

UV Absorption Property of *Murrya koenigii* (Linn) Spreng Wettst Leaves: Effect of Extraction Solvents

Prasenjit Mitra¹, Tanaya Ghosh², Prasanta Kumar Mitra^{2*}¹Department of Biochemistry, All India Institute of Medical Sciences (AIIMS), Jodhpur Rajasthan India²Department of Medical Biotechnology, Sikkim Manipal University, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim, India

*Corresponding author: Prasanta Kumar Mitra

| Received: 10.04.2019 | Accepted: 18.04.2019 | Published: 30.04.2019

DOI: 10.21276/sajp.2019.8.4.4

Abstract

Original Research Article

Murrya koenigii Linn. Spreng Wettst (*M. koenigii* L.) is widely used in medical treatment since long. In traditional medicine the plant is used for its stomachic and tonic properties. It is also used to treat piles, leukoderma, and kidney pain and blood disorders. Modern researchers noted a wide range of pharmacological activities of different parts of this plant. These include anti-oxidant, anti-cancer, anti-inflammatory, anti-diabetic, anti-gastric ulcer, anti-microbial, gastro protective, hepato protective etc. Photo-protective Effect of *M. koenigii* is also known in literature. Aim of the present study was to examine effect of extraction solvents on UV absorbing property of the plant. Leaves of *M. koenigii* L. were collected and identified by the taxonomist. Solvent extractions of the leaves were made separately by using ethanol, chloroform, methanol, acetone, ethyl acetate and benzene. In a spectrophotometer the extractions were separately exposed for absorption of UV ray. Result showed that all extracts of *M. koenigii* L. leaves had UV absorption property but methanol extract had maximum activity. It is concluded that methanol extract of *M. koenigii* L. leaves may be used in preparation of sun screen lotions.

Keywords: *Murrya koenigii* linn leaves; Solvent extractions; UV absorbing property.

Copyright @ 2019: This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

INTRODUCTION

M. koenigii L. (family, Rutaceae), commonly known as curry leaf, is a semi deciduous aromatic herb or small tree with dark green bark. It is widely distributed at foothills of Himalayas from Kumaon to Sikkim, Bengal, Assam, middle and lower hill forests up to the

Height of 5000 ft. The herb, also found in Nepal, Bhutan, Thailand, Pakistan, Vietnam and Sri Lanka, is known by different names. In Nepali it is called 'meehi saag', in Hindi 'bursunga' and in English the herb is known as 'curry leaf tree'. Leaves of the plant are often used in curries for flavouring due to their typical flavour [1].

Several phytochemicals were isolated and characterized from *M. koenigii* L. These include, 9-formyl -3- methyl carbazole, 9- carbethoxy-3-methyl carbazole, 6, 7-dimethoxy-3-methyl carbazole-1, 4-quinone, 7- methoxy- 3 methyl carbazole-1,4-quinone, 1-hydroxy-3-methyl carbazole, Me-2-methoxy carbazole -3- carboxylate, murrayazolidine, murrayacinine, murrayazolinol, girinimbinal, girinimibine, mukonidine, mahanimbinal, mahanimbilol *et al.* [2]

M. koenigii L. has several uses in traditional medicine. The herb is used for its stomachic and tonic properties. Leaves and roots are used to treat piles, leukoderma, and kidney pain and blood disorders. Burk is used to cure eruptions and poisonous animal bites. It is reported that different parts of *M. koenigii* L. possess antimicrobial, anthelmintic, antidiarrheal, hepatoprotective, anti-ulcer, cytotoxic, antitumor, antioxidant, analgesic, and anti-inflammatory properties [3].

Pande *et al.* observed photo-protective effect of *M. koenigii* L. against photo damage induced in Swiss albino mice under acute exposure to ultraviolet radiation [4]. Aim of the present work was to see effect of extraction solvents on UV absorption property of *M. koenigii* L. leaves.

MATERIALS AND METHODS

Collection of plant materials

Leaves of *M. koenigii* L. were purchased from the local market. Leaves were authenticated by the taxonomist of the department of Botany of the University of North Bengal, Dist. Darjeeling, and West Bengal, India. A voucher specimen was kept in the department of Medical Biotechnology, Sikkim Manipal

Institute of Medical Sciences of the Sikkim Manipal University,

Gangtok, Sikkim, India for future references.



Fig-1: *Murrya koenigii* Linn. Spreng Wettst

Extraction of the plant leaves

M. koenigii L. leaves were washed thoroughly under tap followed by distilled water. Leaves were then shade dried and powdered. 80g of this powder was extracted separately with 400 ml of methanol, ethanol, acetone, chloroform, benzene and ethyl acetate in a soxhlet apparatus at 37^o C for 10 minutes. Extracted materials were filtered. Filtrate was made to dry in a lyophilizer. Brownish mass obtained. To 20 mg of this mass distilled water (100 ml) was added. The solution was filtered and the filtrate was processed in a spectrophotometer for UV ray absorption at the range of 200-400 nm. All experiments were repeated for five times and mean value calculated.

Chemicals

Chemicals required for the study were purchased from Loba Chem. Lab, Himedia Lab, India as well as from Merck, Germany.

Statistical analysis

Data were analyzed statistically by SPSS 20. The statistical significance between UV absorption spectra of different extracts was evaluated with Duncan's multiple range test (DMRT). 5% were considered to be statistically significant [5].

RESULTS

UV absorption spectra of methanol, ethanol, acetone, chloroform, benzene and ethyl acetate extracts

of *M. koenigii* L. Leaves are shown in Figures – 2, 3, 4, 5, 6 and 7 respectively.

Methanol extract absorbs maximum UV ray at 200 nm (1.56). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.87, 0.65, 0.54 and 0.48 respectively. At 200 nm wave length ethanol extract absorbs maximum UV rays (1.41). At 250 nm, 300 nm, 350 nm and 400 nm wave lengths ethanol extract of *M. koenigii* L. leaves showed absorptions 0.72, 0.51, 0.49 and 0.42 respectively.

Benzene extract showed maximum UV absorption at 200 nm (1.23). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.65, 0.48, 0.39 and 0.36 respectively. At 200 nm acetone extract absorbs maximum UV rays (1.1). At 250 nm, 300 nm, 350 nm and 400 nm wave lengths acetone extract of *M. koenigii* L. leaves however showed 0.6, 0.41, 0.32 and 0.28 absorptions respectively. Chloroform extract showed maximum UV absorption at 200 nm (0.95). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.49, 0.33, 0.27 and 0.15 respectively. Ethyl acetate extract showed maximum UV absorption at 200 nm (0.65). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.32, 0.22, 0.15 and 0.09 respectively.

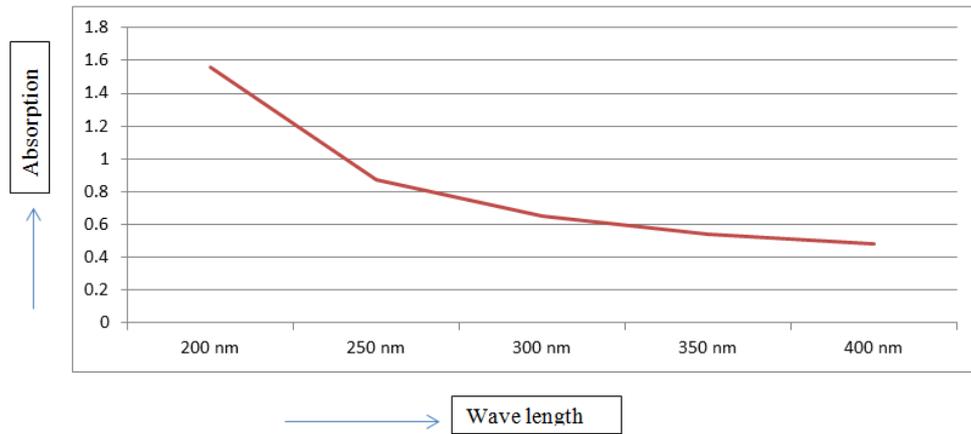


Fig-2: UV radiation absorption by the methanol extract of *M. koenigii* L. leaves

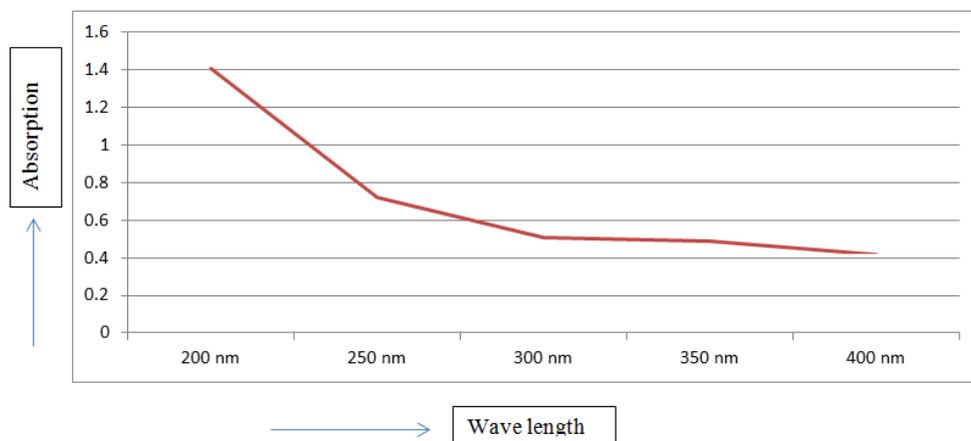


Fig-3: UV radiation absorption by the ethanol extract of *M. koenigii* L. leaves

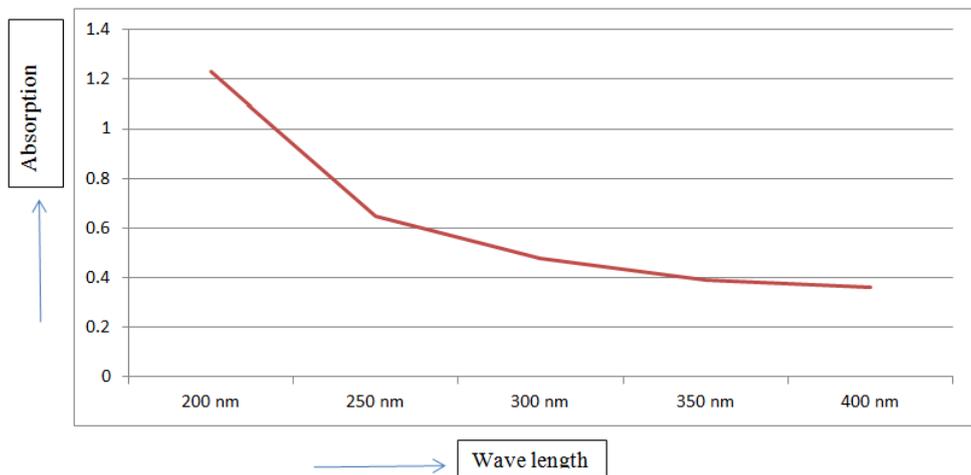


Fig-4: UV radiation absorption by the benzene extract of *M. koenigii* L. leaves

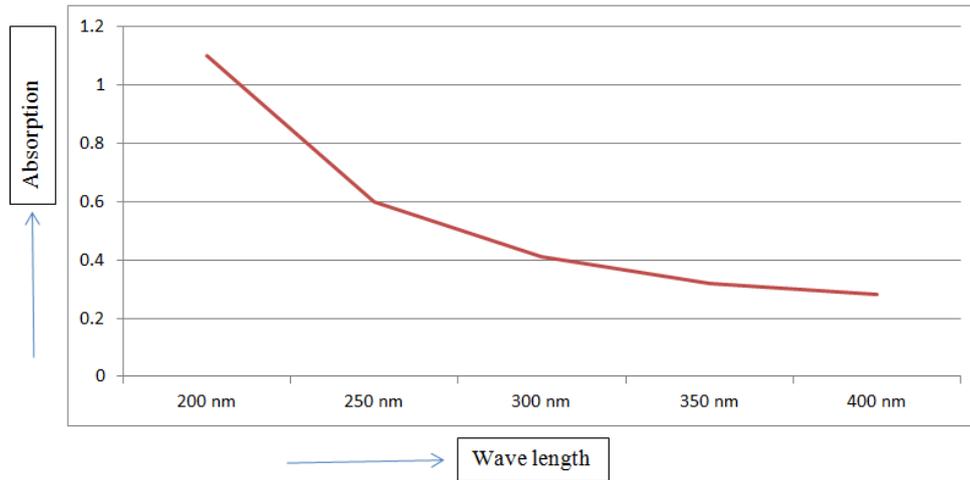


Fig-5: UV radiation absorption by the acetone extract of *M. koenigii* L. leaves

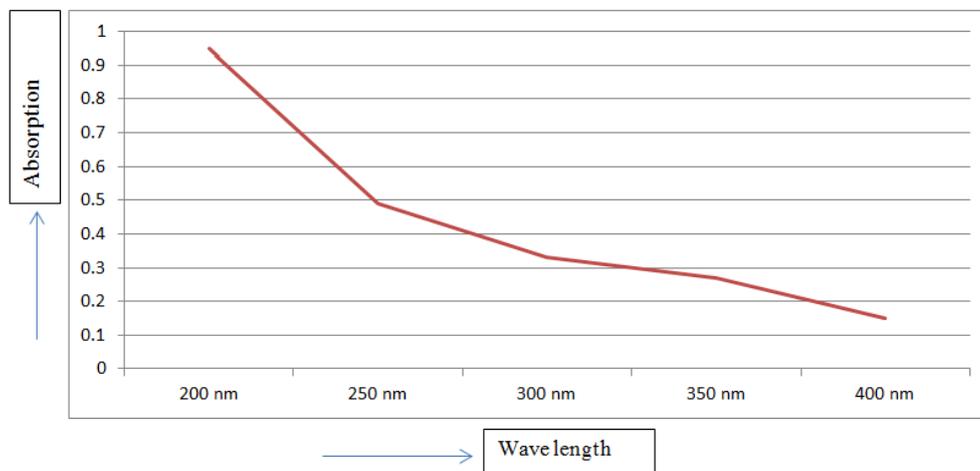


Fig-6: UV radiation absorption by the chloroform extract of *M. koenigii* L. leaves

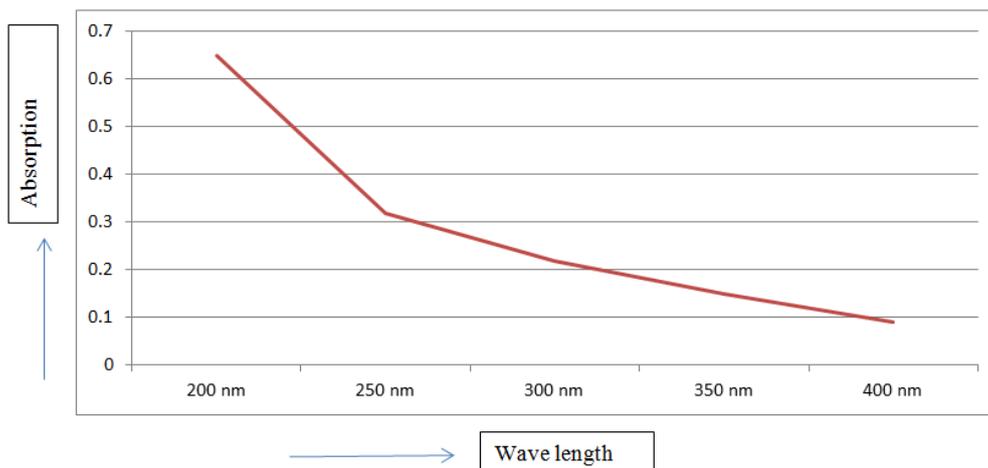


Fig-7: UV radiation absorption by the ethyl acetate extract of *M. koenigii* L. leaves

DISCUSSION

Ultraviolet radiation, non-ionizing radiation, falls under 180 – 400 nm wavelength region in electromagnetic spectrum. Based on region of absorption ultraviolet radiation is known as, germicidal

(wave length, 180-280 nm), erythema (wave length, 281-314 nm) and black light (wave length, 315-400 nm). Though common source of UV radiation is sunlight, it also comes from laboratory equipment like

cross linker, lasers, germicidal lamps, Tran's illuminators, and biological safety cabinet's *et al.* [6]

Solar UV-radiation is required for cutaneous synthesis of vitamin D and this covers almost 90% of the vitamin D requirement of human body. But solar UV-radiation has bad effect too. It can cause skin and eye injury, photosensitivity reactions to ingested drugs, and stimulate genetically determined photo sensitivities. Skin is severely affected if there is over exposure of UV rays. Pigmentary changes atrophy, wrinkling and malignancy may occur. Skin cancer like squamous cell carcinoma, basal cell carcinoma or malignant melanoma may develop. UV ray also affects eye. Cornea, the outer protective coating of the eye, may be affected. Painful inflammation of eye is seen and if the eye gets chronic UV exposure, then it lead to formation of cataracts. Over-exposure to UV radiation also changes distribution and function of white blood cells in human body. This may cause harmful suppressing effect on the immune system [7].

In this context there is search for the sources which can absorb UV radiation from the environment thereby protecting humans. Research was extended even in the field of medicinal plants and presently it is known that several medicinal plants like *Lycopersicon esculantum*, *Oscimum sanctum*, *Mentha piperita*, *Calotropis gigantean*, *Azadirachta indica*, *Aloe vera*, *Carica papaya*, *Phyllostachys pubescens* etc. can absorb ultra violet radiation [8, 9].

Recently photo-protective effect of *M. koenigii* against photo damage induced in Swiss albino mice under acute exposure to ultraviolet radiation was observed [4]. In present study we have shown that all solvent extracts of *M. koenigii* leaf can absorb ultraviolet radiation.

Maximum absorption was found at 200 nm. Further, methanol extract of the leaves had maximum absorption in all the wave lengths of UV region (Figure – 8).

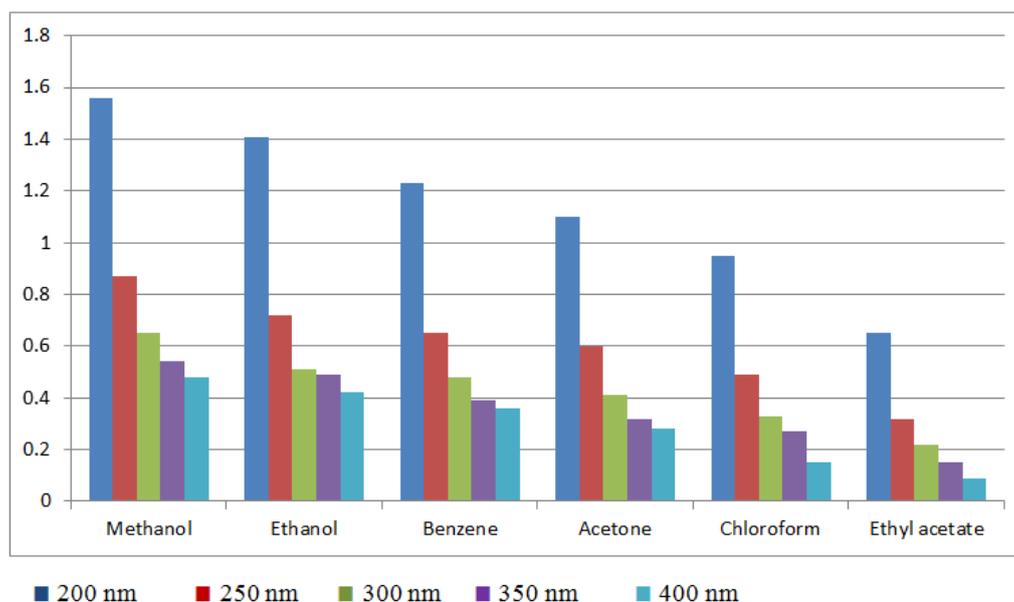


Fig-8: UV radiation absorption at different wave lengths by the methanol, ethanol, benzene, acetone, and chloroform and ethyl acetate extracts of *M. koenigii* L. leaves

Biological activity of medicinal plants varies with season [10-12]. We are now interested to see the effect of season on ultraviolet radiation absorption by *M. koenigii* L. leaves. Work in this direction is presently going on in our laboratory.

CONCLUSION

In the present study we found UV radiation absorption property of *M. koenigii* L. leaves. The property may be utilized in preparation of sun screen lotions to protect humans from UV radiation.

Acknowledgements

We gratefully acknowledge the cooperation of taxonomists of the department of Botany,

University of North Bengal, Siliguri, Dist. Darjeeling, and West Bengal for identification of *M. koenigii* L. leaves.

REFERENCES

1. Jain Vandana, Momin Munira, Laddha Kirti. *Murraya Koenigii*: An Updated Review. *International Journal of Ayurvedic and Herbal Medicine*. 2012; 2(4): 607-627.
2. Saha C, Chowdhury BK. Carbazoloquinones Form *Murraya koenigii* *Phytochemistry*. 1998; 48 (2): 363-366.
3. Gahlawat Dheeraj K, Jakhar Savita, Dahiya Pushpa. *Murraya koenigii* (L.) Spreng: an ethnobotanical, phytochemical and

- pharmacological review. Journal of Pharmacognosy and Phytochemistry. 2014; 3(3): 109-119
4. Pande AR, Mascarenhas B, Bhagwat AM, Desai K. Photo-protective Effect of *Murraya koenigii* (Curry Leaf) Against Photodamage Induced in Swiss Albino Mice Under Acute Exposure to UVB Radiation. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(3): 407-414.
 5. Bliss CI. Statistics in biology, Statistical methods for research in the natural Sciences, Vol. 1, McGraw Hill Book Company, NY. (1967): 558.
 6. MacKie RM. Effects of Ultraviolet Radiation on Human Health. *Radiation Protection Dosimetry*. 2000; 91(1-3):15-18.
 7. Gharge VG, Yadav A. Study of Methanolic Extract of Leaves *Calotropis gigantean* (L.) As an Anti-Solar. Adv Complement Alt Med. 2018; 1(4) : 1-3.
 8. Gupta Dipali. Absorbing Properties of Some Plant Derived Extracts. Research Journal of Chemical and Environmental Sciences. 2013; 1(2) : 34-36.
 9. Gupta Vandana. Environment friendly antibacterial and uv protective finish on cotton using *S. cumini* (L.) leaves extract. International Journal of Textile and Fashion Technology. 2017; 7(1): 53-62.
 10. Feeny P. Seasonal changes in oak leaf tannins and nutrients as a cause of spring feeding by winter moth caterpillars. Ecology. 1970; 51:565-581.
 11. Gupta PL. Variation in morphological characters and active principle constituents of *Eclipta prostrata* Linn. Under different seasonal and soil conditions. JRIM.1977; 12(1): 80-84.
 12. Mauffette Y and Oechel WC. Seasonal variation in leaf chemistry of the coast live oak *Quercus agrifolia* and implications for the California oak moth. *Phryganidia californica* Oecologia. 1989;79:439-445.