

**TOXICITY OF *ALBIZIA GUMMIFERA*; A PLANT COMMONLY USED IN
ETHNOVETERINARY MEDICINE IN KENYA**

A thesis submitted in partial fulfilment of requirements for Masters in Clinical Pathology and
Laboratory Diagnosis.

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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Abstract

Albizia gummifera is a large deciduous, flat crowned tree which has many uses among which is in treatment of conditions such as East coast fever, malaria, headaches, scabies among others. Information on its efficacy and toxicity to animals is however sparse. The current study was aimed at evaluating the acute and sub-acute toxic effects of the aqueous and chloroformic stem-bark extracts of *A. gummifera*.

The stem-barks were collected, air-dried under a shade and ground to a fine powder. Aqueous extracts were obtained by boiling, filtering and freeze drying the ground powder to yield a very fine, beige coloured powdery extract that was 9.28% w/w of the ground powder. Another portion of the ground powder was extracted with chloroform in a Soxhlet apparatus to yield a dark-coloured, pasty extract that was 2.3% w/w of the ground powder.

For the acute toxicity studies, five different doses of the two extracts (2457, 3072, 3840, 4800 and 6000 mg/kg body weight) were administered once orally to five groups (n = 10) of laboratory rats. These were observed daily for clinical signs associated with pain, suffering and impending death for 14 days. The 24-hour, 7-day and 14-day lethal doses 50% (LD₅₀) for the aqueous extract were determined as 6600, 5600 and 5600 mg/kg body weight and for the chloroformic extract as 4800, 3500 and 2900 mg/kg body weight.

For the sub-acute studies, three different doses of the chloroformic and aqueous extracts (100, 300 and 1000 mg/kg body weight) were administered to three groups (n = 10) of laboratory rats each daily by gavage for 28 and 56 days respectively. The rats were observed for clinical signs

daily, haematology and blood chemistry value changes every two weeks and gross and microscopic changes terminally during the dosing period. Dose-dependent changes in clinical signs, haematology values, blood chemistry values and histopathology findings were determined. Dose-dependent clinical signs observed in the aqueous extract dosed rats were: diarrhoea, anorexia and polydipsia whereas in the chloroformic extract dosed rats were: diarrhoea, emaciation, anorexia, polydipsia, in-coordination and dyspnoea. Rats dosed with aqueous extracts of *A. gummifera* were observed to have decreased percentage weight gains with increase in oral dose administered. The control group gained 138.2% of their initial pre-treatment body weight which was statistically significant from the 100, 300 and 1000 mg/kg treatment groups which gained 131.3% ($p = 0.05$), 118.1% ($p = 0.038$) and 77.6% ($p = 0.025$) respectively. Similarly, rats dosed with 100 mg/kg of chloroformic extract had a significantly decreased percentage weight gain of 51.8% ($p = 0.034$) compared to the control group which had a 103.6% weight gain. However, rats dosed with 300 and 1000 mg/kg body weight of chloroformic extracts had 5.1% ($p = 0.024$) and 11.5% ($p = 0.011$) weight loss respectively as compared to the control group.

Dose-dependent blood parameter changes observed in rats dosed with the aqueous extract were increased thrombocyte counts by day 56 ($p = 0.001, 0.003$ and 0.026 for 100, 300 and 1000 mg/kg respectively); decreased albumin ($p = 0.021$ for 1000 mg/kg) and decreased creatinine ($p = 0.003, 0.001$ and 0.000 for 100, 300 and 1000 mg/kg respectively) levels by day 56. Rats dosed with the chloroformic extracts had slightly increased AST ($p = 0.001$ for 1000 mg/kg) and ALT ($p = 0.029$ for 1000 mg/kg) values by day 28. All the other parameters did not exhibit dose-dependence on either aqueous or chloroformic extract oral administration. The chloroformic extract was however observed to have a stabilizing effect towards the normal

reference range on the RBC, hematocrit, MCV and MCHC values at doses higher than 300 mg/kg body weight.

Histopathology revealed the presence of thickened alveolar septi ($p = 0.025$) and depopulated seminiferous tubules ($p = 0.020$) in the groups dosed with 1000 mg/kg body weight of aqueous extract. Similarly, thickened alveolar septi ($p = 0.0003$) were observed in those dosed with 4800 mg/kg body weight of chloroformic extracts. In addition, hepatocyte ($p = 0.0001$) and neuronal necrosis ($p = 0.0001$) were observed in rats dosed with 4800 mg/kg body weight of chloroformic extracts.

The study concluded that the aqueous and chloroformic extracts of *A. gummifera* are slightly and moderately toxic respectively at LD₅₀ doses of 6600 and 4800 mg/kg body weight respectively. However, the dosage range of 50 – 150 mg/kg currently in use at the field level is non-toxic. The study also showed that the target organs for the chloroformic extract were mainly the lungs, brain and liver at doses higher than 4800 mg/kg body weight while those of the aqueous extract were the lungs and testes at doses higher than 1000 mg/kg body weight.

Based on the findings of this study, it is recommended that oral administration of aqueous extract of *A. gummifera* at dosages above 1000mg/kg should be avoided. Similarly, oral administration of chloroformic extract of *A. gummifera* at dosages above 300mg/kg of the aqueous extract should be avoided. Further studies on the efficacy of *A. gummifera* extracts should be carried out based on therapeutic claims at the field level and the phyto-chemical composition of *A. gummifera* extracts are also recommended. Comparative study of *Albizia gummifera* and other *Albizia* species is also suggested so as to determine whether they share similar physiological

and/or pharmacological activities such as antihistamine, antiasthma, nootropic, anticonvulsant, antidiarrhoeal among others.