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DETERMINATION OF SUN PROTECTION FACTOR IN DIFFERENT EXTRACT OF *EULALIOPSIS BINATA*

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Abstract

Sunscreens aid enhancing the body's natural beauty and defence system, which protect the skin against ageing and Ultra-Violet radiation. The present study involves the evaluation of sun protection factor of leaf part of plant *Eulaliopsis binata.* Hydroalcoholic, ethyl acetate and methanolic leaf extract of *Eulaliopsis binata* were prepared via soxhaltion and the total phenolic content and total flavonoid contents with sun protection factor (SPF) of all the extracts were calculated. The methanolic leaf extract showed the highest value among all i.e., 51.56 ± 0.56, 43.32 ± 0.34 and 9.24 ±0.002 value of total phenolic content, total flavonoid contents and SPF value respectively.

***Keywords*:** *Eulaliopsis binata,* Sun Protection Factor, Total Phenolic Content, Total Flavonoid Contents

Introduction

Skin is the primary layer of all living things which cover all the organs, any damaging or alteration in this leads to various condition/disease including darkness of skin, aging etc. hence its protection is the prime target. Chronic exposure of Ultraviolet (UV) radiation may cause skin cancer, there are many way through which humans protects themself from ultraviolet radiation like large hats used by Greeks people, umbrellas used by Chines and Indians. The ultraviolet region divided in to three regions: UV-A, UV-B & UV-C having wavelength 320-400 nm, 290-320 nm and 200-290 nm respectively (Nohynek *et al.,* 2002). However UV-C radiation is filtered by the earth atmosphere, UV-B radiation is not filtered by the ozone layer of earth and causes sun burn and UV-A radiation penetrates deeper in the skin layer and causes premature aging. Sunscreens are the formulation like moisturizers, lotions, skin preparations etc that provide protection against harmful UV radiation and their regular use minimizing the adverse effect of ultraviolet ray (Mishra *et al*., 2012) .

The efficacy of sunscreens products to block UV-B radiation is expressed by the sun protection factor (SPF), which is UV energy required for producing a minimal erythema dose (MED) on protected skin, divided by the UV energy required producing a MED on unprotected skin. MED is defined as the lowest time interval or dosage of UV light irradiation sufficient for producing a minimal, perceptible erythema on unprotected skin (Guyer *et al.,* 2003). Higher value of SPF indicated it is more efficient and provides highest protection against sunburn. However sunscreen products having natural substances are safer as compare to those containing synthetic ingredients. Medicinal plants containing antioxidant, phenols, glycosides (aesculin) etc are having ultraviolet ray absorption capacity and they are considered as potential sunscreen resources. Therefore medicinal plants are the important source for research and open new window for discovering new biological active compounds. Study of their structure function relationship help to develop new drug/formulation to avoid or minimizing the side effects. *Eulaliopsis binata (E. binata)* commonly known as Sabai, Babui or Bhabar, is an important grass species found almost all over India. It is mostly use in paper manufacturing, filter materials in plastics and treatment of papillae and internal injury (Pandey *et al.,* 2007).

Antibacterial study has demonstrated the significant action against the bacterial and fungal strain (Kumar *et al*., 2018). It also showed the significant healing property of *E. binata* against cuts and wounds (Jyotsana *et al*., 2013). People of Himachal Pradesh have been used this plant to various dermatological disorders (Sharma *et al*., 2017). Traditionally *Eulaliopsis binata* plants paste is used to protect skin against the sun harmful radiation but due to lack of valid scientific data in ancient literature promote us to carry the present study and determine the SPF value of hydroalcoholic, ethyl acetate and methanolic leaf extracts of *Eulaliopsis binata* through transmittance method (Balaji *et al.,* 2014).

Materials and Methods

Leaves of Eulaliopsis binata were collected from Himachal Pradesh, India. Leaves of *Eulaliopsis binata* plant were washed with distilled water, dried under dark for 3 days, crushed and make powder form using mechanical blender. Hydroalcoholic, ethyl acetate and methanolic leaf extracts of *Eulaliopsis binata* were prepared by soxhaltion. The extracts were then filtered through Whatman No. 1 filter paper and concentrated under rotary evaporator.

All the chemicals used for evaluation was obtained from Hi media (Delhi). The UV spectra were recorded on Shimadzu UV-Vis. spectrophotometer, Model No. UV-2600.

Sample Preparation

1.0 g of sample of each extract were weighed and diluted up to 100 ml with ethanol. Sonicate this mixture for about 5 minutes and the 5 ml of aliquot was again diluted up to 50 ml. Repeat the same procedure for each 5 ml aliquot and dilute up to 25 ml. Measure the absorbance of samples in the range of 290 to 480 nm by using ethanol as a blank. Sun Protection Factor (SPF) values of each extract were calculated with the help of Mansur equation (Aburjai *et al*., 2003) and with the help of values as shown in Table 1.

$$SPF = CF \times {}^{320}\sum_{290} EE \times I \times Abs$$

Where, CF = Correction factor (10)
EE (λ) = Erythmogenic effect of radiation with wavelength λ
Abs (λ) = Spectrophotometric absorbance values at wavelength λ

Table 1: Value of Erythmogenic Effect of Radiation with wavelength λ (Ee) and Spectrophotometric absorbance values at wavelength λ (I)

λ (nm)	EE×I (normalized)
290	0.0150
295	0.0817
300	0.2874
305	0.3278
310	0.1864
315	0.0839
320	0.0180

Preliminary Phytochemical Analysis

Preliminary phytochemical analysis of *Eulaliopsis binata* leaves extracts were carried out by using previously described method (Kumar *et al*., 2018).

Total Phenolic Content (TPC)

TPC was analyzed using by the Folin- ciocalteau reagent method with slight modifications (Kaur *et al*., 2002). Briefly 1.0 ml aliquot of leave extracts were mixed with 1.0 ml of Folin–Ciocalteu reagent and after 5 minutes of incubation, 10 % sodium carbonate (3 ml) was added. Then this mixure was allowed to stand for 40 minutes at room temperature and the absorbance was measured at 725 nm using Gallic acid as a standard. The results were expressed as mg Gallic acid equivalent (GAE) per gram of extract.

Total Flavonoid Content (TFC)

TFC was determined by colorimetric method (Chang *et al*., 2002), using Quercetin as standard. For this, 0.5 ml of all extracts were placed in test tube containing 0.1 ml of 10% Aluminium trichloride, 0.1 ml of 1 M potassium acetate and 2.8 ml of distilled water. Incubate the reaction mixture at room temperature for about 30 minutes and measure the absorbance at 415 nm using Quercetin as a standard. The concentration of flavonoid was expressed as mg Quercetin equivalent (QE) per gram of extract.

Results and Discussion

Preliminary Phytochemical Analysis

The preliminary qualitative analysis of phytochemical investigation is useful to detect bioactive compounds and it revealed the presence of alkaloids, flavonoids, glycosides, tannins, carbohydrates etc as shown in Table-2.

Determination of total phenolic and flavonoid contents (TPC & TFC)

The total phenolic content of the all leaf extracts of *Eulaliopsis binata*, were calculated from the calibration curve and was 44.18 ± 1.30, 34.89 ± 0.3 and 51.56 ± 0.56 gallic acid equivalents/g for hydroalcoholic, ethyl acetate and methanolic extract respectively and the total flavonoid content was 38 ± 0.20, 25 ± 0.2 and 43.32 ± 0.34 for hydroalcoholic, ethyl acetate and methanolic extract respectively rutin equivalents/g (Table 3). Phenolic and hydroxyl group containing compounds have redox properties, which allow them to act as good antioxidants.

Table 2: Preliminary phytochemical analysis in leaves of *Eulaliopsis binata*

S. No.	Phytochemicals constituents	Type of extract		
		Hydroalcoholic	Ethyl acetate	Methanolic
1.	Alkaloids	+++	+++	+++
2.	Glycosides	+	+	+
3.	Tannins	+++	+++	+++
4.	Carbohydrates	++	++	++
5.	Flavanoids	+	+	+
6.	Poly phenols	++	++	++
7.	Saponins	+	+	+
8.	coumarin	-	-	-

+++: High ++: Moderate +: Present -: Absent

Table 3: Total phenolic, flavonoid contents and SPFvalues of all extracts of *Eulaliopsis binata*

S. No.	Type of extract	Total phenolic content	Total flavonoid content	Sun protection factor (SPF)
1.	Hydroalcoholic	44.18 ± 1.30	38 ± 0.20	7.76 ±0.003
2.	Ethyl acetate	34.89 ± 0.3	25 ± 0.2	3.04 ±0.022
3.	Methanolic	51.56 ± 0.56	43.32 ± 0.34	9.24 ±0.002

Determination of the *in-vitro* sun protection factor

The SPF value of hydroalcoholic, ethylacetate and methanolic leaf extract of *Eulaliopsis binata* was found out be 7.76 ±0.003, 3.04 ± 0.022 and 9.24 ± 0.002 respectively. The methanolic extract offered high SPF value and ethyl acetate showed lowest SPF value among all. The highest value value of SPF indicated that the methanolic extract of *Eulaliopsis binata* can be used as potent sunscreen agent.

Conclusion

The result obtained were showed that ability of extracts to absorb UV- radiation and hence proved UV protection ability. It is essential for collection of similar data for different part of plant such as flowers, as well as other parts. This proved activity of plant showed its importance and prophylactic utility in anti-solar formulation. This will be a better, cheaper and safe alternative to harmful chemical sunscreens that used now a day in the industry. Besides its antisolar activity and effects, making it a useful sun care as well as skin care product. (Bendova *et al*., 2007)

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