

Pharmacognostical and antibacterial evaluation of *Murraya koenigii* (L) Spreng

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ABSTRACT

Our present study was aimed to detect the medicinal uses of the plant *Murraya koenigii* (L) Spreng belonging to the family Rutaceae by performing various studies such as Pharmacognostical, phytochemical and antibacterial activity, using seven different bacterial strains, which are harmful to human beings. The *Murraya koenigii* commonly known as “Curry leaf” has been recognized in different systems of traditional medicines for the treatment of different diseases and ailments of human beings. The leaves of the plant are said to be cooling and stomachache. The study includes macroscopy, microscopy, preliminary phytochemical screening and antibacterial evaluation.

Keywords: *Murraya koenigii*; pharmacognostic; phytochemical; antibacterial activity

1. INTRODUCTION

Plants contain chemical compounds that may be in one way or another responsible for their healing properties and other functions. The chemical compounds are secondary metabolites of which at least twelve thousand have been isolated (Hasan *et al.*, 1988). Medicinal plants, which form the backbone of traditional medicine, have in the last few decades been the subjects for very intense pharmacological studies; this has been brought about by the acknowledgement of the value of medicinal plants as potential sources of new compounds of therapeutic value and as a source of lead compounds in the drug development.

In the developing countries, it is estimated that about 80 % of the population rely on traditional medicine for their primary health care.

There arises a need and therefore to screen medicinal plants for bioactive compounds as a basis for further pharmacological studies (Shailendra Gurav *et al.*, 2007). Up to 80 % of the population depends directly on the traditional medicine for the primary health care (Kirby, 1966).

The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly due to synthesized during secondary metabolism of the plant (Prusti, 2008).

The present study is aimed to investigate the pharmacognostical, phytochemical and antibacterial evaluation of the medicinal plant *Murraya koenigii* (L) Spreng.

2. MATERIALS AND METHODS

2. 1. Collection and authentication of the plant

For the present study, the fresh leaves of *Murraya koenigii* were collected in summer season locally from the Experimental Orchards, Faculty of Agriculture, Annamalai University, Tamil Nadu in May, 2014.

The taxonomic identification of the plant was confirmed by Dr. V. Venkatesalu, Head of the Department of Botany (DDE), Annamalai University, Voucher specimen was deposited in the Department.

2. 2. Microscopic (Anatomical) Studies

The fresh leaves of *Murraya koenigii* was collected and fixed in FAA (Formalin Acetic acid and alcohol mixtures). Free hand sections were taken and kept in 70 % ethanol. The sections were stained with saffranin and mounted according to the methods described by Johansen (1940), Photographs were taken by Phase contrast microscope (Olympus SP-350, digital compact camera, 8.0 mega pixels).

2. 3. Pharmacognostical Studies

2. 3. 1. Fluorescence Analysis

Fine powder and their extracts were obtained in various solvents namely petroleum ether, benzene, chloroform and ethanol. The aqueous extract was prepared by directly boiling the powder with distilled water.

They were examined under visible and UV light. These powdered material were also treated with various reagents such as 50 % HNO₃, acetone, ethyl alcohol, 50 % H₂SO₄, 1 N HCL and 1 N aqueous NaOH are the various chemical and organic reagents used to perform fluorescence analysis (Kokate, 1994) and changes in colour were recorded.

2. 3. 2. Quantitative Determination

The percentage of total ash, water soluble ash, acid insoluble ash, sulphated ash, were obtained by employing the standard methods of analysis as described in pharmacopoeia of India (1996).

2. 3. 3. Phytochemical studies

Murraya koenigii shade dried leaf powder was subjected to determine volatile oil content. Chemical tests were employed in the preliminary phytochemical screening for carbohydrates, alkaloids, phytosterols, glycosides, saponins, flavonoids, proteins, tannins and gums (Trease and Evans, 1966).

2. 4. Antibacterial Assay

2. 4. 1. Microbial strains

The different bacterial strains used for the study of antibacterial activities were collected from the Department of Medical Microbiology, Rajah Muthaiya Medical College & Hospital, Annamalai University, Annamalainagar. The bacterial strains were sub cultured in the Muller Hinton agar medium. The samples for bacterial strain were sub cultured in individual plates (Bauer *et al.*, 1966).

2. 4. 2. Solvent used

The organic solvents such as petroleum ether, benzene, chloroform, ethanol and distilled water were used to extract bio active compounds.

3. RESULTS AND DISCUSSION

The macroscopical studies revealed the shape of leaves of *Murraya koenigii* (L) Spreng as obliquely ovate or some what rhomboid with acuminate obtuse or acute apex, bipinnately compound with exstipulate in alternate arrangement. The petiole were of 20 to 30 cm in length. The leaf had reticulate venation and dentate margin with asymmetrical base (Fig. 1 & 2).



Fig. 1. *Murraya koenigii* (Linn.) Spreng. (Habit).

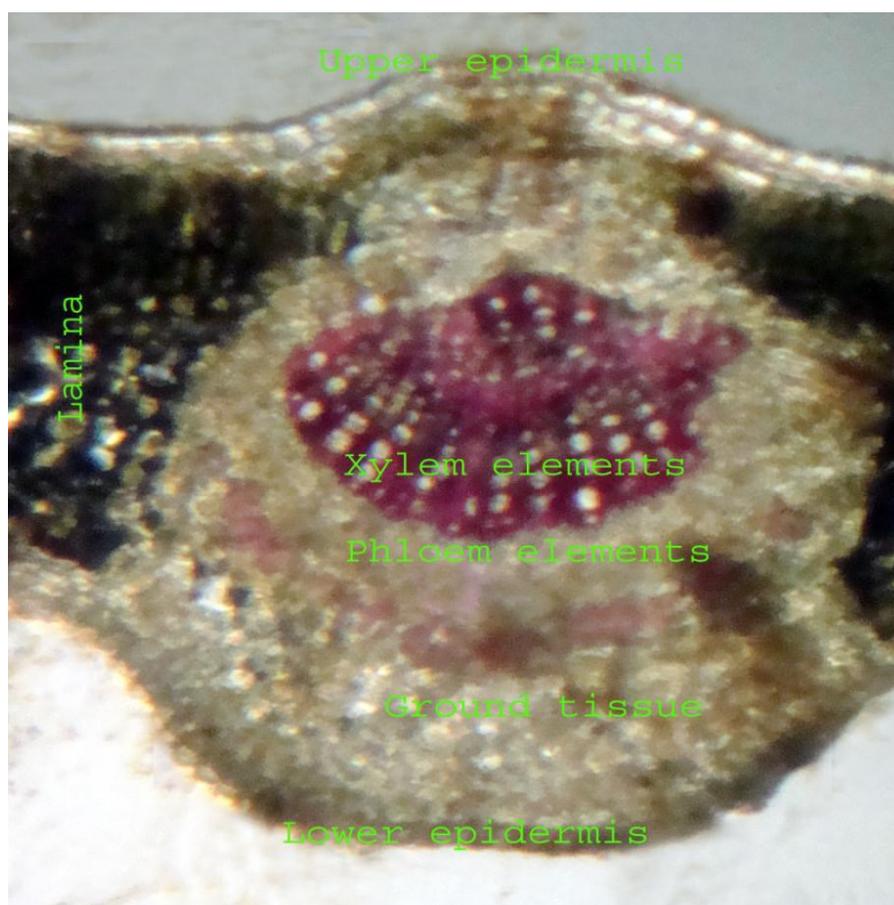


Fig. 2. Transverse section of Leaf.

Under the compound microscope, the stomata were found distributed on abaxial surface while the adaxial surface was without stomata. The type of stomata was noted as anomocytic one. The transverse section of leaf exposed a layer of epidermis composed of rectangular cells as outer most covering on both upper and lower layer. The upper epidermis was enveloped with deposition of cuticle. In midrib portion, epidermis was followed by 1-4 layers of collenchymatous hypodermis in continuation with 2-5 layers of chlorenchyma cells filled with chlorophyll contents. Beneath this, ground tissue portion lies. This portion is composed of oval to polygonal parenchyma cells and is transversed with vascular bundle, sandy and prismatic crystals of calcium oxalate were found in this region.

Table 1. Fluorescence behavior of leaves of *Murraya koenigii*.

Sl. No	Treatment	Under Day Light	Under UV Light
1	Powder as such	Pale Green	Pale Green
2	Powder in Distilled water	Bluish Green	Bluish Green
3	Powder in absolute alcohol	Olive Green	Orange

4	Powder in 10 % NaOH	Light Brown	Dark Brown
5	Powder in 50 % HNO ₃	Yellow	Black
6	Powder in 50 % H ₂ SO ₄	Dark Green	Yellowish Green
7	Powder in Petroleum extract	Light Yellow	Light Green
8	Powder in Chloroform extract	Yellowish Green	Green
9	Powder in Ethanol extract	Light Green	Dark Green
10	Powder in Acetone extract	Pale Yellow	Light Green
11	Powder in 1 N HCl	Orange	Green

Fluorescence properties of *Murraya koenigii* (L) Spreng, powdered leaf material obtained which is used for to analysis under ultra violet light. 50 % HNO₃, acetone, ethyl alcohol, 50 % H₂SO₄, 1N HCL and 1 N aqueous NaOH are the various chemicals and organic reagents used to perform fluorescence analysis. The fluorescence behaviour was noted as in Table 1.

Table 2. Physico-chemical parameters of *Murraya koenigii*.

Sl. No	Parameters	Values obtained on dry weight basis (w/w)
1	Loss of drying	10.17 %
2	Total ash	11.28 %
3	Acid insoluble ash	5.30 %
4	Water soluble ash	1.95 %
5	Methanol soluble extractives	7.70 %
6	Water soluble extractives	9.52 %

The physico-chemical properties of powder exposed the moisture content (loss on drying, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractives and water soluble extractives) are as shown in Table 2. The higher percentage of total ash and acid insoluble ash may be due to the presence of calcium oxalate crystals or other inorganic salts present in various metabolites.

Preliminary phytochemical screening of *Murraya koenigii* (L) Spreng shows the presence of Carbohydrates, Proteins, Phytosterols, Tannins, Flavonoids, Anthroquinone glycosides, Alkaloids and Saponins were presented in the leaf material (Table 3).

The antibacterial activity of the leaf extracts of *Murraya koenigii* (L) Spreng in different solvent extracts are shown in Table 4. The antibiotic disc ampicillin showed antibacterial activity against *Staphylococcus aureus*, *Staphylococcus epidermis*, *Escherichia coli*,

Klebsiella spp, and *Enterobacter* spp. It does not show any activity against *Proteus vulgaris* and *Proteus mirabilis* it had the maximum inhibitory action against almost all the bacteria used for example *Staphylococcus aureus* (14 mm). Therefore it should be understood that by undergoing these studies various secondary metabolites present in the plant, its importance for use as drug, its activity to fight against certain bacteria which are harmful to human beings can be easily identified. Further integrated investigation using HPLC and GC-MS will lead to purification and structural elucidation of active principle against microorganisms.

Table 3. Phytochemical examination of leaves of *Murraya koenigii*.

Sl. No	Qualitative Tests	Results
1	Carbohydrates	++++
2	Protein	+
3	Phytosterols	+
4	Tannin	+
5	Gum / Mucilage	-
6	Flavonoids	++
7	Volatile Oil	+
8	Anthroquinone Glycosides	++
9	Alkaloid	++++
10	Saponins	++

Table 4. Antibacterial activity of *Murraya koenigii*.

Tested organism	Petroleum ether	Benzene	Chloroform	Ethanol	Control
<i>S.aureus</i>	11	11	25	11	25
<i>S.epidermis</i>	-	11	25	-	24
<i>Escherichia coli</i>	-	-	25	-	27
<i>Klebsiella sp</i>	-	-	17	-	12
<i>Proteus vulgaris</i>	23	25	23	-	-
<i>Proteus mirabilis</i>	22	25	24	-	-
<i>Enterobacter sp</i>	-	11	13	10	24

4. CONCLUSION

The observed parameters like morphology, microscopy, quantitative and qualitative studies may be useful to establish certain botanical standards for identification and standardization of *Murraya koenigii* (L) Spreng for the further studies.

References

- [1] Bauer A.W., Kirby W.M.M., Sherris J.C., *Am J Clin Pathol* 45 (1966) 493-496.
- [2] Hasan C.M., Islam S.N., Begun K., Ilias M., Hassain A., *Bengladesh J. Bot.* 17 (1988) 135-139.
- [3] Johanson (1940). Plant Microtechnique Stains Mc GRAW – HILL Publications, 40-50.
- [4] Kirby G.C., *Trans. Roy. Soc. Trop. Med. Hyg.* 90 (1996) 605-609.
- [5] Kokate C.K., (1994). “*Practical Pharmacognosy*”, 3rd Ed, Vallabh Prakashan, New Delhi, 115-127.
- [6] Prusti A., Mishra S.R., Sahoo S., Mishra S.K. (2008). Antibacterial Activity of Some Indian Medicinal Plants Department of Botany, P.N. College, Khurda-752057. *Orissa University Department of Pharmaceutical Sciences*. Utkal University, Bhubaneswar. Orissa. 751 004.
- [7] Shailendra Gurav, Vijay Gulkari, Nandkishore Duragkar, Arun Patil (2007). Pharmacognosy, phytochemistry, pharmacology and clinical applications of *Gymnema sylvestre* R Br. *Department of Pharmaceutical Sciences, Nagpur university*, Amaravati road, Campus, Nagpur, 1(2); 414-433.
- [8] Trease G.E., Evans W.C. (1996). *Pharmacognosy. Macmillan Publishers Ltd.* 213- 832.

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