Background and Aim: *Boswellia dalzielii* Hutch. (Burseraceae) is a popular medicinal plant in Northeastern Nigerian ethnomedicine which is known for its ability to treat epilepsy. This research work aimed to scientifically evaluate the safety and antiepileptic use of both the leaf and stem bark aqueous extracts.

Methodology: The pulverized leaf and root bark were extracted using distilled water by reflux method, and were screened for phytochemicals. Oral and intraperitoneal acute toxicity (LD_{50}) of the extracts were analysed by Lorke's method, and the antiepileptic activity was evaluated using pentylenetetrazole- and strychnine-induced epilepsy in rats. One-way analysis of variance (ANOVA) was used to analyse the data.

Results: Preliminary phytochemical screening of aqueous extract of *B. dalzielii* leaf and root bark revealed the presence of saponins, tannins, flavonoids and terpenoids in both extracts, while alkaloids were present in the leaf. Both oral and intraperitoneal acute toxicity (LD_{50}) were $\geq$ 5000 mg/kg which indicated that the aqueous extracts are safe for use as medicine. The aqueous leaf and root extracts administered at the doses of 250 and 500 mg/kg conferred protection of 60 and 80%; 40 and 60% respectively against pentylenetetrazole-induced convulsion as well as protected 40 and 80; 20% and 60% of rats against death induced by strychnine for both the leaf and root bark extracts respectively, when compared to sodium valproate (20 mg/kg), a standard drug which conferred 100% protection.