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Innovation The Research Concept

Biochemical Studies in W.L.H Chicks infected with Ascaridia Galli and Treated with Cadmium Acetate

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Divya Singh
Associate Professor,
Dept. of Zoology,
Meerut College,
Meerut, U.P., India

Abstract

Biochemical parameters have been discussed in relation to present experiments. Biochemical alteration depends on total protein, glucose, cholesterol, acid phosphatase, alkaline phosphatase and urea in blood. Through blood, biochemical components reach at cellular level for biological and molecular activities.

Keywords:A.galli, cadmium acetate, biochemical parameters, W.L.H Chicks.

Introduction

Today, the poultry industry has grown largely due to initiative of private enterprises, considerable indigenous poultry genetic capabilities and considerable support from complementary veterinary health, poultry feed, poultry equipment and poultry processing sectors. There are many modern integrated poultry processing plants functioning in our country. *Ascaridia galli* leads to the highest degree of pathogenicity. Advanced stage of infection results in various hematological, immunopathological and biochemical changes in the host.

Cadmium(cd) is an environmental pollutant. It is toxic to various organs like kidney, intestine, liver, spleen, testes, bone, blood and immune system. (Friberg *et al* 1986; Goering *et al* 1995). Higher supply of cadmium was recorded to induce carcinogenic effects in mammals. (Hoffman,1985; Elinder *et al* 1985). Metal can cause cell damage and certain organelles altering signal transduction pathways affecting the intra cellular enzymatic system (Cherian and Ferguson, 1997). Ali *et al* (2011) gave an account of the comparative biochemical profile of *Ascaridia galli* infected broiler chicks. *A galli* infection and cadmium acetate treatment induced biochemical changes in blood and lymphoid organs. Studies regarding altered biochemical parameters would be very useful in understanding the immune system of the host.

Aim of Study

A.galli infection and toxicant(cadmium acetate) induced biochemical alterations in blood.Study of altered parameters would be useful in understanding the immune system of the host and in development of vaccines.

Materials and Methods

Male White Leghorn chicks (WLH) were kept separately in spacious wooden cages in animal houses under room temperature with sufficient aeration and suitable light. Female parasites of *A galli* were kept in a petri dish containing saline water for egg laying at 37 Degree Celsius in the incubator. After 24-36 hours, female parasites laid a large number of eggs which were collected in a petri dish having sterile solution. The eggs were kept in sterile solution at 32-37 degree Celsius for embryonation for 20 days. These embryonated infective eggs were used for infection in male WLH chicks orally. The experimental hosts, male WLH chicks were properly grouped and labeled according to experiment design. The dose with the desired amount of cadmium acetate (5 mg/100 ml) was prepared and administered orally with the help of an 18 gauge feeding needle mounted on a suitable graduated syringe. After 30 days of infection, blood was collected from the heart with a sterilized dry glass syringe by cardiac puncture. Blood was centrifuged at 3000 rpm for 10 minutes. After centrifugation, pale yellow serum was obtained for biochemical studies.

Experiment Design

Group	Treatment	Number of chicks
I	Control chicks	8
II	Chicks infected with 800 embryonated eggs of *A galli*	8
III	Chicks treated with 5 mg/100 ml of cadmium acetate	8

IV	Chicks infected with 800 embryonated eggs of *A galli* and treated with 5 mg/ 100 ml of cadmium acetate	8

Serum Total Protein

GROUP I- Mean values in male W.L.H Chicks were found to be 4.56 gm/dl after30 days.
GROUP II- Mean values in male W.L.H Chicks were found to be 6.24 gm/dl after 30 days
GROUP III- Mean values in male W.L.H Chicks were found to be 3.99 gm/dl after 30 days
GROUP IV- Mean values in male W.L.H Chicks were found to be 5.27 gm/dl after 30 days
In the present experiment, serum total protein values were changed after post infection and post treatment. During infections, there is a lowered protein absorption in gastrointestinal tracts of chicks due to its excretion or secretion. This malabsorption may cause protein levels to fall in chicks. Depression of protein value in chickens has been reported by Sharma et al (1984) during experimental Toxocara Canis infection. The presence of infections in gastro intestinal tracts of the host cause a leakage of plasma in intestinal lumen of injured intestine and this leakage results in decline in plasma protein level of host. Khatoon and Ansari(1979) reported increased levels of total protein in blood of Setaria cervi infected buffalo calves. Chauhan et al(2005) reported biochemical changes in blood serum of W.L.H chicks due to effects of A galli infection and cadmium acetate treatment and its combined effect.

Serum Glucose Level

Group I- Mean values were 248.42 gm/dl after 30 days.
Group II- Mean values were281.94 gm/dl after 30 days.
Group III-Mean values were204.07 gm/dl after 30 days
Group IV- Mean values were219.18 gm/dl after 30 days.
During present investigation, glucose level was found to be higher in control than treated and infected chicks. A fall in serum glucose level was observed by Rani (1986) in W.L.H chicks during A.galli infection. Blood sugar of the host has been reported by Cheng(1973) as a source to provide carbohydrate to parasites. It seems that A. galli manages to absorb sugar of the host either directly or indirectly from injured intestinal tissues. Gordon and Webster(1971) showed that nematode Mermmmis nigrescens reduced blood sugar of host desert locust Schistocerca gregaria. Brar et al (1991) found an increase in the level of serum glucose after infection with Haemonchus contortus in desert sheep. Shrivastava et al(1988) noticed decrease in serum glucose level when they observed biochemical changes in sera of cattle immunized with tick tissue extract of Boophilus microplus.

Serum Cholesterol Level

Group I- Mean values were 144.08 mg/dl after30 days
Group II- Mean values were147.01 mg/dl after30 days.
Group III-Mean values were219.06 mg/dl after 30 days.
Group IV- Mean values were 231.08 mg/dl after 30 days
Increases in cholesterol levels were observed throughout the experiment. Lipid metabolism of the host seemed to be increased. Enzymes which were involved in anabolism of lipids in host tissues were inhibited. The hypercholesterolaemia shifts balance in favor of free radicals generation that leads to oxidative tissue damage. The changes in host serum cholesterol due to parasitic infection has been reported by Mishra (1972), Slesaryenko(1973), Leland et al(1960),Bhopale and Johri(1978), Belova and Spleenkov(1978),Biadum (1990), Shistova et al (1970) and Raote et al (1991). Contiho et al (1960) reported a decreased level of cholesterol in human patients infected with Schistosoma mansoni.

Serum Urea Level

Group I- Mean values were 3.70 mg/dl after 30 days.
Group II- Mean values were 6.43 mg/dl after 30 days.
Group III- Mean values were 4.80 mg/dl after 30 days.
Group IV- Mean values were 7.83 mg/dl after 30 days.
The present investigations revealed that serum urea level was observed to be very high in experimental groups. Serum urea level was found slightly decreased in the pure treated group, but combined effect of treatment and experimental ascaridiasis revealed that serum urea level was slightly increased. Nephrotoxicity caused by the appearance of some toxic substances in the intestine being secreted and excreted by larvae and the adult stage of A galli seems to be one of the reasons. The vasoactive amines and

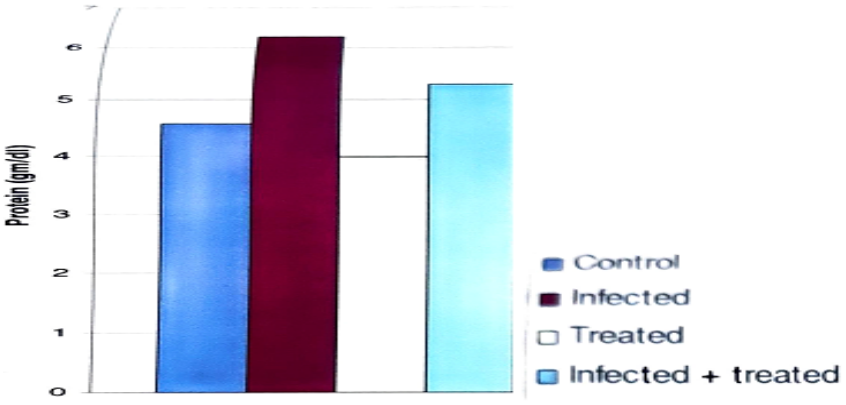
histamine produced during infection by antigen antibody interaction seems to be one of the causes of nephrotoxicity. The increased level of serum urea could be attributed to nephritis and nephrotoxicity caused by ingestion of toxic substances, intestinal obstruction and by certain infection (Oser 1976). El. Abdin et al (1975) reported that the level of urea slightly increased after treatment with anthelmintics in comparison to the control group. Hashen and Mohamed (2009) studied haemato-biochemical studies on aflatoxicosis and treatment of broiler chicks in Egypt.

Serum Acid Phosphatase

Group I – Mean values were 5.35IU/L after 30 days.
Group II- Mean values were 5.61IU/L after 30 days.
Group III- Mean values were 6.23IU/L after 30 days.
Group IV- Mean values were 7.01IU/L after 30 days.
Variations in values of Serum Acid Phosphatase during experiment may be due to disturbed metabolism in chicks due to infections and treatment of cadmium acetate. It may be due to hypophosphatasia and pernicious anemia. Combined effects of treatment and experimental ascaridiasis revealed a significant rise in acid phosphatase activity in W.L.H chicks.
Kumar (1983) reported rise in acid phosphatase levels in albino rats, infected with B.trigonocephalum Brar et al (1991) observed that level of serum acid phosphatase increased in desert sheep, infected with Haemonchus contortus. Rao (1991) reported an increase in serum acid phosphatase level in chicks infected with A galli. Boczon et al (1997) reported on biochemical aspects of host defense mechanisms in experimental trichinellosis. Partani et al(1995) showed biochemical changes in camels naturally infected with gastrointestinal nematodes.

Serum Alkaline Phosphatase

Group I- Mean values were 16.37IU/L after 30 days.
Group II- Mean values were 16.94IU/L after 30 days.
Group III- Mean values were 13.85IU/L after 30 days.
Group IV- Mean values were 14.02IU/L after 30 days.
In present studies, serum alkaline level was found to be higher in the control group. But, the level decreased after 30 days of post infection and post treatment. Due to infection, metabolism of the host is disturbed and activity of various isoenzymes in the intestine of host would be increased.
According to Buriana et al (1979) alkaline phosphatase activity was lower in Ascaris suum infection in swine. Pandey and Rai, (1978) observed alkaline phosphatase activity in mucosa of intestine of pups with experimental taeniasis. A decrease in alkaline phosphatase was observed in mice infected with T. spiralis (stewart,1978). Moshtaghie et al (2000) found that serum alkaline phosphatase level was higher in females than males.Biochemical changes studied in the present experiment may be due to hemorrhages and injuries caused in intestinal tissues



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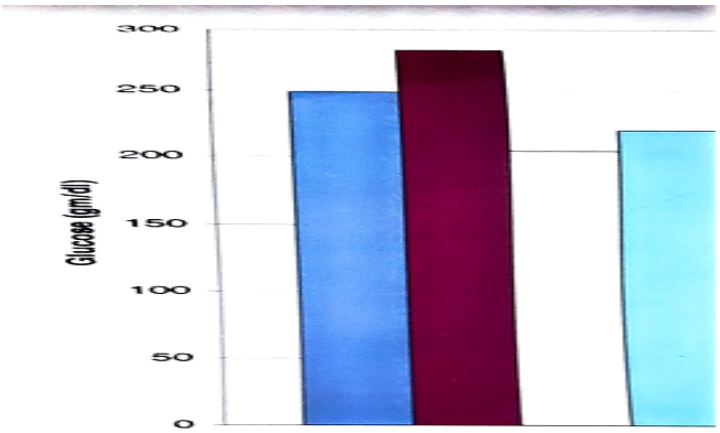
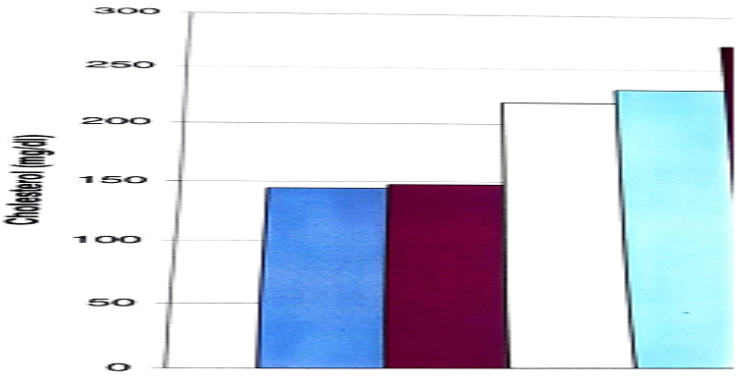
Serum Total Protein (gm/dl) in male W.L.H chicks,



Serum Glucose Level (gm/dl) in male W.L.H chicks



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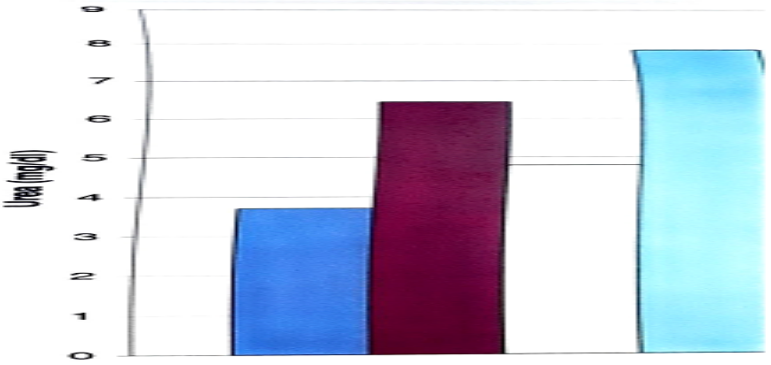
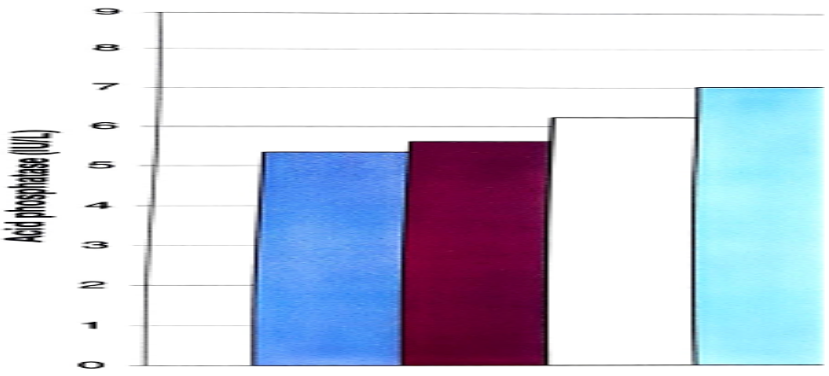
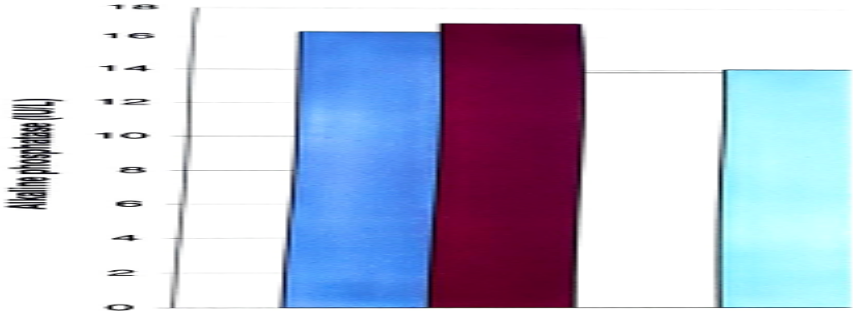
serum Glucose Level (gm/dl) in male W.L.H chicks.



Serum Urea Level (mg/dl) in male W.L.H chicks.



Serum Acid Phosphatase (IU/L) in male W.L.H chicks.



Serum Alkaline Phosphatase (IU/L) in male W.L.H chicks.

Conclusion

It is concluded that *Ascaridia galli* infection and cadmium acetate treatment produce biochemical changes in blood. By studying these changes, we are able to understand the immune system of chicks in a more accurate way.

References

1. *Ali, M.A; Devi, L.I, Lyngdoh, W.M; Das G (2011) comparative biochemical profile of Ascaridia galli infected Broiler chickens. International Journal of Poultry Science 10(7):542-546.*
2. *Balani T; Agarwal S; Thaker A.M(2011) Toxicol Int 18(1) 2-4.*
3. *Belova L.V; Splepenkov, Yu D (1978). Some factors of lipid metabolism in experimental diphyllobothriasis. Meditsinskaya Parazitologiya Parazitaraye Bolezni 47(3), 68-72.*
4. *Bhopale, M.K; Johri G.N (1978). Experimentally infection with Ancylostoma Caninum larvae in mice serum protein pattern during infection with various doses. J Hyg, Epid. Microbiol. Immunol 22(3), 319-327.*
5. *Biadum W (1990) study of serum lipid on guinea pigs during larval ascariasis. Wiadomości parazytologiczne 36(1-3), 15-26.*
6. *Brar, R.S; Sandhu, H.S and Kwatra M.S(1991) Biochemical alteration in palm desert sheep clinically suffered from adult haemonchus contortus. Jr of Research Punjab Agriculture 28(4),559-561.*
7. *Buruiana, L.M; Dema, A and Bodescu, C (1979) changes in serum alkaline phosphatase during Ascaris suum infection in swine. Lucasi stintifice Institute Agronomice N. Balcesciseria 22, 53-59.*
8. *Cheng. T.C (1973). General parasitology Academy press, New York and London.*
9. *Cherian M.G. and Ferugson, PJ(1997), Metallothionein in cytotoxicity and genotoxicity of metals. Mutagenic and carcinogenic potential of heavy metals related to the human environment. Kluwer Academic Publishers, Dordrecht, pp 217-229.*
10. *Continho A and Loureiro, P (1960). Cited from Biochemistry of parasites by Von Brand. T (1973) Jap.J. Med Sci, 385-412.*
11. *El- Abdin. Y.Z; Mossalam, I. (1975). Comparative hematology and biochemical studies on buffalo calves infected with neoascaris vitulorum before and after treatment with concurat Egyptian J. of Veterinary Science 12 (1) 143-152.*
12. *Elinder, C.G., Kjellstrom, Hogstedt Anderson K. and Spang G (1985) Cancer mortality of cadmium working. Brit J Industrial Med 42(10), 651-655.*
13. *Friberg, L; Elinder, C.G, Kjellstrom T and Nard- berg G (1986) cadmium and health A toxicological and epidemiological appraisal vol I, General aspects, Vol II Effects and Response. CRC Press Inc, Boca Raton, Fla 1986.*
14. *Goering, P.L; Wailbos, M.P and Klassen C.D 1995. Toxicology of cadmium. In toxicology of metals. Biochemical aspects (R.A Goyes and M.G Cherian Eds) experimental pharmacology vol 115 pp 189-213 Springer Verlag New York.*
15. *Gordan R and Webster, J.M(1971) cited from Biochemistry of parasites by Von Brand. T (1973). Academic press New York and London. Exp parasitol 29,66-79.*
16. *Hashem MA, Mohamed MH (2009) Haemato- biochemical and pathological studies on aflatoxicosis and treatment of broiler chicks in Egypt. Vet Ital 45(2), 323-37.*
17. *Khatoon H; Ansari, J.A and Baqui A (1981). Biochemical studies on white rats infected with setaria cervi. Comparative physiology and ecology 6(1), 46-49.*
18. *Moshtaghi, A; Taher, M, Urogi H; Facori M(2000) interrelationship between blood glucose level and incidence of bone disease in diabetes. Med J Islamic Acad Sci 13(3) 119-124.*