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

keywords *:sun protection factor, spectrophotomertic , ethanolic extract*

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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.

A number of people with sensitive skin, such as those suffering from skin hypersensitivity don't want to use chemical sunscreens due to concern about skin exposure to unknown chemicals. Although a variety of hypoallergenic cosmetic products have been introduced for customers with sensitive skin, there are still limited options in sunscreen agents. Now, however, researchers have claimed that cosmetics having herbal components are more suitable for hyperallergic skin because they are less irritant and more easily adjustable to skin. Topical cosmetic formulations are the most preferred treatments asked by patients and are also often most prescribed by family physicians and dermatologists for sun burn. Patients feel more comfortable using topical therapies because they have milder side effects, are easier to use, are generally less expensive and are more readily available. Herbal cosmetics must have one or more active sunscreening agent with antioxidant properties in order to achieve good photoprotection effect. The concept of complementary or alternative medicine is increasingly becoming more widely accepted and there is a corresponding rising interest in herbal remedies.

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

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

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?

Table1: Spectrophotometric Absorbance Value

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

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 *Pouteria Sapota , Actinidia Deliciosa ,Solanum lycopersicum ,Musa Acuminata, Carica Papaya ,Daucus Carot* and *Mangifera Indica* was collected in the month of June 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 x$\sum^{320}_{290}$ EE (λ) X I (λ) x ABS (λ)

RESULTS AND DISCUSSION:

Table 2: The Percentage Yield of Ethanol Extract

S.No	Name of The Plant	Percentage Yield (%)
1	*Pouteria Sapota*	12.3%
2	*Actinidia Deliciosa*	9.8%
3	*Solanum lycopersicum*	11.7%
4	*Musa Acuminata*	13.1%
5	*Carica Papaya*	7.5%
6	*Daucus Carot*	9.1%
7	*Mangifera Indica*	10.6%

Table 3: Phytochemical Screening

s.no	Name of the plant	Alk	Carb	Gly	Tan	Phytos	Flav	sapo	Pro	muci
1	*Pouteria Sapota*	+	+	-	+	+	+	+	-	+
2	*Actinidia Deliciosa*	-	+	-	+	+	+	+	+	+
3	*Solanum lycopersicum*	-	+	+	+	+	+	+	-	+
4	*Musa Acuminata*	+	+	+	+	+	+	+	-	+
5	*Carica Papaya*	+	+	+	+	+	+	+	-	+
6	*Daucus Carot*	+	+	+	+	+	+	+	-	+
7	*Mangifera Indica*	+	+	+	+	+	+	-	+	+

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

Table4: Absorbance of Ethanolic Herbal Extracts

			Absorbance						
S.no	**wave length**	**EE*I**	***Pouteria Sapota***	***Actinidia Deliciosa***	***Solanum lycopersicum***	***Musa Acuminata***	***Carica Papaya***	***Daucus Carot***	***Mangifera Indica***
1	290	0.015	0.225	0.372	0.269	0.214	0.383	0.295	0.917
2	295	0.0817	0.207	0.328	0.258	0.205	0.372	0.289	0.914
3	300	0.2874	0.192	0.286	0.239	0.188	0.355	0.275	0.911
4	305	0.3278	0.181	0.255	0.214	0.168	0.331	0.256	0.908
5	310	0.1864	0.171	0.235	0.190	0.151	0.307	0.237	0.905
6	315	0.0837	0.159	0.217	0.165	0.133	0.281	0.214	0.903
7	320	0.018	0.150	0.207	0.148	0.120	0.263	0.196	0.901

Table 5: SPF Number for the Ethanolic Extract

S.No	Name of The Plant	SPF NUMBER
1	*Pouteria sapota*	1.82
2	*Actinidia Deliciosa*	2.63
3	*Solanum lycopersicum*	2.15
4	*Musa Acuminata*	1.70
5	*Carica Papaya*	3.32
6	*Daucus Carot*	2.56
7	*Mangifera Indica*	9.08

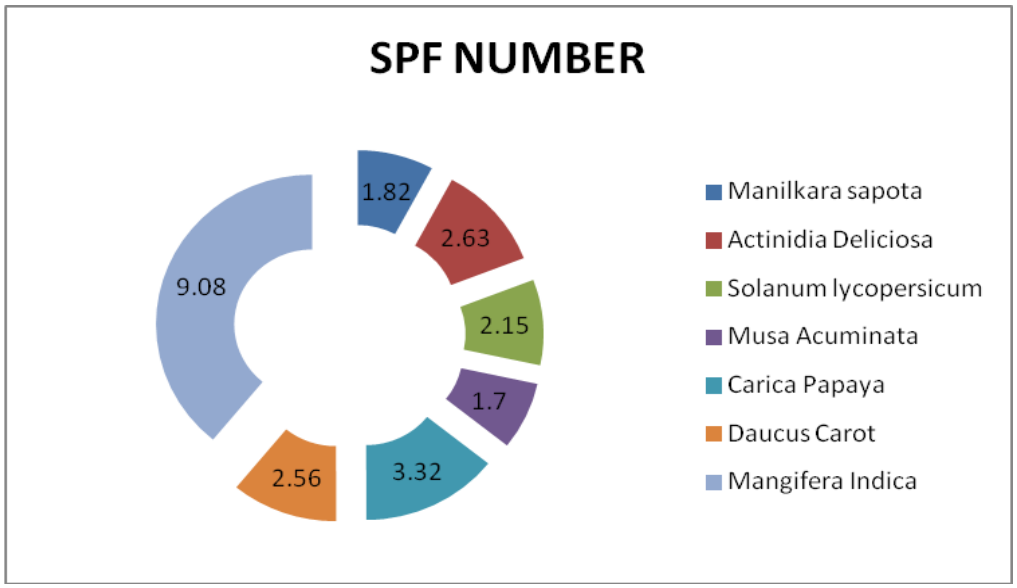

Fig 1: SPF Number for the Ethanolic Extract

From the table -1 we have come to know the percentage yield of the ethanolic herbal extract were obtained in which the *Musa Acuminata* is having highest yield is about 13.1 % and the lowest is *Carica Papaya* is about 7.5%

The percentage yield of the herbal extract were arranged in ascending order :

Musa Acuminata> Pouteria Sapota > Solanum lycopersicum > Mangifera Indica > Actinidia Deliciosa > Daucus Carot > Carica Papaya

From the table -2 shows all the ethanolic herbal extracts contain **Carbohydrates , Tannins, Phytosterol, Flavanoids , Mucilages were present in all ethanolic extracts of** *Musa Acuminata,Pouteria Sapota, Solanum lycopersicum , Mangifera Indica , Actinidia Deliciosa ,Daucus Carot ,Carica Papaya* .

Alkaloids were present in *Musa Acuminata,Pouteria Sapota , Mangifera Indica ,Daucus Carot and Carica Papaya* .but it was absent in *Solanum lycopersicum and Actinidia Deliciosa*

Glycosides were present in *Musa Acuminata Solanum lycopersicum , Mangifera Indica , ,Daucus Carot ,Carica Papaya* .but absent in *Actinidia Deliciosa and Pouteria Sapota*

Saponins were present in *Musa Acuminata,Pouteria Sapota, Solanum lycopersicum , Actinidia Deliciosa ,Daucus Carot ,Carica Papaya* . and absent in *Mangifera Indica*

Proteins were present in *Mangifera Indica and Actinidia Deliciosa* , and absent in *Musa Acuminata,Pouteria Sapota, Solanum lycopersicum,,Daucus Carot ,Carica Papaya* .

SPF number plays an important role in sun screens for measuring the effectiveness in protecting the skin from sun radiation .From the table -6 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-6 we have come to know that the ethanolic herbals extract which are used are have some sun protection property having the range of 9.08-1.70 in which *Mangifera Indica* is having the highest SPF number of about 9.08 and the

lowest is *Musa Acuminata* is about 1.70 SPF number.

The spf no of the herbal extract were arranged in ascending order :

Mangifera Indica > *Carica Papaya* > *Actinidia Deliciosa* > *Daucus Carot* > *Solanum lycopersicum* > *Pouteria Sapota* > *Musa Acuminata*

CONCLUSION:

Herbal sunscreens are rapidly replacing the modern sunscreen containing UV-filters due to associated side effects with UV filters. Many herbal sunscreens are available in market in the form of creams, lotion, and gel having labeled SPF. Also, there are plants available that have given indications of protecting themselves from intense heat and UV radiation from the sun and they are interesting for researchers. The identification of naturally derived sunscreens from the herbs is not impossible, and it requires more concerted efforts.

Herbal cosmetics must have one or more active sunscreening agent with antioxidant properties in order to achieve good photoprotection effect. The concept of complementary or alternative medicine is increasingly becoming more widely accepted and there is a corresponding rising interest in herbal remedies

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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