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Effect of Aqueous Extracts of *Maesopsis eminii* on Purgation using Animal Models

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ABSTRACT

Masopsis eminii is a perenial plant belonging to the family Rhamnaceae, widely distributed and found in old farms, forests and older deciduous forests. It is used mainly in traditional medicine as diuretic and emetic. The purgative effects of *Masopsis eminii* on animal was studied and compared with standard drug, senna. Results showed that the aqueous extracts of *Masopsis eminii* contained anthraquinone, emodin alkaloids, etc; reduced intestinal transit time by increasing propulsive colonic movement in a manner similar to senna. Furthermore, *Masopsis eminii* induced contraction of guinea pig ileum which was antagonised nonspecifically by atropine, mepyramine and methysergide. It is concluded that the purgative effect of *Masopsis eminii* is produced by lubricating the intestinal walls, softening the bowel contents by increasing the amount of water in the intestine, wetting the stool or softening the stool as observed by increased number of wet faeces in rats. These are attribuable to the presence of anthraquinone.

Key words: *Masopsis eminii,* purgative lubricating, colonic movement.

INTRODUCTION

Masopsis eminii is a fairly common and belong to the family Rhamnaceae. It is widely distributed perennial plant-found in old farms, forests, and probably older deciduous forests distributed over West and East African regions. *Masopsis eminii* has been used in traditional medicine practice as a diuretic and emetic (Oliver, 1960), treatment of constipation, painful menstruations and yellow fever (Irvine, 1961) and musluscidal (Adewumi and Sofowora, 1980).

Chemically, the plant has been reported to contain anthraquinone derivatives (Burkil, 1985).

Among the Igbo of eastern Nigeria, the plant is use mainly in the treatment of obstinate constipation for which the leaves are prepared as decoction and the extract drank when necessary. This study is ventured to evaluate the mechanism of its purgative or softening the stomach and intestinal activity using animal models.

MATERIAL AND METHODS

Fresh leaves of *Masopsis eminii* was collected from an old farmland in Akatta, Imo State, Nigeria. Botanical identification was authenticated independently by K. K Agwu, Chief Herbarium Officer, Department of Pharmacognosy and A. D. Ozioko of the Department of Botany, Herbarium Section, all in the University of Nigeria, Nsukka. A specimen of the plant is deposited in the University Herbarium with a voucher number, UNH67.

Preparation of the aqueous extract

The air dried leaves were milled to a course powder and 400g of the powder was boiled with 600ml of distilled water for 30 min. The macerate was centrifuged and the supernatant was filtered under reduced pressure through a Whatman No. 1 filter paper. The filterate was concentrated to about half volume using reduced pressure. Standardization was carried out by evaporating to dryness using the rotary evaporator at 40°C. The extract of senna leaves was prepared and standardized in the same manner and used as the control.

Photochemical tests

The freshly prepared extract of *Masopsis eminii* was tested chemically for the presence of glycosides, saponins, alkaloids, tannins, flavonoids and resins using the methods of Trease and Evans (1983), Cox and Balic (1994)in order to establish the constituents. The following studies were undertaken:

Acute Toxicity Study

Adult albino mice of either sex weighing 20 – 30g were divided into 6 groups of 10 mice per group. The extract was administered to the different groups in doses 400 – 1000mg/kg body weight. The animals were observed for 24 hours for toxic symptoms and mortality.

Purgation Test in Rats

Adult albino wistar rats of either sex weighing between 200 and 250g were used. The animals had free access to food (Standard Livestock feeds) and water until 6h before the experiment. Any animal that produced wet faeces within 6h was removed. Seventy-five rats were selected and randomly divided into three groups – A, B and C of 25 rats per group. Each group was further divided into 5 sub groups of 5 rats per group. Different doses of the extract (20 – 320mg/kg) were administered to the 5 groups of A. In the same way, equivalent doses of senna (positive control) and 25ml/kg normal saline (negative control) were administered to groups B and C respectively. All drug administrations were done by lavage. The rats were then housed singly in cages lined with white blotting papers. Water supply was removed and the rats were observed for 24 hours during which the total number of wet faeces produced by each rat was noted. The onset and duration of purgation with the extract were also recorded.

Gastrintestinal propulsive activity study in mice using charcoal meal test

Fifteen albino mice of either sex (25 – 30g) were randomly divided into 3 groups (A, B & C) of 5 mice per group. The animals were starved for 24h before the experiment but had free access to water. The mice in groups A and B were given 320mg/kg of the extract and senna respectively and 25ml/kg of normal saline was administered to mice in group C. Five min after drug administration, 0.5ml of a 5% charcoal suspension in 10% aqueous solution of tragacanth powder was administered to each animal in the various groups orally. The animals were sacrificed 30 min later and the abdomen opened. The percentage (%) length of the small intestine from the pylorus to the caecum, traversed by the charcoal plug was determined.

Studies on Isolated Guinea-pig Ileum

Guinea-pigs of either sex weighing 300 – 400g were used. The ileum was set up in a conventional manner in organ bath using Tyrode solution of the following composition in mM per litre: NaCl 137, KCl 2.4, $CaCl_2$ 1.8, $MgCl_2$ 1.0, NaH_2PO_4 0.2, $NaHCO_3$ 11.9 and glucose 5.5. The dose of the extract that would provide a measurable response was determined retrospectively. The response produced by this dose was antagonized by equipotent doses of atropine, mepryramine, hexamethonium and methysergide. Each antagonist was incubated for 7 min before the addition of the extract.

Drugs used: Acetycholine chloride (BDH), atropine sulphate (BDH), hexamethonium bromide (Sigma) mepyramine maleate (May and Baker), Methysergide (Sigma) and senna leaf powder purchased locally.

RESULTS

The phytochemical tests showed the presence of anthraquinone glycosides, saponins, alkaloids, tannins and flavonoids. Standardisation of the extract showed the yield of 17.39mg/ml of solid residue.

During the acute toxicity study, the extract did not produce any external symptoms or mortality up to the dose level of 1000mg./kg body weight intraperitoneally (i.p) in mice.

Table 1 shows the comparative activities of the extract of *Masopsis eminii* and senna powder in producing wet faeces in mice. There was no significant difference in wet faces produced by groups A and B at equiconcentration (wt/vol.) respectively.

Table 2 shows the effect of charcoal meal test on propulsive activities of the extract of *Masopsis eminii* compared with senna and the control group. The animals treated with the extract and senna power had equieffect on intestinal motility whereas the control (saline treated group had little or no effect on intestinal motility.

The effect of equipotent doses of antagonists on a constant dose of the extract of *Masopsis eminii* on guinea-pig ileum shows that the sensitivity to inhibitory effects of antagonist drugs increases in the order hexamethonium, methysergide, mepyramine and atropine (Table 3)

Table 1: Activity of the extracts of *Masopsis eminii* and senna in producing wet faeces in rats (n=4)

Dose	Number of wet faeces ± SEM in 24 hours		
(mg/kg)	*Masopsis eminii*	Senna	Normal saline (25ml/kg)
20.0	20.8± 0.84	19.01±1.58	Nil
40.0	23.6±1.14	27.3 ±0.84	Nil
80.0	37.2±1.01	38.7 ± 1.14	Nil
160.0	42.8±0.84	43.5 ±1.58	Nil
320.0	56.2±1.58	55.3 ±1.62	Nil

Table 2: Average percent distance ± SEM traversed by charcoal plug in the presence of equiconentration (320mg/kg) of the extract of *Masopsis eminii* and senna, and 25ml/kg of normal saline (n=4)

Drug	Mean % distance ± SEM
Masopssi eminii	78.9 ± 1.54
Senna Normal saline	80.3 ± 1.1826.7 ± 2.10

Table 3: Equipotent doses of antogonists that produced 50% inhibition of contraction produced by a constant dose of *Masopsis eminii* (17.4mg/ml) (n=4)

Drug	Dose (M)
Atropine sulphate	7.2×1^{-11}
Mepyramine maleate	2.5×10^{-7}
Methyscrgide	4×10^{-6}
Hexamethonium bromide	5×10^{-5}

DISCUSSION

The use of herbal medicines in various forms of intestinal disorders has been a common practice in African traditional medicine. The stembark and twigs of *Craton macrostachy(u)*s have been reported to have purgative and trypanocidal effect (Addae-Mensah et el, 1992).

Purgation is an important therapy within the rural Nigerian Community as purgatives are used as part of general treatment for virtually all illnesses. Several herbal preparations are used within the various local communities and are classified by the ruralites according to the intensity of their effects (Iwu,1982, Farombi, 2003).

From the present investigation the aqueous extract of *Masopsis eminii* did not induce any toxic effect or mortality upto the dose level of 1000mg/kg during the acute toxicity study. Animal behavior, food and water intake were normal.

Production of wet or watery faeces in rats or mice after oral administration of a drug in a positive test for purgative activity (Fairbairn and Moss, 1970, Yamauchi et al, 1976, Field 2003) Furthermore, drug accepted as a purgative must in addition be able to increase the gastrointestinal propulsive action and be able to lower the intra-abdominal pressure so that the evacuation of the bowel is effected without strain. The ability of *Masopsis eminii* extract to produce wet faeces in rats and to increase gastrointestinal propulsive movement in mice satisfy these requirements (Field, 2003).

The extract was found to be as potent as senna powder in producing wet faeces and in increasing the gut motility in animal and lowering the intra-abdominal pressure (see table 1)

Furthermore, the aqueous extract of *Masopsis eminii* contracted the guinea-pig ileum showing increase in peristalsis, one of the mechanisms by which purgatives work to produce their pharmacoloic effect. However, this propulsive (stimulant) action was antogonised by atropine, hexamethonum, mepryramine and methysergide which shows that *Masopsis eminii* causes peristalsis nonspecifically. The interplay of cholinergic, histaminergic and serotoninergic receptors and causation of intestinal propulsive action may simply be additive or synergistic to increase peristalsis, irritating the intestinal mucosa and lubricating the intestinal walls thereby causing purgation or softened faeces.

Finally, the purgative activity of the extract of *Masopsis eminii* is strengthened by the phytochemical tests which showed that the extract contains anthraquinone, a glycoside which liberates the active alkaloid after absorption, saponins, a natural detergent which possesses emolient purgative properties (Fingl, 1980, Etukudo, 2003). It has been reported that those resinous glycosides act as drastic laxatives by irritating both the small and large intestine to cause purgation (Ranstad, 1959). The purgative action of naturally occurring glycoside has been reported (Yamauchi et al, 1976, Falbriant and Farsworth, 2001) by lubricating the intestinal walls and softening the bowel contents by increasing the amount of water in the intestines. It is also worthy of note that senna, a standard purgative which produced equieffect on weight per volume basis with the extract of *Masopsis eminii* also contained anthraqunone glycoside as the active constuituent and is responsible for the purgation produced by these compounds (Ranstand, 1959, Burkill, 1985).

We conclude that the extract of *Masopsis eminii* does not induce any toxic manifestation and the drug can be safely used as a therapeutic agent, namely purgative or laxative.

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