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Biochemical changes induced by *Ascaridia galii* infection during Passive Immunization in W.L.H. Chicks

Divya Singh
Deptt. of Zoology, Meerut College, Meerut
divyasingh134@gmail.com

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Abstract

Immune response and biochemical parameters are closely related to each other. Any change in immune response would also induce alteration in biochemical parameters like Serum protein, Serum glucose, Serum cholesterol, Serum Acid Phosphatase, Serum Alkaline Phosphatase, Serum urea. The present study evaluated changes in biochemical parameters duringPassive immunization .

Key words *- Biochemical Parameters, A. galli, ascaridiasis, Thymus, Bursa, Spleen.*

Introduction :

Ascaridiasis is considered to be an alarming disease, which is caused by *A. galli*, the most common and most serious nematode parasite of Poultry. The presence of nematode parasite in hosts intestine leads to a large array of pathological manifestation.

The parasitic infection disturbs the internal micro-environment of the host by inducing biochemical, haematological and pathological changes. Lymphoid organs such as bonemarrow, thymus, spleen, bursa of fabricius, GALT, MALT play an important role in providing immunity through active and passive immunization.

The present study is related to induce immunity through involving sensitized lymphoid cells. The knowledge regarding altered biochemical parameters during *A. galli* infection would be helpful in understanding the immune system of the host. Ambali et al (2007) worked on evaluation of subchronic chloropyrifos poisoning on biochemical changes in mice. Ali et al. (2011) worked on comparative biochemical profile of *A galli* infected broiler chickens. In recent years, the field of immunology has attracted greater attention from scientific community in view of growing awareness regarding the need to modulate the host's immune system.

Materials and Methods - Embryonated eggs were collected and administered to laboratory maintained chicks orally, in ratio of 500 and 1000 eggs. Thymus and mixed cells (Bursa, Thymus and Spleen) were collected on 15th day from donor chicks. Then they were transferred intra-peritoneally within four hours to recipient group. Challenge infection was given with 500 and 1000 eggs, after 15 days of cell transfer.

Experimental Design :

Group.	Treatment	Number of chicks
C_1	Control	6
D_1	Infected with 500 embryonated eggs	6
D_2	Infected with 1000 embryonated eggs	6
G_1	Immunized with sensitized Thymic cells + 500 dose	6
G_2	Immunized with sensitized mixed cells + 500 dose	6
G_3	Immunized with sensitized thymic cells + 1000 dose	6
G_4	Immunized with sensitized mixed cells + 1000 dose	6

Table - 1

Biochemical Analysis in Control, Donor and Recipient Group (both with Thymus cell transfer and mixed cell transfer of chicks).

S.No.	Biochemical Parameters	Control Group	Donor D_1	Recipient Group (500 eggs)	
				Thymus G_1	Mixed G_2
1.	Serum Cholesterol (mg/dl)	210	268	260	241.1
2.	Serum Protein (mg/dl)	3.7	2.4	1.8	1.5
3.	Serum Acid Phosphatase (KA units)	7.0	2.6	2.3	2.1
4.	Serum Alkaline Phosphatase (KA units)	32	28	35	37
5.	Serum Glucose (mg/dl)	219	194	135	165
6.	Serum Urea	3.29	3.5	3.7	10.5

Table - 2

Biochemical Analysis in Control, Donor and Recipient Group (both with Thymus cell transfer and mixed cell transfer of chicks).

S.No.	Biochemical Parameters	Control Group	Donor D_2	Recipient Group (1000 eggs)	
				Thymus G_3	Mixed G_4
1.	Serum Cholesterol (mg/dl)	210	282	280	238.8
2.	Serum Protein (mg/dl)	3.7	2.0	1.5	1.3
3.	Serum Acid Phosphatase (KA units)	7.0	2.1	1.9	2.2
4.	Serum Alkaline Phosphatase (KA units)	32	27	31	32
5.	Serum Glucose (mg/dl)	219	180	125	175
6.	Serum Urea	3.29	3.9	4.5	7.5

Preperation of Serum -

The blood that was collected from experimental hosts was incubated at 34^0C for 20 hours to obtain serum. Aspiration of blood followed by its centrifugation gave good yield of pale yellow serum. All biochemical studies were performed on blood serum.

Results and Discussion :

Serum Cholesterol -

In control chicks, average cholesterol was 210 mg/dl. In both donor groups D_1 and D_2, it was 268 and 282 mg/dl. In recipient groups G_1 and G_2, it was 260 and 241.1 mg/dl. In recipient groups, G_3 and G_4 average serum cholesterol was 280 and 238.8 mg./dl. Cholesterol is a steroid which exists in free as well as in esterified form. Hyper Cholesterolemia was observed throughout the experiment. Rise in blood cholesterol level seems attributed to enhanced lipid metabolism of the host. The activity of a number of enzymes involved in catabolism and metabolism may be influenced by various factors. Basith et al. (1998) found serum cholesterol level elevated in chickens infected with *Eimeria necatrix*. The increased Cholesterol level was suggestive of inhibited activity of enzymes involved in anabolism of lipids in the host tissues.

Serum Protein -

In control chicks, serum protein was 3.7 mg/dl. In donor group, D_1 and D_2 average serum protein was 2.4 and 2.0 mg/dl. In recipient group G_1 and G_2, average serum protein decreased to 1.8 and 1.5 mg./dl. In recipient group G_3 and G_4 it decreased to 1.5 and 1.3 mg./dl.

Immunized group showed hypoproteinemia after 15 days of Post infection. During *A. galli* infections, there is lowered protein absorption in gastro-intestinal tracts of chicks due to its excretions or secretions. This malabsorption leads to fall in serum protein level of chicks. The reason is probably that parasites feed on tissues of intestine, causing injuries which lead to fall in plasma protein level of hosts blood. Brar et al. (1991) observed the fall in total serum protein in desert sheep clinically suffered with adult Haemonchosis.

Serum Acid Phosphatase -

In control chicks, serum acid phosphatase was 7.0 K.A. Units. In donor groups D_1 and D_2, it decreased to 2.6 and 2.1 K.A. Units. In recipients group G_1 and G_2 it decreased to 2.3 and 2.1 K.A. units. In recipient group G_3 and G_4, level decreased to 1.9 and 2.2 K.A respectively. Units. The decrease in Serum acid Phosphatase may be due to disturbed metabolism in chicks intestinal tissue during *A. galli* infection. The acid phosphatase level may have declined due to hypophosphatasia and perinicious anaemia. Rao (1991) demonstrated an increase in Serum Acid Phosphatase and alkaline Phosphatase level in chicks experimentally infected with *A. galli.*

Serum Alkaline Phosphatase -

In control chicks, it was 32 K.A. Units. In donor groups, D_1 and D_2 it was 28 and 27 K.A. units. In recipient group G_1 and G_2, level increased to 35 and 37 K.A. Units. In recipient group G_3 and G_4, it was 31 and 32 K.A. Units.

During the host parasite interaction, energy metabolism of host is disturbed, and thus, elevation in alkaline phosphatase level may be attributed to increase in activity of various isoenzynes in intestine of host. Simaraks et al. (2004) noticed that the value of serum alkaline phosphatase was higher in female than male in Thai indigenous chickens.

Serum Glucose -

In control chicks, serum glucose was 219 mg/dl. In donor group D_1 and D_2, it was 194 and 180 mg/dl. In recipient group G_1 and G_2, it was found to be 135 and 165 mg/dl. In recipient group G_3 and G_4, it was 125 and 175 mg/dl. Glucose is the chief source of energy in nematodes. Hypoglycemia was observed in immunized group in comparison to control group. Tanveer et al. (1998) reported decreased glucose level in rabbit due to high dose of crude hydatid cyst fluid of sheep origin.

The fall in Serum glucose level was attributed to disturbances in carbohydrate metabolism of *A galli* infected chicks. This in turn, leads to malabsorption of sugar in injured gastro intestinal tract of infected chicks.

Serum Urea - In control chicks, serum Urea was 3.29 mg/dl. In donor group D_1 and D_2 , it was 3.5 and 3.9 mg/dl. In receipient group G_1 and G_2, it increased to 3.7 and 10.5 mg/dl. In recipient group G_3 and G_4, it increased to 4.5 and 7.5 mg/dl. The present studies revealed a rise in serum urea level in immunized group.

The larvae and adult forms of *A galli* present in the lumen of intestine of W.L.H. chicks excrete and secrete certain toxic substances, causing nephrotoxicity. Main cause of elevation in serum urea level may be nephrotoxicity, which is caused by infection of these toxiic substances (Oser, 1976). Nephrotoxicity may also be caused due to Vaso-active amines and histamines produced during antigen antibody interaction in host's body. The rise in serum urea level is dependent on severity of infection.

Increased level of urea concentration was also observed by Siddique et al. (1997). Biochemical alterations in present experiment as revealed in WLH chicks with experimental ascardidiasis may be due to injuries and haemorrhages caused in intestinal tissues and malabsorption caused there by. The above work would be helpful in designing of vaccines for passive immunization which in turn would be helpful directly for poultry industries. Increased products desired for poultry would benefit for mankind. Study of altered biochemical parameters helps to understand immune system of host.

Recently, immunotherapy has emerged as a strong second line treatment for parasites. Immunization by vaccination has greatly helped by not only controlling parasite, but it has strong potential for completely eradicating any parasitic infections.

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