International Journal of Research in Pharmacy and Pharmaceutical Sciences
ISSN: 2455-698X; Impact Factor: RJIF 5.22
Received: 25-01-2020; Accepted: 20-02-2020; Published: 26-02-2020
www.pharmacyjournal.in
Volume 5; Issue 1; 2020; Page No. 47-49

Determination of Sun Protection Factor in different extracts of *Catharanthus Roseus*

Vinod Kumar[1*], Chandra Mohan[2]
[1, 2] Assistant Proffesor, SMAS, K. R. Mangalam University, Gurugram, Haryana, India

Abstract
Herbal preparation used as **s**unscreens is not only for enhancing the human natural appearance and immune system but also protect the skin against ageing and harmful Ultra-violet radiations. The present study involves the evaluation of sun protection factor (SPF) of the leaf part of plant *Catharanthus roseus*. Hydroalcoholic, ethyl acetate and methanolic leaf extract of *Catharanthus roseus* was 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., 53.24 ± 0.36, 46.02 ± 0.14 and 11.02 ±0.001 value of total phenolic content, total flavonoid contents and SPF value respectively.

Keywords: *Catharanthus roseus*, sun protection factor, total phenolic content, total flavonoid contents, sunscreen cream

1. Introduction
Medicinal plants have been used to treat various disorders in humans from ancient time, apart from this medicinal plant also used to enhancing the skin appearance and provide protection against various skin disorders. As per WHO, sun rays provides nutrients to the human body, which is important for growth of bones by boosting the body's vitamin D supply, enhancing the use certain minerals, like calcium and phosphorus which avoid softens and weakens of bones. Apart from this excessive exposure of sun rays leads to various skin disorders such as sunburns, wrinkles, lower down the immunity against infections, causes premature aging, and cancer. Ultraviolet (UV) region can divide in to three regions: UV-A (320-400 nm, penetrates deeper in the skin and cause premature aging), UV-B (320-400 nm, not filtered by the ozone layer and causes sun burn) & UV-C (200-290 nm, filtered by the earth atmosphere). Ultraviolet (UV) radiation generates free radical species that causes various skin changes which can be prevented by the use of antioxidant [1, 2]. Herbs having high antioxidant value can provide permanent protection against the harmful ultraviolet (UV) sunrays. Sunscreens are the cosmetic formulation like others formulation available in market such as moisturizers, lotions, skin preparations etc that provide protection against harmful sun ray and minimizing the various adverse effects of UV-B radiation. The ability to block harmful UV-B radiation is expressed by the sun protection factor (SPF), which is the energy required to produce minimal erythema dose (MED) divided by the UV energy required to produce MED on unprotected skin. Minimal Erythema Dose is defined as the lowest time interval or dosage of UV light irradiation sufficient for producing a minimal, perceptible erythema on unprotected skin [3]. Efficiency of sunscreens products can be predicated by its sun protection factor value, which prevents sun burn. 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 [4]. 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. *Catharanthus roseus* or sada-bahar is an evergreen, dicotyledonous plant originated from islands of Madagascar belonging to the Apocynaceae family. Leaves are oval to oblong, having short petiole. Flowers are pink to purple in colour. It is an important medicinal plant possesses antitumour, anti-diabetic, antiulcer, hypotensive, anti-microbial, control hemorrhage and scurvy, anti-oxidant, anti-oxidant potential and antimutagenic effects etc. Traditionally *Catharanthus roseus* 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 *Catharanthus roseus* through transmittance method [5].

2. Materials and Methods
Leaves of *Catharanthus roseus* were collected from the herbal garden of K. R. Mangalam University campus Sohna, India during the flowering period. Leaves of *Catharanthus* 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 *Catharanthus* was prepared by soxhaltion. The extracts were then filtered through Whatman No. 1 filter paper and concentrated under rotary evaporator.

2.1 Chemicals and Materials
All the chemicals used for evaluation was obtained from Hi media (Delhi).
Apparatus: UV Shimadzu UV-2600 spectrophotometer.

2.2 Sample preparation
1gram of samples of each extracts were weighed and diluted up to 100 ml with ethanol, sonicate the mixture for 05 minutes and then withdrawn 05 ml of aliquot which again

diluted up to 50 ml. Repeated the same procedure for 05 ml aliquot and diluted up to 25 ml. Measure the absorbance in the range of 290 to 480 nm using ethanol as blank. Sun protection factor (SPF) values of each extracts were calculated by Mansur equation [6, 7]:

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

Where CF = Correction factor [10]

EE (λ) = Erythmogenic effect of radiation with wavelength λ

Abs (λ) = Spectrophotometric absorbance values at wavelength λ

2.3 Preliminary phytochemical analysis

Preliminary phytochemical analysis of *Catharanthus roseus* leaves extracts were carried out by using previously described method [8].

2.4 Total phenolic content (TPC)

TPC was analyzed using by the Folin-ciocalteau reagent method with slight modifications [9]. Briefly 01 ml aliquot of leaves extracts were mixed with 1 ml Folin–Ciocalteu reagent, after 5 minutes of incubation added 10 % sodium carbonate (3 ml), allow standing for 40 minutes at room temperature and measured the absorbance at 725 nm taking Gallic acid as standard and results were expressed as mg Gallic acid equivalent (GAE) per gram of extract.

2.5 Total flavonoid content (TFC)

TFC was determined by colorimetric method [10] using Quercetin as the standard. 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 30 minutes and measure the absorbance at 415 nm using Quercetin as the standard. The concentration of flavonoid was expressed as mg Quercetin equivalent (QE) per gram of extract.

3. Results & Discussion:

3.1 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 showed in Table-2.

3.2 Determination of total phenolic and flavonoid contents

The total phenolic content of the all leaf extracts of *Catharanthus roseus*, were calculated from the calibration curve and was 47.12 ± 1.20, 31.27 ± 0.1 and 53.24 ± 0.36 gallic acid equivalents/g for hydroalcoholic, ethyl acetate and methanolic extract respectively and the total flavonoid content was 33.6 ± 0.22, 23 ± 0.1 and 46.02 ± 0.14 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.

3.3 Determination of the in vitro sun protection factor

The SPF value of hydroalcoholic, ethylacetate and methanolic leaf extract of *Catharanthus roseus* was found out be 8.16 ±0.002, 4.05 ±0.011and 11.02 ±0.001 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 *Catharanthus roseus* can be used as potent sunscreen agent [11].

4. Conclusions

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.

Conflict of Interest

The authors have no conflict of interest.

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
Total	1

Table 2: Preliminary Phytochemical Analysis in Leaves of *Catharanthus Roseus*

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 SPF Value of all Extracts of *Catharanthus Roseus*

S. No.	Type of extract	Total phenolic content	Total flavonoid content	Sun protection factor (SPF)
1	Hydroalcoholic	47.12 ± 1.20	33.6 ± 0.22	8.16 ±0.002
2	Ethyl acetate	31.27 ± 0.1	23 ± 0.1	4.05 ±0.011
3	Methanolic	53.24 ± 0.36	46.02 ± 0.14	11.02 ±0.001

5. References

1. Nohynek GJ, Schaefer H. Risk and benefit of organic ultraviolet filters. Reg. Toxicol. Pharmacol. 2001; 33:285-299.
2. Mishra AK, Mishra A, Chattopadhyay P. Assessment of in vitro sun protection factor of *Calendula officinalis* L. (asteraceae) essential oil formulation. J Young Pharmacists. 2012; 4:17-21.
3. Guyer SF, Afaq F, Mukhtar H. Photochemoprotection of skin cancer by botanical agents. Photodermatol

Photoimmunol Photomed. 2003; 2:26-28.
4. Kumar V, Pal M, Dhiman N. Determination of sun protection factor in different extract of *Eulaliopsis Binata*. Plant Archives. 2019; 19(2):185-187.
5. Balaji H. Versatile Therapeutic effects of Vinca rosea Linn. International Journal of Pharmaceutical Science and Health Care. 2014; 4(1):59-76.
6. Aburjai T, Natsheh FM. Plants used in cosmetics. Phytotherapy Res. 2003; 17:987-1000.
7. Mansur JS, Breder MNR, Mansur MCA, Azulay RD. Determination of the sun protection factor by spectrophotometry. Anais Brasileiros de Dermatologia. 1986; 61:121-124.
8. Kumar V, Kumar A, Rajput SK, Pal M, Dhiman N. Pharmacognostic and pharmacological evaluation of *Eulaliopsis binata* plant extracts by measuring *in vitro/in vivo* safety profile and anti-microbial potential. Toxicol. Res. 2018; 7:454-464.
9. Kaur C, Kapoor HC. Anti-oxidant activity and total phenolic content of some Asian vegetables. Int. J. Food Sci. Technol. 2002; 37:153-161.
10. Chang C, Yang M, Wen H, Chern J. Estimation of total flavonoid content in propolis by two complementary colorimetric methods. J Food Drug Anal. 2002; 10:178-182.
11. Bendova H, Akrman J, Krejcí A, Kubac L, Jírova D, Kejlova K, *et al*. *in vitro* approaches to evaluation of Sun Protection Factor. Toxicol. in vitro. 2007; 21:1268-75.