

Formulation and *in-vitro* Evaluation of *Moringa concanensis*, Nimmo. Seed Oils Sunscreen Cream

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Abstract: In the present study efforts were made to formulate sunscreen cream using extracted *Moringa concanensis*, Nimmo. seed oil. Evaluation of same was done for sunscreen activity by using *in vitro* SPF method. SPF of formulation was found 1.46 with ultra boot star rating 1 which approaches toward sunscreen activity.

Keywords: *Moringa concanensis* (Moringaceae), SPF, Sunscreen activity.

Introduction

Ultraviolet light which is responsible for sunburn, suntan and increases the risk of basal cell carcinoma and malignant melanoma. Different radiation are of UVA in the 320-400, UVB-290-320 and UVC- 100-290 nm range respectively. Exposure to solar radiation is recognized to have negative effects on the human skin. UVA rays can be divided into two key wavelengths: short-wave UVA (320 - 340 nm) and long-wave UVA (340 - 400 nm). Ultraviolet radiation A and B (UVA, UVB) are especially harmful by different mechanisms that result in suppression of skin's immune system. This immunosuppressive effect generates photodermatoses, skin premature aging and skin cancers. The Sun Protection Factor (SPF) measures the length of time a product protects against skin reddening (sunburn) from UVB (Ultra Violet) radiation, compared to how long it takes to redden without protection. To maintain the SPF, reapply sunscreen every two or four hours and right after swimming or sweating¹.

An individual's response to UV radiation and melanin production is dependent on skin color and other genetic factors. Even if an individual has dark skin, or whose skin readily produces melanin when exposes to UV radiation, may still experience sunburn as a result of high intensity of UV radiation and an extended length of exposure. Sunscreens are cosmetic

formulations that block UV rays. Sunscreens are assigned sun protection factors, or SPF, ratings that are supposed to indicate the level of protection from UV radiation². This is important for human well-being because exposure to ultraviolet radiation (principally UV-B radiation) has a number of effects on health including sunburn, skin cancer, immune suppression and damage to the eye³.

Moringa concanensis, Nimmo. (Moringaceae) tree commonly known as Horseradish tree, Drumstick tree, Never Die tree, West Indian Ben tree, and Radish tree^{4,5,6,7}. Moringaceae tree is native through the sub-Himalayan tracts of India^{4,5,6}. It is most commonly found in the forest inventories in every part of the country^{5,6,7}. *Moringa concanensis*, Nimmo. is widely used in India, since the Ayurveda and Unani medicinal systems use it for the treatment of several ailments⁸.

In literature seed extract of *Moringa* species reported to have anti-inflammatory, purgative, tonic^{8,9,10,11}, analgesic¹⁰, potential antitumor¹², anti-fungal¹³, antispasmodic, anti-inflammatory and diuretic activity¹⁴. Dried seeds of *Moringa concanensis*, Nimmo. are used in ophthalmic preparation, venereal affection, in goitre, glycosuria and lipid disorders¹⁵.

Fatty oil obtained from the seed kernels of *Moringa concanensis*, Nimmo. is yellowish brown, semi-solid, with a faint odour of bitter almonds. The % composition of mixed fatty acids in seed oil as

Palmitic- 11.04, Stearic- 3.58, Arachidic- 3.44, Behenic -7.09, Palmitoleic- 2.38, Linoleic- 1.83 % respectively 17,18. Characteristics of seed oil Density (mg mL^{-1}) 24°C - 0.8660, Refractive Index at 40°C - 1.4648, Saponification Value-179, Iodine Value ($\text{g of I/100 g of oil}$)-67.00, Unsaponifiable Matters 0.78^{16,17}. The study was designed with an objective to determine the *In vitro* Sun Protection Factor (SPF). In present study we have made an attempt to formulate the topical cream from seed oil of *Moringa concanensis*, Nimmo. and evaluation of the same.

Material and Methods

Plant material

Plant material of *Moringa concanensis*, Nimmo. were collected from Tah. Mouda, Dist. Nagpur, India. The plant material was identified, authenticated taxonomically and herbarium sheet deposited to Botanical Survey of India, Pune with voucher specimen number (GPGMCOPL-1). The seed were cleaned, dried under direct sunlight and powdered by a mechanical grinder.

Seed oil extraction

Dried powdered material of seed of *Moringa concanensis*, Nimmo. (50 g) was extracted with 50 volumes of petroleum ether ($60-80^{\circ}\text{C}$) using a Soxhlet apparatus. This process of extraction was repeated for 6h, the petroleum ether distilled out by distillation assembly, then concentrated by hot plate drying and air-drying at temperature of $40 \pm 2^{\circ}\text{C}$ (yield 15.9% w/w).

Sunscreen cream formulation

Step I: Water phase was prepared by collecting deionised water (72 %) and then 5 % water was removed aside from this for final volume makeup. Water soluble components Disodium EDTA (0.02%), Sodium Methyl Paraben (0.3%) and Triethanolamine (0.5%) were dissolved in deionised water, meanwhile, carbopol (0.5%) was allowed to swell using an homogenizer and heated up to 80°C .

Step II: Oil phase was prepared by heating Sodium Propyl Paraben (0.06%), Stearic acid (2%), Cetyl alcohol (1%), Cetomacrogal-1000 (2%), Cetostearyl alcohol (5%) and *M. concanensis* seed oil (20%) at 80°C .

Step III: Oil phase was added in water phase at 80°C with continuous stirring for 20-25 min and then it was homogenized till uniform emulsion is formed. To improve the aesthetic value of the product, perfume was added in quantity sufficient. The finished product has white colour and gel-like consistency. It was then poured into the wide mouth container and stored at temperature not exceeding 37°C .

Determination of *In-Vitro* SPF of Sunscreen Cream Method

Approximately 100 mg of the investigational sample was applied and spread on 50 sq.cm area to obtain a sample film thickness of $2 \mu\text{L}/\text{cm}^2$ on Transpore surgical tape to get an even film as suggested in the operation manual of Optometrics LLC SPF-290S for the sample preparation and application technique. The samples thus prepared were exposed to Xenon arc lamp with UV range 290nm to 400nm for determining the SPF.

WIN SPF uses the Diffey's method for the standard deviation calculation for SPF.

$$\sigma_{\text{Diffey}} = \text{SPF}^2 \sqrt{\frac{\sum \frac{E_{\lambda} B_{\lambda} \sigma \text{MPF}_{\lambda}}{\text{MPF}_{\lambda}^2}}{\sum E_{\lambda} B_{\lambda}}}$$

Where,

MPF_{λ} = scan MPF value

E_{λ} = Spectral Irradiance of terrestrial sunlight under controlled conditions

B_{λ} = Erythral Effectiveness.

Table 1 Composition of *Moringa concanensis*, Nimmo. seed oil sunscreen cream

Sr. No.	Ingredients	Use	Components (%w/w)
1	Cetosteryl alcohol	Emulsifier	5
2	Stearic acid	Emollient, Coemulsifier	2
3	Cetomacrogal-1000	Emulsifier	2
4	Cetyl alcohol	Emollient, Coemulsifier	1
5	Carbopol 940	Gelling agent	0.5
6	Disodium EDTA	Chelating Agents	0.02
7	Na Methyl Paraben	Preservative	0.3
8	Na Propyl Paraben	Preservative	0.06
9	Triethanolamine	Surface active agent	0.5
10	Purified Water	Vehicle	62
11	<i>M. concanensis</i> seed oil	Active ingredients	20
12	Perfume	-	q.s.

Result

Seed oil of *Moringa concanensis*, Nimmo. was extracted and Sunscreen cream was formulated using this oil. Formulated cream was evaluated for sunscreen activity using in vitro SPF method. SPF value of sunscreen cream was found to be 1.46 with ultra boot star rating 1.

Discussion

SPF value for sunscreen above 2 is considered as having good sunscreen activity. In present study formulated sunscreen cream was found near the range of good sunscreen activity and hence *Moringa*

concanensis, Nimmo. seed oil may be considered as good candidate for sunscreen or cosmoceutical purposes. Further this cream can be evaluated for spreadability, viscosity, microbial testing, water content, etc.

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