

## **Analysis of Serum Protein Profile by Gel Electrophoresis in Chicks Infected with A Galli Eggs and Cadmium Acetate**

**Divya Singh**

*Assistant Professor*

*Dept. of Zoology,*

*Meerut College, Meerut*

*Email: divyasingh134@gmail.com*

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**Divya Singh**

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### **Abstract**

*Male W.L.H. chicks were given infection of Ascaridia galli eggs (1000 eggs) and were treated with cadmium acetate (5 mg/100 ml). Serum obtained from control, infected and treated groups were analyzed for serum total protein profile concentration of antibodies after the 30th day as per experimental design.*

### **Keywords**

*Ascaridia galli, antibodies, cadmium acetate, albumin, Alpha-1 Globulin, Alpha-2, Globulin, Beta Globulin, Gamma Globulin.*

## **Introduction**

India is now the world's fifth-largest egg producer and the eighteenth largest producer of broilers. Poultry farming has progressed considerably during the last decade. The technological advances have revolutionized the role and structure of the poultry industry in India.

*Ascaridia galli* is a parasitic roundworm and causes disease called ascariasis. Sadun (1950) found that chickens infected with *A Galli* failed to grow normally and developed splenomegaly, hepatomegaly, and atrophy of the thymus.

Metal can cause cell damage by different mechanisms which include direct damage of cell membrane and certain organelles altering signal transduction pathways of affecting intracellular enzymatic system (Cherian and Ferguson, 1997). Agarose gel electrophoresis is used for the analysis of various protein profiles of serum of control and different experimental group of male W.L.H. chicks. Schwarz *et al* (2011) studied about immunopathogenesis of *Ascaridia galli* infection in layer chicken.

## **Materials and Methods**

Male W.L.H. chicks were grouped and labeled according to experimental design. The inocula with desired number of embryonated eggs (1000) embryonated eggs were administered orally to chicks. Dose with the desired amount of cadmium Acetate (5 mg/100 ml) was administered orally.

For collection of blood, male W.L.H. chicks were sacrificed after 30 days of infection. Blood was taken in clean and dry centrifugal tube and centrifuged at 3000 rpm for 10 minutes. After centrifugation, pale yellow serum was obtained and stored in a deep freezer for analysis of serum protein profiles. Agarose gel electrophoresis was used for the analysis of various protein profiles of serum of control and different experimental group of chicks. The following experimental groups were categorized as under -

- |           |   |  |
|-----------|---|--|
| Group I   | - | Control Chicks   |
| Group II  | - | Chick infected with 1000 infective eggs of <i>A Galli</i> .                                    |
| Group III | - | Chicks treated with 5 mg/100 ml of cadmium acetate.  |
| Group IV  | - | Chicks infected with 1000 <i>A galli</i> eggs and treated with 5mg/ 100 ml of cadmium acetate. |

## **Results**

### **Albumin -**

- |           |   |  |
|-----------|---|--|
| Group I   | - | In control group of male W.L.H. chicks concentration of albumin was 38.55 percent at 30 days respectively.   |
| Group II  | - | In infected group of male WLH chicks, the concentration of albumin was 40.92 percentage after 30 days of post-infection.   |
| Group III | - | In this group, albumin concentration was 32.26 percent after 30 days of post-treatment. The concentration of albumin was significantly ( $P < 0.005$ ) decreased in comparison to the control group. |
| Group IV  | - | In the group, albumin concentration was 36.90 percent after 30 days of post-infection and post-treatment.  |

**Alpha - I Globulin**

- Group I - In control group of male W.L.H. chicks, concentration of alpha - 1 globulins depicting IgA<sup>1</sup> antibodies were found to be 10.90 percent after 30 days.
- Group II - In this group, the concentration of alpha - 1 globulins depicting IgA<sup>1</sup> antibodies was 9.90 percent after 30 days of Post-infection.
- Group III - In the treated group, the concentration of alpha 1 globulins depicting Ig A<sup>1</sup> antibodies was observed to be 8.22 percent after 30 days of post-treatment.
- Group IV - Concentration of alpha - 1 globulins depicting Ig A<sup>1</sup> antibodies was 6.79 percent after 30 days of Post Infection and Post-treatment.

**Alpha - 2 Globulin**

- Group I - In the control group, the concentration of alpha -2 globulins depicting Ig A<sup>2</sup> antibodies was 9.96 percent after 30 days.
- Group II - In this group, the concentration of alpha -2 globulins depicting Ig A<sup>2</sup> antibodies was 10.16 percent after 30 days. The Ig A<sup>2</sup> was slightly increased in comparison to the control group.
- Group III - Concentration of alpha - 2 globulins depicting Ig A<sup>2</sup> antibodies were 22.39 percent after 30 days of Post-treatment.
- Group IV - Concentration of alpha 2 globulins depicting Ig A<sup>2</sup> antibodies were 6.79 percent after 30 days of Post -Infection, and Post-treatment.

**Beta Globulin**

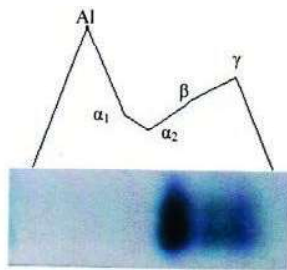
- Group I - In the control group, the concentration of beta globulins was 15.80 percent after 30 days.
- Group II - Concentration of beta globulins was 11.85 percent after 30 days of Post-infection.
- Group III - Concentration was 9.71 percent after 30 days of Post- treatment. Concentration was significantly (P<0.005) decreased as compared to control group.
- Group IV - Concentration was 9.15 percent after 30 days of Post-infection and Post-treatment. The concentration of beta globulins presented a significant (P<0.005) fall as compared to the control group.

**Gamma Globulin**

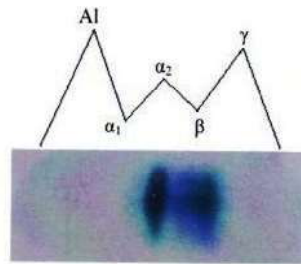
- Group I - In the control group, the concentration of gamma globulins depicting IgG antibodies was 24.26 percent after 30 days.
- Group II - In this group, concentration was 24.82 percent after 30 days of post-infection.

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 Divya Singh

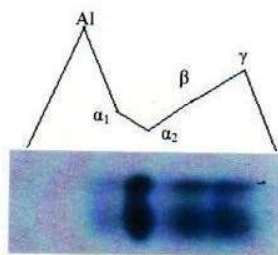
- Group III - Concentration was 27.26 percent after 30 days of Post-treatment. IgG antibodies showed a significant. ( $P < 0.005$ ) increase in humoral immune response as compared to control group.
- Group IV - Concentration of gamma globulins depicting Ig G antibodies were 37.68 percent after 30 days of Post-infection and post-treatment. Ig G antibodies showed a significant ( $P < 0.005$ ) increase in humoral immune response in comparison to control group.



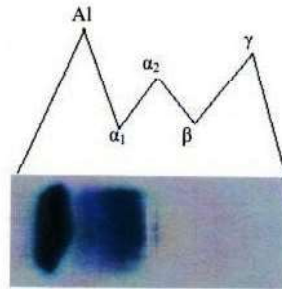
**Fig. 1** Serum protein profiles of control group of WLH Chicks.



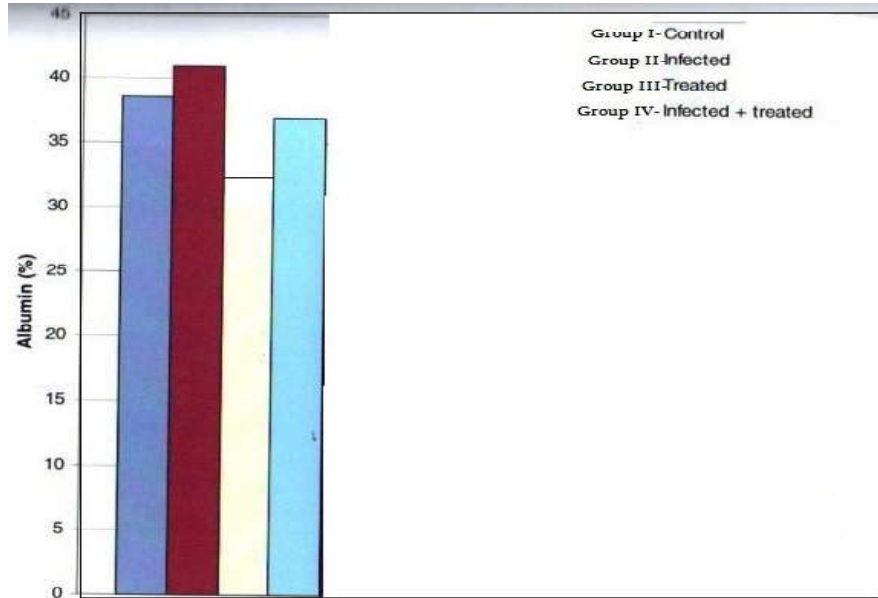
**Fig. 3:** Serum protein profiles in treated group of WLH chicks.



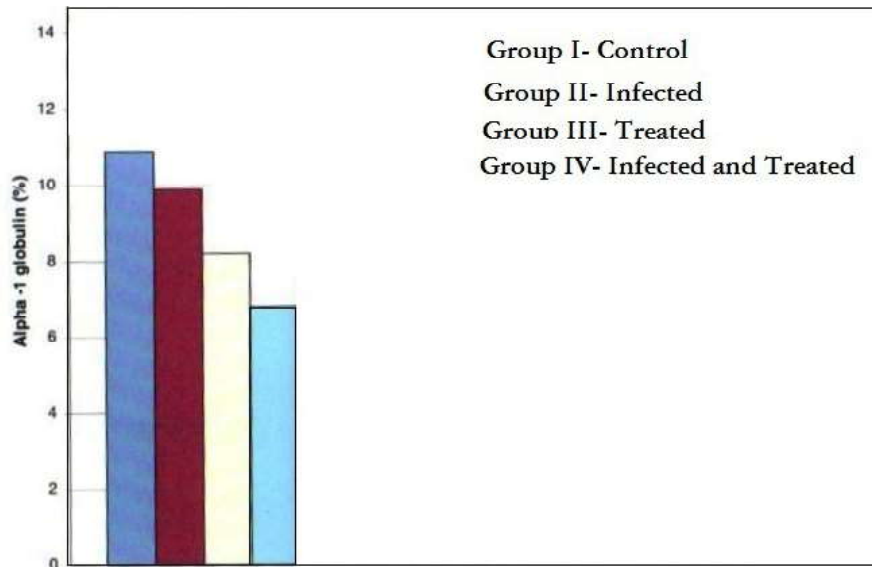
**Fig. 2** Serum protein profiles of infected group of WLH Chicks



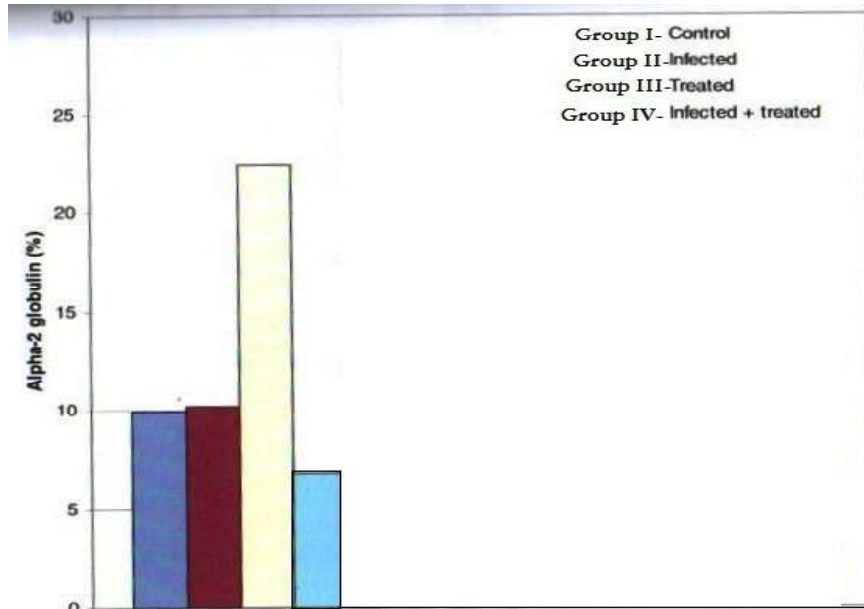
**Fig. 4:** Serum protein profiles in infected + treated group of WLH chicks.



**FIGURE 5**  
Albumin (%) in male white leg horn chicks

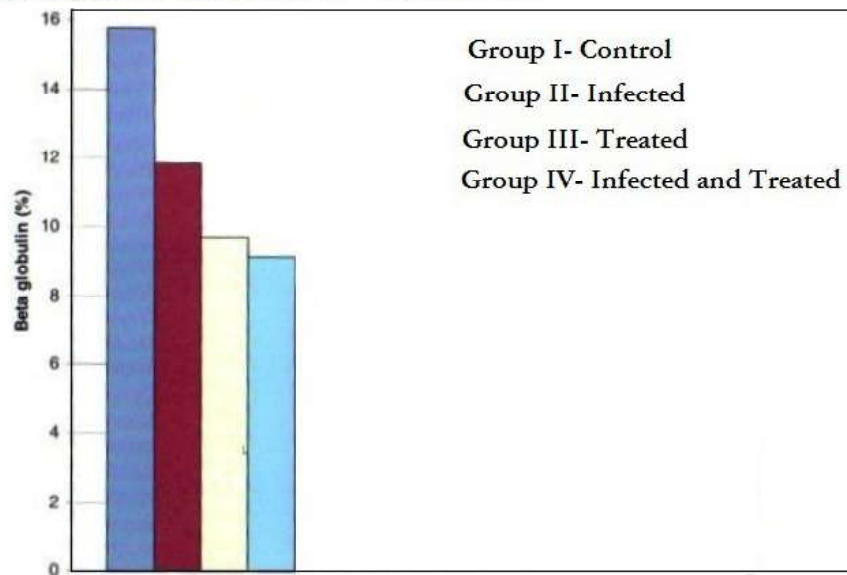


**FIGURE 6**  
Alpha-1 globulin (%) in male white leg horn chicks



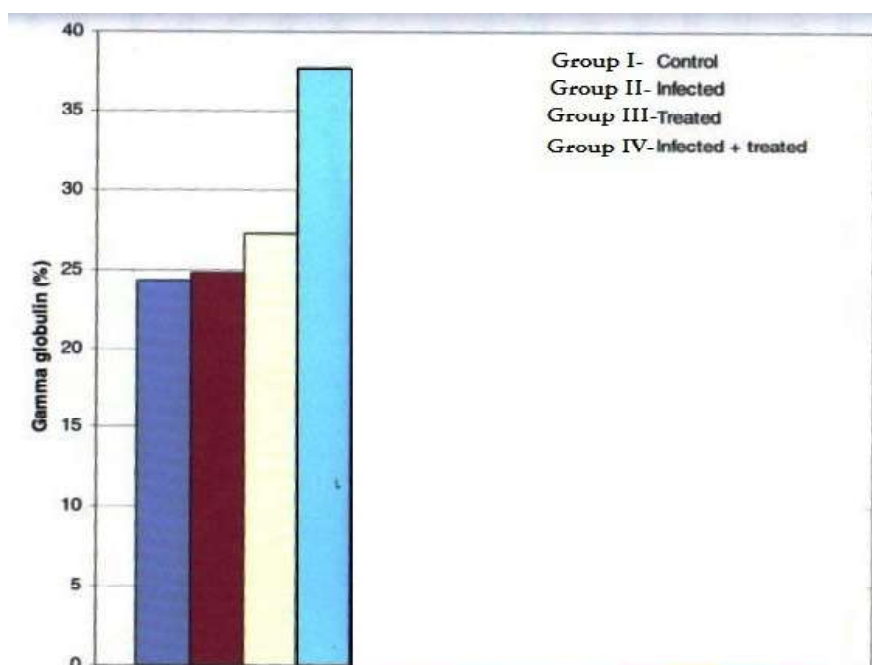
**FIGURE 7**

Alpha-2 globulin (%) in male white leg horn chicks



**FIGURE 8**

Beta globulin (%) in male white leg horn chicks



**FIGURE 9**  
Gama globulin (%) in male white leg horn chicks

### Discussion

The five major bands observed in W L H chicks were albumin, alpha -1 globulin, alpha -2 globulin, beta globulin, and gamma globulin. Albumin is largest single fraction in a healthy bird. It serves as a major reservoir of protein and is synthesized in the liver. An increase in albumin concentration is associated with dehydration. Decrease can occur with blood loss, severe infection, and chronic infection (Margaret and Wissman 2001). Rajkhowa *et al* (1996) reported a decrease in total Proteins and albumin levels due to infection of *Schistosoma indicum*. The present findings are supported by the findings of Arkhipova (1971). The fall in alpha -2 globulin is due to the reduced production of hepatoglobulin components by the liver (Tizard, 1984). A decline in alpha -1 globulin concentration in chicks infected with *Toxocara Canis* was experimentally observed by Brand *et al* (1951). Two-way ANOVA revealed that decline in beta globulin concentration was dependent on time intervals of Post-infection. Another reason for the fall in beta globulin is that beta lipoproteins and possibly glycoproteins are produced peripherally in response to tissue damage. Moiscenko (1981) observed an increased level of beta globulin in infected sheep with mixed infection of helminth parasites. Deutsch *et al* (1974) found increased gamma globulin levels in chickens treated with human gamma 2 globulin and reported that a direct correlation existed between gamma globulin level and antibody activity and their eventual utilization at the site of parasitic invasions. The increase in gamma globulin can be attributed to the augmentation of immune response.

The accurate interpretation of chick plasma proteins is a very important diagnostic tool in differentiating and measuring of albumin and different types of globulin. Protein electrophoresis is a useful test in diagnosis. Changes in protein fraction are an important event in several diseases and toxic conditions may help in procuring a diagnosis test.

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