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EVALUATION OF ANTISOLAR ACTIVITY OF *HIBISCUS HIRTUS LINN*

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ABSTRACT

In the recent days we are getting corrosive UV radiations which are emitted from the sun and they are causing damage to our skin, for this purpose the natural substances extracted from medicinal plants are widely used as sun protective agents. The natural medicinal plants are full of flavanoids and phenolic compounds. The main aim of the present study is the measurement of absorbance of methanol extract at different wavelengths of 290-310nm are done by using UV visible spectrophotometer to calculate the sun protection factor to evaluate the antisolar activity. Methanol extract of leaves of *Hibiscus hirtus Linn* showed the highest SPF value at 290nm. From this observation we conformed that our extract have an anti solar activity for UV B region.

KEYWORDS

Medicinal plants, Sun protection factor, Anti solar activity, Methonaol extract of *Hibiscus hirtus Linn*, UV visible spectrophotometer. UV B region.

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INTRODUCTION

The commonly used word related to skin is the ultraviolet radiation from sun. This commonly used ultra violet term is taken from the Latin language which means "beyond violet", as violet is the color of the shortest wavelengths of visible light. The ultraviolet radiation is considered into three types: UVA (400 – 315 nm), UV B (315 – 280 nm) and UV C (280 – 100 nm) ¹. The earth is reached mostly with the rays of UV-A and UV-B exposure are both short-lived and reversible. The effects from ultraviolet radiation are mild to chronic which includes reddening of skin, burns of skin due to sun, skin darkening, patches forms on the skin, which are the mild effects of the radiation, chronic effects includes the giddiness the person and become faint, sunstroke to kids and geriatrics, melanin content in the body is increased, dehydration which leads to loss of nutrients and deficiency of nutrients, immunosuppression, and cause damage to eyes and also cause skin cancer ².

In the market we are available with so many sunscreen lotions/creams/gels/ointments which contain the active substances to protect from UV-B rays, as they labeled for the broad spectrum they only provide very little protection to UV-A rays. These are the formulations which are used to get rid of effects caused by the sun and safeguard our skin³.

Herbs/medicinal plants are used in cosmetics along with medicines from time unknown because of their potent phytoconstituents flavonoids, phenols, tannins, proteins and vitamins C and E

contents⁴. In the modern days people are more known about the unwanted and side effects of the UV radiation and they are more interested in the sun protecting agents because these dangerous rays may even cause so many dermatitis problems, which includes, rashes, reddening, tanning, patches to the extent it may leads to skin cancer in the case of more exposure to this radiation. So many people are mostly exposed to this radiation which is increasing the skin cancer every year and this are mostly on to the exposed areas of the body like neck, head, back, face and hands⁵.

The unhealthy effects of sun radiation are due to mainly the rays that are present in the ultraviolet (UV) region of the electromagnetic spectrum, as we have already mentioned the regions of electromagnetic radiations A, B, C where in these three regions the UVC radiation is filtered by the atmosphere before reaching earth and it is considered to be safe. The damaging effects of skin with different complications is mostly with UV B region/radiation which is not completely filtered out by the ozone layer and is responsible for the damage due to sunburn. UVA radiation reaches the deeper layers of the epidermis and dermis and provokes the premature aging of the skin. Because of these complications most of the products/cosmetics are producing with sunscreen/sun protecting agents in the skin and hair products ⁶.

The daily practice to keep the sun screen formulations can cause less damage to our skin from ultraviolet rays. There are lot products in the market, the best product

is identified by its sun protection factor (SPF) which is defined as the UV energy required producing a minimal erythema dose (MED) on protected skin, divided by the UV energy required to produce a MED on unprotected skin

SPF= Minimal erythema dose in sunscreen
protected skin

Minimal erythema dose in
nonsunscreen protected skin

The Minimal Erythemal dose (MED) is defined as the lowest time interval or dosage of UV light irradiation sufficient to produce a minimal, perceptible erythema on unprotected skin.

The greater the value of SPF, the product is more efficient, so it is mandatory to all the sunscreen products to measure the SPF factor⁷ but is up to some extent only that higher numbers on labels are more about marketing. In fact, the FDA is proposing to ban sunscreens that are labelled with an SPF number higher than 50, since there is no scientific evidence showing that they offer any more protection than lower numbers. I recommend a minimum SPF of 30 and a maximum of 50⁸.

Natural sun blockers: Like Squalane from olive oil in some products protects the skin sensitive lipids. Allantoin is an extract of the comfrey plant is used for its healing, soothing, and anti-irritating properties. This extract can be found in antiacne, sun care, products and clarifying lotions because of its ability to help heal minor wounds promote healthy skin. Some clinical studies confirm that allantoin enhance skin repair. Aloe Vera gel has

natural UV resistance can be used as a natural sunblock as well as an effective method of acne treatment. Aloe Vera offers many benefits when applied topically to skin and ingested orally. The main destroying factor for skin is oxygenated molecules which are often called free radicals. To stimulate the skin to repair and build itself naturally we need essential antioxidants.

Foods that boost natural sun protection:

Citrus fruits: Lemons, limes, oranges and grapes are high in vitamin C long term intake of vitamin C and E can reduce the potential sun burn.

Carrots: Not only helpful to our eye but also useful to protect our skin.

Strawberries: Posses antioxidants and vitamin C and E which helps to protect skin from damage.

Green tea: It contains catechins which have disease preventing properties and protect against sunburn inflammation.

Pomegranates: which have antioxidants and it has SPF value of 20% used in sunscreen products.

Almonds: which are best source of vitamin E which provides protection and repair the skin?

Red grapes: which posses poly phenols that inhibit skin cancer induced by UV rays.

Leafy Greens: Green lettuce, spinach, kale, Swisschard, is excellent source of antioxidants lutein and zeaxanthin.

Tomatoes: It contains lycopene is a Carotenoid and antioxidant which neutralizes the free radicals.

Watermelon: which contain 40% of Lycopene than tomatoes used to reduce free radicals?

Turmeric: which contain both antioxidants and anti inflammatory properties which

protect the epidermal cells of skin from the damage by UV radiation.

Sun protection factor: It is introduced in 1974 is a measure of the fraction of sun burn producing UV rays that reach the skin, for example SPF 15 means that 1/15 of the burning radiation will reach the skin. Assuming sunscreen is applied evenly at a thick dosage of 2 milligrams per square centimeter mg/cm².

Sun protection factor values of some medicinal plants:

Red raspberry- has the SPF of 28-50

Carrot seed oil- has the SPF of 38-40

Grape seed oil- has the SPF of 4

Argan oil- has the SPF of 30

Avocado oil- have the SPF of 15

Tropical ferns- have the SPF of 4

Hemp seed oil- has the SPF of 6

Mrry oil- has the SPF of 15

Coconut oil- has the SPF of 4 blocks 75% of UV radiation

Alfalfa oil- act as sun screen agent and used in the treatment of water retention

Almond oil- has the SPF of 5. ⁹

Physical sun blockers are two types that are mostly used zinc oxide and titaniumdioxide both provide broad spectrum UVA and UVB protection. They are gentle enough for every day use ,especially for individuals with sensitive skin and for children, because they rarely cause skin irritation,but, because of scattering effect, they often causes so called whitening phenomenon ,when they are applied on skin, which seriously affects the asthetics and in efficacy of sunscreen products.

Chemical sun blockers contains organic (carbon based) compounds such as oxybenzone, octinoxate, octisalate,and avobenzone, which creates a chemical reaction and works by changing UV rays

into heat, then realising that heat from the skin, it is often referred as a chemical or organic absorber. Experiment of methanol extract of *Hibiscus hirtus* Linn shows the maximum absorbance at UVB (290-320nm). It is determined by calculating the sun protection factor^{10, 11}.

MATERIALS AND METHODS:

The leaves which are collected in the fresh form are dried and made into powder and extract is prepared by using the soxhlet apparatus with methanol as the solvent.

Requirements for the present study are extract, cuvettes, 10ml and 50ml volumetric flasks, measuring cylinder, and spectrophotometer.

The extract which is obtained by soxhlation from methanol is dried then the extract is accurately weighted about 10mg and dissolved in 50ml methanol marked as primary stock solution as it becomes the concentration 20 microgram/ml then take 1ml of primary stock solution dissolved in 9 ml of methanol marked as secondary stock solution which is 2 microgram/ml.Then the secondary stock samples filled in cuvette kept in UV spectrophotometer methanol are used as control. Then observe the absorbance by increasing 5nm from 290 to 320nm then they obtained absorbance is substituted in the following formula is used for calculating the sun protection factor. [2, 7]

$$\text{SPF} = \text{CF} \times \sum_{320-290\text{EE}} (\lambda) \times I (\lambda) \times \text{Abs} (\lambda)$$

Where,

EE= Erythema effect spectrum

I=Solar intensity spectrum

Abs=Absorbance of sunscreen products

CF=Correction factor (10)

The value of $EE \times I$ are constant determined by Sayre (8) et. al.

Normalized product function used in the calculation of SPF

Wavelength(nm)	$EE \times I$ (normalized)
290(nm)	0.0150
295(nm)	0.0817
300(nm)	0.2874
305(nm)	0.3278
310(nm)	0.1864
315(nm)	0.0839
320(nm)	0.0180

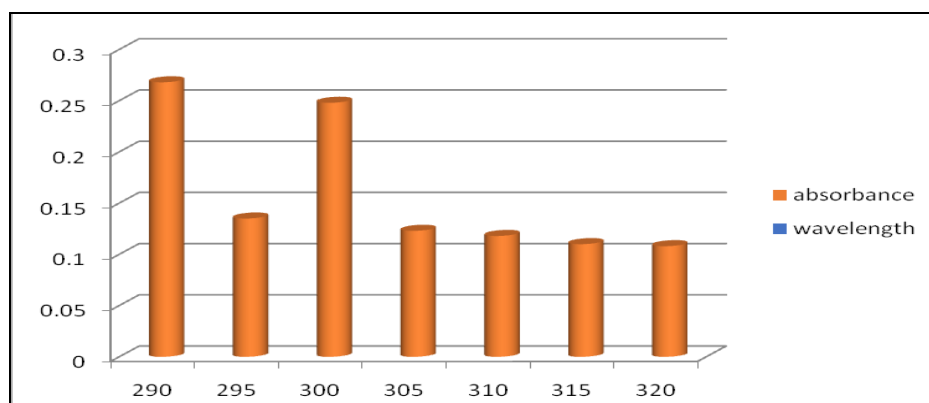
RESULTS AND DISCUSSION

The values of the absorbance are noted and they were substituted in the given formula then they obtained results are presented in the following table. The absorbance is measured by increasing 5nm of wavelength and the concerned values are taken into consideration the results showed that the maximum absorbance is at 290nm and minimum

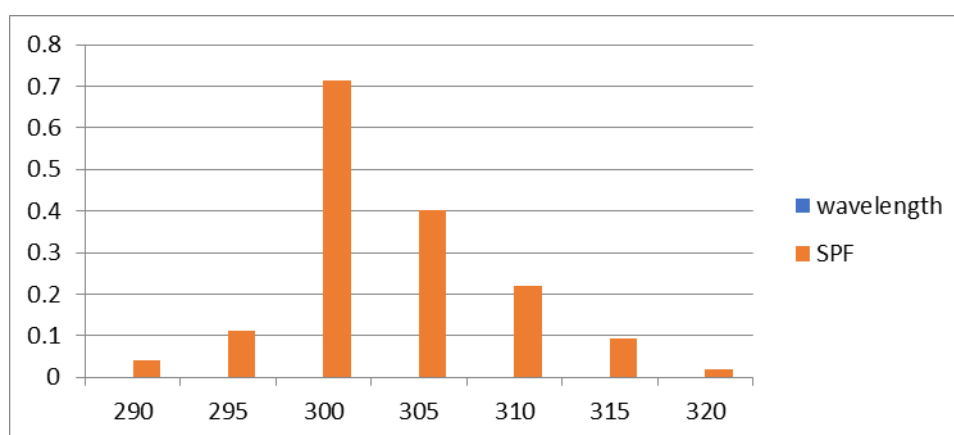
absorbance is at 320 nm. Based on the values the present selected plant *Hibiscus hirtus* Linn, is having the sun protection factor that means has the capacity to protect from the UV rays of sun. The graphs are plotted based on the absorbance and the SPF factor of the plant.

Wavelength (nm)	$EE \times I$ (normalized)	Absorbance	Sun protection factor
290nm	0.01500	0.268 (Max)	0.0402
295nm	0.0817	0.135	0.110295
300nm	0.2874	0.248	0.712752
305nm	0.3278	0.123	0.403194
310mm	0.1864	0.118	0.219952
315mm	0.0839	0.110	0.09229
320mm	0.0180	0.108 (Min)	0.01944

Graph based on absorbance of the extract



Graph based on SPF of the extract



Discussion

The selected plant is done for Qualitative analysis of *Hibiscus hirtus* Linn which shows the presence of flavonoids which are responsible for anti solar activity. The conformation of the presence of flavonoids in the extract was confirmed by phyto chemical screening especially by Shinoda test, lead acetate test; sodium hydroxide test. It absorbs light and helps to protect the photo sensitive substances in *Hibiscus hirtus* Linn.

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CONCLUSION

The methanol extract of *Hibiscus hirtus* Linn posses the property of absorption of UV radiation. Thus it is well known for anti solar activity due to their sun protection factor so it can be used in the anti solar formulations. It is cheaper, better and safe. [10]

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