CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1174209

Available online at: http://www.iajps.com Research Article

ESTIMATION OF PHYTOCHEMICALS AND SUN PROTECTION FACTOR (SPF) NUMBER IN COMMONLY USED ETHANOLIC FRUIT AND VEGETABLE EXTRACTS

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Abstract:
The aim of the present study is phytochemical screening and the ultraviolet absorption properties of ethanolic herbal extracts of some commonly used vegetable and fruits sources by determining the sun protection factor (spf) number. The invitro SPF number is determined according to the spectrophotomertic method described by Mansur et.al.,. Ethanolic herbal extracts were prepared and after dilution with alcoholic solutions the absorbance were recorded between 290-320 using uv-vis spectrophotometry. It was observed that all of the ethanolic herbal extract showed some UV protection capability.

Key words: *Sun protection factor, spectrophotomertic, ethanolic extract*

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*Please cite this article in press as Chandaka Madhu et al., **Estimation of Phytochemicals and Sun Protection Factor (SPF) Number in Commonly Used Ethanolic Fruit and Vegetable Extracts**, Indo Am. J. P. Sci, 2018; 05(01).*

INTRODUCTION:

The sun is the Natural source of energy which is located at the center of the solar system [1]. It mainly consist of hydrogen helium [2] and heavy metals [3]. The sun emittes different types of electromagnetic radiations (IR, UV & Visible) in which UV Rays shows both beneficial (synthesis of vitamin D3) as well as harmful effects (allergic reaction) [4], immuno suppression, photo aging and skin cancer [5, 6]. Based upon the wave length range the UV Radiation is mainly divided into three distinct bands UVA (320-400nm) , UVB (290-320nm) and UVC (200-290nm).In which UVC is effectively filtered by ozone layer [7]. UVB is primarily associated with Erythema and sun burn.UVA is primarily associated with skin cancer.

The sun care products are widely used to protect the skin from UV Radiations by physical sun screens (those that reflect the sun light) or chemical sun screens (those that absorb the sun light) [8]. But sun screen products are causing hyper sensitivity on sensitive skins which we can rectify by using herbal sun screens. However now a day's research have climbed that cosmetic having herbal components are more suitable for hyper allergic skin because they are less irritant and more easily adjustable to the skin. So the present study is to estimate the phytochemicals and SPF number of Herbal extracts which are having a good anti-oxidant property.

SPF can be calculated by applying the following formula know as Mansur equation

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times ABS(\lambda)$$

Where CF=Correction Factor (10), EE (λ) = Erytmogenic Effect of Radiation With Wavelength (λ), ABS (λ) = Spectrophotometric Absorbance Value at Wavelength (λ) The Values of EE X (λ) are Constants. Which is given in the table -1.

MATERIALS AND METHODS:

Materials Required

Chemicals Required: Ethanol, Water

Instruments used: Double Beam-UV-Spectroscopy (UV-Win software), Heating Mantles

Glassware Required: Beaker (50ml & 100ml), Volumetric Flasks (25 ml, 50ml & 100 ml), Glass Rods, Pipettes (1ml), (500 ml) Round Bottom Flask and Condenser.

Collection and Authentication of Plant Material

The plant material *Manilkara zapota, Actinidia Deliciosa, Solanum lycopersicum, Musa Acuminata, Carica Papaya, Daucus Carota, Mangifera Indica, Vitis vinfera,and Beta vulgaris* was collected in the month of October 2017 from local market, madinaguda in Hyderabad.

Preparation of Ethanolic Extract

The Ethanolic extract of the plant was prepared using reflex condensation process. The fresh fruits about 200g was weighed and placed in a 500 ml round bottom flask with 200ml of ethanol and its refluxed for 8 hrs at 40°c . Then suspension was filtered through a fine muslin cloth. The solvent was evaporated by heating until ¾ is reduced. The remaining solvent is evaporated under room temperature. A semisolid residue was obtained. The percentage yield and phytochemical screening is studied.

Sample Preparation

0.5 g of all samples was weighed, transferred to a 50 mL volumetric flask, diluted to volume with ethanol, followed by ultrasonication for 5 min and then filtered through cotton, rejecting the first 5 mL. A 2.5 mL aliquot was transferred to 25 mL volumetric flask and diluted to volume with ethanol. Then a 5.0 mL aliquot was transferred to a 25 mL volumetric flask and the volume completed with ethanol. The absorption data were obtained in the range of 290 to 320, every 5 nm, and 3 determinations were made at each point, followed by the application of Mansur equation.

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times ABS(\lambda)$$

Table1: Absorbance Value at Wavelength (λ)

wave length	EE*I
290	0.015
295	0.0817
300	0.2874
305	0.3278
310	0.1864
315	0.0837
320	0.018

RESULTS AND DISCUSSION:

Table 2: The Percentage Yield of Ethanol Extract:

S.No	Name of The Plant	Percentage Yield (%)
1	*Musa acuminate*	12.4%
2	*Mangifera indica*	11.6%
3	*Actinidia deliciosa*	13.5%
4	*Daucus carota*	14.2%
5	*Carica papaya*	10.5%
6	*Manilkara zapota*	13.1%
7	*Beta vulgaris*	9.6%
8	*Solanum lycopersicum*	14.6%
9	*Vitis vinfera*	10.4%

Table 3: Phytochemical Screening

Name of the plant	Alk	Carb	Gly	Tan	Phytos	Flav	sapo	Pro	muci
Musa acuminate	+	+	+	+	+	--	--	--	--
Mangifera indica	+	+	+	+	+	--	--	--	--
Actinidia deliciosa	+	+	+	+	+	--	--	+	--
Daucus carota	+	+	+	+	+	+	+	+	--
Carica papaya	+	+	+	+	+	--	--	--	--
Manilkara zapota	+	+	+	+	+	+	--	--	--
Beta vulgaris	+	+	+	+	+	--	--	+	--
Solanum lycopersicum	+	+	+	+	+	--	--	--	--
Vitis vinfera	+	+	+	+	+	+	+	+	--

The above table indicates the presence (+) or absence (-) of phytochemicals in ethanolic extract-- Alk:Alkaloids , Carb:Carbohydrates , Gly:Glycosides, Tan:Tannins, Phytos:Phytosterol, Flav:Flavanoids , Sapo:Saponins , Pro:Proteins , Muci:Mucilages

Table 3: Absorbance of Ethanolic Herbal Extracts

			Absorbance						
s.no	wave length	EE*I	*Musa acuminate*	*Mangifera indica*	*Actinidia deliciosa*	*Daucus carota*	*Carica papaya*	*Manilkara zapota*	*Beta vulgaris*
1	290	0.015	1.014	0.225	0.372	0.099	0.595	0.698	0.708
2	295	0.0817	0.892	0.207	0.328	0.98	0.465	0.532	0.624
3	300	0.2874	0.760	0.192	0.286	0.100	0.395	0.439	0.533
4	305	0.3278	0.650	0.181	0.255	0.099	0.332	0.385	0.474
5	310	0.1864	0.566	0.171	0.235	0.103	0.293	0.341	0.437
6	315	0.0837	0.487	0.159	0.217	0.100	0.290	0.308	0.403
7	320	0.018	0.356	0.150	0.207	0.098	0.323	0.279	0.374

s.no	wave length	EE*I	*Solanum lycopersicum*	*Vitis vinfera*
1	290	0.015	0.949	0.921
2	295	0.0817	0.904	0.703
3	300	0.2874	0.841	0.613
4	305	0.3278	0.743	0.565
5	310	0.1864	0.634	0.530
6	315	0.0837	0.533	0.497
7	320	0.018	0.458	0.472

Table 4: SPF Number for the Ethanolic Extract

S.No	Name of The Plant	SPF NUMBER
1	*Musa acuminate*	6.714
2	*Mangifera indica*	1.826
3	*Actinidia deliciosa*	2.638
4	*Daucus carota*	0.9448
5	*Carica papaya*	3.513
6	*Manilkara zapota*	4.062
7	*Beta vulgaris*	4.920
8	*Solanum lycopersicum*	14.733
9	*Vitis vinfera*	8.094

From the table -2 we have come to know the percentage yield of the ethanolic herbal extract were obtained in which the solanum lycopersicum is having highest yield is about 14.6% and the lowest is beta vulgaris is about 9.6%

The ascending order of the percentage of ethanolic extract was given as beta vulgaris < vitis vinifera <carica papaya <mangifera indica < musa accuminata < manilkara zapota <actinidia deliciosa <daucus carpta <solanum lycopersicum.

From the table -3 shows all the ethanolic herbal extracts contain alkaloids, carbohydrates, glycosides, tannins and phytosterol but in *Carica Papaya ,Vitis Vinifera* and *Solanum Lycoperisum* the proteins were present.where as flavanoids are present in *Vitis Vinifera,Daucus Arota* and *Beta Vulgaris*. Especially the saponins were present in *Vitis Vinifera* and mucilages were present in *Beta Vulgaris*

SPF number plays an important role in sun screens for measuring the effectiveness in protecting the skin from sun radiation .From the table -4 We have found that, when the UV radiation range is increasing the absorption by the herbal extracts were gradually reducing. But from the table no-4 we have come to know that the ethanolic herbals extract which are used are have some sun protection property having the range of 0.9448-14.733 .SPF number of the following extracts where given in ascending order i.e., *Daucus Carota ,Mangifera Indica ,Actinidia Deliciosa ,Carica Papaya ,Manilkara Zapota ,Beta Vulgaris ,Musa Accuminata,Vitis Vinifera And Solanum Lycopersicum*

CONCLUSION:

The SPF values of the ethanolic extracts of some commonly found vegetables sources were evaluated .It was found that all are having almost similar UV protection capabilities, along with their many beneficial effects, easily available, cheap and safety.

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