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SPECTROSCOPIC EVALUATION OF SUNSCREEN POTENTIAL OF *LANTANA CAMERA*

Abhinay Kumar Dwivedi

Department of Pharmacognosy, Institute of Pharmacy, Madhav University, Abu Road, Pindwara - 307026, Rajasthan, India.

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Correspondence to Author:
Abhinay Kumar Dwivedi

Professor,
Department of Pharmacognosy, Institute of Pharmacy, Madhav University, Abu Road, Pindwara - 307026, Rajasthan, India.

E-mail: abhinavnbri@gmail.com

ABSTRACT: *Lantana camara L.*, belonging to family Verbenaceae. It is a native to tropical and subtropical regions and sprawls as an array of strains and diverse varieties. *Lantana camara* is a flowering ornamental, erect, hairy aromatic shrub, it is a most widespread, variable straggling plant with variegated flower characteristics. The plant is sprawled all round India with their ability to accustom in diverse climatic and atmospheric conditions. Different parts of plants have been considered to possess numerous constituents of pharmaceutical importance. *Lantana camara* predominantly the leaves have been used in the treatment of various human ailments. UV-radiation is perceived as a major cause that vitiate the intuitive nature and function of skin. UV-radiation may cause detrimental effects to the usual characteristics of human skin. UV-filters or sunscreens are the agent that could help to assuage the deleterious effect of UV radiation by absorbing and tempering the harmfulness to a major extent. The present study supports the sun protective efficacy of *Lantana camara* in concentration dependent manner that could heighten cosmeceutical scope of *Lantana camara*.

INTRODUCTION: *Lantana camara L.*, called by the multiple vernacular names like Surinam tea plant, Spanish flag wild or red sage etc. is a shrubby aromatic hedge belonging to family Verbenaceae. It is a native to tropical and subtropical part of the world, the flourish well and sprawls as an array of strains and varieties. Lantana camara was presumably introduced In India before nineteenth century. *Lantana camara* is a flowering ornamental, erect, hairy aromatic shrub, it is regarded as a most pervasive, catholic, straggling plant with variegated flower characteristic.

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The plant is sprawled all round subtropical and tropical part with their ability to accustom in diverse climatic and atmospheric conditions. The leaves possess peculiar characteristics features with decussate with leathery texture, rough bristled upper surface, pubescent lower surface and dentate leaf margin leaves and twigs are used as a green mulch.

Different parts of plant have been considered to possess various constituents like phenolic compounds, essential oils, flavonoids, alkaloids, quinine, tannin, carbohydrates, proteins, glycosides, steroids, iridoid glycosides, oligosaccharides, saponins, terpenoids. *Lantana camara* predominantly the leaves have been used in the treatment of wound healing, scratching, toothache stomachache, bronchitis, rheumatism, biliary fever, antiseptic and in variety of infections. Retrospective research presaged that leaf extract

could offer protection against multiple disorders and oxidative stress. Due to the presence of vital corresponding components, sunscreen activity has been chosen for the study. Sunscreen agent are compounds which are principally used to protect the skin from deleterious UV radiations and oxidative stress [1-6].

SPF = Minimal erythemal dose in sunscreen protected skin / Minimal erythemal dose in non-sunscreen protected skin

MED is the minimum time interval or dosage of ultraviolet irradiation engender noticeable erythema on protected or unprotected skin [7-9]. Higher SPF value would be beacon of higher protection against UV radiation. The sample absorbance was recorded at 5 nm interval in the range of 290-320 nm.SPF is determined by spectrophotometer. The SPF value was reckoned by using formula [7-14].

$$\text{SPFspecrophotometer} = \text{CF} \times \sum_{290}^{320} \text{EE}(\lambda) \times \text{I}(\lambda) \times \text{Abs}(\lambda)$$

Where is CF denoting Correction factor (10), EE (λ) indicates erythmogenic effect of bring about by radiation at wavelength (λ) Abs (λ) corresponds to spectrophotometric absorbance values at discrete wavelength (λ). The value of EE(λ)×I(λ) taken as a constant and displayed in **Table 1.**

MATERIAL AND METHODS: Analytical grade chemical and glassware of ASGI mark had been used to perform study. The analysis of sample was done in UV-VIS Spectrophotometer model UV-1700 Pharmaspec Shimadzu.

Collection and Processing of Plant Material: The leaves of *Lantana camara* have been collected in the month of September from sideways to the road, Bhopal MP. The collected plant leaves were thoroughly washed with tap water then shade dried till crumpled. The dried leaves were used to make coarse powder. The powder is shifted to obtain uniform size, the powdered was then subjected to extraction with selected solvents.

Extraction of Plant Material: The hydro alcoholic extract has been prepared by immersing the plant drug in the selected solvent for seven days consecutive with occasional stirring. 200g of powdered plant material was accurately weighed, each 50 g of drug was extracted with 60%, 70%, 80% and 90% of alcohol respectively. The extract is then filtered thrice through Whatman filter, the filtrate was collected, evaporated to dryness. The residual dregs of solvent were expunged in the desiccator. The yield of individual extract was calculated [8, 9].

Sample Preparation: 10 mg of plant extract mixed with 100 mL of hydroalcoholic solution to get 100µg/mL. The mixture is then filtered through Whatman filter paper, three dilution 40µg/mL, 50µg/mL and 60µg/mL were made with stock solution, each sample had been scanned thrice for selected wavelength at 5 nm intervals through UV spectrophotometer. The base line correction was made with similar solvent used for extraction. The absorbance of selected dilutions of *Lantana camara* extract was recorded [8, 9].

***In-vitro* SPF Determination:** The UV absorption efficacy of *Lantana camara* extracts were evaluated by spectrophotometric method. The 40µg/mL, 50µg/mL and 60µg/mL dilutions of disparate extract were made from initial stock solution, the devised dilutions were scanned thrice in the range of 290 nm to 320 nm at 5 nm interval. The means of absorbance was taken for each discrete concentration, the absorbance values has been multiplied with the constant. The summation of those multiplied with correction factor constant 10 [7-14].

TABLE 1: PRODUCT FUNCTION USED IN CALCULATION OF SPF

Sr. no.	Wavelength in nm	EE(λ) X I (normalized)
1	290	0.015
2	295	0.0817
3	300	0.2874
4	305	0.3278
5	310	0.1864
6	315	0.0839
7	320	0.018
Total		1

RESULT AND DISCUSSION: The percentage yield of plant extract with different solvents was found as *Lantana camara* 6.4%, 6.8%, 6.9%, 7.8%. The result corroborated that 90% hydroalcoholic solvent had more extractable efficiency in terms of maximum upshot compared to other extraction solvent used in the study. The spectrophotometric SPF evaluation method could be useful in development of sun protective preparation.

It would be better alternative for preliminary evaluation before going to *in-vivo* study. In this study plant extracts were evaluated by UV-spectrophotometry. The SPF was reckoned by Mansur equation. The observation and outcome revealed that hydro alcoholic extracts of *Lantana camara* had potential of sun screen and could be used as sunscreen in cosmetics development. 90% of hydroalcoholic extract had shown greater potential compared to other used in the study, although 60% hydroalcoholic extract had observed as lowest UV screening potential.

TABLE 2*: IN-VITRO* SPF VALUE AT CONCENTRATION 40µg/mL

S. no.	Wave length in nm	EE(λ) X I (normalized)	LC 60% (absorbance) 40µg/ml	LC 70% (absorbance) 40µg/ml	LC80% (absorbance) 40µg/ml	LC90% (absorbance) 40µg/ml
1	290	0.015	3.8255±0.019	4.6534±0.019	5.9425±0.018	6.8547±0.018
2	295	0.0817	3.6254±0.013	4.3249±0.011	5.4031±0.015	6.6181±0.020
3	300	0.2874	3.2274±0.021	4.0124±0.015	5.1582±0.014	6.2922±0.015
4	305	0.3278	2.9552±0.011	3.7329±0.014	4.8625±0.011	5.9664±0.014
5	310	0.1864	2.7923±0.017	3.5254±0.018	4.3571±0.018	5.4858±0.018
6	315	0.0837	2.5752±0.014	3.1204±0.014	3.9207±0.015	5.1415±0.015
7	320	0.018	2.1206±0.015	2.8265±0.011	3.5859±0.018	4.7420±0.012

Value=Mean±SD, LC-*Lantana camara*

TABLE 3: *IN-VITRO* SPF VALUE AT CONCENTRATION 50µg/mL

Sr. no	Wave length in nm	EE(λ) XI (normalized)	LC 60% (absorbance) 50µg/ml	LC 70% (absorbance) 50µg/ml	LC 80% (absorbance) 50µg/ml	LC90% (absorbance) 50µg/ml
1	290	0.015	4.9614±0.010	5.8981±0.012	6.7512±0.012	7.4421±0.012
2	295	0.0817	4.6224±0.015	5.6254±0.019	6.5518±0.019	7.1924±0.015
3	300	0.2874	4.3041±0.016	5.3814±0.015	6.2325±0.012	6.8587±0.017
4	305	0.3278	4.1234±0.018	4.9852±0.011	5.8142±0.019	6.5364±0.014
5	310	0.1864	3.8111±0.019	4.6281±0.022	5.5084±0.022	6.2381±0.021
6	315	0.0837	3.5542±0.012	4.2879±0.015	5.2812±0.011	5.9154±0.012
7	320	0.018	2.9841±0.014	3.9104±0.019	4.9954±0.015	5.4755±0.011

Value=Mean±SD, LC-*Lantana camara*

TABLE 4: *IN-VITRO* SPF VALUE AT CONCENTRATION 60µg/mL

Sr. no.	Wave length in nm	EE(λ)XI (normalized)	LC 60% (absorbance) 60µg/ml	LC70% (absorbance) 60µg/ml	LC80% (absorbance) 60µg/ml	LC 90% (absorbance) 60µg/ml
1	290	0.015	5.9311±0.017	7.2144±0.021	8.7251±0.016	9.6985±0.017
2	295	0.0817	5.6724±0.019	6.9984±0.018	8.5024±0.017	9.3802±0.014
3	300	0.2874	5.3510±0.024	6.7752±0.017	8.1803±0.023	9.1551±0.017
4	305	0.3278	4.9981±0.018	6.5821±0.012	7.7841±0.017	8.8604±0.012
5	310	0.1864	4.7338±0.012	6.1351±0.011	7.4814±0.018	8.6851±0.011
6	315	0.0837	4.4814±0.019	5.9287±0.017	6.9987±0.013	8.3185±0.024
7	320	0.018	4.1041±0.014	5.2715±0.015	6.5481±0.014	7.9234±0.019

Value=Mean±SD, LC-*Lantana camara*

TABLE 5: SPECTROPHOTOMETRIC VALUES OF SPF AT DIFFERENT CONCENTRATION

Sr. no.	Extract	SPF 40µg/ml	SPF 50µg/ml	SPF 60µg/ml
1	LC 60%	4.320	5.860	7.228
2	LC 70%	5.384	7.172	9.313
3	LC 80%	6.874	8.417	11.180
4	LC 90%	8.494	9.385	12.721

LC-*Lantana camara*

The result substantiates the photo protective efficiency is contingent to concentration of solute, as the ratio of extract increased the SPF has been increased that might be due to more promising solute at higher concentration. The plant selected for the study already had multitudinous medicinal benefits, this additional property would extend the horizon of *Lantana camara*.

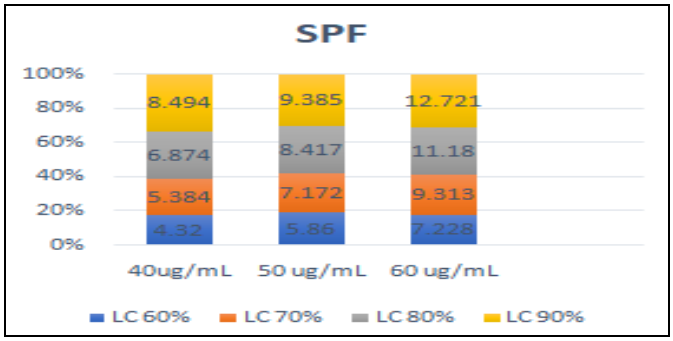

FIG. 1: GRAPHICAL PRESENTATION OF SPF VALUE

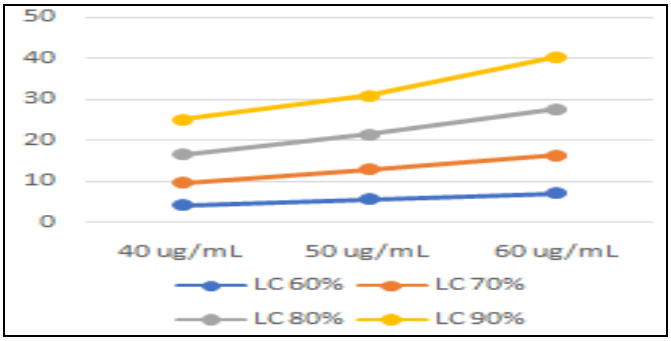

FIG. 2: LINE DIAGRAM FOR SPF VALUE

CONCLUSION: *Lantana camara* is a tropical plant growing luxuriant in Indian subcontinent. The study paves the path for further research and investigation in concerned areas. The present study unfolds new horizon and scope for investigation of drug. The efficacy of hydroalcoholic extract of leaves made plants more apposite to use as sunscreen agents. Nature could redress suffering and ailments of mankind. In recent years many novel compounds have been successfully discovered from natural sources, and many are there in the vault of nature. Natural therapy is always convivial and biocompatible compared to synthetic counterparts. *Lantana camara* is traditionally acclaimed for their medicinal properties. The present study supports the sun protective efficacy in concentration dependent manner that could heighten cosmeceutical scope of *Lantana camara.*

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REFERENCES:

1. Ghisalberti EL: *Lantana camara* L. (Verbenaceae), Fitoterapia 2000; 71(5): 467-486, ISSN 0367-326X,doi.org/10.1016/S0367-326X(00)00202-1.
2. Ganesh T, Saikatsen, Thilagam G, Loganatham T and Raja Chakraborty: Pharmacognostic and anti-hyperglycemic evaluation of *Lantana camara* (L) var. aculeate leaves in alloxan-induced hyperglycemic rats, Int J Res Pharm 2010; 1(3): 247-252.
3. Reddy NM: *Lantana camara* Linn. Chemical Constituents and Medicinal Properties: A Review Sch. Acad J Pharm 2013; 2(6): 445-448.
4. Venkatachalam T: Physicochemical and preliminary phytochemical studies on the *Lantana camara* (L.) fruits. IJPPS 2011; 3(1): 52-54.
5. Bhakta D and Ganjewala D: Effect of leaf positions on total phenolics, flavonoids and proantho-cyanidins content and antioxidant activities in *Lantana camara* (L). Journal of Scientific Research 2009; 1(2): 363-369.
6. Sanjeeb Kalita, Gaurav Kumar, Loganathan Karthik and Kokati Venkata Bhaskara Rao: A Review on Medicinal Properties of *Lantana camara* Linn. Research J Pharm and Tech 2012; 5(6): 711-715.
7. Costa SC, Detoni CB, Branco CR, Botura MB and Branco A: *In-vitro* photoprotective effects of *Marcetia taxifolia* ethanolic extract and its potential for sunscreen formulations. Rev Bras Farmacogn. 2015; 25: 413-418
8. Dwivedi AK, Spectrophotometric Evaluation of Sun Screen Potential of *Azadirachta indica*. Int J of Pharm Sci 2024; 2(2): 184-189. doi.org/10.5281/zenodo.10634571
9. Dwivedi AK: "Spectrophotometric determination of sun screen potential of selected medicinal plants. Int J Pharm Sci Rev Res 2022; 74(2): 104-107; DOI: 10.47583/ijpsrr. 2022. v74i02.01
10. Li L, Chong L, Huang T, Ma Y, Li Y and Ding H: Natural products and extracts from plants as natural UV filters for sunscreens: A review. Animal Model Exp Med 2023; 6(3): 183-195. doi: 10.1002/ame2.12295. Epub 2022 Dec 19. PMID: 36536536; PMCID: PMC10272908
11. Dwivedi AK: Spectroscopic Evaluation of Sun Screen Potential of *Hibiscus rosa-sinensis*. Journal of Pharmacognosy and Phytochemistry 2024; 13(2): 162-164. doi.org/10.22271/ phyto. 2024. v13.i2b.14896
12. Sutar MP and Chaudhari SR: Screening of *in-vitro* sun protection factor of some medicinal plant extracts by ultraviolet spectroscopy method. Journal of Applied Biology & Biotechnology 2020; 8(6): 48-53. DOI: 10.7324/JABB.2020.80608
13. Mansur JS, Breder MNR, Mansur MCA and Azulay RD: Determinacao Do Fator De Protecao Solar Por Espectrofotometria. an Bras Dermatol Rio De Janeiro 1986; 61: 121-4.
14. Poudel B, Gurung A and Subedi HR: *In-vitro* sun protection factor determination of selected medicinal plants and formulation of sunscreen cream. Sys Rev Pharm 2022; 13(10): 664-671 DOI: 10.31858/0975-8453.

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