

Haematological Modulation in W.L.H. Chicks during Passive Immunization

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Abstract

Hematological studies were carried out in W.L.H. chicks infected with embryonated A. galli eggs, treated with cadmium acetate and immunized with bursal, thymic and splenic cells. Haemoglobin and total erythrocyte count were higher in control chicks and decreased during experimental ascariasis and treated group.

Keywords :- *Ascaridia galli, cadmium acetate, PI Post Infection, PT Post Treatment, PIM Post Immunization.*

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Introduction

In recent years, field of immunology has attracted greater attention of scientific community in view of growing awareness regarding need to modulate host's immune system. The main reason is to achieve desirable effect for preventing any infection or diseased condition rather than treating it by chemotherapy in advanced stage after appearance of symptoms of disease. Cadmium has been demonstrated to induce broad spectrum of pathophysiological conditions either directly or indirectly associated with erythropoiesis (Berlin and Piscator, 1961; Fox *et al*, 1971). Pathak and Gaur (1983) studied haematological changes associated with *Taenia hydatigera* infection in dogs. Balani *et al* (2011) studied on hematological changes due to short term oral administration of imidacloprid.

The immediate protection against *A. galli* infection can be provided by passive immunization studies. So, pasive immunization has great significance.

Materials and Methods

The experimental hosts, male W.L.H. chicks were properly grouped and labelled according to experimental design. The inocula with desired number of embryonated eggs (500 embryonated eggs) were administered orally to male W.L.H. Chicks.

The dose with desired amount of cadmium Acetate (5 mg/100 ml) was prepared and administered orally.

Thymus, Bursa and Spleen were collected on 15th day from donor chicks. Then, they were transferred intra-peritoneally within four hours to recipient group.

The following experimental groups (EG) were categorized as under :

- EG-I: Control male chicks
- 8 male chicks
- EG-II: Chicks, infected with 500 infective eggs of *A. galli*
- 8 male chicks
- EG-III : Chicks, treated with 5 mg/100 ml cadmium acetate
- 8 male chicks
- EG-IV : Chicks, infected with 500 embryonated eggs of *A. galli* + treated with 5 mg/100 ml cadmium acetate
- 8 male chicks
- EG-V : Chicks immunized with thymic cells
- 8 male chicks
- EG-VI Chicks immunized with bursal cells
- 8 male chick
- EG-VII Chick immunized with splenic cells
- 8 male chick
- EG-VIII Chick immunized with thymic cells,+ 500 embryonated *A. galli* eggs
- 8 male chicks
- EG- IX Chick immunized with bursal cells + 500 embryonated *A. galli* eggs
- 8 male chicks
- EG- X Chick immunized with splenic cells + 500 embryonated *A. galli* eggs

- 8 male chicks

EG- XI Chick immunized with thymic cells+ cadmium acetate treatment

- 8 male chicks

EG-XII Chick immunized with bursal cells + cadmium acetate treatment

-8 male chicks

EG-XIII: Chicks immunized with splenic cells + cadmium acetate treatment

- 8 male chicks

The life cycle of *Ascaridia galli* was observed to be completed between 30-40 days and experimental results were taken after 30 days. Chicks from from each of above groups were autopsied after 30 days for studying hematological parameters.

Result

Total Erythrocyte Count (Fig. 1)

Group I: In control male WLH chicks the total erythrocyte counts were found to be 3.94 million/mm³ after 30 days respectively.

Group II: In male WLH chicks the total erythrocyte counts were found to be 3.74 million/mm³ after 30 days.

Group III : In the above group of male WLH chicks, the total erythrocyte counts were found to be 2.82 million/mm³ after 30 days of PT. The total number of erythrocytes was found to be significantly (p<0.005) decreased in comparison to control group indicating suppression of erythrocytes count by cadmium treatment.

Group IV : In the above group of male WLH chicks, the total erythrocyte counts were found to be 2.71 million/mm³ after 30 days of PI and

PT respectively. The total number of erythrocytes was found to be significantly (p<0.005) decreased as compared to control group.

Group V : In the above group of male WLH chicks, the total erythrocyte counts were found to be 2.58 million/mm³ after 30 days of post immunization. Total erythrocytes counts were observed to be highly significantly (p<0.005) decreased in comparison to control group.

Group VI : In the above group of male WLH chicks, the total erythrocyte counts were found to be 2.43 million/mm³ after 30 days of post immunization. Total erythrocytes counts were observed to be significantly (p<0.005) decreased in comparison to control group.

Group VII : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.94 million/mm³ after 30 days of post immunization. Total erythrocytes counts were observed to be slightly significantly (p<0.005) decreased as compared to control group.

Group VIII : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.59 million/mm³ after 30 days of post immunization & post infection. Total erythrocytes counts was found to be slightly significantly (p<0.005) decreased in comparison to control group.

Group IX : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.45 million/mm³ after 30 days of post immunization & post infection. Total erythrocytes counts were observed to be significantly (p<0.005) decreased as compared to control group.

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Group X : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.14 million/mm³ after 30 days of post immunization & post infection. Total erythrocytes counts were recorded to be slightly significantly ($p<0.005$) decreased in comparison to control group.

Group XI : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.27 million/mm³ after 30 days of post treatment and post immunization. Total erythrocytes counts were observed to be slightly significantly ($p<0.005$) decreased in comparison to control group.

Group XII : In the above group of male WLH chicks, the total erythrocyte counts were found to be 3.12 million/mm³ after 30 days of post treatment and post immunization. Total erythrocytes counts were recorded to be slightly significantly ($p<0.005$) decreased as compared to control group.

Group XIII : In this group of male WLH chicks, the total erythrocyte count was found to be 3.14 after 30 days of post treatment and post immunization. This value was to be decreased in comparison to control group.

Haemoglobin (Fig. 2)

Group I : In control male WLH chicks the haemoglobin was observed to be 12.92 gm/dl after 30 days.

Group II : Haemoglobin was observed to be 11.88 gm/dl after 30 days of post infection.

Group III : In the above group of male WLH chicks, the haemoglobin was observed to be 10.42 gm/dl after 30 days of PT. The concentration of haemoglobin was significantly

($P<0.005$) decreased in comparison to control group.

Group IV : In the above group of male WLH chicks, the haemoglobin was observed to be 9.90 gm/dl after 30 days of PI & PT respectively. The concentration of haemoglobin was found to be significantly ($p<0.005$) decreased as compared to control group.

Group V: In the above group of male WLH chicks, the haemoglobin was observed to be 9.60 gm/dl after 30 days of PIM respectively. The concentration of haemoglobin was found to be highly significantly ($p<0.005$) decreased in comparison to control group.

Group VI : In the above group of male WLH chicks, the haemoglobin was observed to be 8.87 gm/dl after 30 days of PIM respectively. The concentration of haemoglobin was recorded to be significantly ($p<0.005$) decreased as compared to control group.

Group VII: Haemoglobin was observed to be 12.40 gm/dl after 30 days of PIM respectively. The concentration of haemoglobin was found to be significantly ($p<0.005$) decreased in comparison to control group but upto 45 days, it comes to normal range.

Group VIII : Haemoglobin was observed to be 11.39 gm/dl after 30 days of PI & PIM respectively. The concentration of haemoglobin was found to be significantly ($p<0.005$) decreased as compared to control group.

Group IX : In the above group of male WLH chicks, the haemoglobin was observed to be 11.57 gm/dl after 30 days of PI and PIM respectively. The haemoglobin concentration was observed to be slightly significantly ($p < 0.005$) decreased as compared to control group.

Group X : In the above group of male WLH chicks, the haemoglobin was observed to be 11.13 gm/dl after 30 days of PI and PIM respectively. The concentration of haemoglobin was found to be slightly significantly ($p < 0.005$) decreased as compared to control group.

Group XI : In the above group of male WLH chicks, the haemoglobin was observed to be 10.84 gm/dl after 30 days of PIM and PT respectively. The concentration of haemoglobin was found to be

slightly significantly ($p < 0.005$) decreased in comparison to control group but after treatment of anthelmintic it increased in comparison to infected group.

Group XII : In the above group of male WLH chicks, the haemoglobin was observed to be 10.57 gm/dl after 30 days of PIM and PT respectively. The concentration of haemoglobin was noticed to be significantly ($p < 0.005$) decreased as compared to control group but after treatment it elevated as compared to infected group.

Group XIII : In this group of male WLH chicks the haemoglobin concentration was observed to be 10.69 gm/dl after 30 days of PIM and PT. This value was significantly ($p < 0.005$) decreased in comparison to control group.

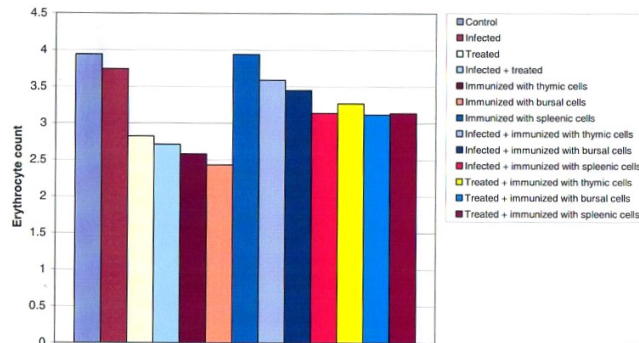


FIGURE 1
Total erythrocyte count in male white leg horn chicks infected, treated and immunized with lymphoid cell after 30 days

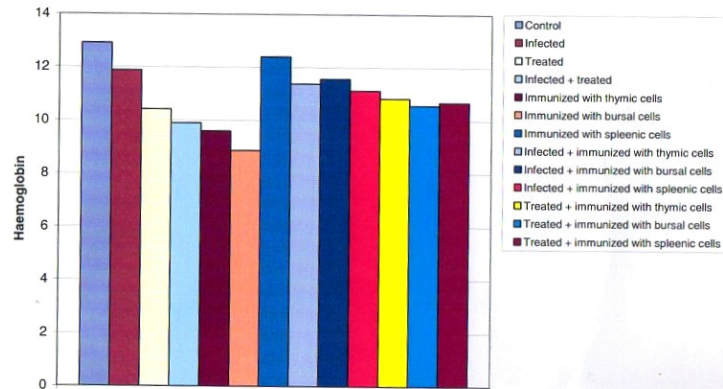


FIGURE 2: Haemoglobin (mg/dl) in male white leg horn chicks infected, treated and immunized with lymphoid cell after 30 days

Discussion

Significant alterations were observed in haematological parameters of WLH chicks during experimental ascaridiasis, cadmium acetate treatment and *A. galli* infection. Investigations of physiological changes produced in the hosts by parasites are essential for understanding of pathogenicity (Sadum and Williams 1966). Studies regarding haematological modulations are beneficial in understanding immune system of host.

During the present investigation the haemoglobin and total erythrocyte count were found to be higher in control chicks. Total erythrocyte count and haemoglobin concentration were found to be highly decreased during experimental ascaridiasis and treated group. The infected, treated and immunized group revealed erythropania, hypohaemo globinaemia with a significant suppression of erythrocyte counts and haemoglobin percentage.

Simaraks *et al.* (2004) reported that

total erythrocyte and haemoglobin were found to be higher in males than females. Haemoglobin and packed cell volumes were influenced by androgen. Depression in erythrocyte counts was observed during experimental ascaridiasis (Sadun, 1950). Muraveva (1977) has also reported decrease in haemoglobin concentration and erythrocyte counts during trichuriasis in adults and children.

Perman and Scholtthauer (1978) reported anaemia in dogs with heart worm disease. In Egypt, the average haemoglobin concentration in people infected with *Ancylostoma duodenale* was reported to be less than in uninfected persons from the same locality, indicating anaemia due to hookworm infection (Nass and Youssif 1978). A fall in haemoglobin content and total erythrocyte counts in chickens experimentally infected with *Toxocara canis* was reported by Sharma *et al.* (1984). More or less, similar decline trend in total erythrocyte counts and haemoglobin concentration was reported by Matta (1980)

in fowl infected with *Raillientia cesticillus*.

Kohapakdee *et al.* (1995) reported that haemoglobin concentration was found to be decreased in infected goats but after treatment with levamisole the haemoglobin concentration raised.

A significant decrease in the haemoglobin, total erythrocytes and platelets count in infected birds was observed which reverted back to near normality after treatment with anthelmintic (Dabeer *et al.* 1997).

Kumar *et al.* (1998) reported low haemoglobin level in infected horses with *Setaria equine* in comparison to control, uninfected horses.

Howlader *et al.* (1997) observed that haemoglobin concentration was significantly lower in infected goats than uninfected healthy goats. Decrease in erythrocyte counts and haemoglobin content in pigs during larval ascariasis was reported by Paciezewski (1980).

Lal and Kumar (1983) also observed anaemia in albino rats with experimental *B. trigonocephalum* infections. A similar trend in dogs infected with *Taenia hydatigera* was

reported by Pathak and Gaur (1983) and suggested that anaemia in dogs with *T. hydatigera* infection was a sequence of interference in the absorption mechanism and damage of the intestinal mucosa by these worms.

The erythrocytopenia and hypohaemoglobinaemia observed in the present investigation might be due to the increased rate of erythrocytic sedimentation. This is in accordance with findings of Matta and Ahluwalia (1982) in fowls during *A. galli* infection.

Kumar *et al.* (1999) reported low level of haemoglobin concentration in children infected with intestinal parasites. Alada *et al.* (2004) reported the steady but significant increase in the concentrations of hematocrit and haemoglobin after treatment with soyabeans diet in rats.

Passive immunization is achieved by transfer of antibodies from both primary and secondary lymphoid organs. Elucidation of mechanisms involved might be useful in development of immunotherapeutic reagents in future.

References :

- Berlin, M. and Piscator (1961). Blood volume in normal and cadmium Poisoning rabbits. *Arch. Environ. Hlth*, 2, **100-107**.
- Dabeer, Perviz, A and Aruna, K. (1997) Immuno haematological alteration induced by *A. galli*. *Uttar Pradesh J. Zoology* 17(2), **105-108**.
- Garg, S.K., Katoh Rajesh and Chauhan, P.P.S. (2004). Evaluation of efficacy of fenbendazole against natural gastrointestinal nematodiasis in goats (*Capra hircus*). *Small ruminant Research* 51: **97-100**.
- Hartmann, S and Lucius R. (2003). Modulation of host immune responses by nematode cystatins. *International J. Paraistology*. 33:**1291-1302**.

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Howlader, M.M.R., Huq, M.M. (1997). Haemoglobin concentration and hematocrit value of black Bengal goat infected with *Fasciola gigantica* Asian - *Austrian J. Anim. Sci.* 10(1) : **118-121**.

Kohabakdee, S., Pralomkaran, W. and Saithanoo, S. (1995). Changes in blood constituents and worm egg counts in Thai native and Cross bred goats raised in vill environments in southern Thailand. *Asian Austrian J. Anim. Sci.* 8(3) : **241-247**.

Kumar, U., Sinha, S., Singh, R.P. and Srivastava, S.P. (1999). Haemoglobin levels and concomitant intestinal parasites among children in and around Patna. *Ind. Pedia* 36(5) : **521-522**.

Matta, S.C. (1980). Studies on effect of Raillietina Spp. on some haematological indices of Fowl. *Ind. J. Poult, Sci.* 15:**273-274**.

Matta, S.C. and Ahluwalia, S.S. (1982). Haematological indices as influenced by *Ascaridia galli* infection fowl-I effect on haemoglobin concentration PCV and erythrocyte sedimentation rate (ESR). *Ind. J. Poult, Sci.* 17:**45-46**.

Muraveva, G.S. (1977). Clinical and laboratory characteristic of Trichuriasis and blood groups in Aktwal. nye veprosy bor by gel mintozami Sborni Knuschy Khrebat Pastera, pp. **88-91**

Nass, N.T. and Youssif, M (1978). Relation of intensity of Ancylostoma infection to anaemia. *J. Egypt, Soc. Parasitol* 8: **199-204**.

Paciejewski, S. (1980). Observations on state of health of Pigs during larval ascariidiasis. *Medycya weterynaryiana.* 36: **432-435**.

Pathak, K.M.L. and Gaur, S.N.S. (1983). Haematological changes associated with *Taenia hydatigera* infection in dogs. *Ind. J. Anim. Sci.* 58: **635-639**.

Perman, V and Scholthaver, J.C. (1978). Haematology of dogs with Heart worm disease. In Proceeding of heart worm Veterinary Medicine Publishing company U.S.A.

Sadun, E.H. (1950). Studies on pathogenicity in chickens of single infections of variable size with nematode, *Ascaridia galli*. *Poult. Sci.* 29, **712-722**.

Shamoto K, Yamauchi K. (2000). Recovery responses of chick intestinal villus morphology to different refeeding procedures. *Poult Sci* 79(5): **718-23**.

Sharma, S.C., Bhatia, B.B. and Pachauri S.P. (1984). Blood cellular and biochemical studies in chickens experimentally infected with *Toxocara canis*. *Ind. J. Parasitol*, 8, **159-163**.

Simaraks, S., Chinrasri, O and Aengwanich, S. (2004). Haematological values of Thai indigenous chickens in north eastern, Thailand. *Songklanakarin J. Sci Technol* 26(3), **425-430**.

Stoev, S.W., Anguelov, G., Ivanov, I and Paviov, D (2000). Influence of Ochratoxin A and extract of archicoke on vaccinal immunity and health in broiler chicks. *Exp. Toxicol, Pathol*, 52(1), **43-55**.