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Evaluation of unripe *Mormodica charantia* and *Mormodica dioica* fruit extracts for diuretic and antidiuretic effects in rats

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Abstract: The aim of this study was to evaluate the diuretic and antidiuretic effects of fruit extracts of unripe *Mormodica charantia* Linn. and *Mormodica dioica* Roxb. (Family: Cucurbitaceae), using the hydrated rat assay technique and a randomized Latin square design. The freeze dried extracts suspended in 0.5% polyvinylpyrrolidone in dose of 30–60 mg/kg or hydrochlorothiazide (diuretic, 30 mg/kg) or hydralazine (antidiuretic, 30 mg/kg) were administered orally to male rats and their urine output was monitored over a 5 h period. The urine samples and both fruit extracts were analysed for sodium and potassium content using flame photometry. Both extracts failed to induce significant diuretic and antidiuretic activities. In contract, the reference diuretic and antidiuretic drugs caused a significant increase and reduction respectively in urine output. Urinary sodium excretion also remained unaltered with extract treatments but urinary potassium content increased markedly (*M. charantia* by 66% and *M. dioica* by 60%) and significantly. Further, both extracts had a high endogenous potassium content (*M. charantia* and *M. dioica* 65 and 85 meq/l respectively). We conclude that *M. charantia* and *M. dioica* fruits may be useful as a cheap food supplement to replenish potassium loss in patients on diuretic therapy. Med Sci Res 27:821–823 © 1999 Lippincott Williams & Wilkins

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Introduction: Consumption of the unripe fruits of the two curcurbits *Mormodica charantia* Linn. and *Mormodica dioica* Roxb. (Family: Curcurbitaceae) has increased in Sri Lanka in the recent past. This may, at least in part, be due to their proven antidiabetic [1,2] and antiulcerogenic [3] activities. Some of the users claim that regular consumption of either of these fruits causes a moderate rise in urine output while others claim a mild decrease. However, the validity of these claims has not been scientifically tested.

In the Ayurvedic system of medicine, in Sri Lanka, the fruits of these two curcurbits are recommended for heart disease [4]. Yet neither the precise nature of the heart disease for which they are recommended nor their mode of action(s) are indicated. Pharmacologically, such an action could be mediated via a direct effect on the heart or kidneys.

The objective of this study was to evaluate diuretic and antidiuretic activities of fruit extracts of *M. charantia* and *M. dioica* and their effects on urinary sodium and potassium content. This was done using the hydrated rat assay developed by De Felice *et al.* [5] and a randomized Latin square design. The doses of the extracts chosen were that previously shown to have hypoglycaemic activity in rats and human [2,6] and its multiples.

Materials and methods: Fresh unripe fruits of *M. charantia* and *M. dioica* were purchased respectively from vegetable stores in Colombo and Moneragala, Sri Lanka, and their identity was authenticated by Professor R.N. de Fonseka, Department of Botany, University of Colombo. The fruits were thoroughly washed, deseeded and cut into thin slices. These were immediately minced separately, using a Kenwood mincer and the pulps were squeezed through four layers of gauze. The two filtrates were freeze-dried using a freeze-drier 1 ml of fresh filtrate was equivalent to 35 ± 5 mg of freeze dried extract for *M. charantia* and 50 ± 5 mg for *M. dioica*.

The freeze dried extracts of *M. charantia* (30 and 300 mg/kg) and *M. dioica* (30, 300 or 600 mg/kg) or hydrochlorothiazide [diuretic drug (HCT), 30 mg/kg] (Merck Sharp and Dohme Ltd., Hoddesdon, UK) or hydralazine [antidiuretic drug 30 mg/kg] (Novartis Pharmaceuticals, Camberley, UK) were pulverized in a porcelain mortar and suspended in 0.5% (w/v) polyvinylpyrrolidone (PVP) (mol. wt. 10,000, Sigma Chemical Company, St. Louis, MO, USA) 2–3 h prior to experimental use.

Healthy male adult Sprague-Dawley rats (210–220 g) from our own colony were used as experimental subjects ($n = 16$). They were kept in a well ventilated animal house under standardized conditions (temperature: 28–31 °C, photoperiod; approximately 12 h natural light and 12 h dark). The animals had free access to pelleted food (Oils and Fats Corporation, Seeduwa, Sri Lanka) until 2 h prior to treatment.

The diuretic effects of the two extracts were evaluated using a randomized Latin square 8 × 8 with eight groups of two rats in each, so that each group was orally tested with the vehicle (0.5% PVP, 3 ml/kg), a diuretic (HCT; 30 mg/kg), an antidiuretic (hydralazine; 30 mg/kg). *M. charantia* extract (30 and 300 mg/kg) or *M. dioica* extract (30, 300 or 600 mg/kg).

All these treated rats were then orally treated with normal saline [0.9% NaCl (w/v); 27 ml/kg], to impose a uniform total water load of 30 ml/kg while minimizing the amount of PVP. The urinary bladder of each rat was emptied by gentle compression of the pelvic area and by a pull of the tail.

The rats from each treatment group were placed in stainless steel metabolic cages fitted with measuring cylinders to collect urine without any faecal contamination. At the end of 5 h, the urinary bladders were emptied once again as before and the total urine output over the 5 h period determined.