

Changes in the Serum Protein Content in Different Experimental Chicks due to Plasmodium Gallinaceum Infection

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Abstract- Chicks infected with Plasmodium gallinaceum were treated with hormones testosterone, Diethylestilbestirol, Thyroxine and changes in the serum protein content was monitored. In this research work the male and female chicks were taken with different age groups of first week and fourth week. In this study the total protein content during infection was changed. Albumins were decreased and globulins were increased. Total proteins also decreased.

Index Terms- Plasmodium gallinaceum, chicks, Testosteron, Stilbestirol, Thyroxine.

I. INTRODUCTION

The physiological status of the animal is indicted by the metabolic status of proteins (Harper, 1985). Proteins are of much biological significance in the tissue repair and growth as it is the only food factor that is capable of being easily absorbed and utilized for this purpose. Its importance is clear from the fact that its daily requirement of animals is about 30-40g. they are not only important for tissue repair, but can also play a major role in the protection of the body from the invading organisms. During the invasion of the parasite in the hosts, there is a possibility of some issue decrease occurring and this in turn increases the body protein during parasitic invasion and increase may also due to the formation of antibodies, which try to defend the body.

All such physiological changes are reflected on the serum protein and is of immense value in understanding the pathogenicity of Plasmodium Gallinaceum infection. The study of total protein content, albumin's and globulin content in parasite infections shall be of help in understanding the degree of pathogenicity.

The disturbances in serum protein level are a characteristic feature of many parasite infections. In most cases there is a progressive decrease in albumin and an increase in globulin mostly r-globulin's. This leads to marked changes in the albumin, globulin rates.

Albumin loss during parasite infection could have different causes depending on the type of infection. The rise in globulin, especially r-globulin may be due to the presence of the parasite. The presence of any parasite does trigger the immunological reactions in the host, resulting in the formation of a number of antibodies. Antibodies are pertinacious molecules of the globulin specially r-globulins. The immunoglobulin contains parasite specific antibodies which can be localized in various fractions. It is possible that antibodies are at least partially responsible for the change in serum protein levels.

However, variations in the serum proteins values depend upon the host species, the presence or absence of previous infection, the hormonal balance, severity of infection e.t.c.

II. METHODS AND MATERIALS

For this research work the male and female leghorn chicks were produced from Tirumala Hatcheries, Hanmakonda. These chicks were maintained under modern poultry methods. They were vaccinated and provided with a 100 watts bulb on the cage for maintaining suitable temperature. The chicks were given balanced feed. Plasmodium gallinaceum used in this study was maintained by syringe passage in male and female leghorn chicks.

In this experimental study the hormones used are a synthetic sexual steroid hormone Testosterone (25mg in 1ml aquaviron B12), synthetic sexual steroid hormone Diethylestilbestrol, and a synthetic Thyroid hormone, Thyroxine sodium IP50 mg/100mcg(as anhydrous).

The total number of chicks taken were 12 in two batches with different age groups, one week and four week old chicks, each batch consisting of 6 chicks. The serum protein levels of different age experimental chicks were observed before the experiment. They were given 0.25 mg of testosterone in five doses for five days. The blood was collected and estimation of serum proteins was done by UV absorption (A280) method. A batch of one week and four week chicks were inoculated with Plasmodium gallinaceum intravenously, with out any hormone. The quantity of blood was 0.5 ml. Another batch of one week and four week chicks were given after 5days of hormone treatment, Plasmodium gallinaceum and blood was taken when the infection was heavy. The same procedure was used for female chicks also during peak infection, they were analysed for the study. The same procedure was used for the hormones diethylstilbestrol and thyroxine. But the drug treatment was given upto 6days by oral tablets.

III. RESULTS AND FINDINGS – IN MALE EXPERIMENTAL CHICKS

The results obtained of the total serum protein content in Plasmodium Gallinaceum infected chicks, hormone treated and infected chicks are shown in the table no. 1

The table shows that the total serum protein level is decreased in all infected hosts, but the percentage of decrease is varied from host to host in different experimental chicks.

In one week old male experimental chicks with Plasmodium Gallinaceum infection the decrease in total serum protein level is 13.6%. In testosterone drug treated chicks the decrease in total serum protein level is 2.7%, and in testosterone treated chicks

with Plasmodium infection the decrease is 24%. In stilbestrol drug treated chicks the decrease in total serum protein level is 3%, and in stilbestrol treated chicks with Plasmodium Gallinaceum infection the decrease is 26%. In thyroxine drug treated chicks the decrease in total protein level is 3%, and in thyroxine treated chicks with Plasmodium Gallinaceum infection the decrease is 24%. In fourth week male experimental chicks with Plasmodium Gallinaceum infection the decrease in total serum protein level is 19%.

In testosterone drug treated chicks the decrease in total serum protein level is 3.3% and in testosterone treated chicks with Plasmodium infection the decrease is 18.9%. In stilbestrol drug treated chicks the decrease in total serum protein level is 4%, and in stilbestrol treated chicks with Plasmodium Gallinaceum infection the decrease is 27%. In thyroxine drug treated chicks the decrease in total serum protein level is 5%, and in thyroxine treated chicks with Plasmodium infection the decrease is 28%. The albumin levels have also decreased in all infected chicks and globulin levels have increased in all infected experimental chicks. (Table No. 1)

IV. RESULTS IN FEMALE EXPERIMENTAL CHICKS

The results obtained on the total serum protein content in Plasmodium Gallinaceum infected chicks, hormone treated, treated and infected chicks are shown in the table.2.

The table shows that the total serum protein level is decreased in all infected hosts, but the percentage of decrease is varied from host to host in different experimental chicks.

In one week old female experimental chicks with Plasmodium Gallinaceum infection the decrease in total serum protein level is 13.3%. In testosterone drug treated chicks the decrease in total serum protein level is 3%, and in testosterone treated chicks with Plasmodium infection the decrease is 28%. In stilbestrol drug treated chicks the decrease in total serum protein level is 4.6%, and in stilbestrol treated chicks with Plasmodium Gallinaceum infection the decrease in total protein level is 1.4%, and thyroxine treated chicks with Plasmodium Gallinaceum infection the decrease is 18.9%.

In fourth week female experimental chicks with Plasmodium Gallinaceum infection the decrease in total serum protein level is 11.4%.

In testosterone drug treated chicks the decrease in the total serum protein level is 3%, and in testosterone treated chicks with Plasmodium infection the decrease is 24%. In stilbestrol drug treated chicks the decrease in total serum protein level is 2%, and stilbestrol drug treated chicks with Plasmodium Gallinaceum infection the decrease is 26.8%. In thyroxine treated chicks the decrease in total serum protein level is 4%, and in thyroxine treated chicks with Plasmodium infection the decrease is 27%.

The albumin levels have also decreased in all infected chicks and globulin levels have increased in all infected experimental chicks. (Table No. 2).

TABLE – 1 Showing changes in serum protein level of different male experimental chicks due to Plasmodium gallinaceum (values represent changes in the serum protein level and the mean \pm standard of 6 animals in each group).

S.No.	Host	Total protein	Albumins	Globulins
1	Normal one week chick sera	7.4 \pm 0.334	5.15 \pm 0.288	2.10 \pm 0.288
2	One week infected chick sera	6.25 \pm 0.669	4.25 \pm 0.187	2.25 \pm 0.187
3	Normal fourth week chick sera	7.5 \pm 0.152	5.25 \pm 0.182	2.35 \pm 0.187
4	Fourth one week infected chick sera	6.45 \pm 0.187	3.95 \pm 0.187	2.35 \pm 0.187
5	First week testosterone treated chick sera	7.20 \pm 0.334	4.64 \pm 0.182	2.60 \pm 0.182
6	First week testosterone & infected chick sera	5.60 \pm 0.262	3.20 \pm 0.187	2.60 \pm 0.187
7	Fourth week testosterone treated chick sera	7.25 \pm 0.669	3.60 \pm 0.182	3.55 \pm 0.182
8	Fourth week testosterone & infected chick sera	6.08 \pm 2.839	4.35 \pm 0.187	3.55 \pm 0.182
9	First week stilbestrol treated chick sera	7.20 \pm 0.187	4.35 \pm 0.187	3.55 \pm 0.182
10	First week stilbestrol& infected chick sera	5.45 \pm 0.187	3.25 \pm 0.187	2.35 \pm 0.187

11	Fourth week stilbestrol treated chick sera	7.24 ± 0.334	4.45 ± 0.182	2.80 ± 0.182
12	Fourth week stilbestrol& infected chick sera	5.45 ± 0.187	3.25 ± 0.187	2.20 ± 0.187
13	First week thyroxine treated chick sera	7.2 ± 0.669	3.60 ± 0.228	3.45 ± 0.228
14	First week thyroxine& infected chick sera	5.60 ± 0.262	3.25 ± 0.182	2.35 ± 0.182
15	Fourth week thyroxine treated chick sera	7.15 ± 0.669	5.10 ± 0.228	2.35 ± 0.228
16	Fourth week thyroxine& infected chick sera	5.45 ± 0.187	3.35 ± 0.187	2.35 ± 0.187

TABLE – 2 Showing changes in serum protein level of different male experimental chicks due to Plasmodium Gallinaceum (values represent changes in the serum protein level and the mean ± standard of 6 animals in each group).

S.No.	Host	Total protein	Albumins	Globulins
1	Normal one week chick sera	7.5 ± 0.893	5.25 ± 0.187	2.35 ± 0.187
2	One week infected chick sera	6.5 ± 0.182	4.35 ± 0.182	2.35 ± 0.187
3	Normal fourth week chick sera	7.45 ± 0.334	5.30 ± 0.187	2.35 ± 0.187
4	Fourth one week infected chick sera	6.60 ± 0.182	3.35 ± 0.182	2.25 ± 0.187
5	First week testosterone treated chick sera	7.30 ± 0.893	4.60 ± 0.187	2.35 ± 0.187
6	First week testosterone & infected chick sera	5.45 ± 0.187	3.20 ± 0.187	2.35 ± 0.187
7	Fourth week testosterone treated chick sera	7.24 ± 0.334	4.65 ± 0.182	2.60 ± 0.182
8	Fourth week testosterone & infected chick sera	5.60 ± 0.262	3.20 ± 0.182	2.60 ± 0.182
9	First week stilbestrol treated chick sera	7.15 ± 0.669	4.35 ± 0.228	2.80 ± 0.223
10	First week stilbestrol& infected chick sera	5.45 ± 0.187	3.25 ± 0.187	2.25 ± 0.187
11	Fourth week stilbestrol treated chick sera	7.35 ± 0.187	5.25 ± 0.187	2.25 ± 0.187
12	Fourth week stilbestrol& infected chick sera	5.45 ± 0.187	3.25 ± 0.187	2.35 ± 0.187
13	First week thyroxine treated chick sera	7.4 ± 0.187	4.45 ± 0.187	3.25 ± 0.187

14	First week thyroxine& infected chick sera	6.08 ± 0.283	3.35 ± 0.187	3.25 ± 0.187
15	Fourth week thyroxine treated chick sera	7.20 ± 0.187	4.45 ± 0.187	2.85 ± 0.187
16	Fourth week thyroxine& infected chick sera	5.45 ± 0.187	3.25 ± 0.187	2.35 ± 0.187

V. CONCLUSION

This study shows due to plasmodium infection there is a decrease in the total serum proteins and serum albumens and increase of serum globulins. The reason for the decrease in the total serum protein may be due to their rapid metabolism for providing energy to the host as well as to the parasite. More over, these parasites are present in the serum and there is a possibility of mechanical destruction and subsequent absorption. Hence the nutrient protein albumin is also consumed. This is also adds to the decrease in the total serum protein content.

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