



## EFFECT OF INDUCED TOXIC PATHOLOGICAL EFFECT OF PHARMACEUTICAL AGENTS AND HEAVY METALS ON BROILER BIRDS

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### ABSTRACT

The indiscriminate and injudicious use of second generation fluoroquinolones *viz.*, enrofloxacin produced anemia, leucopenia, hypoglycaemia, hypoproteinemia, increased enzymatic activity and hepatotoxic and nephrotoxic effects in broiler chickens. Exposure to heavy metals results in congestion and hemorrhages in the lungs, tubular degeneration in kidneys and occasional hemorrhages in the brain. The present article was conducted to review the various pharmaceutical, physiological and toxicopathological effects of different chemical agents and heavy metals due to environmental exposure and through feed on poultry birds.

**Key words:** Chemical, Exposure, Heavy metal, Poultry birds, Toxic pathology.

### INTRODUCTION

Enrofloxacin is a second generation quinolone derivative which belongs to the group fluoroquinolone. The fluoroquinolones are metabolized in the liver and excreted in urine through the kidney. The liver and kidney develop the highest drug concentration though concentrations in essentially all tissues, including the skeletal and central nervous system reach therapeutic levels. That is why it is relevant to detect the pathological alteration in the visceral tissues and organs. Selenium function is closely associated with Vitamin E. Both have antioxidant property and protect the biological membranes from oxidative degeneration. Glutathione peroxidase is the enzyme which has selenium as its constituent with 4gm Se atoms per mole. Out of the total body selenium, 40 per cent is in the enzyme glutathione peroxidase as observed in rats. Both glutathione peroxidase and vitamin E prevent the formation of lipid hydroperoxides which damage the cellular membrane and disturbed the structural integrity of the cells. Selenium and vitamin E are mutually replaceable to some extent but up to a particular limit.

### Established research facts

Cases of acute ciprofloxacin toxicity of birds have been reported earlier by many investigators<sup>1,2</sup>, in human<sup>3</sup> and in broiler birds<sup>4</sup>. Birds treated with therapeutic dose develop mild diarrhea and depression which simulated the reports<sup>3,5</sup>. Broiler birds of control group had no clinical manifestation at any stage during the experimental period. Anemia in human treated with ciprofloxacin has been reported<sup>3,6</sup>. Broiler birds treated with ciprofloxacin develop leucopenia<sup>4</sup>. Hypoproteinemia in broiler birds treated with overdoses of ciprofloxacin was reported<sup>4</sup>. Niyogi<sup>4</sup> and Sugawara *et al.*<sup>7</sup> also reported an elevated serum enzymatic activity in broiler birds and monkey respectively after therapy with ciprofloxacin both in therapeutic dose and higher doses of the drug. An increased level of serum enzymatic activity is known to occur in a wide range of inflammatory/degenerative disease conditions particularly in hepatic and nephrotic diseases<sup>8</sup>. Salyi *et al.*<sup>9</sup> induced acute experimental selenium

poisoning in broiler chicks and concluded that oral LD<sub>50</sub> of selenium in the form of sodium selenite was 9.7mg/kg body weight. Earlier workers<sup>9-11</sup> has reported significant decline in body weight of selenium fed chickens. The organic form of selenium is known to be accumulated in higher quantities and persist for longer periods in tissues as compared to inorganic toxicity<sup>12</sup>. Increasing trends in the liver concentration of selenium in chicks, hens and cockerels have been reported by other workers. Accumulation of selenium was dose dependent which simulates with the observations of the present study<sup>10</sup>. According to Cousins and Cairney<sup>13</sup> increased intake of selenium resulted in steady rise in tissue selenium concentrations until levels as high as 5-7ppm in liver and kidneys. Paul *et al.*<sup>14</sup> conducted with sixty healthy day old broiler chicks to determine the effect of induced enrofloxacin toxicity. The birds were divided into four groups keeping the first group as control. Clinically, the broiler birds in all the treatment groups administered with therapeutic dose of enrofloxacin expressed the clinical symptoms of systemic toxicity. Hematological studies indicated that the hemoglobin concentration, packed cell volume, total erythrocyte count and total leukocyte count showed significant variation (P<0.01) between the treatment groups. Biochemically, all treated groups of birds induced with graded dose level of enrofloxacin, had significantly (P<0.01) decreased levels of total plasma protein with simultaneous reduction in albumen-globulin (A:G) ratio than in controls. An investigation was conducted by Kumar *et al.*<sup>15</sup> on 300 day-old apparently healthy broiler chicks of either sex procured from a commercial hatchery in Kolkata, India. All the chicks were from the same hatch and also from the same breeding stock. The birds were maintained under standard feeding and management conditions. The oral LD<sub>50</sub> of selenium in sodium selenite in broiler chickens is 9.590838mg per kg body weight, contained in that compound. The oral ALD<sub>50</sub> of sodium selenite was determined by Karber's method and was found to be 9.59038mg/kg body weight<sup>15</sup>.

## CONCLUSION

Based on the review and analysis of physiological effects of different pharmaceutical chemicals and heavy metals, it was suggested that their indiscriminate and injudicious use produces anemia, leucopenia, hypoglycaemia, hypoproteinemia, increased enzymatic activity and hepatotoxic and nephrotoxic effects in broiler chickens. Heavy metals possess high density and toxicity towards living beings. Heavy metals constitute the crust of the earth which resists degradation. Human get inflicted with heavy metals through the agency of food, water and atmosphere. Mercury poisoning by eating fishes is a prominent cause for public health hazard<sup>16</sup>.

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