to evaluate the haematological and biochemical changes in domestic ducks of Kashmir Valley naturally infected with coccidia.

Materials and Methods
Study animals and sample collection
A total of 30 coccidia infected ducks were taken and 9 domestic ducks were kept as control group. The control group birds were administered antibiotic, coccidiostat and anthelminthic to ensure their healthy status.

Haematological Analysis
Blood samples were collected from wing vein of infected and control group birds using a 5mL sterile syringe and a 23 gauge needle. The blood samples were transferred to EDTA treated tubes. The total red blood cell or erythrocyte counts were made in a 1:200 dilution of blood in Hayem' fluid. The total white blood cell or leucocyte counts were performed in 1:20 dilution of blood in Turk's fluid. The Hb concentration was estimated by matching acid haematin solution against the standard comparator provided in Sahli's haemoglobinometer. Packed cell volume and erythrocyte sedimentation rate were measured using a Wintrobe tube.

Biochemical Analysis
Blood samples were collected in EDTA free tubes. The tubes were allowed to stand for about 4-5 hours in vertical position till it clotted. A straw coloured liquid (serum) was produced on the top of clotted blood. The serum was separated by decanting from the test tube and stored at -20^0c. The biochemical analysis of collected and stored serum for total protein and albumin was done using spectrophotometer. The serum globulin was calculated by subtracting albumin from total protein.

Statistical Analysis
The whole data was fed into Microsoft Excel 2010, a computer programme (SPSS 11.5 for windows). The data was represented as mean of replicates followed by standard deviation i.e. mean ± standard deviation (SD). ANOVA was carried out to determine the variance of data registered followed by Turke' test, to detect significant difference among groups.

Results and Discussion
Haematological and biochemical values are the indicators of the pathological damage caused by the infection. The haematological values of infected and control birds are summarized in Table 1. The total RBC counts and Hb

values showed reduction in the infected group when compared to control group. The present findings are in conformity with the observations made by Turk [7], Padmavathy and Muralidharan [8], Ogbe *et al.* [9] and Adamu *et al.* [6] for *Eimeria* infection. The reduced levels of Hb and lower RBC count observed in the study for the infected ducks might be attributed to haemorrhage in the caeca and intestine. There may be injury to tissue and liberation of large quantities of histamine, which increase the local blood flow and also increase the permeability of capillaries and venules allowing large qualities of fluid to come out [8]. Hayat *et al.* [10] and Mehmood *et al.* [11] also reported a decrease in haemoglobin concentration in animals infected with coccidiosis.

Table 1: Haematological Value in Control and Diseased Birds

Host	RBC($X10^6/mm^3$)	WBC($X10^3/mm^3$)	HB(g/dl)	ESR(mm/hr)	PCV (%)
Control	3.18 ±0.11	13.17 ±0.21	13.53 ±0.04	1.79	42.65 ±0.28
Infected	2.95 ±0.05	16.47± 0.57	9.45± 0.09	2.21	38.80 ±0.54

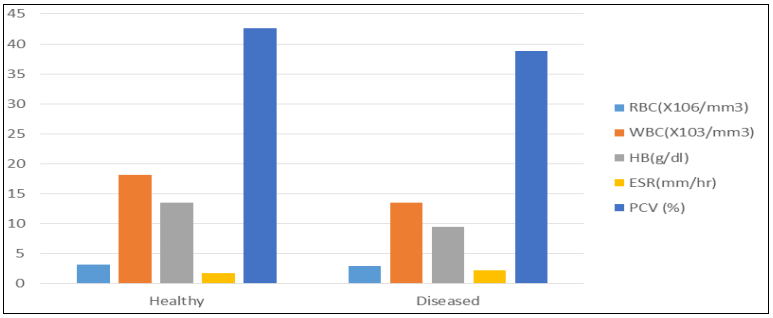

Fig 1

There was also a significant reduction in PCV in infected birds as compared to control ones. Hein [12] also recorded a fall in PCV in fowl. Similarly, Turk (1985) also observed a fall in haematocrit value in caecal coccidiosis. The present results were also comparable to those reported previously by a number of authors for *Eimeria* infection [6, 8, 9, 10, 11].

An increase in the number of WBC was observed in the peripheral blood of infected birds. This increase might be attributed to the induction of an immune response in the infected birds because these cells participate in the first line of defense against many infections [13].

The erythrocyte sedimentation rate showed an increase in the infected birds as compared to control ones. A similar observation was recorded by Stephens [14] in case of coccidiosis in chicken. The increase in ESR might be due to inflammatory processes during damage to the intestinal wall.

The study revealed a significant variation in levels of plasma proteins between control and infected ducks. The values of plasma proteins in control and diseased birds are shown in Table 2.

Table 2: Biochemical values in control and diseased birds

Host	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)
Control	7.24± 0.34	4.61 ±0.23	1.20± 0.06
Infected	6.23 ±0.30	3.40± 0.40	0.88 ±0.05

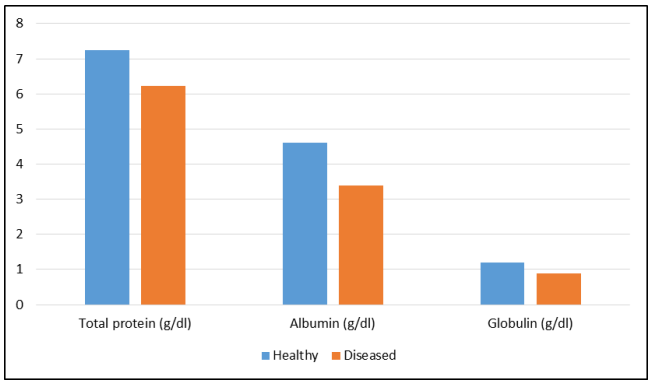

Fig 2

It was observed that the total protein showed a decreased trend in infected ducks when compared to control ones. Fall in total plasma protein (hypoproteinemia) was also observed by Mondal *et al.* [15] in infected chicken. The fall might be due to acute stress in infected birds that leads to cortisol secretion and catabolism of proteins [16]. The haemorrhage on account of coccidiosis causes large loss of plasma proteins. Plasma albumin and globulin levels showed a high variation between control and infected birds. The infected birds had low levels of Albumin and globulin values. These results are in agreement with the observations of Bautista *et al.* [17] These alterations might be due to dietary, digestive / absorptive and immunological factors.

Acknowledgements
The authors are highly thankful to the Head department of Zoology and Head department of clinical biochemistry, University of Kashmir for providing the laboratory facilities for successful completion of this piece of work.

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