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Hepatoprotective Role of AV/LCP/18 In CCl_4 Induced FLKS Syndrome in Commercial Broilers

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Abstract

A total of 75 day old broiler chicks were divided into three equal groups. Group A served as negative control. Group B (positive control) and C (treatment group) were intoxicated with oral administration of CCl_4 @ 1 ml/kg body weight after every 3rd day during 15-28 days of age. Group C was given AV/LCP/18 @ 0.10 ml / chick / day in drinking water during 29th-42nd day of age. At the end of experiment, significantly ($P<0.01$) higher mean body weight and lower FCR was observed in treatment group C as compared to positive control group B. Similarly, significantly ($P<0.05$) decreased levels of SGOT, SGPT, cholesterol, triglycerides, creatinine and higher mean values of serum protein profile along with mild degenerative changes in liver and kidney of broilers in group C were observed as compared to group B indicating therapeutic efficacy of AV/LCP/18 in ameliorating the toxic effects or FLKS induced by CCl_4 in commercial broilers.

Key Words : CCl_4 toxicity, AV/LCP/18, Hepato-protective, Broilers

Introduction

Fatty Liver and Kidney Syndrome (FLKS) is a metabolic disease in poultry that may occur either due to metabolic or nutritional disturbances or chemical intoxication. It is well established that carbon tetrachloride (CCl4) induces hepatotoxicity resulting into hepatic steatosis, centrilobular necrosis and ultimately cirrhosis and acute tubular necrosis (Karmia, 2007). Hepato-protection by conventional or synthetic drugs used in the treatment of liver diseases is inadequate and sometimes may have serious side effects (Guntupalli *et al.* 2006). A number of Ayurvedic medicinal preparations are recommended for the treatment of liver disorders (Chatterjee, 2000). Therefore, the present study was undertaken to assess the hepato-protective activity of AV/LCP/18, poly-herbal formulations (supplied by M/S Ayurvet Limited, Baddi, India) in CCl4 induced FLKS in commercial broilers.

Materials and Methods

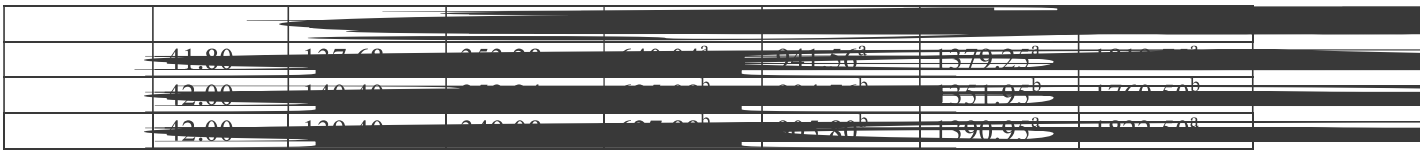
A total of 75 day old commercial broiler chicks (Cobb) were randomly divided into three groups each comprising of 25 chicks. Group A served as negative control, group B served as positive control and group C as treatment group. FLKS was induced in group B and C by oral administration of CCl_4 @ 1 ml/kg body weight at every 3rd day during 15-28 day of age. The treatment group C was given AV/LCP/18 @ 0.10 ml/chick in drinking water from 29 to 42 day of age. Commercial broiler

feed was offered to all the groups throughout the experimental period without any additional supplementation of choline and biotin in order to induce hepatic syndrome. Weekly average body weight, feed consumption and feed conversion ratio (FCR) was recorded till 6th week. Blood samples were collected from wing vein without anticoagulant from 10 birds per group on 28th and 42nd day of experiment to evaluate serum biochemical parameters by using analytical kits of RFCL Ltd. on clinical chemistry semi auto analyser. For gross pathological study, 5 birds from each group were slaughtered and samples of liver and kidneys were collected in 10% formal saline and processed for histopathological examination (Luna, 1968). All the parameters were statistically analyzed as per the method of Snedecor and Cochran (2004).

Results and Discussion

Significantly (P<0.01) higher body weight and non significantly lower FCR were observed in group C chicks as compared to positive control group B (Table 1&2) indicating efficacy of AV/LCP/18 in improving gut function, metabolism, nutrient assimilation and utilization. Similar findings have been reported by Singh *et al.* (2002) in broilers.

Table 1. Effect of AV/LCP/18 administration on weekly body weight of broiler chicks



Mean with different superscripts in a column differ significantly (P < 0.01)

Table 2. Effect of AV/LCP/18 administration on Feed Conversion Ratio of broiler chicks

Biochemical parameters

Average serum biochemical values of experimental broilers observed at 28th and 42nd day of age are presented in Table 3. The SGOT and SGPT levels were found to be elevated significantly (P<0.05) in CCl_4 intoxicated group B as compared to control group A on both the intervals of experiment. Similar findings were reported earlier in rats during CCl_4 intoxication (Dahiru et *al.* 2005; Kanter et *al.* 2005). However, the levels of these enzymes returned to normal level in therapeutic group C treated with AV/LCP/18 and found well comparable to that of the healthy control group A at the end of experiment which indicates the therapeutic efficacy of AV/LCP/18. Significant (P<0.0) decrease in the serum protein and globulin levels were noticed in CCl_4 intoxicated birds of group B and C on 28th day of experiment when compared with negative healthy control group A. Samudram et *al.* (2008) also reported significant (P<0.05) decrease in serum proteins in CCl_4 induced hepatic damage in rats. Normal values were recorded for these parameters in therapeutic treated group C and found well comparable to healthy control group A on 42nd day. Similar findings were also reported in broilers intoxicated with CCl_4 and supplemented with Repchol (Jadhav et *al.* 2009).

Table 3. Effect AV/LCP/18 administration on serum biochemical parameters of broilers on 28th and 42nd day

SGOT (IU/L)	268.38^{b}	290.79^{a}	288.73^{a}	261.91^{b}	286.47^{a}	257.73^{b}
SGPT (IU/L)	20.16^{b}	34.35^{a}	33.77^{a}	19.16^{b}	29.60^{a}	13.73^{c}
T Protein (g/dl)	4.67^{a}	4.20^{b}	4.26^{b}	4.21	4.11	4.20
Albumin (g/dl)	1.63	1.57	1.58	1.11	1.10	1.11
Globulin (g/dl)	3.04^{a}	2.66^{b}	2.70^{b}	3.09	3.00	3.08
Glucose (Plasma)	166.20	156.05	155.02	172.57	171.07	172.81
T Cholesterol (mg/dl)	118.31^{b}	138.28^{a}	136.28^{a}	123.86^{b}	137.30^{a}	112.45^{c}
Triglycerides (mg/dl)	65.59^{b}	74.78^{a}	73.97^{a}	73.42^{b}	89.73^{a}	70.17^{b}
HDL (mg/dl)	74.25^{b}	89.52^{a}	86.90^{a}	71.52	73.16	67.74
VLDL (mg/dl)	13.11^{b}	14.95^{a}	14.79^{a}	15.08	15.94	14.03
LDL (mg/dl)	30.93	33.80	34.57	37.26	38.19	30.66
Creatinine (mg/dl)	0.78	0.86	0.85	0.89^{a}	0.98^{a}	0.51^{b}

Mean with different superscripts in a row differ significantly (P < 0.05)

The mean values of serum cholesterol and triglycerides were found to be significantly (P<0.05) increased in CCl_4 intoxicated group B when compared with the negative control group A on 42nd day of experiment. However, in therapeutic treated group C, these values were found well comparable to healthy control group A and significantly (P<0.05) lower than group B on 42nd day which may be attributed due to *Phyllanthus emblica and Picrorrhiza kurroa* herbal ingredients of AV/LCP/18 that are scientifically well established to posses hypocholesterolemic activity (Khanna *et al. 1994).* Serum creatinine levels in group C were found significantly (P<0.05) lower compared to CCl_4 intoxicated group B on 42nd day of experiment. Glucose level was more or less same in all the three groups. Thus serum biochemical profile indicates the efficacy of AV/LCP/18 containing herbs (*Boerhavia diffusa, Andrographics paniculata, Phyllanthus emblica and Picrorrhiza kurroa*) in ameliorating CCl_4 induced liver and kidney damage.

Gross and histopathological observations

Severe congestion in liver and kidney along with pale areas in liver was evident in CCl_4 intoxicated group B on 28th and 42nd day of experiment. Liver from group C returned to normalcy and kidney showed only mild congestion at the end of experiment. On histopathological examination, liver from positive control group B showed severe granular and vacuolar degenerative changes along with focal necrotic areas on both intervals. However, only mild degenerative changes were observed in therapeutic group C on 42nd day of experiment. Adhesions of glomerular tuff to bowmen's capsule, interstitial hemorrhage and vacuolar degenerative changes were evident in kidney from group B. While in group C, only mild haemorrhages in glomeruli were observed at the end of the experiment. Similar lesions were also reported earlier during CCl_4 intoxication and polyherbal supplementation in mice (Girish *et al.* 2009).

Findings of growth performance, biochemical estimates, gross and histopathological lesions indicated that AV/LCP/18 polyherbal liver tonic is therapeutically efficacious in ameliorating the toxic effect of FLKS induced by CCl_4 in broiler chicks

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Conflict of Interest

All authors declare no conflict of interest.

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