



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(8): 2108-2110
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www.thepharmajournal.com
Received: 26-05-2023
Accepted: 08-07-2023

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Effect of lead and Thiram on clinical signs and gross pathology in broiler chicken

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Abstract

A study was conducted to examination of the clinical signs and gross lesions of lead acetate, tetramethyl thiuram disulfide, individual and its combination induced toxic effects in broilers. Hundred day old broiler chicks divided into four groups, in each group has 25chicks. The control group fed with basal diet, lead acetate @ 300 ppm per day, tetramethyl thiuram disulfide @ 60 ppm per day and its combination of lead acetate and tetramethyl thiuram disulfide with same dose. The clinical signs observed as greenish diarrhoea, torticollis, prostration, weight loss, lethargy, hock sitting position. The gross pathology was observed moderate congestion of liver and kidneys, bowing and moderate bending, gradual shortening of tibial bones were noticed.

Keywords: Thiram, tetramethyl thiuram disulfide, weakness, ruffled feathers, prostration

Introduction

Lead (Pb), a ubiquitous metal, is one of the most abundant elements present on earth. In this context, contamination of drinking water with lead is most problematic in residential areas either very old or very new (Bakalli *et al.*, 1995) ^[1]. The Pb poisoned animals showed symptoms encephalopathy, lethargy, delirium, convulsions and coma. The Pb will be excreted mainly through urine and faeces. Lead can also present in hair, nails, sweat, saliva and breast milk. As the Pb accumulates in body over a period of time and slowly releases into urine, even a small quantity of Pb intoxication (Vij, 2005) ^[2].

The popular name of TMTD is thiram and trade names include Thiuramyl, Thiuram, Fomarsol, Tersan, Nomersan, and Thyrid-75 WP (Nene YL and Thapliyal PN 1982) ^[3].

Materials and Methods

Chemicals

Lead acetate (PbAc) obtained from Thermo Fisher Scientific India Pvt. Ltd., Mumbai, and thiram obtained from Seed Research and Technology Centre (SRTC) Professor Jayashankar Agriculture University.

Experimental animals: The day old broiler chicks from Venkateshwara Hatcheries, each group contain twenty five chicks. Then lead and thiram give to chicks according to scheduled. The experiment was carried out according to the guidelines of Ethical Committee.

Methods

A study was revealed clinical signs and gross pathological changes observed and recorded. Detailed necropsy was conducted and examine the gross pathological changes and organs were collected in 10% NBF.

Results

Grossly, clinical signs were observed as decreased water and feed intake, lethargy, torticollis, inability to walk, dullness, greenish diarrhoea, weakness, ruffled feathers, prostration, weight loss, lateral recumbence, sternal recumbence, hock sitting position seen in lead, thiram and mixed group birds during the entire period of experiment (Fig 2, 3 and 4) and the birds of control group were apparently normal (Fig 01).

After sacrifice, all the birds were examined for gross changes, if any. The gross changes were observed in heart, liver, kidneys and tibial bones of toxic groups (Group 2, 3 and 4), *viz.* enlarged heart, and liver and spleen were observed. The edges of liver were round in group 2 during 3rd week of experiment.



Fig 1: Photograph of normal healthy bird (Group 1)



Fig 2: Photograph of bird showing clinical signs of dullness, depression, torticollis, hock sitting and inability to stand (Group 2)



Fig 3: Photograph of bird showing stretching of leg and sternal recumbency (Group 3)



Fig 4: Photograph of birds showing clinical signs of ruffled feathers, dullness, depression, inability to stand and hock sitting posture (Group 4)

Group 2 birds heart showed hydro pericardium and pale liver with focal areas necrosis. The kidneys were congested and haemorrhagic during the end of the experiment (Fig 6).



Fig 5: Control birds (Group 1) brain, heart, lungs, liver, spleen, kidneys, tibial bones and bursa showing normal architecture



Fig 6: PbAc treated birds (Group 2) showing enlarged heart, liver and spleen, pale liver with focal areas necrosis and fatty change

Gross lesions, showed swollen and congested kidneys, splenomegaly, oedema of hock joint, bending of the tibial bones, haemorrhages and enlarged growth plate in group 3 (Fig 7).



Fig 7: TMTD treated birds (Group 3) showing congested of liver and kidneys, splenomegaly, bending of tibial bone

Group 4 birds showed pale liver, swollen kidneys, enlarged heart, shortened tibial bones with mild to moderate bending / bowing of legs, petechial hemorrhages on liver, kidney and spleen were also noticed (Fig 8).



Fig 8: PbAc + TMTD treated birds (Group 4) showing congested liver, swollen kidneys and shortened tibial bones

The common features observed were moderate congestion of liver and kidneys. The significant gross changes like bowing and moderate bending and gradual shortening of tibial bones were observed in treated groups.

Discussion

The clinical signs observed in PbAc intoxicated group birds included anorexia, decreased feed and water intake, dullness, inability to walk, weakness, ruffled feathers, prostration, weight loss, greenish diarrhoea, lethargy and without any mortality during experimental period. Several authors (Okeke *et al.*, 2015; Suganya *et al.*, 2016; Shah *et al.*, 2016 and Jaiswal *et al.*, 2017) [5] documented similar observations in PbAc induced toxic studies in experimental birds.

The TMTD treated group birds showed hock sitting posture, unable to get up, spraddle legs, lateral and sternal recumbency. Extension or widening of legs and wings and wobbling gait seen in few birds. These findings are in accordance with the conclusion of Veltmann and Linton (1986) [9], Wu *et al.* (1990) [10], Lakshman *et al.* (2002) [11], Rath *et al.* (2004) [12] and Subapriya *et al.* (2007) [13] who fed thiram to the broiler birds at different levels to induce the tibial dyschondroplasia (TD).

The clinical signs were severe in PbAc and TMTD mixed toxic group, than the individual intoxicated birds. This could be due to synergistic cytotoxic action of PbAc and TMTD. The clinical signs were exhibited in toxic groups may be due to the toxic nature of PbAc, TMTD and its combination which might have interfered with general metabolic process of different organs like liver, kidneys, heart and tibial bones etc., (Rath *et al.*, 2004 and Lakshman. 2011) [12, 4].

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