EFFECT OF *MENTHA PIPERITA* ON BIOCHEMICAL PARAMETERS OF BROILERS FED OCHRATOXIN

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ABSTRACT

A trial was conducted to study the effect of *Mentha piperita on broilers fed ochratoxin.* The results of the present study reveals that feeding of ochratoxin at both the levels (2 and 4 ppm) significantly (P<0.05)reduced the level of serum total protein and albumin and significantly increased serum creatinine, ALP, AST and ALT. whereas no significant change observed due to administration of *M.Piperita* at both the levels (2and 4 g/kg feed). There was non significant increase in serum total protein in group VI.

KEYWORDS: *Mentha piperita*, biochemical parameters, ochratoxin

INTRODUCTION

In India during 2004-05 more than 85 % of feed samples were found positive for mycotoxins (Devegowda *et al.*, 2005). Ochratoxin is considered to be three times more dangerous than aflatoxin. It is reported to be nephrotoxic, hepatotoxic, teratogenic and immunosuppresive, causing a drastic reduction in the lymphoid cell population (Hohler, 1998). Considering the ever increasing demand for poultry meat and eggs and the lingering threat to the poultry industry due to ochratoxin, it becomes necessary to find means of controlling the fungal etiology and its toxin. The use of herbal agents in controlling the production and spread of mycotoxins in broilers is a recent concept. *In vitro* studies have reported inhibitory effect of essential oils of Pudina *(Mentha piperita*) on *Aspergillus ochraceus* growth and ochratoxin production. *Mentha piperita* is reported to posses antioxidant, antimicrobial, immunomodulatory and antitoxigenic properties (Basilico and Basilico, 1999). Work reported on the inhibitory effect of plant extracts on ochratoxin mostly deal with *"in vitro"* studies. However, the present experiment is aimed at "*in vivo*" studies on biochemical parameters of birds fed ochratoxin and counteracting adverse effects of ochratoxin with dry leaf powder of *Mentha piperita.*

MATERIALS AND METHODS

108 day old broiler chicks of either sex were procured from M/S Phoenix Hatcheries*.* Ochratoxin was produced in cereals according to the method described by Trenk *et al.* (1971). The representative samples of feed were submitted for quantification of ochratoxin by thin layer chromatography (AOAC, 1995) at the Animal Feed Analytical and Quality Control Laboratory (A.F.A.Q.C.L.) Veterinary College, Namakkal (Tamil Nadu) and added in broiler diet to give a final concentration of 2 and 4ppm. Nine experimental diets were formulated as per Bureau of Indian Standard (BIS, 1992) specification. Nine groups were maintained in duplicate with six broilers in each replicate (Table 1).

Two ml of blood was collected aseptically from wing vein of two broilers of each replicate on 15th, 25th and 35th day and serum was separated. The serum was analyzed using ECOM-F 6124 automatic serum analyzer at Central Diagnostic Laboratory, College of Veterinary Science and A H., Jabalpur, for total proteins, albumin, ALT, AST, ALP and creatinine. The methodology and the

Table 1. Design of experiment for in vivo studies with ochratoxin and leaf powders

Groups	Treatments
Group I control	Only broilers ration
Group II	2 ppm Ochratoxin
Group III	4 ppm Ochratoxin
Group IV	2g *Mentha piperita* / Kg feed
Group V	4g *Mentha piperita* / Kg feed
Group VI	2 ppm Ochratoxin + 2g *Mentha piperita* / Kg feed
Group VII	2 ppm Ochratoxin + 4g *Mentha piperita* / Kg feed
Group VIII	4 ppm Ochratoxin + 2g *Mentha piperita* / Kg feed
Group IX	4 ppm Ochratoxin + 4g *Mentha piperita* / Kg feed

reagents used in each parameter were as per the recommendation of the manufacturer of analyzer. Means were obtained as per standard procedure and analyzed using completely randomized design. The differences between treatments and within each treatment were tested statistically for their significance (Snedecor and Cochran, 1995).

RESULTS AND DISCUSSION

Mean serum total protein in groups II and VII fed ochratoxin was significantly lower than control at all the intervals. Although non significant variations was recorded in groups supplemented with Mentha piperita (Groups III and IV) leaf powder as compared with control on day 35th of experiment. Supplementation of 4 g Mentha piperita / Kg feed with 2 ppm ochratoxin increased serum total protein significantly. While, supplementation of Mentha piperita with 4 ppm ochratoxin could not reverse the reduction in protein level as compared to the control values. Reduction in total serum protein due to ochratoxin has been earlier reported by various workers (Ramadevi *et al.* ,2000; Stoev *et al.* , 2002 ;, Agwane and Lonkar ,2004 ; Anil Kumar *et al.* ,2005 and Bhanuprakash *et al.* 2006). The reduction in total serum protein could be due to inhibition of hepatic protein synthesis by competitive inhibition of phenylalanyl-t-RNA synthetase with phenylalanine (Creepy *et al.,* 1979). Anorexia, pathological changes in liver and kidney could also cause reduced serum protein. Supplementation of 2g *Mentha piperita* to broilers fed 2 ppm ochratoxin (Gr VI) increased total serum protein at all stages of experiment. Improved serum total protein concentration which could be due to decreased oxidative stress as *Mentha piperita* is reported to reduce stress (Sakhare *et al,* 2007). Serum albumin in ochratoxin fed groups II and III was significantly lower than control. Serum albumin levels in broiler receiving only *Mentha piperita* (Groups IV and V) leaf powder were statistically similar with control group values. Supplementation of both 2 g and 4 g *Mentha piperita* / Kg feed with 2 or 4 ppm ochratoxin was not effective in counteracting adverse effect of ochratoxin. Lowered serum albumin concentration, due to ochratoxicosis has also been reported by Stoev *et al.* (2002) and Sakhare *et al.* (2007). Decrease in serum albumin concentration may be due to factors related with protein synthesis and also due to leakage of albumin resulting from kidney damage (Huff *et al.,* 1988). However, birds fed 4 g *Mentha piperita* along with 2 ppm ochratoxin at all stages of growth showed increase serum albumin concentration. These findings are in agreement with the previous work reported by Stoev *et al.* (2002) and Sakhare *et al.* (2007).

The marker enzymes ALP, AST and ALT activities were significantly increased in the group II and III indicated a drastic hepatic disorder was caused by administration of 2 and 4 ppm ochratoxin in feed.

Table 2. Mean values of biochemical parameters in broiler chickens fed ochratoxin with and without *Mentha piperita* (35th day)

Groups	Treatments	Total protein (g/dl)	Albumin (g/dl)	Creatinine (mg/dl)	ALP (U/L)	AST (U/L)	ALT (U/L)
I	control	3.41[a]	2.60[a]	0.84[b]	1630[c]	233[c]	20.2[d]
II	2 ppm OT	2.85[b]	1.62[b]	1.79[a]	1680[a]	367[a]	40.0[a]
III	4 ppm OT	2.00[b]	1.00[b]	1.85[a]	2080[a]	365[a]	44.0[a]
IV	2g *M. piperita*	3.45[a]	2.80[a]	0.96[b]	1642[c]	236[c]	27.0[c]
V	4g *M. piperita*	3.35[a]	2.41[a]	0.80[b]	1636[c]	230[c]	21.0[d]
VI	2 ppm OT+2g *M. piperita*	2.92[b]	1.72[b]	1.81[a]	1669[a]	365[a]	37.0[a]
VII	2 ppm OT+ 4g *M. piperita*	3.00[a]	1.78[b]	1.59[a]	1658[b]	352[b]	34.0[b]
VIII	4 ppm OT+2g *M. piperita*	2.05[b]	1.00[b]	1.84[a]	2066[a]	360[a]	43.0[a]
IX	4 ppm OT+ 4g *M. piperita*	2.35[b]	1.20[b]	1.65[a]	2050[a]	356[a]	40.0[a]
CD SE	P< 0.05	0.4894 0.1414	0.7738 0.2236	0.5994 0.1732	12.90 3.728	9.221 2.665	4.894 1.414

Values bearing similar superscripts in the same column do not differ significantly (P>0.05)

The elevated activities of ALP, particularly in the broilers receiving diet containing high concentration of ochratoxin would suggest that tissues such as the liver were affected by ochratoxin causing hepatic disorders, damage to the hepatocytes and release of the enzyme after damage (Kaneko, 1980). Administration of 2 g and 4 g *Mentha piperita* alone exhibited the same level of ALP activity at par with control values. The data of present study revealed that administration of mentha piperita had ameliorating effect at 2 ppm ochratoxin only, at the same time even *4 g Mentha piperita* did not have any ameliorative effect on ALP activity in groups fed 4 ppm ochratoxin .

Serum ALT and AST values increased significantly in group II and III fed 2 and 4 ppm ochratoxin. Serum AST values in groups fed *Mentha piperita* (Groups IV and V) were at par with control. Supplementation of 4g *Mentha piperita* / Kg feed with 2 ppm ochratoxin was effective in reducing the transferase actitivities but to a very less extent, there was no effect of supplementation of *Mentha piperita on* transferase actitivities in 4ppm ochratoxin fed broilers (group III). A significant increase in aminotrasferases indicated a severe liver damage due to administration of 2 and 4 ppm ochratoxin. The findings are in agreement with Raina *et al.* (1991)and Raju and Devegowda (2000).

Birds receiving ochratoxin showed higher serum creatinine level in comparison to control. Groups IV and V, supplemented with *Mentha piperita* leaf powder, were at par with control in terms of serum creatinine values. Supplementation of *Mentha piperita* to toxin fed groups (Groups VI, VII, VIII and IX) did not reduce serum creatinine values significantly in comparison to control. Increase in serum creatinine concentration in toxin fed broiler could be due to nephrotoxic action of ochratoxin, which causes renal impairment by destruction of epithelial cells of proximal convoluted tubules and damage to glomeruli (Huff *et al.*, 1988). Serum creatinine level may be considered as a sensitive indicator of ochratoxin A induced kidney damage. The findings are in agreement with the reports of Bhanuprakash *et al.* (2006) and Sakhare *et al.* (2007). Increase in serum creatinine levels in broilers fed ochratoxin supplemented with *Mentha piperita* at all the levels, suggested that *Mentha*

piperita was ineffective in ameliorating the effect of ochratoxin. Thus, it was conclded that 4 g / kg feed Mentha piperita dry leaf powder was effective in reducing the adverse effect of only 2 ppm ochratoxins on some biochemical parameters of broilers.

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