Some observations on the toxic effects of the seed extract of *Sphenostylis stenocarpa* (Hochst ex A. Rich) Harms. on intestinal muscle

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Abstract. The effects of the water extract of *Sphenostylis stenocarpa* were observed on the guinea pig ileum and rabbit jejunum. The extract produced dose dependent contractions of the guinea pig ileum with an \( ED_{50} \) of \( 3.664 \times 10^{-5} \) g/ml and a calculated dose ratio of 1.25. The extract specifically stimulated muscarine receptors. Atropine (\( 8 \times 10^{-7} \) g/ml) caused a parallel shift to the right of the log dose–response curve in the guinea pig ileum suggesting a competitive antagonism. Boiling for about 12 h did not affect the contractile action of the extract on tissue preparations. However, boiling for 12–14 h completely abolished its contractile effect. Incubation of the extract with cholinesterase at 37°C for 1 h did not abolish its contractile action on the intestine.

Introduction

Edible legumes are excellent sources of dietary proteins and oils especially for developing countries of the humid tropics. *Sphenostylis stenocarpa*, commonly known as the African Yam bean, is a protein-rich plant food cultivated for both the seeds and the tuber in the Eastern part of Nigeria. Its native names are Okpo dudu (Ibo), sese (Yoruba), girigiri (Hausa) and bitei (Obudu). The plant is also grown as an ornament in Europe and other countries [2].

It is usually planted beside the yam and guided on to the yam stakes. 100 g of the seeds contain 391 calories, 21.1% protein, 1.2 g fat, 74.1 g total carbohydrate, 5.7 g fibre, 3.2 g ash, 61 mg Ca and 437 mg P. [3]. An analysis of the amino acid profile of the seed based on an average of four cultivars at Ibadan [3] shows that the African yam bean has a high level of methionine (1%) and cystine (2%).

About 8–16 seeds are contained in elongated pods. The seeds are rounded to oval in shape with a smooth surface and grey coloured appearance. The seeds are usually eaten in times of food scarcity (traditionally April–August). They are soaked in water for some hours and boiled overnight. It is commonly believed that the insufficiently cooked seeds cause diarrhoea and stomach cramps whereas the overcooked seeds cause constipation. The current study was designed to investigate the pharmacological basis for the toxic actions
which *S. stenocarpa* elicits in persons who consume it and to suggest a better method of preparing it for food so as to assure a maximum utilisation of its protein content.

The seeds of *S. stenocarpa* used in this study were obtained from Obudu in the Cross River State of Nigeria. They were identified as *S. stenocarpa* seeds in the department of Botany, University of Nigeria Nsukka.

**Materials and methods**

**Extraction**

100 g of the ground seeds was macerated in 400 ml water for 24 h with continuous shaking using a Gallenkamp shaker. The extract was then expressed through gauze and the starch contained in the extract was removed by centrifugation and filtration with Whatman filter paper no. 1 under negative pressure.

**Phytochemical tests**

The extract was tested for the presence of alkaloids (with Mayer’s and Wagner’s reagents), flavonoids (with dilute ammonium hydroxide and ferric chloride solution), glycosides (Fehling’s test), tannins (ferric chloride, lead acetate and bromine water tests) and saponins.

**Boiled extract**

The extract was boiled for 6 h. at 1 h intervals and for 12–14 h over a water bath and the effect of boiling on the activity of the extract on tissue preparations was observed.

**Preparation of guinea pig ileum**

Guinea pigs weighing 120–150 g were killed (after starving them for 24 h) by stunning and were exanguinated as completely as possible. Ileal segments were prepared following the method of Perry [8]. The segment was suspended in a 10 ml tissue bath containing tyrode solution maintained at 37°C and continuously aerated with a slow stream of air. Responses of tissue to 0.2 ml of various drugs including the extract were picked by a Ugo Basile isotonic transducer under a load of 0.5 g and recorded by a Ugo Basile double channel physiograph (No. 7080). Tissue preparations were allowed to equilibrate for 15–20 min before starting the experiments. The effects of the extract and several agonists like acetylcholine hydrochloride (1 x 10^{-5} g/ml), histamine diphosphate (2 x 10^{-3} g/ml), nicotine dihydrogen tartarate (1 x 10^{-4} g/ml) and neostigmine bromide (1 x 10^{-5} g/ml) as well as antagonists like atropine sulphate (1 x 10^{-5} g/ml), mepyramine maleate (2.5 x 10^{-5} g/ml) and hexamethonium bromide (2 x 10^{-5} g/ml) on the tissue were observed. All drugs and the extract were dissolved in distilled water and