Original Research Article

Antidiarrhoea activities of aqueous extract of *Myrianthus arboreus* leaves in Albino Rats.

Abstract

Diarrhoea is one of the leading causes of morbidity and mortality in children under the age of 5 years. Due to this problem, the World Health Organization has encouraged studies that will bring about the desired treatment and prevention of diarrhoea. Myrianthus arboreus leaves (MA) is used in some tribes of Nigeria for food. In this study, the antidiarrhoea activities of the aqueous extract of Myrianthus arboreus leaves were investigated with experimental animals via feacal count, measurement gastrointestinal charcoal meal distance and electrolyte composition. The extract (500, 1000 and 2000) mg/kg in comparison with loperamide hydrochloride, decreased the degree of gastrointestinal motility, production of diarrhoea stool, reduced the frequency of defecation and delayed the onset of diarrhoea in castor oil induced in albino rats. Also the extract inhibited the concentration of intestinal fluid electrolytes.

Key Words: Diarrhoea, *Myrianthus arboreus*, castor oil, loperamide hydrochloride

Introduction:

Myrianthus arboreus is a tropical tree growing up to 15m height which contain both male and female flower with spreading branches from a short stem (White and Abernathy, 1997; Wilks and Issembe, 2000; Tshibangu *et al*., 2002). It is usually divided close to the base, the roots form a network structure above ground. It is found in wet environment and on stream-banks of the forest region of Guinea to West Cameroons and extending across Africa. The wood is yellowish-white, soft, fibrous and difficult for art work (Irvine, 1961; Okigbo, 1978). Though perishable, it is used in making soap. The slash is slightly tinted but rapidly darkens to brown. The bark is said to be variable in appearance: In parts of South East Nigeria, it may be greenish white and slightly flaky, or almost white and smooth (Okafor, 1978; Okigbo, 1978). In Congo, a bark-tisane is said to be cholagogic and antidysenteric. The bark is taken in Nigeria as a febrifuge. In Nigeria, it is known by Igbo as *Ujuju*, Edo *Ihieghe*, Efik *Ndisok*, Igala *Apulu*, Nupe *Tsakpaci* and Yoruba *Ibi cere* (Wilks and Issembé, 2000; Tshibangu *et al*., 2002). When the leaves fall and lie on the ground, they form a good ground-cover retaining moisture and rotting down to form thick humus. In SE Nigeria, the young leaves are commonly eaten in vegetable-soup, hence the tree being known in Yoruba as the "Soup tree". The soup is so highly considered by the Egba people as to evoke the saying that "one will kill his child for the sake of *ibishere* soup" (Wilks and Issembe, 2000; Tshibangu *et al*., 2002). In Ghana, there are some tribes that eat the leaves as part of their food. In Gabon scrapings of the leaves are cooked in palm-oil is taken to relieve sore-throat. Extract of the leaves is made in Nigeria with Alehornea (Euphorbiaceae) for drinking in case of dysentery, and leafy shoots are chewed by people on the Cameroon Mountain for this purpose (Okafor, 1978; Tshibangu *et al*., 2002). In Sierra Leone, the decoction form boiled young leaf-flushes and peeled green banana have been used as medicine taken to stop diarrhoea and vomiting. Nwachoko *et al*

(2015) reported that *Myrianthus arboreus* is rich in phytochemicals (glycosides, saponins, sterols and tannins). Amata (2010) and Oyeyemi *et al* (2014), reported that *Myrianthus arboreus* leaves is rich in phytochemicals, noting the presence of tannins, alkaloids and flavonoids. Diarrhoea is the passage of abnormal liquid or unformed stool at an increased frequency (Guerrant *et al*., 1992; Ahlquist, 2001; Wilson, 2005). It is also linked with increased frequency, fluidity or volume of bowel movements and is characterized by increased frequency of bowel sound movement, wet stool and abdominal pain (WHO, 2003; Navaneethan and Gianella, 2008). The passage of loose or watery stools is usually at least three times in a 24 hour period (Navaneethan and Gianella, 2008). In Nigeria, diarrhoea resulting from infection is one of the known killer diseases among children under 5 years of age (Audu *et al.*, 2000; Nwachoko and Jack, 2015). This work examine the antidiarrhoea activities of aqueous extract of *Myrianthus arboreus* leaves in albino rats.

Materials and Methods

Plant Material

Myrianthus arboreus leaves (MA) were obtained from Ekuku-Agbor in Ika South Local Government of Delta State, Nigeria. The sample was air dried and ground to powder form prior to analysis. Extraction was carried out with warm distilled water in the ratio of 1g to 5ml. The powdered form of the leaves were soaked for 30 minutes and filtered using Whatman No. 1 filter paper and also with a funnel plunged with glass wool (Bakare *et al.*, 2011). The residue was re-extracted in warm distilled water for same duration and filtered. The filtrates were pooled together and concentrated with a water bath at 50^0C. The concentrated form of the sample was stored at 4^0C until needed.

Experimental Animals

Albino rats weighing between 150 – 200 g, were obtained from the Animal House of the Department of Biochemistry, University of Port Harcourt, Choba, Nigeria. The animals were acclimatized for one week prior to the commencement of the experiment. The animals were housed under standard laboratory conditions with light and dark cycles of 12 hours and were provided with rodent pellet food and water *ad libitum.*

Drugs

The drugs used in this study included castor oil (finest cold drawn castor oil), loperamide hydrochloride (Aaron Healthcare and Export PVT Ltd, Uttarahand, India), activated choarcoal and gum acacia (Sigma, USA)

Castor oil induced gastrointestinal transit:

Rats of either sex of weight (150 – 200g), fasted for 18 hours were randomly allocated into six groups. Group 1 (control) received 10ml/kg of distilled water, group 2 (normal) received no form of pre-treatment, group 3, 4 and 5 received 500, 1000 and 2000 mg/kg of MA extract and group 6 received 5mg/kg of loperamide hydrochloride . After 1 hour of treatment with the extract, distilled water and standard drug, diarrhoea was induced by oral administration of 1ml of castor oil to the test as well as the control group, after a period of 1 hour latter, 1 ml of charcoal meal (10% charcoal suspension and 5% gum acacia) was given to each of the animals. The animals were sacrificed after 1 hour following the administration charcoal

meal. The distance traveled by the charcoal meal from the pylorus to the caecum were measured and expressed as a percentage of the total length of the intestine from the pylorus to the caecum of each animal (Mascolo *et al.,* 1994; Mukherjee *et al.,* 1995; Rani *et al.,* 1999).
Pl - LM/LSI x 100% . PI = Peristaltic index, LM – Distance travelled by charcoal meal, LSI – length of small intestine, % inhibition: (control – test)/control x 100

Castor oil induced diarrhoea in rats and faecal count:

Castor oil-induced diarrhoea was determined by the method of Awoutes *et al* (1978). Rats weighing between 150 – 200 g fasted for 18 hours were randomly distributed into five groups. The administration procedure was as described above. The time taken for onset of diarrhoea and faecal droppings were recorded. Percentage inhibition was calculated (Izzo *et al.,* 1992; Mukherjee *et al.,* 1995; Karim *et al.,* 2010).
% inhibition = (control – test)/control x 100.

Results

The effect of aqueous extract of MA leaves on castor oil-induced diarrhoea and Na^+/K^+ concentrations in albino rats is as shown in table 1.

Table 1. Effect of aqueous extract of MA leaves on castor oil-induced diarrhoea and Na^+/K^+ concentrations in albino rats.

Group	Treatment	IL (cm)	CML (cm)	PI (%)	I (%)	Na^+ (mmol/l)	K^+ (mmol/l)
1	Control	84.0 ± 7.0	47.3 ± 2.5	56.3	-	25.7±4.6[a]	6.3±3.2[a]
2	Untreated	86.3 ± 3.8	21.0 ± 7.5	24.3	-	10.0±0.0a*	3.6±0.5[a]*
3	500mg/kg	77.7 ± 6.1	30.3 ± 9.3	39.0	35.9	10.0±0.0[a]	2.9±0.4[a]
4	1000mg/kg	83.3 ± 4.2	32.7 ± 4.6	39.0	30.9	12.0±2.0[a]	3.7±0.4[a]
5	2000mg/kg	95.3 ± 5.0	32.7 ± 4.7	34.3	30.9	16.3±6.0[a]	2.8±0.2[a]
6	5mg/kg loperamide	89.0 ± 8.9	27.7 ± 9.7	31.1	41.4	18.7±15.0[a]	4.6±1.7[a]

Key: LSI – length of small intestine, CML = Charcoal meal length, PI = Peristaltic index, I = Inhibition, MA = *Myrianthus arboreus*. n= 4

The effect of aqueous extract of MA on the faecal count of castor oil-induced diarhoea albino rats is as shown in table 2.

Table 2. Effect of aqueous extract of MA on the faecal count of castor oil-induced diarhoea albino rats.

Group	Treatment	OD (MIN)	MWF	% I
1	Control	30	1.5 ± 2.0	-

2	500 mg/kg	240	0.3 ± 0.0	80.0
4	1000 mg/kg	60	0.7 ± 1.4	53.3
4	2000 mg/kg	240	0.2 ± 0.0	89.0
5	5 mg/kg loperamide	240	0.3 ± 0.0	80.0

Key: OD = Onset of diarrhoea, MWF = Mean wet faeces after 6 hour, I = Inhibition

Discussion

The result of the percentage inhibition of the aqueous extract of *Myrianthus arboreus* leaves (MA) against castor oil induced diarrhoea in albino rats are as shown in Table 1. The result showed that mean charcoal meal length (CML) of animals in group 1 was the highest, followed by the mean CML of animals in group 4 and 5 pretreated with 1000 and 2000mg/kg MA extract respectively. Trend observed in the mean CML of animals in a group will reflect in the percentage peristaltic index (PI) and percentage inhibition. Thus group 6 animals with the least mean CML had the least PI and the highest percentage inhibition. Also group 4 and 5 animals that have the highest CML among the pretreated groups, have the highest PI and least percentage inhibition. Comparing the PI values of both control and the treated groups, MA leaf extract inhibited the PI values of treated groups. Also, the distance travelled by charcoal meal in the experimental groups was inhibited by the extract. The distance traveled by charcoal meal in the control, untreated and treated groups, showed that MA leaf possess antidiarrhoea properties. Also the extract may have affected the concentration of intestinal fluid electrolytes. Na^+ value for group 1 (control) was 25.7 ± 4.6 mmol/l, which was higher when compared with that of the treated groups.

Table 2. showed the result of percentage inhibition of aqueous extract of MA leaves on the faecal count of castor oil induced diarrhoea in albino rats and the delay to the onset of diarrhoea. The results show that the control group (group1) had minimal resistance to the onset of diarrhoea. Following 30 minutes after the

administration of castor oil, the animals in the group produced wet/diarrhoea stool. Different is the case of the groups pretreated with MA extract and standard drug. The animals in group 3 had 60 minutes delay while groups 2, 4 and 5 had 240 minutes delay respectively, before the onset of diarrhoea. The same trend was observed in the mean wet faeces (MWF) in both control and the pretreated groups. Group 1 animals which received no form of pretreatment had 1.5 ± 2.0 MWF while the animals in group 3 with a delay of 60 minutes, had MWF of 0.7 ± 1.4. The animals in groups 2 and 5 had MWF of 0.3 ± 0.0 each. Groups that had the highest delay in the onset of diarrhoea, had the least MWF and highest percentage inhibition.

In general, on evaluating the antidiarrhoea property of MA leaves via inhibition of distance traveled by charcoal meal, wet faecal count and intestinal fluid electrolytes, it could be said that MA leaves extract possess significant antidiarrhoea property.

Ethical Approval:

As per international standard or university standard ethical approval has been collected and preserved by the authors.

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