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Down-regulation of β-defensins, an immuno-linked gene in quinalphos-exposed birds

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Quinalphos, an organophosphate pesticide, is widely used in agriculture to mitigate pest load and poses risks to non-target species, including poultry. The sublethal and immunotoxic effects of quinalphos on indigenous Kamrupa chickens, vital for Northeast India's rural economy, are poorly understood. In this study an attempt has been made to study the acute toxicity and immunosuppressive effects of quinalphos in Kamrupa chickens. Twenty birds were divided into control (n=10) and treatment groups (n=10), with the latter receiving a single oral LD50 dose (22.5 mg/kg body weight) in corn oil via oral gavage. Birds in the treatment group exhibited rapid onset of neurological symptoms, excessive salivation, reduced feed intake, diarrhoea, and 50% mortality within 36 hours. Massive reduction in lymphocyte counts with elevated haemoglobin; total erythrocyte count, total leukocyte count, and heterophil percentage were evident in haematological findings. Serum biochemistry showed increased alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, cholesterol, and uric acid, and reduced cholinesterase activity. Histopathological findings showed hepatic, renal, and neural degeneration. Gene expression studies showed significant downregulation of β-defensin genes (AvBD1, AvBD6, AvBD7). These findings highlight the need for low-dose or safer pest-control alternatives to protect poultry and the environment as a whole.

Keywords: β-defensins, organophosphate toxicity, quinalphos, avian immunity, oxidative stress