

Short communication

EFFECTS OF AQUEOUS EXTRACTS OF *HIBISCUS SABDARIFFA* CALYCES AND *OCIMUM GRATISSIMUM* LEAVES ON INTESTINAL TRANSIT IN RATS

OWULADE M. O., EGHIANRUWA, K. I.* AND DARAMOLA, F. O.

Department of Veterinary Physiology and Pharmacology,
University of Ibadan, Ibadan, Nigeria.

The effects of aqueous extracts of the leaves of *Ocimum gratissimum* and calyces of *Hibiscus sabdariffa* on intestinal transit were determined in experimental rats. The leaves of *Ocimum gratissimum* were oven dried and then pulverized. The dried calyces of *Hibiscus sabdariffa* were also pulverized. 10% extracts of both powders were made and administered orally to rats at varying doses. Test rats were given the 10% extracts of *Ocimum gratissimum* and *Hibiscus sabdariffa* at 0.5/100g, 1ml/100g, 2ml/100g body weight. Control rats received saline instead of extracts. After 30 minutes, each animal was then given 1.5 ml of a dye solution orally. 1 hour after administering the dye each rat was sacrificed and the intestine carefully dissected out. The length of the intestine and the transit point of the orally administered dye were then measured. The transit point was calculated as a percentage of the total length of the intestine. The extracts of both *Ocimum gratissimum* and *Hibiscus sabdariffa* caused a reduction in the transit points of the dye. The extract of *Hibiscus sabdariffa* was more effective. The reduction in transit point, and hence the increase in transit time by both extracts indicates that the plants could be useful at appropriate doses in the control of diarrhea. *Hibiscus sabdariffa* would be more effective in this regard.

Key Words: *Hibiscus sabdariffa*, *Ocimum gratissimum*, intestinal transit, aqueous extract.

* Correspondence.

INTRODUCTION

The consumption of a variety of local herbs and vegetables by man is believed to contribute significantly to the improvement of human health, in terms of prevention, and or cure of diseases because plants have long served as a useful and rational source of therapeutic agents [Roberts and Tyler 1999]. *Hibiscus sabdariffa* and *Ocimum gratissimum* are popular plants whose products are used by virtually every Nigerian. *Ocimum gratissimum* is a shrub commonly found around village huts and in gardens [Iwu, 1993]. It is known as *Efinrin ajase* in Yoruba, *Ebavbokho* in Bini, *Aai doya ta gida* in Hausa, *Nchonwu* in Igbo. The leaves are used locally for soup. It is also used to treat cases of stomach upset and diarrhea

MATERIALS AND METHODS

Animals: Albino rats of both sexes and weighing between 100-125g were used. These rats were obtained from the Department of Physiology, University of Ibadan. They were randomly selected and kept in seven groups of five rats per

group. Each group was kept in a separate cage. All animals were fed with commercially formulated rat feed and water was given *ad libitum*. Their cages were cleaned daily and food and water changed daily. Food was withdrawn from the animals 24 hours before experiment but water was allowed.

Preparation of aqueous Extract.: The leaves of *Ocimum gratissimum* were collected from Arulogun in Oyo state and were identified at the Department of Botany, University of Ibadan, Nigeria. The calyces of *Hibiscus sabdariffa* were collected from Toro in Bauchi state and identified at the Department of Botany, Abubarka Tafawa Balewa University, Bauchi, Nigeria. The respective parts of both plants were oven dried separately at 80°C, pulverized and then sieved. Twenty-five grams of the powdered leaf was weighed out and dissolved in 250 ml of distilled water to make 10% extract. This was filtered and the residues discarded. The resultant extracts were stored in capped bottles and kept in refrigerators before use.

Preparation of Dye: The dye was prepared by a modified method of Uwagboe and Orimilikwe (1995). 95 mls of 10% aqueous suspension of charcoal (BDH, England) was mixed with 5 ml of giemsa stain (BDH, England).

Studies of Intestinal Transit: Table 1 shows the groups of animals and the treatment each group received. 24 hours before experiment, food was withdrawn from the animals but water was freely allowed. During the experiment, each rat received the appropriate dose of the respective extracts. The extracts were administered orally using an oral cannula.

Table 1.
Animal groupings and treatments

Group	n	Dose of 10% O.G. (ml/100g)	Dose of 10% H.S (ml/100g)	Dose of 0.9% NaCl (ml/100g)
1	5	0.5	Nil	Nil
2	5	1.0	Nil	Nil
3	5	2.0	Nil	Nil
4	5	Nil	0.05	Nil
5	5	Nil	1.0	Nil
6	5	Nil	2.0	Nil
7	5	Nil	Nil	1.0

The control group (Group 7) received normal saline. Thirty minutes after the administration of the extract, 1.5ml of the dye was administered orally to each rat using an oral cannula. The rats were then kept without food and water for 1 hour before the determination of transit point of the dye. At the end of this time, the rats were sacrificed by an overdose of chloroform. Their peritoneum was opened and the entire length of the small intestines were carefully stretched and cut open. The lengths of the intestines from the pyloric junction were measured; the distance transverse by the dye from the pyloric junction was also measured.

Analysis of Results:

The distance transversed by the dye from the pyloric junction was calculated as percentages of the entire length of the intestines. This was regarded as the percentage transit point of the dye at each dose of an extract. The means and standard errors of the means [SEM] of these percentages were calculated for each group. Data from the control group were regarded as zero administration of the extracts. These data were then fed into the computer using the computer software, Microsoft excel [Microsoft Incorporation, USA] to obtain graphic representations. The levels of significance between the transit points of each dose were determined using Students' t- test.

RESULTS AND DISCUSSION

The results are presented in Table 2. Extracts from *Hibiscus sabdariffa* caused dose-dependent reduction in the percentage transit point of the dye. The reduction of percentage transit point by extract of *Ocimum gratissimum* was not dose-dependent. However, the reduction was significant (P < 0.05) when compared to the percentage transit in normal rats.

Zobo, the aqueous extract of the calyces of *Hibiscus sabdariffa* caused a reduction in the percentage transit point indicating a reduction in intestinal motility, and increased transit time.

The mechanism by which *Hibiscus sabdariffa* caused this action cannot be ascertained from this study but studies carried out by other workers (Obiefuna, 2001; and Odebiyi and Sofowora, 1978) on the phytochemical constituents of the plant indicate the presence of pectin, a known protectant and adsorbent (Swinyard, 1975). Pectin dissolves in water to form viscous colloidal solution and was once used widely in the treatment of diarrhea (Swinyard, 1975). Obiefuna *et al.*, (1994) also observed that the petal extract of the plant produced relaxation of isolated rat aorta. Relaxation of the intestinal smooth muscle would cause increased transit time. At appropriate dose, zobo could therefore become a constipating agent. It could also be effective in reducing the intensity of diarrhea.

Table 2.
Mean percentage transit points of dye in the intestines of rats administered extracts of *Ocimum gratissimum* and *Hibiscus sabdariffa* [n =5 in each case].

EXTRACT	DOSE [MI/100g]	MEAN TRANSIT POINT	%
<i>Ocimum gratissimum</i>	0.5	68.88 ± 6.21**	
	1.0	72.48 ± 1.78*	
	2.0	69.10 ± 4.64*	
<i>Hibiscus sabdariffa</i>	0.5	83.70 ± 5.55 ^{NS}	
	1.0	78.60 ± 4.78*	
	2.0	60.66 ± 3.24**	
CONTROL Normal saline	1.0 ml	85.14 ± 4.53	

^{NS} Not significant; *P<0.05; **P<0.01 (c.f. control)

Although, a reduction in motility was evident between control and test rats, the leaf extract of *Ocimum gratissimum* did not produce a dose-dependent effect. The leaf extract of *Ocimum gratissimum* is therefore not as effective an inhibitor of intestinal motility as *Hibiscus sabdariffa*.

The effectiveness of the leaf extract of *Ocimum gratissimum* in controlling gastrointestinal upset (Oliver, 1969; Schippers, 2000; Lewis and

Elvin-Lewis, 1977) may not be due to a direct relaxation of the intestinal smooth muscle. A fraction of the crude extract has been shown to contract guinea pig ileum and rat colon [Onojobi, 1986]. This action cannot be associated with reduced intestinal motility. The antispasmodic action of thymol contained in the aromatic volatile oil obtained from the leaves of *Ocimum gratissimum* could be associated with reduced intestinal motility [Iwu, 1993]. This action in conjunction with antibacterial property of the plant may be responsible for its observed action in diarrhea.

REFERENCES

- Iwu, M. M. (1993).** Handbook of African Medicinal plants. CRC Press. Boca Raton. Pp 214-215.
- Lewis, W. H. and Elvin-Lewis, D. M.F. (1977).** Medical botany: Plants that affect Man's health. John Wiley, London.
- Obiefuna, P. C. M., Owolabi, O. A., Adegunloye, B. J., Obiefuna, I. P., and Sofola, O. A. [1994].** The petal extract of *Hibiscus sabdariffa* produced relaxation of isolated rat aorta. *Int J. Pharmacol.* 32: 69 – 74.
- Odebiyi, O. O. and Sofowora, E. A. (1978).** Phytochemical screening of Nigerian medicinal plants. *Lloydia*, 41: 234 – 235.
- Onojobi, F. D. [1986].** Cited in: Iwu, M. M. [1993]. Handbook of African Medicinal plants. CRC Press. Boca Raton. Pp 214-215
- Oliver, B. [1969]** Medicinal plants in tropical West Africa. Cambridge University Press, Cambridge.
- Philips, T. A. [1977].** An agricultural notebook. Longman. London. pp 81.
- Roberts, J. E. and Tyler, V. E. [1999].** Tyler's herbs of choice. The therapeutic use of phytomedicinals. The Haworth Herbal Press. New York. Pp 11.
- Schippers R. R. (2000).** African Indigenous Vegetables. Chatham, U. K/ Natural Resource Institute.
- Swinyard, E. A. [1975].** Surface-acting drugs. In: The pharmacological basis of therapeutics. 5th edition. Goodman, L. S. and Gilman, A. [eds]. Macmillan Publishing Company, New York. Pp 946 – 959.
- Uwagboe, P. E. and Orimilikwe, S. O. [1995].** Effect of histamine H₂ receptor blocker on gastrointestinal transit in conscious albino rats. *Nig. J. Physiol. Scs.* 11: 56 – 58.

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