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Formulation and Evaluation of Herbal Skin Whitening Cream

Mukati Sandeep*, Sharma Ayushi, Dwivedi Sangeeta, Koshta Ashok, Joshi Ankur, Malviya Sapna, Kharia Anil

Modern Institute of Pharmaceutical Sciences, Indore MP, INDIA

ABSTRACT

Melanin is the natural color in our skin is synthesized by melanocytes. The distribution pattern in the nearby keratinocytes and the nature of the formed melanin determine the actual color of our skin. Melanin form through the series of oxidative reaction involving the amino acid tyrosine in the presence of enzyme tyrosinase. Skin whitening agent after inhibit the activity of tyrosinase. The drawback of the quick effect was, the high cytotoxicity of hydroquinone and its huge irritation potential. So that's why herbal medicines are currently in demand and their popularity is increasing day by day. The objective of this research is to formulate skin whitening formulation, which have ability to give whitening effect without any side effects using herbal products. Now a day's hyperpigmentation is a major problem. As per previous literature survey it is reported that lycopene, Citric acid & Tocopherol shows significant result in skin whitening activity. It is reported that plants Tomato, Lemon & Cucumber (fruits) contain high amount of Lycopene, Citric acid & Tocopherol. So from above conclusion to hypothesize that this plants may have significant role in skin whitening.

Keywords: Melanocyte, Epidermis, Skin, Melanin, Lycopene, Citric acid, Tocopherol.

*Corresponding Author Email: mukatisandeep1995@gmail.com

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INTRODUCTION

The skin is the largest part (organ) of the body, accounting for about 15% of the total adult body weight. It performs many important functions, including protection against external physical, chemical, and biologic attacker, as well as prevention of excess water loss from the body and a role in thermoregulation. "The thin layer of tissue (group of cell) forming the natural outer covering of the body of a vertebrate animal". The body's outer skin, which protects against heat and light, injury, and infection. Skin regulates body temperature (t) and stores vitamin D, water, and fat. it is made up of two main layers: the dermis and the epidermis.

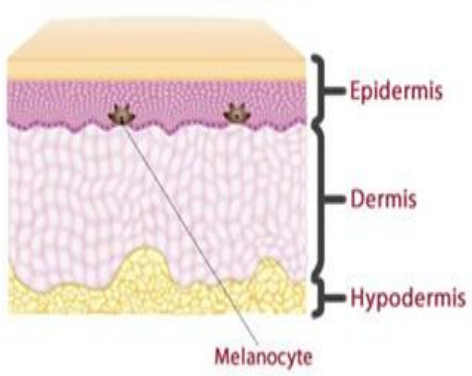

Figure 1: Skin

Functions of Skin:

Skin well-behaved the following functions:

Sensation contains a multiformity of nerve endings that jump to heat and pressure, vibration, cold, touch, and tissue damage.

Thermoregulation sweat glands and dilated blood vessels (increased superficial perfusion) aid heat deficit, while constricted vessels greatly reduce cutaneous blood stream and conserve heat.

Control of evaporation:

The skin provides a relatively dry and semi-impermeable barrier to reduce liquid (fluid) loss.

Storage and synthesis acts as a storage center for fat (lipids) and aqua (water).

MATERIALS AND METHOD

- **Collection & Authentication of plants:**
- Collection time: July 2018
- From: Local market, Indore
- Identified by: Prof. Dr. Nrendra Vyas, MIPS collage, Indore (M.P.)
- Voucher no. HERB/MIPS/2018/0036

Preparation of extracts:

Preparation of extract (Lemon):

Fresh fruits of lemon were chosen, weighed, washed, cut and their juice contents crush-out. in a glass beaker. There after 50 ml of the juice strained out, using Whatman no.one filter paper and concentrating it on electrical water bath at low heat to defend thermal sensitive substance which are present in the extract.

Preparation of extract (Tomato):

Fresh fruits of tomato were chosen, washed, cut into the small pieces and dried. After that it was subjected to fine powder with the help of mortar pestle ultimately record the weight of powdered tomato. It was squashed with hydro-alcoholic mixture of ethanol and distilled water in the ratio 70: 30 consequently for three days at room temperature. Agitation of solvent was conserved for enhance the capability of extraction process. After three days, the extracted solution was filtered and marc was pressed, Then this solution was concentrated in electrical water bath to thick paste.

Preparation of extract (Cucumber):

Fresh fruits of cucumber were selected, washed, cut in to the small pieces and dried. After that it was subjected to fine powder with the help of mortar pestle finally record the weight of cucumber. It was macerated with hydro-alcoholic mixture of ethanol and distilled water in the ratio 70: 30 respectively for three days at room temperature. Agitation of solvent was maintained for enhance the efficiency of extraction process. After three days, the extracted solution was filtered and marc was pressed, then this solution was concentrated on electrical water bath to thick paste.

Development of Formulation:

The formulation components used were listed in first Table. Water in oil emulsion of fruit extracts were formulated. The oil soluble components (stearic acid, lanoline, mineral oil) were dissolved in the oil phase (Part A) and heated up to 80° C. fruit Extracts (lemon, tomato, cucumber) and water soluble components (glycerin, triethanolamine, water) were dissolved in (Part B) and heated up to 80° C. After heating, the aqueous phase was added in portions to the oil phase with constant stirring until cream is formed, than preservatives (Methyl paraben, Propyl paraben) were added.

Composition of developed formulation:

Table 1: Quantity taken for 50g of cream

S. No.	Ingredients	F1	F2	F3	F4	F5	Control (F6)
1	Lemon Extract	0.25mg	0.50mg	0.75mg	1.0gm	1.25gm	-
2	Tomato Extract	0.25mg	0.50mg	0.75mg	1.0gm	1.25gm	-
3	Cucumber Extract	0.25mg	0.50mg	0.75mg	1.0gm	1.25gm	-
4	Stearic acid	6.5gm	6.5gm	6.5gm	6.5gm	6.5gm	6.5gm
5	Lanoline	4.5gm	4.5gm	4.5gm	4.5gm	4.5gm	4.5gm
6	Mineral oil	5gm	5gm	4.5gm	4gm	4gm	5gm

7	Glycerin	2.5gm	2.5gm	2.5gm	2.5gm	2.5gm	2.5gm
8	Triethanolamine	1.2gm	1.2gm	1.2gm	1.2gm	1.2gm	1.2gm
9	Methyl paraben	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm
10	Propyl paraben	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm
11	Water	30ml	30ml	30ml	30ml	30ml	30ml

Evaluation of Extracts & Formulations:

Evaluation of Extracts:

Physical characteristics: The extracts of lemon, tomato, and cucumber were evaluated for its color, odor, taste, physical state, percent yield and results are shown in table No2.

Evaluation of Formulation:

The formulations were tested for Physical evaluation, pH, wash ability, spreadability etc.

Physical evaluation: Physical parameter such as color and consistency were checked visually and results are mentioned in table 3.

pH measurement:

The pH of various formulations (cream) was determined by using pH meter (Digital). One gram of each formulation (cream) was dissolved in 100 ml of distilled water (i.e. 1% aqueous solution) and stored for two hours. The measurement of pH of each formulation was done three time and average values are mentioned in table No. 3

Homogeneity:

All formulations of cream generate consistent distribution of extracts in cream. This was confirmed by detectable appearance and by touch.

Washability:

Formulations were applied on the skin and then ease and degree of washing with water were examined manually.

Spreadability:

It indicates the extent of area to which the topical formulation (cream) readily spreads on applying to skin or the affected area. The bioavailability capability of a topical formulation also depends on its spreading value. The Spreadability was demonstrated in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for disconnection of the two slides, better the Spreadability.

Two sets of glass slides of standard measurement were taken. The cream formulation was placed over one of the slides. The other glass slide was placed on the top of the cream formulation, such that the cream was sandwiched between the two slides in an area occupied by a distance of 6.0 cm along the glass slide. 100gm weight was placed upon the upper slides so that the cream between

the two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of cream adhering to the glass slides was scrapped off. The 2 glass slides in position were fixed to a stand without slightest disturbance and in such a way that only the upper slide to slip off freely by the force of weight tied to it. A 20 gram weight was tied to the upper slide carefully. The time taken for the top glass slide to travel the distance of 6.0 cm and separated away from the lower slide under the influence of the weight was noted. The test was repeated by 3 times and the mean time taken for calculation.

Spreadability was calculated by using the following formula:

$$S = M \times L / T$$

Where,

S = Spreadability, **M** = Weight in the pan (tied to the upper slide), **L** = Length of glass slide and **T** = Time (in sec.) taken to separate the slides.

Skin irritation test: *Patch Test*

About 1-3gm of material to be tested was placed on a piece of fabric or funnel and applied to the sensitive part of the skin e.g. skin behind ears. The cosmetic to be tested was applied to an area of 1 sq.m. of the skin. Control patches were also applied. The site of patch is view after 24 hrs.

RESULTS AND DISCUSSION:

Evaluation of Extracts:

Characteristics of concentrates of Lemon, Tomato, And Cucumber: color, odour, taste, physical state and percent yield of all three extracts are as follows.

Table: 2 Evaluations of Extracts:

Characteristics	Lemon	Tomato	Cucumber
Color	Brown	Red Brown	Green Brown
Odor	Aromatic	Characteristic	Characteristic
Taste	Characteristic	Characteristic	Characteristic
Physical state	Semi solid	Semi solid	Semi solid
Percent yield	13.9%	10.3%	8.7%

Determination of percentage yield:

The % yield of each extract(drug) was calculated by using following formula:-

$$Percentage\ Yield = \frac{Weight\ of\ extract}{Weight\ of\ powder\ drug\ taken} \times 100$$

Percentage yield of Lemon:

% yield was found to be=13.9%w/w

Percentage yield of Tomato:

$$\%\ yield\ was\ found\ to\ be = 10.3\%w/w$$

Percentage yield of Cucumber:

% yield was found to be=8.7%w/w

Evaluation of Formulation:

Table 3: Evaluation of formulation

Formulation	pH	color	Consistency	Homogeneity	Wash ability	Spreadability (gm-cm/sec)
Control	6.59	Creamy White	Semi-solid	Homogenous	Good	15.59
F1	6.62	Creamy White	Semi-solid	Homogenous	Good	16.71
F2	6.51	Creamy White	Semi-solid	Homogenous	Good	17.12
F3	6.34	Creamy White	Semi-solid	Homogenous	Good	18.69
F4	6.30	Brownish	Semi-solid	Homogenous	Good	22.92
F5	6.17	Brownish	Semi-solid	Homogenous	Good	22.98

DISCUSSION:

- As already discussed skin is the largest organ of the body, accounting for about 15% of the total adult body weight. It performs many vital functions, including protection against external physical, chemical, and biologic assailants, Melanin is a pigment that is produced by cells known as melanocytes in the skin of most animals, including humans.
- The pigmentation of skin is caused by exposure of uv radiation, genetic factors, stress condition, hormonal imbalance.
- The hydro alcoholic extracts of Lemon, Tomato & Cucumber by maceration process found their Percent yield of Lemon, Tomato & Cucumber was 13.9%, 10.3% & 8.7%. The cream was prepared by the extracts.
- The results of evaluation are displayed in table: 2, Formulation 1, 2, 3 (creamy white) and Formulation 4, 5 (Brownish) in color whereas controlled formulation was Creamy white in color. Each of cream was found to be homogenous and easily washable. All formulations had slightly acidic pH which was compatible with normal skin physiology. F_3 cream is found to be best formulation among them due to its better colour and spreadability as compared to other formulation.

CONCLUSION:

A Cream formulation containing the extracts of *Citruslimon, Solanumlycopersium, Cucumissativus* has significant depigmentation effects on human skin due to reduced melanin levels in skin. Tyrosinase inhibitors and other agents that affect the melanin biosynthesis pathway are widely distributed in plant material lycopene. Citric acid & Tocopherol gives antioxidant activity. All

these herbs gives synergistic effect. These natural ingredients offer safer alternatives to hydroquinone, for use in topical skin lightening compositions as shown by many Literature survey. This research work based on such literatures to make a cream by using herbal plants to overcome the side effects of synthetic skin whitening agents further experiment is to be needed in such research work.

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