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Anti-diarrheal Activity of *Melastoma malabathricum* L. leaf Extracts (Melastomataceae)

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The objective of this study was to investigate the anti-diarrheal activity of leaf of *Melastoma malabathricum* in rats. Anti-diarrheal effects of the ethanol extracts at 100, 200 and 400 mg/Kg were evaluated in rats using castor oil induced models. Results showed that the ethanol extract exhibited significant and dose dependent anti-diarrhoeal activity in the model used. A percentage diarrheal inhibition of extract at 400 mg/Kg was 93.67%. Diarrheal protection in the model used by the extract is dose dependent and the diarrheal inhibitory effects of the extract are comparable to loperamide. Therefore, a result of present study suggests that the ethanol extract of *Melastoma malabathricum* possesses anti-diarrheal activity.

Keyword: *Melastoma malabathricum*, Anti-diarrheal, Castor Oil.

1. Introduction

Diarrheal diseases are one of the leading causes of morbidity and mortality in developing countries and are responsible for the death of millions of people each year^[1]. Despite immense technological advancement in modern medicine, many people in the developing countries still rely on the healing practices and medicine plants for their daily health needs^[2]. Considering this fact the world health organization has constituted a diarrheal disease. Control programme, which includes studies of traditional medicinal practices, together with evaluation of health education and prevention approaches^[3].

Melastoma malabathricum belongs to the Melastomataceae family. It is also called the Singapore Rhododendron or Senduduk. It is a erect shrub or small tree 1.5 to 5m tall. It

was traditionally used to treat diarrhea, dysentery, leucorrhoea, hemorrhoids, wounds, and infection during confinement, toothache, flatulence, sore legs, and thrush and also it is used by the Jah hut people in Malaysia to cure diarrhea^[4]. The plant possesses anticancer^[5], hepatoprotective^[6], fertility enhancement and antiinflammatory activities^[8]. Though the plants has been extensively used for various diseases including treatment of diarrhea. Hence, an attempt has been made to screen the diarrhea preventive and protective activity of the extract of the leaf of *Melastoma malabathricum* in animal models.

2. Materials and Methods

2.1 Plant Materials

The leaves of *Melastoma malabathricum* L. were collected from Daudeli, Joide Taluk,

Hubli District, North Karnataka. With the help of local flora, a voucher specimen (VOCB 1637) were identified and retained in Ethnopharmacology Unit, Research Department of Botany, V. O. Chidambaram College, Tuticorin for further reference.

2.2 Preparation of Plant Extract

The leaf of *Melastoma malabathricum* were dried separately under shade and then powdered with a mechanical grinder to obtain a coarse powder, which were then subjected to extraction in a Soxhlet apparatus using ethanol. The ethanol extract were concentrated in a rotatory evaporator. The concentrated ethanol extracts of leaf of *Melastoma malabathricum* were used for anti-diarrheal activity.

2.3 Animals

Normal healthy male Wistar albino rats (180-240g) were used for the present investigation. Animals were housed under standard environmental conditions at temperature (25±2°C) and light and dark (12:12h). Rats were fed with standard pellet diet (Goldmohur brand, MS Hindustan Lever Ltd., Mumbai, India) and water *ad libitum*.

2.4 Acute Toxicity Studies

Acute oral toxicity study was performed as per OECD-423 guidelines (acute toxic class method), albino rats of either sex selected by random sampling were used for acute toxicity study^[9]. The animals were kept fasting for overnight and provided only with water, after which the extracts were administered orally at 5mg/kg body weight by gastric incubations and observed for 14 days. If mortality was observed in two out of three animals, then the dose administered was assigned as toxic dose. If mortality was observed in one animal then the same dose was repeated again to confirm the toxic dose. If mortality was not observed, the

procedure was repeated for higher doses such as 50, 100 and 2000 mg/kg body weight.

2.5 Experimental Setup

The animals were divided into four groups of six rats each.

Group I: Rats treated with castor oil (10 ml/Kg p.o) for 7 days

Group II: Rats treated with ethanol extract of leaf of *Melastoma malabathricum*, at the dose of 100 mg/Kg body weight daily for 7 days.

Group III: Rats received ethanol extract of leaf of *Melastoma malabathricum*, at the dose of 200 mg/Kg body weight daily for 7 days.

Group IV: Rats received ethanol extract of leaf of *Melastoma malabathricum*, at the dose of 400 mg/Kg body weight daily for 7 days.

Group V: Rats treated with Loperamide (2 mg/Kg) body weight.

The anti-diarrheal activity was performed by the method developed by Havagiray *et al.*,^[10]. Diarrhea was induced in rats by administration of 10 ml/Kg castor oil to all groups by orally. Animals were fasted for 24 hours with free access to water prior to the test. Ethanol extract of *Melastoma malabathricum* (100, 200 & 400 mg/Kg) and the standard drug (Loperamide) were given orally (2 mg/Kg).

3. Results and Discussion

The extracts significantly reduced the number of diarrheal episodes in a dose-dependent manner when compared with the untreated control. At 400 mg/Kg dose *Melastoma malabathricum* showed 93.67% reduction in the number of faecal episodes when as loperamide (2 mg/Kg) offered 94.84% protection. The results indicated that the ethanol extract of *Melastoma malabathricum* was higher effective in controlling castor oil induced diarrhea at the

doses of 100 mg/Kg, 200 mg/Kg and 400 mg/Kg body weight.

Table 1: Anti-diarrheal activity of ethanol extract of *Melastoma malabathricum*

Groups	Dose	% protection	Weight of stools (g)
Group I	10ml/kg	0.00	2.023±0.011
Group II	100mg/kg	80.02 %	0.404±0.0667**
Group III	200mg/kg	84.64 %	0.311±0.0214**
Group IV	400mg/kg	93.67%	0.128±0.0166***
Group V	2mg/kg	94.84 %	0.104±0.0131***

Each Value is SEM ± 6 individual observations * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Compared to castor oil induced control vs drug treated rats

Although the extract was found to reduce castor oil induced diarrheal episodes but the mechanism of its anti-diarrheal activity is uncertain. Since castor oil produces diarrhea by preventing fluid and electrolyte absorption and thus resulting in intestinal peristalsis^[11], one of the probable mechanism of anti-diarrheal activity of the test extract *Melastoma malabathricum* may be disability to enhance fluid and electrolytic absorption through the gastrointestinal tract. As cholinergic stimulation often cause diarrhoea by increasing GI mobility^[12], the significant inhibition of GI mobility by test extract *Melastoma malabathricum* suggested its probable mode of action to be the prevention of cholinergic transmission or its anticholinergic effect on gastric mucosa. Most plant species that have anti-diarrheal potential confirm tannins as one of the major constituents^[13-15] and leaf of *Melastoma malabathricum* also contain tannins. These tannins precipitate proteins of enterocytes, which in turn reduce the peristaltic movements and intestinal secretion^[16]. Thus further phytochemical studies are required to isolate anti-diarrheal components from the extract to establish its extract mode of anti-diarrheal activity.

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