BIOCHEMICAL PROFILE OF BROILER CHICKENS EXPERIMENTALLY INFEKTED WITH ASCARIDIA GALLI


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ABSTRACT

A study was conducted to evaluate the changes in the serum biochemical profile of the broiler chickens experimentally infected with Ascaridia galli. The infected birds showed changes in the level of glucose, cholesterol, total protein, albumin, magnesium, potassium and SGPT. The serum level of the above metabolites and SGPT initially decreased with progress of infection except for cholesterol and potassium level.

Key words: Albumin, Ascarida galli, Chickens, Glucose, SGPT, Total protein.

INTRODUCTION

Ascaridiosis is one of the salient causes for economic losses in modern poultry farming (Permin and Raving, 2001). Among the parasites next to the coccidium, Ascaridia galli infection in chicken is considered to be of great importance as it can cause loss of weight, meat production, egg production and mortality of birds (Kamal, 1989). It is an intestinal worm and chickens under three months of age are mostly susceptible to it. Some of the reported changes in Haemato-biochemical profile of the infected birds includes decrease level of Total erythrocyte count, packed cell volume, haemoglobin, serum total protein, albumin (Deka and Borah, 2008), calcium and phosphatase (Patra et al., 2010). However, the available reports on other biochemical changes in the A. galli infected birds is scanty. Therefore, a study was conducted to evaluate the biochemical changes in the broiler chickens experimentally infected with A. galli.

MATERIALS AND METHODS

Sample collection and prevalence studies: In the present study intestines from 100 chickens were collected from different slaughterhouses in Aizawl to see the prevalence of A. galli infestation in chicken. The samples were brought to the laboratory immediately after collection. The mature parasites were recovered and collected after opening the individual intestine in normal saline solution following the procedure of Alcom (2001). The mature male and female worms were identified and separated based on their length.

Culture and inoculation of infective eggs of A. galli: The collected female worms were macerated in a pestle and mortar with 5 ml PBS and washed 5-6 times in distilled water before placing them in clean petridishes for culturing in normal saline at 28-30 °C for 21 days to embryonate in a B.O.D. incubator. Few drops of 5% formalin were added to the culture medium to prevent bacterial and fungal growth (Deka and Borah, 2008; Islam et al., 2008). When the infective stage was reached, the eggs were collected in a centrifuge tube containing normal saline. The pellet was collected after washing with normal saline for three times at 1000 rpm. The pellet was suspended in double distilled water to count the number of eggs as per the procedure of Choudhary (1989). Twenty five commercial (Vencorb 400) broiler chicks procured from M/s. Ranchaw Dawr; Durlang, Aizawl, Mizoram, India were used in the present
study. Each of the chicks was fed once with 2 ml of the egg suspension containing 400 eggs of infective stage of A. galli.

**Collection and processing of blood:** When A. galli eggs started appearing in the droppings of the infected birds, blood samples for biochemical analysis were collected from wing vein on 0 day, 7th, 14th, 21st, 28th, and 56th day post treatment. Five birds were randomly selected and 2 ml of blood was collected in sterile test tubes without any anticoagulant for biochemical analysis. Serum was separated out and stored at -20 °C until analysis. The serum biochemical parameters were estimated in a UV-Vis Spectrophotometer (Chemitos Spectroscan 2600) using commercially available diagnostic kits purchased from M/s. Crest Biosystems.

The statistical differences in response to various parameters were calculated by simple ANOVA (Snedecor and Cochran, 1994).

**RESULTS AND DISCUSSION**

The blood biochemical profile of the birds experimentally infected with A. galli was evaluated using commercially available diagnostic kits. The change in serum biochemical parameters is given in Table 1. The serum glucose level in the infected birds gradually decreased significantly as low as 45.10 mg/dl upto 21st day thereafter, the level gradually increased significantly. The change in serum glucose level at different days of infection is shown in figure. Wikipedia (wikipedia.org/wiki/Ascaridia galli) and poultry world (www.world poultry) also reported the decrease in the level of glucose in A. galli infected chickens. Rawat et al. (2010) reported decrease in the level of glucose in serum as well as in pericardial fluid due to HPSV infection. Similar finding was also observed by Bhatti et al. (1989).

The serum cholesterol level was found to increase gradually and on 56th day of the treatment the level was as high as 140.45 mg/dl. The change in serum cholesterol level at different days of infection is shown in figure 2.

The infected birds showed decrease in level of serum total protein upto 14th day thereafter, the level gradually significantly increased and attained the normal level on 56th day. The change in serum total protein at different days of infection is shown in figure 3. The decrease observed in the serum total protein is in agreement with the findings of Deka and Borah (2008) and Tanwar and Mishra (2001). Deka and Borah (2008) reported a significant decrease (p<0.05) in total protein of chicks infected orally with one hundred and five hundred infective eggs of A. galli. Hypoprotenaemia might occur due

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Methods</th>
<th>0 day</th>
<th>7th day</th>
<th>14th day</th>
<th>21st day</th>
<th>28th day</th>
<th>56th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose (mg/dl)</td>
<td>GOD/POD</td>
<td>484.69±3.36a</td>
<td>404.08±3.27b</td>
<td>313.26±2.97c</td>
<td>45.10±1.64d</td>
<td>63.27±1.01e</td>
<td>204.08±1.30f</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>CHOD/PAP</td>
<td>70.21±1.52d</td>
<td>76.40±1.89e</td>
<td>83.82±2.19c</td>
<td>91.51±1.78g</td>
<td>93.26±1.74h</td>
<td>140.45±4.22i</td>
</tr>
<tr>
<td>Total Protein (g/dl)</td>
<td>Birect</td>
<td>7.08±0.75f</td>
<td>3.23±0.42g</td>
<td>2.67±0.23m</td>
<td>3.14±0.23n</td>
<td>6.32±0.46o</td>
<td>7.18±0.35p</td>
</tr>
<tr>
<td>Albumin (g/dl)</td>
<td>BCG</td>
<td>1.17±0.23c</td>
<td>0.82±0.10d</td>
<td>1.64±0.10e</td>
<td>1.95±0.02f</td>
<td>1.30±0.13g</td>
<td>1.29±0.10h</td>
</tr>
<tr>
<td>Globulin (g/dl)</td>
<td>BCG</td>
<td>5.91±0.66b</td>
<td>2.41±0.28c</td>
<td>1.03±0.09e</td>
<td>1.19±0.02f</td>
<td>5.02±0.20g</td>
<td>5.98±0.16h</td>
</tr>
<tr>
<td>AG ratio</td>
<td>Calmagite-EGTA</td>
<td>0.24</td>
<td>0.34</td>
<td>1.59</td>
<td>1.64</td>
<td>0.26</td>
<td>0.20</td>
</tr>
<tr>
<td>Magnesium (mg/dl)</td>
<td>Calmagite-EGTA</td>
<td>0.69±0.09a</td>
<td>0.65±0.06b</td>
<td>0.49±0.03c</td>
<td>0.37±0.02d</td>
<td>0.36±0.02e</td>
<td>0.52±0.03f</td>
</tr>
<tr>
<td>Potassium (mg/dl)</td>
<td>Colosimetric</td>
<td>4.49±0.17a</td>
<td>4.51±0.16c</td>
<td>7.32±0.23e</td>
<td>9.55±0.26g</td>
<td>10.53±0.27h</td>
<td>17.95±0.30i</td>
</tr>
<tr>
<td>SGPT (U/dl)</td>
<td>Reitman &amp; Frankel's</td>
<td>29.53±0.85a</td>
<td>30.0±1.14a</td>
<td>21.23±0.35c</td>
<td>13.50±0.61e</td>
<td>9.0±0.71i</td>
<td>18.0±0.71c</td>
</tr>
</tbody>
</table>

Means in a row bearing different superscripts differ significantly (p<0.01)
FIG. 1. Change in glucose level in different stages of infection.

FIG. 2. Change in cholesterol level in different stages of infection.

FIG. 3. Change in Total Protein level in different stages of infection.
FIG. 4. Change in Albumin level in different stages of infection.

FIG. 5. Change in Magnesium level in different stages of infection.

FIG. 6. Change in Potassium level in different stages of infection.
to increased motility of intestine as in diarrhoea. In that case the proteins might get lost from the bowel (Deka and Borah (2008). Coles (1967) reported that a considerable loss of tissue protein might occur through leakage into gut with loss of digestive secretion and mucus due to intestinal parasitism in anaemic birds, which also caused inefficient protein absorption and utilization in the system to the extent of leading to marked decrease in serum protein.

The *A. galli* infection in chickens showed decrease in the level of serum albumin. The level decreased to 0.82 g/dl from 1.17 g/dl on the 7th day. The decrease observed in the level of serum albumin is in agreement with the findings of Deka and Borah (2008). The decrease in serum albumin level is a common form of hypoproteinaemia due to its small size and osmotic sensitivity to fluid movement. The albumin is selectively lost in intestinal parasitism. The hypoalbuminaemia of intestinal parasitism is aggravated by increased albumin catabolism (Tanwar and Mishra, 2001). The change in the albumin level at different stages of infection is shown in figure 4. Rawat et al. (2010) reported significant reduction (*P* < 0.05) in total protein, albumin and globulin in the chickens experimentally infected with HPSV. Shivachandra et al. (2003) also reported decrease in the level of total protein, globulin and albumin up to five week of PI in chickens with HPSV infection.

The change in the level of magnesium in the serum of the infected chickens is shown in Fig. 5. The level gradually decreased up to 28th day and on 56th day the level was found to come to normal level. Similar decrease in the serum levels of Calcium and Phosphate in the birds infected by *A. galli* was reported by Patra et al., (2010). The serum potassium profile is shown in figure 6. The level increased significantly from 4.49 on 0 day to 17.95 on 56th day in the infected birds.

The change in serum glutamate pyruvate transaminase (SGPT) level at different stages of infection is shown in figure 7. The SGPT level decreased from 7th day of infection till 28th day. An increase in the activity of the enzyme was observed on 56th day.

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