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Research Paper

Sun screen potential of *Canna indica* seeds

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ABSTRACT

Canna indica vernacularly known with numerous names such as Indian shot, Indian canna, African arrowroot, purple arrowroot, dev ked, bajarbattu etc. the plant thrives well in various tropical and sub-tropical atmosphere encompasses to family Cannaceae. The plant has been endowed with multitudinous chemical constituents. Canna indica demonstrates multifarious activity includes antioxidant, anti-inflammatory, hepatoprotective, antiviral, anti-diarrheal, anthelmintic, antibacterial, molluscicidal, cytotoxic, analgesic. hemostatic and immunomodulatory etc. The seeds of the plant are small, ovoid, globular, hard and dense enough to sink in water. The seed of the plant would be used to treat variety of human condition, UV-radiation manifested as major cause that sully the intuitive nature of skin. UV-radiation may adversely affect the normal function and property of human skin. UV-protectives or sunscreens are the compound that could help to attenuate the deleterious effect of UV radiation by absorbing and countering to major extent.

INTRODUCTION

Canna indica profoundly known as numerous names such as Indian shot, Indian canna, African arrowroot, purple arrowroot, dev ked *etc*. the plant thrives well in various tropical and sub-tropical atmosphere encompasses to family Cannaceae. The plant has been bestowed with multitudinous chemical constituents like cardiac glycosides, alkaloids, flavonoids, steroids, terpenoids, carbohydrates, proteins, saponins, tannins and pigments. *Canna indica* demonstrates multifarious activity included as antioxidant, anti-inflammatory, hepatoprotective, antiviral, anti-diarrheal, anthelmintic, antibacterial, molluscicidal, cytotoxic, analgesic. hemostatic and immunomodulatory etc. The seeds of the plant are small, ovoid, globular, hard and dense enough to sink in water. Presence of vital constituent could offer protection against skin disorders,

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oxidative stress and insidious UV radiation. Due to presence of viable component, sunscreen activity has been chosen for the study. Sun screens are compound which predominately protect the skin from deleterious UV radiations and oxidative stress. [1-5]

$$SPF = \frac{\text{Minimal erythemal dose in sunscreen protected skin}}{\text{Minimal erythemal dose in non-sunscreen protected skin}}$$

MED minimal erythemal dose is the minimum time interval or dosage of ultraviolet irradiation prompted perceivable erythema on protected or unprotected skin. [6,7] Higher SPF value would be indicator of higher protection against UV radiation. SPF is determined by spectrophotometer. The sample absorbance was recorded at 5 nm interval in the range of 290-320 nm. The SPF value was calculated by using the formula. [8]

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

where is CF denoting Correction factor (10), EE (λ) indicates Erythmogenic effect of radiation at wavelength (λ) Abs (λ) adjoin to spectrophotometric absorbance values at specific wavelength (λ). The value of EE(λ)×I(λ) is constant and shown in Table 1. [8,9]

MATERIAL AND METHODS-

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

Collection and Processing of Plant material

the seeds of *Canna indica* have been collected in the month of September from the medicinal herbal garden, Madhav university campus, abu road, Pindwara India. The seeds were primarily washed with tap water then shade dried till complete drying. The dried seeds were used to made coarse powder. The powder is then shifted to get powder of uniform size, the powdered seeds was subjected to extraction with appropriate solvents.

Extraction of Plant Material

The hydro alcoholic extract has been prepared by immersing the coarse powder in the solvent for week with intermittent stirring. 200g of powdered seed was accurately weighed, each 50g was extracted with increasing strength of 60%,70%,80% and 90% of alcohol, the extract is then filtered thrice through whatman filter, the filtrate was collected, evaporated and dried. The residual dregs of solvent were removed in desiccator. The yield of discrete extract was calculated.

Sample Preparation

10 mg of seed extract mixed with 100 mL of hydroalcoholic solution to get 100µg/mL dilution. The mixture is then screened through whatman filter paper, three dilutions of each extract 40µg/mL,50µg/mL and 60µg/mL were made with stock solution, individual sample has been scanned thrice for selected wavelength at 5nm intervals to UV spectrophotometer. The base line correction was made with individual similar solvent used for extraction. The absorption of selected

concentration of *Canna indica* seed extract was recorded. [7-9]

In vitro SPF Determination

The UV absorption efficiency of *Canna indica* seed extracts were determined spectroscopically. The 40µg/mL, 50µg/mL and 60µg/mL dilutions of discrete extract were made from stock solution, the prepared dilutions were scanned in the range of 290 nm to 320 nm at 5 nm interval in triplicate. The mean of absorbance was taken was taken for each distinct concentration, the absorbance values has been multiplied with the constant shown. the summation of those multiplied with correction factor constant 10. [9-11]

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 *Canna indica* seed extracts 5.5%,5.9%,6.2%,6.9% The result corroborated that 90% hydroalcoholic solvent had higher extractable efficiency in terms of maximum extractable matter compared in the series of solvent used in the study. The spectroscopic SPF screening method could be useful in development of sunscreen formulations additionally it would serve as alternative for preliminary evaluation to *vivo* experimentation of sunscreens. In this study seed extracts were evaluated by UV spectrophotometry. The SPF was calculated by Mansur equation. The observation and result revealed that hydro alcoholic extracts of *Canna indica* seed extracts had good potential of sun screen and could be used as sunscreen ingredients in cosmetics development. 90% hydroalcoholic extract had shown greater SPF value in the line, although extract of 60% hydroalcoholic solution displayed lowest SPF value.

Table no.2- In vitro SPF value at concentration 40µg/mL

Sr. No	Wave length in nm	EE(λ) X I (normalized)	CI 60% (absorbance) 40µg/ml	CI 70% (absorbance) 40µg/ml	CI 80% (absorbance) 40µg/ml	CI 90% (absorbance) 40µg/ml
1	290	0.015	3.4583±0.015	4.9224±0.016	5.5421±0.018	6.1547±0.019
2	295	0.0817	3.1256±0.019	4.4225±0.021	5.1531±0.012	5.8781±0.021
3	300	0.2874	2.9254±0.017	3.9924±0.014	4.8912±0.014	5.5682±0.017
4	305	0.3278	2.6252±0.021	3.6329±0.013	4.3115±0.019	4.9154±0.019
5	310	0.1864	2.1823±0.013	3.2254±0.019	3.9541±0.022	4.7891±0.016
6	315	0.0837	1.8572±0.019	2.9184±0.017	3.6947±0.014	4.5475±0.014
7	320	0.018	1.4236±0.018	2.5015±0.016	3.3985±0.021	4.2483±0.011

Value=Mean± SD, CI – *Canna indica*

Table no.3- In vitro SPF value at concentration 50µg/mL

Sr. No	Wave length in nm	EE(λ)XI (normalized)	CI 60% (absorbance) 50µg/ml	CI 70% (absorbance) 50µg/ml	CI 80% (absorbance) 50µg/ml	CI 90% (absorbance) 50µg/ml
1	290	0.015	4.2154±0.019	5.6477±0.016	6.1522±0.018	6.9421±0.013
2	295	0.0817	3.1245±0.013	5.1354±0.014	5.8348±0.017	6.5234±0.018
3	300	0.2874	2.8341±0.018	4.9974±0.017	5.2865±0.012	6.2554±0.017
4	305	0.3278	2.5254±0.014	4.5301±0.012	4.8742±0.011	5.8664±0.019
5	310	0.1864	2.0541±0.017	4.1554±0.021	4.4854±0.021	5.5921±0.022
6	315	0.0837	1.8542±0.014	3.9775±0.014	4.1785±0.014	5.3248±0.018
7	320	0.018	1.4884±0.017	3.3614±0.023	3.9844±0.018	4.7225±0.019

Value=Mean± SD, CI – *Canna indica*

Table no.4- In vitro SPF value at concentration 60µg/mL

Sr. No	Wave length in nm	EE(λ)XI (normalized)	CI 60% (absorbance) 60µg/ml	CI 70% (absorbance) 60µg/ml	CI 80% (absorbance) 60µg/ml	CI 90% (absorbance) 60µg/ml
1	290	0.015	5.6210±0.017	6.2154±0.011	6.9284±0.016	7.5254±0.017
2	295	0.0817	5.3224±0.019	5.9154±0.018	6.1234±0.013	7.1542±0.014
3	300	0.2874	4.8512±0.014	5.2241±0.017	5.9514±0.023	6.9015±0.018
4	305	0.3278	4.1214±0.019	4.7541±0.012	5.7641±0.017	6.5054±0.012
5	310	0.1864	3.9258±0.011	4.3351±0.011	5.3914±0.018	5.9251±0.012
6	315	0.0837	3.2284±0.019	3.9587±0.017	4.8587±0.013	5.3915±0.021
7	320	0.018	2.8541±0.014	3.2785±0.015	4.4412±0.014	5.1204±0.019

Value=Mean± SD, CI – *Canna indica*

Table no.5- Spectrophotometric values of SPF at different concentration

Sr.No.	Extract	SPF 40µg/ml	SPF 50µg/ml	SPF 60µg/ml
1	**CI** 60%	3.709	3.608	6.168
2	**CI** 70%	5.234	6.562	6.906
3	**CI** 80%	6.329	7.062	8.136
4	**CI** 90%	7.334	8.472	9.230

CI – Canna indica

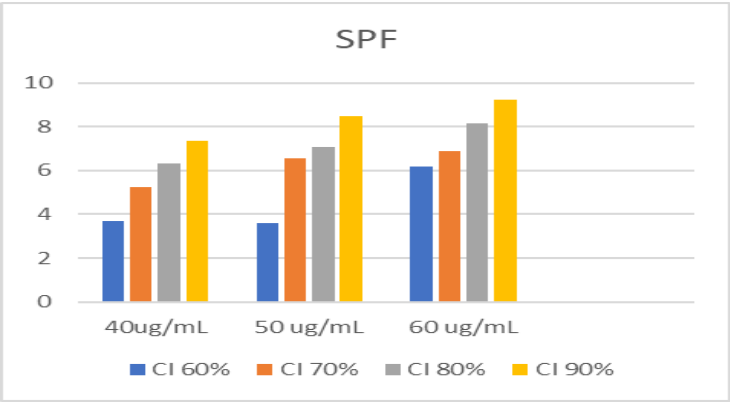

Figure1-Graphical Presentation of SPF value

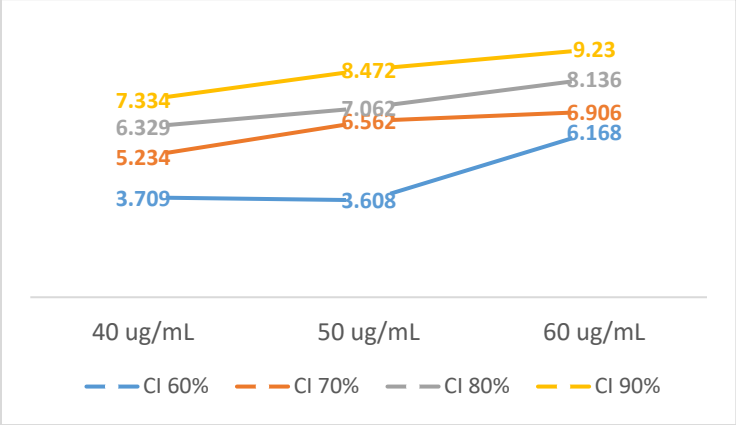

Figure 2 – Line diagram for SPF value

The output substantiated the photo protective efficiency was contingent on concentration of extractable matter, As the ratio of concentration raised the SPF has been increased that might be due to more apt solute at higher concentration. The plant selected for the study already had many potential medicinal benefits, this additional property would broaden the ambit of *Canna indica.*

CONCLUSION

Canna indica is a tropical plant thrived profusely in different part of world; The study unravels the sun screen potential of hydroalcoholic extract of seeds that makes plant more suitable to use for sun screen formulations. The inclination towards the nature kindled discovery of novel compounds from natural sources, natural therapy is always innocuous and biocompatible than synthetic alternatives with iota of side effects. *Canna indica* is traditionally renowned for its medicinal properties. The present study buttresses the add on property as sun protective in concentration dependent manner. The study ushered the UV protection potential of *Canna indica*. further research needed to support the evidence.

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