COMPARATIVE SUN PROTECTION FACTOR DETERMINATION OF ROOT EXTRACTS OF LIQUORICE VS MARKETED COSMETIC FORMULATION.

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\textbf{ABSTRACT}
The aim of study was to evaluate the correlation between root extracts Liquorice and marketed Liquorice Cream as Sun Protective agent. The in-vitro Sun Protection Factor of aqueous root extract of Glycyrrhiza glabra and randomly selected marketed pure Liquorice cream is determined according to Spectrophotometric method of Mansur et al. The results indicate that there was no more good correlation between the in-vitro SPFs values.

**Keywords:** Glycyrrhiza glabra Extract, Sun Protection Factor, Photo protection, Erythema.

**INTRODUCTION:**

The Glycyrrhiza glabra in India communally know as the Jestmadh. For centuries plants have been used throughout the world as drugs and remedies for various diseases. Liquorice is a plant of ancient origin and steeped in history. It grows in subtropical climates in Europe, the Middle East, and Western Asia. Liquorice extracts and its principle component, glycyrrhizin, have extensive use in foods, tobacco products, and snuff, and in traditional and herbal medicine. Liquorice (Glycyrrhiza glabra), is a perennial herb which possesses sweet taste[1]. Liquorice has extensive pharmacological effects for human being. The most common medical use liquorice is for treating upper respiratory ailments including coughs, hoarseness, sore throat and bronchitis.[2,3]. Medicinally Liquorice used as cough suppression, gastric ulcer treatment, treatment of early Addison disease, treatment of liver disease and as a laxative. The anti-ulcerative activity has been demonstrated extensively and in China and Japan, Liquorice is clinically for the treatment of stomach ulcers[4-11]. Its preparations are used as a conditioning and flavoring agent in tobacco products. So far more than 80 different constituents of liquorice preparations (flavonoids, chalcones and coumarines) have been identified. Glyzyrrhizic acid or glycyrrhizin is the main biologically active compound of the liquorice root. Glycyrrhizin possesses a sweet taste and sweetness-potentiating characteristics and have been employed industrially[12].

UV radiation comes from sun with radiation spectrum of 200nm-400nm. The distinguished major bands are UVA (400-320 nm) and UVB (320-290 nm) and UVC (290-200 nm). Despite its benefits, the sin may become a terrible enemy of the skin by inducing photoaging and in some cases photo carcinogenesis [13]. various studies show the great influence of solar radiation on skin. Between these UV-A and UV-B are mainly responsible for skin hazards such as sunburn, cutaneous degeneration, photosensitivity, phototoxicity, ectinic lastisis[14]. It is well documented that ultraviolet (UV) light indicc immune suppression and oxidative stress, which play an important role in the induction of skin
cancers \cite{15}. Earlier investigation evidenced that ultraviolet (UV) radiation is known to cause distinct mutations in keratinocytes that ultimately contribute to the development of the nonmelanoma skin cancers, which include basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). The process by which these mutations are introduced, begins with the reaction of UV photons with cellular DNA. All these investigations make it necessary to protect the skin from such carcinogenic radiation. Available marketed sunscreen produces protection on the basis of active principles that provide protection through various mechanisms such as reflection or absorption of radiation by them \cite{16}. Studies have been performed on various plants (helichrysum, Rangula, Chamomole, Hamamelis virginiana, Cinnamomum zeylanicum and Rosa damascene etc.).

Total extracts which contains phytoconstituents like flavonoids, tannins, anthraquinones and cinnamate etc. also play a valuable role in sun protection, if they are applied directly on the skin \cite{17-18}. In the series of sun protectants, cucumber plant is widely exploited since long time and found best as traditional used plant. The motivation for evaluation and comparison of effectiveness of cucumber extracts and marketed cucumber formulation.

All available marketed sunscreens with a SPF number filters out the UVB parts of ultraviolet radiation. Labeled “broad-spectrum” will filter out some of the UVA as well as UVB. It is well known for some time that UVB radiation causes skin cancer \cite{19}. But recent evidence suggested that UVA radiation also increases the risk of skin cancer, as well as skin wrinkling and ageing \cite{20}. It is felt appropriate to use natural agents, which can protect and treat the ailments of skin and maintain natural immunity of skin. Fresh cucumber extract has many qualities for its use as a skin caring product. So many useful ingredients in cucumber it can help you in treating so many skin problems. It has become a part of daily beauty product into face packs, facials, juice and many other things which can affect your skin \cite{21}.

**MATERIALS AND METHODS:**

The present study, it was planned to evaluated the Sun Protective property of Liquorice from UVA as well as UVB radiation and compare the marketed formulation (Liquorice) and root extract of Liquorice.

**Preparation of Extracts:**

The root of Liquorice was collected from locally and dried for several days and powdered with the help of an electric grinder. The course material was macerated with distilled water. The extracts were dried at 50°C in a water bath. The percentage yields obtained of the extract was 11.31 %.
Then root extracts was used for evaluated for sun protective efficiency by utilizing simple and rapid in-vitro sun protection determination method. Marketed Liquorice contented cream product (Fairness Cream with SPF 15) was randomly selected and compared with fresh Liquorice extracts by making different dilution (100 & 200 µg/ml) in ethanol. The absorbance of all samples were recorded at different nanometer with the 5 nm intervals from 250-350 nm. The in-vitro SPF values were determination at wavelength from 290-320 nm according to the method discussed by Mansur et al.

Reagents and samples:
The all reagents are analytical grade. Ethanol (Merck®) analytical grade. Commercially available sunscreen creams of various manufactures were purchased from local pharmacies.

Apparatus:
For this evaluation used the Beckman DU-70 UV/Visible spectrophotometer, equipped with 1 cm quartz cell, computer and printer Epson FX-850.

Sample preparation:
Weight accurately 1.0 g of all samples, transferred to a 100 ml volumetric flask, diluted to volume with ethanol, followed by Ultrasonication for 5 min and then filtered through cotton, rejecting the ten first ml. A 5.0 ml aliquot was transferred to 50 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 spectra of samples in solution were obtained in the range of 290 to 450 nm using 1 cm quartz cell, and ethanol as a blank. 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\(^{22,23}\).

\[
SPF = CF \cdot \sum_{290}^{320} EE(\lambda) \cdot Abs.(\lambda)
\]

Where, CF=10 (correction factor), EE (λ) = Erythmogenic effectof radiation with wavelength λ and Abs. (λ) = Spectrophotometric absorbance value of a solution

RESULTS AND DISCUSSION:
The Tab.1 showed that aqueous bark extract of Liquorice has sun protection activity as the concentration of extract increases from 100-200 µg/ml. The Liquorice aqueous bark extract have high protective property as compared to marketed formulation for both UVA and B ranges that was statistically analyzed (p≤0.05). The SPF value of marketed Liquorice cream
was found to be $4.8441 \pm 0.005$ at 200 µg/ml concentration while SPF value of Liquorice aqueous bark extract at different concentration i.e. 100 & 200 µg/ml were found to be $3.502 \pm 0.004$ and $7.8222 \pm 0.008$ respectively. Data of average SPF values of fresh Liquorice aqueous bark extract and marketed Liquorice cream were compared to each other at same concentration (200µg/ml) indicating fresh bark aqueous extract of Liquorice was found to be same than marketed formulation. The marketed Liquorice cream covers broad ranges of UV absorbance while fresh Liquorice aqueous bark extract absorbs skin erythmal producing UV-B radiation suggesting same potent sun protective in marketed formulation contains and Liquorice cream. This might be due to the synthetic composition base ingredients in the marketed Liquorice cream.

**Tab. 1: Determination of SPF value using of Marketed Liquorice cream and fresh aqueous root extract of Liquorice.**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Wave length</th>
<th>EE Value</th>
<th>LM-200 µg/ml</th>
<th>LE1-100 µg/ml</th>
<th>LE2-200 µg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>290</td>
<td>0.015</td>
<td>0.4576 ±0.003180</td>
<td>0.4593±0.0006667</td>
<td>1.069±0.001764</td>
</tr>
<tr>
<td>2</td>
<td>295</td>
<td>0.0817</td>
<td>0.470 ±0.003512</td>
<td>0.4193±0.0006667</td>
<td>0.962±0.002028</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>0.2874</td>
<td>0.480 ±0.003512</td>
<td>0.3843±0.0006667</td>
<td>0.864±0.002186</td>
</tr>
<tr>
<td>4</td>
<td>305</td>
<td>0.3278</td>
<td>0.4896 ±0.00318</td>
<td>0.3503±0.0003333</td>
<td>0.768±0.002028</td>
</tr>
<tr>
<td>5</td>
<td>310</td>
<td>0.1864</td>
<td>0.4993 ±0.003383</td>
<td>0.3187±0.0003333</td>
<td>0.680±0.002082</td>
</tr>
<tr>
<td>6</td>
<td>315</td>
<td>0.0839</td>
<td>0.4783 ±0.003383</td>
<td>0.2903±0.0008819</td>
<td>0.607±0.002082</td>
</tr>
<tr>
<td>7</td>
<td>320</td>
<td>0.018</td>
<td>0.4273 ±0.003383</td>
<td>0.2673±0.0008819</td>
<td>0.551±0.001856</td>
</tr>
</tbody>
</table>

Sun Protection Factor $4.8441 \pm 0.005$ $3.502 \pm 0.004$ $7.8222 \pm 0.008$

*SPF: Sun Protective Factor, EE: Erythemogenic effect, LM: Marketed Liquorice Cream, LE1:Fresh aqueous root Extracts of Liquorice (100µg/ml), LE2: Fresh aqueous root Extracts of Liquorice (200µg/ml).*

The proposed UV spectrophotometric method is simple, rapid, employs low cost reagents and can be used in the *in vitro* determination of SPF values in many cosmetic formulations. The proposed methodology may be useful as a rapid quality control method. It can be used during the production process, in the analysis of the final product, and can give important information before proceeding to the *in vivo* tests.

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REFERENCES: