

RESEARCH ARTICLE

Cadmium toxicity and detoxification effects of eco-friendly biomaterials in liver and kidney of *Rattus norvegicus* (Wistar rats)

Ekwumemgbo, P.A.^{a*}, Okibe, F.G.^a, Jangber, Z.N.^{a,b} and Oladele, S.B.^b

^aDepartment of Chemistry, Faculty of Science, Ahmadu Bello University, Zaria, Nigeria.

^bDepartment of Veterinary Pathology, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria.

*Corresponding author email: pat_adamma@yahoo.com

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ABSTRACT

The study investigated the detoxifying effects of biomaterials; *Moringa oleifera* powder (MO); *Zingiber officinale* powder (ZO) and mixture of *Moringa oleifera* and *Zingiber officinale* powder (MZ) supplemented feeds in liver and kidney of adult *Rattus norvegicus* (wistar rats) weighing 150 – 300 g and exposed to cadmium nitrate ($\text{Cd}(\text{NO}_3)_2$). The rats were divided into 9 groups of 5 each. Groups 1 and 2 were positive control (PC) and negative control (NC) respectively. Groups 3-5 and 6-8 were dosed with 0.50 mg/kg body weight (BWT) $\text{Cd}(\text{NO}_3)_2$ intraperitoneally for 7 days and administered water *ad-libitum* and grower mash feed (GMF) supplemented with 5%, 10%, 15% MO, 5%, 10% and 15% ZO respectively for 21 days while Group 9 was dosed with Cd for 7 days and administered with GMF supplemented with 10% mixture of MZ for 21 days. Median Lethal Dose (LD_{50}) studied showed survival of all wistar rats with 10 mg/kg body weight (BWT) cadmium nitrate intraperitoneal treatment. In the liver, detoxification was insignificant ($p > 0.05$) with 5% treatment while 10% and 15% were significant ($p < 0.05$) respectively. In the kidney all doses of the biomaterials detoxified significantly ($p < 0.05$) with degree of detoxification ranking in both organs 5% < 10% < 15%. The histological slides of liver and kidney showed no lesions in the PC, 10% and 15% MO and 15% ZO supplemented groups. However, there were congestions in the kidneys of those supplemented with 5% MO, 5% and 10% ZO and the NC slides respectively. Also, there was no necrosis of hepatocytes in the liver of the PC, 5%, 10% and 15% MO slides whereas vacuolation of the hepatocytes and necrosis of the hepatocytes occurred in the NC slides. The study shows that the biomaterials studied could detoxify cadmium from wistar rats.

Keywords: Detoxification, Cadmium, Rats, *Moringa oleifera*, *Zingiber officinale*