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## PHARMACOGNOSTIC EVALUATION OF SIMPLE EFFECTIVE HEALTHCARE TRADITIONS USING *MURRAYA KOENIGII* (L.) SPRENG FOR DIGESTION AND DIGESTIVE DISORDERS

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**ABSTRACT:** As per the appeal issued by World Health Organization (WHO) "save plants to save lives," there is the need for a global movement for the conservation of medicinal plants and the revitalization of the native health traditions of local communities. Such health traditions based on medicinal plants are the result of centuries of observation, selection, and experimentation. They thus constitute an accumulated pool of medical wisdom, based on the dictum "an ounce of practice is worth tons of theory." Unfortunately, such invaluable knowledge and experience are increasingly coming under the category of 'dying wisdom.' Throughout human history people have relied on natural products and plants, in particular, to promote and maintain good health and to fight sickness, pain, and disease. The past 200 years have witnessed not only an acceleration in the rate of extinction of plant and animal species but also the erosion of traditional knowledge related to the medicinal properties and uses of the plant and other natural products. India also had a rich tradition for primary healthcare, but due to the lack of systemic study and documentation, this traditional knowledge was lost forever. But somehow the practical application of such knowledge can be met with a few routine practices among local populations in Kerala, a southern state of India. The present paper deals with the pharmacognostic analysis of two simple and effective healthcare measures for digestion and digestive problems using *Murraya koenigii* leaves.

**INTRODUCTION:** The global crisis in health care is deepening. For the majority, affordable quality healthcare seems a distant dream. Healthcare systems need to understand the complex interplay of biology, behavior, socioeconomic and environmental factors that shape health. These factors cannot be considered in isolation from each other.

Planning effective treatment of disease requires addressing them all together, fully and integrated <sup>1</sup>. The integrated approach includes the application of modern medicine as well as technologies to study and treat diseases based on traditional, complementary, alternative medicines.

India is known to be a Country of a rich source of traditions and traditional healthcare practices among other eastern Countries of the world. Kerala had a strong traditional knowledge system based on Ayurveda, and a traditional physician was found practiced in each village in Kerala. But unfortunately, due to lack of systematic study and documentation, most of the traditional knowledge



has been lost forever. But somehow the practical application of that knowledge can be met with a few habitual practices among local populations in their daily life for regular disorders. Leaves of *M. koenigii* commonly called curry leaves are a popular leaf-spice used in very small quantities for their distinct aroma due to the presence of volatile oil and their ability to improve digestion. "Let food be your medicine and let medicine be your food." Herbal and natural products of folk medicine/traditional medicine have been used for centuries in every culture throughout the world.

Scientists and medical professionals have shown increased interest in this field as they recognize the true health benefits of these remedies. The important advantages claimed for therapeutic uses of medicinal plants in various ailments are their safety besides being economical, effective and their easy availability. Its leaves are widely used in Indian cookery for flavouring foodstuffs<sup>2</sup>. The present study attempts to evaluate two such practices using *Murraya koenigii* (L.) Spreng for Digestion and Digestive disorders.

### Objectives:

- Document the simple and effective traditional healthcare measures for digestion and digestive problems.
- Scientifically evaluate such healthcare measures.
- Identify the mechanism of traditional herbal based preparations.

**Review of Literature:** The curry leaf tree is native to India, Sri Lanka, Bangladesh, and the Andaman Islands. Later spread by Indian migrants, they now grow in other areas of the world where Indian immigrants settled and the leaves are particularly associated with South Indian cuisines<sup>2</sup>. The leaves of *M. koenigii* are reported to have a great medicinal value such as antibacterial, anti-inflammatory, antifeedant, etc.<sup>3</sup> The two such customary practices include the use of leaves of *M. koenigii* along with buttermilk. It is found having slightly squeezed leaves of *M. koenigii* put in butter milk after a heavy lunch for digestion.

In case of stomach problems and digestive disorders the usual practice of taking buttermilk

boiled with leaves of *M. koenigii* and rhizomes pieces of *Curcuma longa* L. for one or two days. For the study, these two preparations were made and the pharmacognostic analysis of *M. koenigii* leaves was carried before and after making drug preparations. The phytochemical profiling of leaves was also recorded using HPTLC. The anatomical structure and position and size of stomata associated with oil cells support the use of leaf in fresh. The same aroma, as well as flavour due to this essential oil in the preparation even after the removal of leaf, shows its volatile and miscible nature. The chemical constituents in the essential oil of *M. koenigii* leaves are reported<sup>4</sup> including sabinene,  $\beta$  caryophyllene,  $\alpha$  pinene,  $\beta$  phellandrene and traces of terpinene, linalool, ocimene, etc.

### MATERIALS AND METHODS:

**Collection and Authentication of Plant:** The plant sample collected from the herb garden of Kottakkal Arya Vaidya Sala during June and authenticated at Drug Standardisation Laboratory, Centre for Medicinal Plants Research, Arya Vaidya Sala, Kottakkal, Kerala, India.

Subkingdom: Tracheobionta  
 Superdivision: Spermatophyta  
 Division: Magnoliophyt  
 Class: Magnoliopsida  
 Subclass: Rosidae  
 Family: Rutaceae  
 Genus: *Murraya*  
 Species: *M. koenigii* (L.) Spreng

**Collection and Documentation of Data:** The data on preparations using leaves of *M. koenigii* for digestion and digestive disorders **Table 1** were collected from the residents of Malappuram, Palakkad and Kozhikode including a random survey of 75 families and information were documented.

The pharmacognostic analysis of leaves of *M. koenigii* was done including morphological identification, microscopic anatomical studies of petiole and the leaflets using chloral hydrate solution. The histochemical studies were also conducted using Sudan for oil, iodine for starch and ferric chloride for tannin. The leaf powder also used to study the diagnostic characters. The chemical analysis was done before and after processing as used in traditional practice.

**TABLE 1: TRADITIONAL PRACTICES FOR DIGESTION AND DIGESTIVE DISORDERS USING *M. KOENIGII***

S. no.	Traditional practice		
	Health condition	Ingredients used	Mode of Administration
1	For Digestion	<i>M. koenigii</i> leaves and fresh buttermilk	5-7 leaves of <i>M. koenigii</i> slightly crushed by hand and added into 60 ml of buttermilk. This is taken after a heavy meal.
2	For Digestive disorders	<i>M. koenigii</i> leaves, <i>Curcuma longa</i> rhizome, and fresh buttermilk	About 120 ml of buttermilk boiled with 7-21 crushed leaves of <i>M. koenigii</i> and 2-3 <i>Curcuma longa</i> rhizome pieces to reduce half of the volume. This is taken 1-3 times a day.

**RESULTS AND DISCUSSION:** Essential oils are aromatic oil obtained from plant materials. They are secondary metabolites of various parts of plants and are derived from terpenes and their oxygenated compounds. The essential oil has been shown various therapeutic benefits. Essential oils shown antibacterial, antifungal, antiviral, insecticidal and antioxidant properties. They are used in aromatherapy, food preservation and fragrance industry<sup>5</sup>. The aroma and flavour of leaves of *M. koenigii* are due to the presence of highly volatile essential oil. The leaves of *M. koenigii* are also reported to have a great medicinal value such as antibacterial, anti-inflammatory, antifeedant, etc.<sup>3</sup>

The anatomical studies show the presence of more oil cells containing oil globules near the stomatal area and this in turn aid their easier outward movement while preparations. This effective use of this principle can be used in the traditional healthcare practice of having preparations using slightly hand squeezed leaves in raw as well as boiled buttermilk for digestion and digestive disorders. The highly volatile oil present in the leaves of *M. koenigii* during preparations absorbed by the liquid (Buttermilk) in contact. The **Plate 1** shows the pharmacognostic profile and **Plate 2** shows the TLC profile of *M. koenigii* leaf.

#### **Pharmacognosy:**

**Morphology:** The leaves of *M. koenigii* **Plate 1B** are the leaflets as the plant has compound imparipinnate leaf of 12 to 22 cm in length and 4 to 5.5cm in breadth; rachis slender and pubescent; petiolule slender, terete, 1 or 2 mm in length; leaflet 10 to 20, alternate, ovate, lanceolate or rhomboid, 2 to 4.5 cm in length and 1 to 2.4 in breadth, margin crenulate, base obliquely subcuneate, tip obtusely acuminate, minutely notched, dull green dorsally and greenish white ventrally when dry, with characteristic odour and taste; veins 3 to 6 pairs alternate, reticulate, not prominent on both sides; texture, papery to subcoriaceous and slightly brittle when dry.

**Anatomy:** The anatomical structure of *M. koenigii* leaf<sup>6, 7, 8</sup> studied and shown in the Plate **1C-F**. The pharmacognostic and phytochemical studies of *M. koenigii* leaf reported<sup>3</sup> its high range of stomatal number (67-82) as well as a stomatal index (13.47-15.42) were also observed in this study. The detailed anatomy of various components of leaf-like rachis and leaflet are:

**Rachis:** TS shows epidermis a single layer of isodiametric cells covered by thick cuticle; unicellular, non-glandular, curved, gradually tapering trichomes measuring 37 to 45  $\mu$  long and 2 to 5  $\mu$  broad, present; base of trichome swollen and embedded in epidermis, cortex many layered, parenchymatous, hypodermal cortical cells are smaller, isodiametric, compactly arranged, inner cortical cells are larger, elongated tangentially, loosely arranged with intercellular spaces; abundant pyramidal calcium oxalate crystals measuring 12 to 25  $\mu$  in length and 5 to 15  $\mu$  in breadth, several showing twinning, present in cortical cells; cortex in the hypodermal region is traversed by lysigenous cavities; vascular bundle is encircled by a ring of 2 or 3 layered sclerenchymatous pericycle and consists of vessels with annular and spiral thickenings, arranged in radiating rows, xylem parenchyma and xylem fibers with thick walls; phloem is situated towards the periphery of the xylem ring and contains sieve tubes, companion cells, phloem parenchyma, and phloem fibers; medullary rays uniseriate, numerous, with cells containing calcium oxalate crystals; pith large, made up of thin walled parenchymatous cells, several of which are pitted.

#### **Leaflet:**

**Midrib:** TS is flat towards adaxial surface and ridged towards abaxial surface; unicellular, non glandular trichomes arise from the abaxial epidermis; adaxial and abaxial hypodermis bi or triseriate, composed of isodiametric collenchymatous cells; collenchymatous cells of both the surfaces possess single and twinned rhomboid



calcium oxalate crystals, ground tissue composed of loosely arranged, thick-walled isodiametric parenchymatous cells; vascular bundle forms an arc with adaxial xylem and abaxial phloem; xylem comprises of vessels with annular and spiral thickenings, xylem parenchyma and fibers; phloem contains sieve tubes, phloem parenchyma, and phloem fibers.

**Lamina:** TS shows both the adaxial and abaxial epidermis covered by a cuticle; abaxial epidermal cells narrow and laterally elongated while those on adaxial surface slightly radially elongated; palisade biseriate, concentric starch grains of 3 to 5 $\mu$  diameter are found in spongy cells, spongy

parenchyma made up of loosely arranged chlorenchyma; lysigenous cavities present; epidermal cells of lamina in surface view are elongated, straight walled and polygonal; in costal region they are elongated and thin-walled; stomata more on abaxial surface than on adaxial; paracytic; stomatal index of abaxial epidermis 16 to 18 and of adaxial epidermis 13 to 15; unicellular, non glandular, gradually tapering, curved trichomes measuring 80 to 160  $\mu$  long and 6 to 15  $\mu$  broad are distributed on the abaxial epidermal layers; trichomes numerous on costal region and fewer on intercostal regions, leaving cicatrices after detachment.

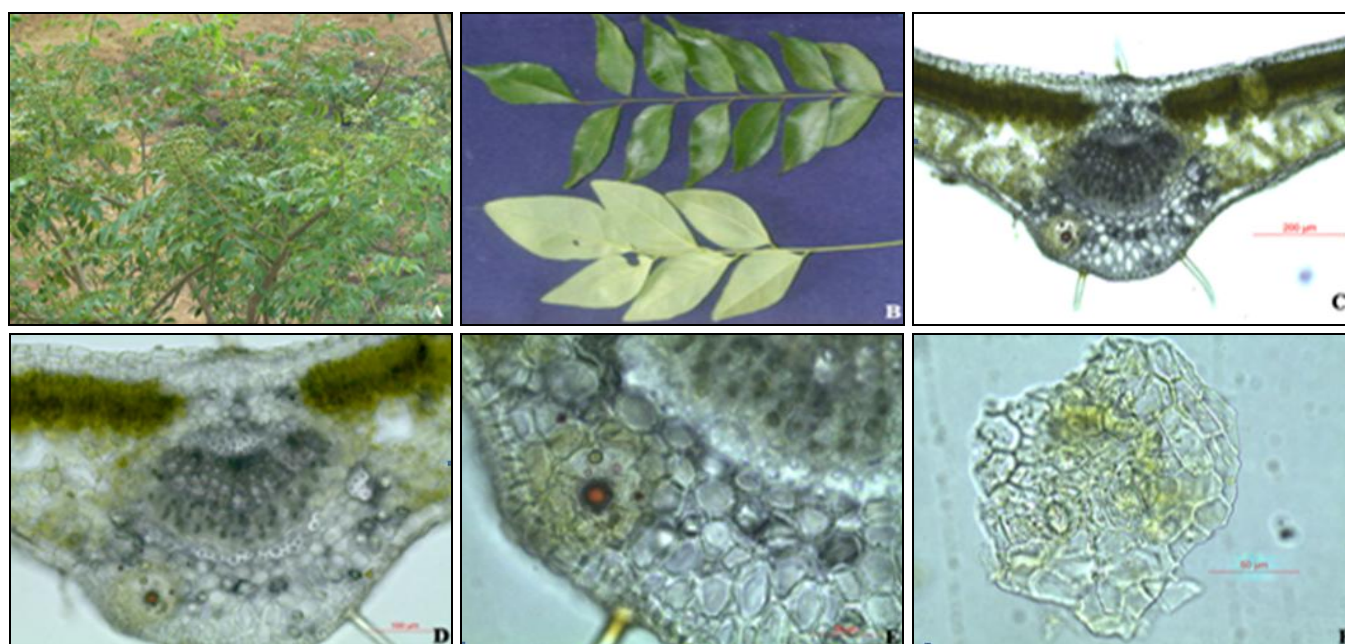


PLATE 1: *MURRAYA KOENIGII* (L.) SPRENG. A) HABIT; B) LEAVES; C) TS OF THE LEAF; D) TS OF THE LEAF SHOWING MIDRIB; E) TS SHOWING OIL GLOBULES NEAR THE LOWER EPIDERMIS; F) LOWER EPIDERMIS IN SURFACE VIEW SHOWING UNDERLYING CELLS, STOMATA AND OIL GLOBULES

#### Diagnostic Characters of Powder of *M. Koenigii*:

The following diagnostic characters<sup>4</sup> observed in the powder of *M. koenigii* leaf. These specific characters help in the identification of *M. koenigii* leaf and also may impart the unique medicinal properties mentioned above to the leaf.

- Prismatic crystals of calcium oxalate and volatile oil globules scattered as such throughout the powder.
- Cells containing single and twinned rhomboid calcium oxalate crystals.
- Plenty of simple, unicellular, thick-walled, sickle-shaped or straight, trichome with pointed apex.
- Fragments of the upper and lower epidermis in surface view the cells of the former being bigger, with straight, thick anticlinal walls and devoid of stomata, and at places show underlined oil cells. The cells of the lower epidermis are not uniform in size, the anticlinal walls are thin and at places are slightly sinuous, exhibiting oil cells lying underneath, embedded with large sized anomocytic stomata, their subsidiary cells and half of the peripheral walls of the guard cells being strongly striated.
- Transversely cut fragments of the lamina with 2 layers palisade underneath the upper epidermis embedded with oil cells & spongy parenchyma with prismatic crystals of calcium oxalate.

- Longitudinally cut fragments thin walled fibers, annular tracheids and pitted fibrous tracheal vessels.
- Fragments of the epidermis of rachis in surface view showing evaluated cuticularised cells embedded with oil.

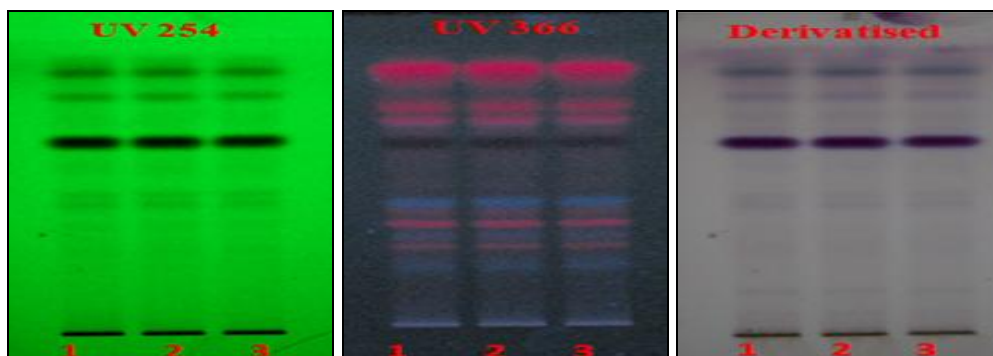


PLATE 2: TLC PROFILE OF *MURRAYA KOENIGII* LEAVES. 1 - 3 LEAF ETHANOLIC EXTRACTS

**Phytochemistry:** The estimation of total essential oil content in fresh leaf and processed leaf were carried out using Clevenger method. The chemical profile was done using ethanolic extracts of *M. koenigii* in HPTLC system. The TLC profiles were shown in **Plate 2**. The chemical estimation of essential oil content was done before and after processing as used in traditional practice. The results are shown in **Table 2**.

TABLE 2: THE ESSENTIAL OIL CONTENT OF *M. KOENIGII* BEFORE AND AFTER PROCESSING

S. no.	Plant material analysed	Essential oil content (%)
1	Fresh leaves of <i>M. koenigii</i>	0.35 - 0.40
2	Processed leaves of <i>M. koenigii</i> as in traditional practice	0.04 - 0.05

**CONCLUSION:** The healthcare tradition mentioned in the study is simple and effective. It is found using as a customary practice in 75 families in three districts of Kerala. The presence of oil and glandular dots on the surface of leaves gives the aroma for the leaf. The anatomy of the leaf shows the presence of abundant oil cells containing oil globules near stomata and this aid in the mixing of oil in the medium of intake like buttermilk. The reduction in the oil content after processing shows the transmission of essential oil to the medium used in the traditional preparation of buttermilk. The acidic nature of the buttermilk also helps in the easier absorption of the oil in the leaf. So this can

be accepted as a scientific, effective primary healthcare measure.

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**CONFLICT OF INTEREST:** Nil

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