

LEVAMISOLE TOXICOSIS IN BROILER CHICKS SUFFERING FROM SUBACUTE TOXICOSIS OF LEAD, SELENIUM OR MONENSIN

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ABSTRACT

Broiler chicks of 2 weeks of age were grouped and fed lead (1200 mg/kg feed), selenium (15 mg/kg feed), selenium plus vitamin E (15 + 200 mg/kg feed) and monensin (240 mg/kg feed) to induce subacute toxicosis. One group was kept on basal feed. After four weeks the first subgroup from each group was perorally given 250 mg levamisole/kg body mass, the second subgroup was subcutaneously administered 100 mg levamisole/kg body mass and the third subgroup was given no treatment. The oral administration of levamisole did not produce any clinical signs. The subcutaneous administration of levamisole resulted in shivering, partial or complete paralysis and death in different groups. The higher number of death and severe clinical signs following levamisole subcutaneous administration were observed in birds subacutely intoxicated with lead, selenium and monensin compared with control group. This observation suggests that subacute toxicosis of these substances may alter the clinical pattern of levamisole toxicosis.

Key words: Levamisole, Lead, Selenium, Monensin, Toxicosis.

INTRODUCTION

Levamisole, the *l*-isomer of dl-tetramisole, is a broad spectrum anthelmintic drug used in livestock and poultry. In large animals it is administered either orally or through subcutaneous injection (Janssen, 1976). In poultry, it is exclusively given through the oral route. In cattle, sheep and other livestock, intoxication of levamisole is manifested by muscarinic and nicotinic effects and subcutaneous injection may also result in dermal irritation leading to necrosis of epidermal layer (Van Nueten, 1972). In chicken LD₅₀ and minimum toxic dose of tetramisole is 2750 mg/kg body mass (Roberson, 1988). Information about clinical pattern of levamisole toxicosis in chicken is scanty. Subcutaneous route in chicken, though not suitable for clinical purposes, may be adopted for certain experimental studies. Interaction of levamisole with other substances has been reported. It has a synergistic effects and reduces the toxicity of fluorouracil for treatment of colon cancer (Abdalla *et al.* 1995). A synergy has also been reported with warafarin given to patients of atrial fibrillation (Scarfe and Israel, 1995). Combined therapy of levamisole with streptomycin or ryfampicin eliminated the paratuberculosis infection from rabbits (Mondal *et al.*, 1994). The complexes of levamisole with different metals also influenced its toxicity and

immunomodulatory effect. Complexes with zinc increased its immunomodulatory effect and decrease its toxicity (Kovachev *et al.*, 1994). Information is not available about the interaction of the levamisole with different environmental pollutants or drugs added to the poultry rations. Such interactions may alter the results of an experimental study.

With these considerations the present study describes the clinical patterns of levamisole toxicosis induced by subcutaneous and oral routes in broiler chickens. The interaction of levamisole with other substances was also studied by concurrent feeding of toxic levels of lead, selenium and moenesin to the chickens.

MATERIALS AND METHODS

A total of 150, day-old, broiler chicks (Astra B breed) were reared on broiler mash (BK-1) under standard brooding and managmental conditions. At two weeks of age these birds were divided into five equal groups and their feed was amended with different substances as follows: group A-selenium (15 mg/kg) as sodium selenite, group B-selenium plus vitamin E (15 mg+200 mg α -tocopherol/kg), group C-monensin (240mg/kg) as monensin sodium and group D-lead (1200mg/kg) as lead acetate. The last group E was kept on unamended basal feed.

After an adaptation period for four weeks on these rations, five birds from each group were placed in separate pens and levamisole (5.0% aqueous solution of levamisole HCl) was injected subcutaneously into the neck region at dose rate of 100mg/kg body mass. The birds were observed for clinical signs and deaths in each group.

In the second experiment, started simultaneously with the first one, remaining 10 birds in each group were divided into two subgroups. Birds of the first of the subgroup from each group were administered perorally, with the help of a crop tube, a single dose of aqueous solution of levamisole HCl at a dose rate of 250 mg/kg body mass. The birds of the second of the subgroup acted as control. The broiler chicks were observed for clinical signs for one week.

RESULTS

In the first experiment, after subcutaneous injection of levamisole, birds became depressed, sitting on hocks and started to shiver which progressed to partial or complete paralysis. Birds in partial paralysis were unable to stand whereas those in complete paralysis were lying flaccid with head and neck extended forward and wings spreaded laterally. Some of the birds died in this condition within half an hour while others recovered gradually within 12 hours of the administration of the drug. Some of the recovered birds developed a swelling at the site of injection which was persistent even after four days. A comparison of the clinical pattern and number of birds died in each group is shown in Table 1.

Table1: A comparison of clinical signs and deaths in different groups administered 100 mg levamisole/kg body mass through subcutaneous route

Sub Groups*	Dietary additions	Partial paralysis	Complete paralysis	Death: (No.)
A	Selenium	0	5	3
B	Selenium+ Vitamin E	1	4	1
C	Monensin	0	5	3
D	Lead	1	4	3
E	Nil	2	3	1

Number of birds showing complete paralysis and number of deaths was maximum in groups fed selenium (group A) and monensin (group C) followed by those fed lead (group D) and least in birds given unamended diet (group E).

In the second experiment, the oral administration of levamisole did not produce any clinical sign. No difference was observed between the behaviour of birds of different groups.

DISCUSSION

The clinical signs observed by subcutaneous administration of levamisole were suggestive of nicotinic effects which soon progressed to muscarinic. Such nicotinic and muscarinic effects were also the predominating signs of levamisole toxicosis in large animals (Van Neuten, 1972). The swelling of skin at the site of injection in some birds might correspond to the local dermal irritation in cattle following subcutaneous administration of levamisole. In human beings, skin eruptions and erythema have been described after intake of levamisole (Clavere *et al.* 1994). Feeding of higher dietary levels of lead, selenium and monensin to broiler chicks is known to induce subacute toxicosis characterised by a decrease in body mass (Khan *et al.*, 1993 a & b). The lower oral dose of 250mg/kg body mass was used in the present experiment in order to observe any alteration in the toxic reaction by its concurrent administration with other substances.

The subcutaneous administration of levamisole, however, produced more severe reaction in the birds fed selenium, monensin or lead concurrently compared with those given selenium plus vitamin E or control group. A less severe reaction observed in birds fed selenium plus vitamin E suggests an ameliorating effect of this vitamin. Vitamin E is known to degrade the free radicle species and prevent lipid peroxidation and by this means prevents the damage to the cell membranes (Benjamin, 1978; Chow and Tappel, 1974). In the present study the mechanism by which vitamin E reduced the severity of the toxic reaction could not be ascertained.

The results of the present study suggested that levamisole administered subcutaneously interacts with selenium, monensin and lead and the toxic reaction is exacerbated. This information is of interest for research workers of experimental pathology and toxicology that results of levamisole toxicity might be altered in birds suffering from inapparent or subacute toxicosis of selenium, monensin or lead.

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