

Short Communication

EFFECT OF AQUEOUS LEAF EXTRACT OF *SOLANUM AETHIOPICUM* ON ISOLATED GUINEA PIG ILEUM

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Pharmacological reactivity of guinea pig ileum to aqueous extract of *Solanum aethiopicum* was determined *in vitro*. Extract of the vegetable contracted the isolated ileum in a dose dependent fashion. These contractions were inhibited by mepyramine ($5 \times 10^{-5}M$) cimetidine ($5 \times 10^{-5}M$) and atropine ($5 \times 10^{-5}M$) inferring that the stimulatory effects were modulated by H_1 and H_2 (histaminergic and muscarinic (cholinergic) receptors. The mechanism of action of the laxative effect of *Solanum aethiopicum* was observed to be more than the bulk forming property of indigestible cellulose contained in vegetables generally.

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INTRODUCTION

The most satisfactory prophylactic and therapeutic agent for functional constipation is a diet rich in fiber. Dietary fibers also benefit patients who need to avoid straining at stool, patients with irritable bowel disease and diverticular disease of the colon (Tainter and Buchanan, 1954). Dietary fiber increases the mass of stool; its water content, and the rate of colonic transit. These effects are usually apparent within 24 hours and with repeated administration, reach a maximum after several days. Lack of fiber in diets was established as a contributive factor in certain disorders of the bowel and other disease of man (Painter and Burkitt, 1975; Mendeleff, 1977). The lignin and pectin in dietary fiber appear to also lower plasma cholesterol by reducing the plasma low-density lipoprotein fraction (Anderson and Chen, 1979; Behall, 1984). The mechanism of action of dietary fiber as laxative has been described as essentially devoid of any systemic effect (Tainter and Buchanan, 1954), but recent findings are contrary to this opinion. There are reports suggesting that some vegetables have pharmacological effects underlining their purgative action on the gastrointestinal tract (Arowolo et al, 1989; Dina et al, 2001), and hypotensive effect on the circulatory system in the body (Arowolo et al, 1989). This particular study is aimed at investigating the pharmacological reactivity of guinea pig ileum to another vegetable (*Solanum aethiopicum*) commonly consumed in Nigeria.

MATERIALS AND METHOD

The vegetable was purchased from Bodija market in Ibadan. The leaves were removed and washed after identification by a qualified taxonomist at the botany department, University of Ibadan. The leaves were cut into pieces and prepared for extraction as described by (Dina et al, 2001). The final concentration of 1gm/ml was obtained as extract

which served as the stock solution for dilutions needed during the course of the work.

Tissue Preparation

Isolated segments of ileum from Guinea pig of both sexes were suspended in Tyrode solution (NaCl 8.0; CaCl₂ 0.2; KCl 0.2; MgCl₂ 0.2; NaHPO₄ 0.05; NaHCO₃ 1.0 and glucose 1gm/dl) at 37°C and gassed with 5% carbon dioxide in oxygen. Contractions were recorded on a kymograph (Biosciences, Kent, England) with an isotonic frontal writing lever which was loaded with 0.5g and which magnified the contractions 6 times. After an equilibration for 30 minutes the aqueous extract was added sequentially in graded doses to the bath. After a dose response curve for the extract had been established the procedure was then repeated in the presence of $5 \times 10^{-5}M$ atropine sulphate. (Nutritional Biochemical corporation, Cleveland Ohio), $5 \times 10^{-5}M$ mepyramine maleate (Poulenc Ltd, Montreal, Quebec) and $5 \times 10^{-5}M$ cimetidine (Sigma Chemical Company, St Louis, Missouri, U. S. A). The whole procedure was repeated five different times (n=5).

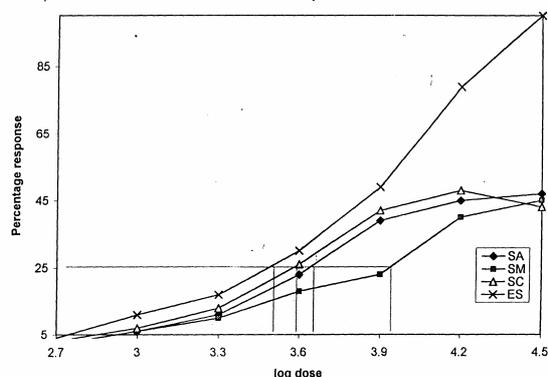
RESULTS

The extract of *Solanum aethiopicum* elicited dose dependent contractions of guinea pig ileum. The threshold contractile response was obtained at $225 \pm 3.52mg$ of aqueous extract; maximum response was attained at $3200 \pm 10.01mg$ of the extract. Atropine (5×10^{-5}) mepyramine (5×10^{-5}) and cimetidine (5×10^{-5}) inhibited these responses. Log dose response curve plotted shows a shift to the right and was sub maximal in the presence of atropine, mepyramine and cimetidine respectively (Fig 1). The dose ratios of ED for the extract of the vegetable alone and in the presence of atropine (0.8), mepyramine (0.7) or cimetidine (0.9) extrapolated from the curve approximated unity (1.0) (Fig 1), indicating pharmacological antagonism.

Table 1:

Dose ratios of extract of the vegetable alone and in the presence of 5×10^{-5} M atropine, 5×10^{-5} M mepyramine and 5×10^{-5} , cimetidine 5×10^{-5} atropine

ES	5×10^{-5} M atropine	5×10^{-5} M mepyramine	5×10^{-5} cimetidine
	0.8	0.7	0.9

**Fig. 1:**

Log dose-response curve for *Solanum aethiopicum* alone (ES) and in the presence of 5×10^{-5} M atropine (SA), 5×10^{-5} M Mepyramine and 5×10^{-5} M cimetidine

DISCUSSION

The extract of *Solanum aethiopicum* elicited dose-dependent contractions of guinea pig ileum. These contractions were also inhibited by known antagonists of cholinergic (i.e atropine) and histaminergic (i.e mepyramine, cimetidine) receptors thus inferring that the contractions produced by the extract were mediated by cholinergic and histaminergic receptors. Dale (1914), discovered that cholinergic receptors modulate the contractile response of smooth muscle along the wall of mammalian gastrointestinal tract. Evidence also abound that histamine induced contractile response of gastrointestinal tract is mediated by H receptors (Hell, 1990) but Barker and Hough (1983) submitted that H receptors also modulate neurotransmitter induced smooth muscle contraction in addition to it's stimulatory effect on gastric acid secretion. The implication of the foregoing is that the acclaimed purgative effect of *solanum aethiopicum* is based on two mechanism of action namely; the bulk forming indigestible cellulose it contains like any other vegetable and neuromuscular stimulation of gastrointestinal tract mediated by cholinergic and histaminergic pathways. Furthermore, the ability of the vegetable extract to cause cimetidine blocked

stimulation of H receptors shows that *S. aethiopicum* causes increased secretion of gastric hydrochloric acid by the oxyntic cells which could make a meal of the vegetable contraindicated in ulcer patients.

However, not all vegetable has pharmacological effect on the systems as reported by Arowolo *et al* (1989). It is therefore necessary to further study the pharmacological effects of other vegetables on gastrointestinal tract especially those known to have strong purgative effect so as to have clearer understanding of these plants which will help to determine when their consumption is unadvisable.

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