EFFECTS OF LEAD ACETATE ON MACROPHAGE FUNCTIONS IN BROILER CHICKS

S.K. Khurana⁠¹ and R.S. Chauhan²
Department of Veterinary Public Health and Epidemiology
CCS Haryana Agricultural University, Hisar-125001, India

ABSTRACT

Effect of lead acetate (400 ppm) was investigated by administration in drinking water for six weeks in broiler chicks. The functional activity of macrophages assessed by nitroblue tetrazolium (NBT) reduction test indicated a significant decrease in number of functional macrophages in birds given lead acetate. The mean NBT positive cells were 35.60 ±1.22 and 21.20 ± 1.04% in control and treated birds respectively.

Lead is the most abundant of natural heavy metals that has been mobilized and distributed to a large extent in the environment. Exposure of animals and birds occur as residues are naturally occurring in soil, water and pasture (Rodostitis et al. 1994). Chronic exposure to heavy metals may lead to immuno suppression causing vaccinal failure and increased susceptibility to diseases (Koller, 1979). Macrophages actively participate in immune mechanisms. Therefore, present investigation was undertaken to study the effect of lead acetate on macrophage functions in chickens.

Fifteen days old broiler chicks (10) were obtained from a local hatchery and maintained under hygienic conditions. The chicks were vaccinated with Ranikhet disease vaccine (F strain) and divided into two groups of five chicks each. Chicks in group 1 served as control and were given normal broiler mash and water, while the chicks in group II were given normal broiler mash and water containing 400 ppm lead acetate for six weeks.

To measure the functional activity of phagocytic cells, the nitroblue tetrazolium reduction test was employed at the end of the treatment following the method described by Talwar (1983) with slight modifications.

Briefly, the peritoneal macrophages were collected into sterile phosphate buffered saline (PBS, pH 7.2), washed three times and the viability of cells were determined. The final concentration of macrophages was adjusted to 1x10⁶ cells/ml to the 0.2 ml of cell suspension, 0.1 ml of killed salmonella activated plasma and 0.3 ml of Nitroblue tetrazolium dye (0.2% in PBS) was added. The reaction mixture was incubated at 37° C for 30 minutes and the reaction was stopped by adding chilled PBS. Mixture was centrifuged at 400xg for 4 minutes. After discarding the supernatant, cells were suspended in a drop of PBS and then from these cells smear was made on a clean glass slide, dried in air, fixed in methanol for 2 minutes. The smear was then washed, dried and mounted in DPX

Present address:
1. Veterinary Public Health, College of Veterinary and Animal Sciences HPKV, Palampur-176 062, India.
2. Veterinary Pathology, College of Veterinary Sciences,GBPUAT, Pantnagar-263 145, India.
moutant. Per cent NBT positive cells were counted under oil immersion microscope using zigzag method used for differential leucocyte count (Chauhan, 1995).

NBT positive cells are easily recognizable as these are able to convert yellow Nitroblue Tetrazolium dye into distinctive bluish dark granules and are expressed as per cent NBT positive cells. In lead acetate (400 ppm) fed birds the percentage of NBT positive cells was significantly lower. (P<0.05) than controls. The NBT positive cells were 35.60±1.22% and 21.20±1.04% in groups I & II respectively.

A decrease in NBT positive cells has been recorded following lead acetate treatment, which indicates reduced functional status of phagocytic cells. The reduction in number of active phagocytic cells in lead acetate fed birds may also be responsible for decreased resistance to infection as macrophages actively participate in immune response of body. Similarly decreased phagocytic ability of Kupffer cells in the liver has been reported (Trego et al. 1972). Khurana et al. (1995), Kumar et al. (1998) also reported reduction in humoral and cell mediated immune response in chicken fed with lead acetate. Since this test has indicated reduction in active macrophages due to treatment with lead acetate, a further investigation is also required to see the bactericidal activity of macrophages from lead exposed birds/animals.

REFERENCES


