ACUTE AND SUBACUTE TOXICITY OF NICANDRA PHYSALOIDES (L) GAERTN IN MICE AND CALVES RESPECTIVELY

A Thesis Submitted to the University of Nairobi in Partial Fulfillment of the Masters of Science Degree in Clinical Studies

JOHN KAUNGA MUTHEE, B.V.M (Nbi) Dip. DFM (PTC, NL)

Department of Clinical Studies
Faculty of Veterinary Medicine,
University of Nairobi.

University of NAIROBI Library
04652411
ABSTRACT

The plant Nicandra physaloides (L) Gaertn, commonly known as the 'apple of Peru' is a member of the solanaceae family. It has been widely associated with livestock poisoning in Kenya and elsewhere. The clinical signs reportedly associated with its poisoning are circling, tremors of the hind limbs, tachycardia, bloat, convulsions, coma and death. In the current study the acute toxicity was determined by intra-peritoneal injections of the aqueous extracts from different plant parts in a total of one hundred and fifty (150) white Swiss mice aged between 10 and 12 weeks and divided in groups of six (3 males and 3 females) for each dosage level. The median lethal dose (LD₅₀) was then calculated by the method of Reed and Muench (1938). The subacute toxicity was determined by feeding five groups of two male Friesian calves each, aged between 8 and 10 months, at 0 (control), 4, 8, 16 and 32% levels of dried ground whole plant material in wheat bran for 14 weeks. The physiological parameters of rectal temperature, respiration, heart rate and ruminal motility were taken from all the calves every morning for the whole period of the experiment. The blood for hematology (5ml in EDTA) and biochemistry (15ml without anticoagulant) was collected weekly via the jugular veno-puncture after thorough disinfection of the site with surgical spirit. LD₅₀ values for the leaf, fruit and whole plant extracts were 1.82, 2.58 and 3.62 g/kg body weight respectively, therefore, classifying the plant as slightly toxic according to Loomis (1978). The clinical signs showed by the mice were starry coat, slowed movements, fast respiration, gasping for air and leaping into the air before collapsing. The treated calves transiently exhibited muzzle drying, heart beat irregularity, loose feces, staggering gaits and lower growth rate than the control group. The activity of the enzyme gamma-glutamyltransferase (GGT) and the mean corpuscular volume (MCV) were significantly lower (P<0.05) in the treated group than in the control. There was no significant difference (P>0.05) between the treated and control groups in respect of the other assayed hematological (total
protein, hemoglobin, red blood cells, packed cell volume, mean corpuscular hemoglobin concentration, white blood cells, lymphocytes and neutrophils) and biochemical (aspartate aminotransferase, creatinine and blood urea nitrogen) parameters. There were no mortalities, no gross or histopathological lesions in all the groups. The possible reasons for the difference in behaviour between the calves in this experiment and the suspected natural cases were thought to be due to the variations in animal susceptibility or even plant toxin content. It is concluded that the plant *Nicandra physaloides* growing around the Kabete areas of Kenya may contain toxic phytochemicals that may cause poisoning in livestock if consumed. *Nicandra physaloides* is known to contain glycosides, steroids and alkaloids from earlier studies. More studies are necessary to determine the nature of these phytotoxins and their exact mode of action. Meanwhile livestock keepers are advised to control this plant in their pastures and avoid its consumption by animals.