

Analgesic and Behavioural Effects of *Morinda citrifolia*

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Abstract

The traditional therapeutic indications for the use of *Morinda citrifolia* L. (Rubiaceae) have been investigated. The lyophilised aqueous extract of roots of *M. citrifolia* was evaluated for analgesic and behavioural effects in mice. The extract did not exhibit any toxic effects but did show a significant, dose-related, central analgesic activity in the writhing and hotplate tests; this effect was confirmed by the antagonistic action of naloxone. Furthermore, administration of *M. citrifolia* extract at high dosages decreased all behavioural parameters in the two compartment test, the light/dark choice situation test, and the staircase test; together with the induced sleeping time, these results are suggestive of sedative properties.

Key words

Morinda citrifolia, analgesic activity, sedative effects, behavioural effects.

Introduction

Traditionally, the roots and leaves of *Morinda citrifolia* L. (Rubiaceae) are used in Mauritius, Tangatapu, Vietnam, the Philippines, and India as analgesic or antirheumatic agents as well as for the treatment of dysurea (1, 6, 14, 18, 19). Pharmacological investigations have demonstrated that the roots of *M. citrifolia* exert an antihypertensive action (8, 9, 10, 22) and that an alcoholic extract has an *in vitro* antispasmodic effect on the isolated uterus of the rat (22). Since these first chemical studies, only few substances have since been identified (14) and most of these belong to the anthraquinone class (12, 15).

The initial objective of the present study was to investigate the peripheral and central analgesic properties of *M. citrifolia* by means of both the writhing and hotplate tests (experiment 1). Since central analgesic effects were found, we then proceeded to search for sedative properties by means of a free exploration procedure specially adapted to reveal such effects (experiment 2). As this result

was also positive we went on to investigate putative anxiolytic effects by using two experimental models, namely the light/dark choice paradigm described by (7) as modified by (2) and the staircase tests of (20) (experiment 3). In addition, we examined the effect of various doses of *M. citrifolia* on the induction of sleep in mice treated with a subhypnotic dose of pentobarbital (experiment 4) and the acute toxicity of the plant by administering high dosages of *M. citrifolia*.

Materials and Methods

Animals

Male and female Swiss mice weighing 20–22 g (5 weeks old) were used for the acute toxicity tests and male Swiss mice weighing 30–35 g (9 weeks old at the start of the tests) were used for the analgesic and behavioural tests. The animals were obtained from Laboratoire Janvier, Legenest. All animals were conditioned in standard Macrolon boxes (5 mice per box) with laboratory diet (croquettes Extralabo) and drinking water *ad libitum* under a 12/12 h light/dark cycle with additional red light at 1 am in order to observe the animals in their high activity period when the lights were off.

Plant extract

Aqueous extracts were prepared from the decorticated, dried roots of African *M. citrifolia* obtained from the Laboratories of Expansion Aromatique Française (France) by the traditional method: 50 g of dried, powdered roots were decocted during 15 min and macerated for 4 h in 300 ml hot distilled water. After filtration, the aqueous filtrate was concentrated under reduced pressure and then lyophilised; 2.9 mg of lyophilisate corresponded to 30 mg of powdered, dried plant material. All doses are expressed in terms of dried plant material (mg/kg body weight).

Characterisation of the aqueous extract was limited to the evaluation of the anthraquinone compounds by TLC on silica gel with solvent systems (I) benzene-ethyl formate-formic acid (75 : 24 : 1, v/v) and (II) ethyl acetate-formic acid-acetic acid-water (68 : 7 : 7 : 18, v/v); visualisation of spots by ammonia and UV (365 nm). The following R_f values were obtained: solvent system (I) 0.13, 0.15, 0.21, 0.60, 0.75 and solvent system (II) 0.04, 0.24, 0.51, 0.60, 0.85, 0.88, 0.90.

Experiment 1

Writhing test: Prior to testing each animal received the lyophilisate of the aqueous extract of *M. citrifolia* at a dose of 100, 200, 400, 800, and 1600 mg/kg *i.p.* Control animals received 0.9% NaCl solution *i.p.* 30 min later. For the test, a solution

