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DEVELOPMENTAND CHARACTERIZATION OF FACIAL SCRUB USING NATURAL EXFOLIANTS

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ABSTRACT

For healthy and glowing skin, regular cleansing was necessary thereby remove dirt, dead cell, sebum etc. The present study was undertaken to develop and characterize facial scrub using natural exfoliants. Facial scrub contains natural exfoliants such as grape seed, guava seed, pomegranate seed which is used as an active ingredient having antioxidant properties. These active ingredients and excipients are looked for incompatibility studies. Studies showed that all of them are compatible with each other. Prepared face scrub was evaluated by spreadability, extrudability, pH, viscosity and stability study. The application of the scrub helps to exfoliate surface of the skin. All the studies showed that the prepared scrubis having all the properties to apply on face and make our skin more glowing and smoother. Optimizationby design expert software is done to get the desired formulation quantities which is required to formulate a scrub. After developing the optimized batch, it is again subjected to various evaluation parameters. The result showed the same as before. After application of scrub, skin becomes softer, cleaner and refreshed.

KEYWORDS: Facial scrub; Optimization; Natural exfoliants; Grape seed; Guava seed; Pomegranate seed;Antioxidant; Exfoliation; Glowing skin; Characterization.

INTRODUCTION

Facial scrub is the cosmetic product which cleanses, exfoliates the facial skin and gives healthy complexion. Generally, skins are of three types; dry skin, oily skin, and sensitive skin. The people with dry skin must use facial scrub which contains hydrating ingredients and

moisturizer is must for them after usingscrub. Gentle scrubs should be used for sensitive skin. For those who are having oily skin, it is essential to get a scrub that exfoliates deeply to prevent the pores from clogging and also to balance the skin's oil production. We can use a face scrub twice or thrice a week followed by lightweight face oil. Regardless of skin type, always we should select a scrub which is not hurtful but gentle to the skin. The harsh ones can domore harm than good to the skin. For oily skin, gel based scrub is preferred. For dry skin, cream-basedscrub is useful. For sensitive skin, scrubs with super soft granules are having good results.

Face scrubs, unlike face washes, go deeper into the skin to unclog pores and revive dull skin. Skin becomes dull, non-glowing due to various causes and these can effectively be overcome with the application of scrubs. There are two types of scrub being used on the skin such as facial scrub and body scrub. Facial scrub removes the dead skin cell and exfoliates the skin. Scrub can be used on any type of skin. On regular use of scrubs, skin becomes glowing and smoother because dead skin cells are remove thereby exposing new skin cells. Scrubs can be directly applied on to the skin or can be applied with small cosmetic pad.

Gentle message is recommended on application of the scrub gel which helps to exfoliate the skin, improve blood circulation, increase oxygen supply to all surface of skin. The prime purpose of a skin exfoliator is to unclog pores and let them breathe.

BENEFITS

- Face brightening
- Reduce dark spots and acne marks
- Improves skin texture
- Reduces the pores and acne breakouts
- Averts ingrown hair issues
- Skin brightening
- Offers a radiant glow to the skin

MATERIALS AND METHODS PREFORMULATION STUDIES

Preformulation studies may be defined as testing of the physical and chemical properties of a drug substance alone and in combination with excipients proposed to be used in formulation. Preformulation investigations are designed to deliver all necessary data, especially physico-chemical, physico-mechanical and biopharmaceutical properties of drug substances, excipient

and packaging materials as well as compatibility. The overall objective of the preformulation testing is to generate information useful to the formulator in developing stable and bioavailable dosage forms, which can be produced.

Selection of excipients

The excipients for the development of facial scrub using natural exfoliants were selected after performing various experimental trials. The excipients include carbapol940 as gelling agent, triethanolamine as neutralizer for adjusting the p^H, sodium lauryl sulphate as foaming agent, propylene glycol as moisturizer, phenoxyethanol as preservative and glycerin as humectant.

Identified using FTIR Spectroscopy Compatibility between the drugs and excipients

The compatibility between drug and excipients was carried out in the ratio of 1:1. Physical observation should be done at every week up to one month and FTIR study was carried out to determine the compatibility of excipients with the drug.

CHARACTERIZATION OF API

Optical Microscopy

The particle size of all the liposomes were evaluated by using optical microscope fitted with a calibrated eyepiece micrometer. The particle diameters of about 50 particles were measured randomly.

The average particle size was determined by using the Edmondson's equation, D mean=Σnd/Σn

Where “n” =number or frequency of microspheres observed and “d” = means size range.

FORMULATION OF FACIAL SCRUB

Table 1: Formulation Ingredients for the facial scrub.

Sl.no	Name of the ingredient	Category	Quantity(%)
1.	Grape seed	Exfoliant	2
2.	Pomegranate seed	Exfoliant	2
3.	Guava seed	Exfoliant	2
4.	Carbopol940	Gelling agent	8
5.	Propylene glycol	Moisturizer	0.1
6.	Triethanolamine	Neutralizer	0.1
7.	Sodium lauryl sulphate	Foaming agent	4
8.	Phenoxyethanol	Preservative	0.2
9.	Glycerin	Humectant	q s
10.	Perfume	Fragrance	q s
11.	Distilled water	Vehicle	q s

Carbopol 940 was weighed and dissolved in a beaker containing water and stirred continuously for few minutes until it forms a gel and Phenoxyethanol was added into it. Sodium lauryl sulphate was weighed, dissolved separately with water and was added into the gel. Followed by this, Propylene glycol was added drop wise. Add Triethanolamine into gel to neutralize the pH. Add Glycerin into the gel to retain the moisture. The active ingredient mixture was then added into the prepared gel and stirred.

OPTIMIZATION

Various formulations of facial scrub were prepared by changing the amount of grape seed, pomegranate, and the amount of guava seeds and optimized by 2^3 Factorial design. Eight batches (F1-F8) of facial scrub was prepared by changing the amount of grape seed, pomegranate, and the amount of guava seeds had taken as variables. The Spreadability and Extrudability of the scrub was kept as the response factors. By using the design expert (stat-ease) software version13, the optimization profiles were obtained. The optimized formula had used for the preparation of facial scrub of natural exfoliant with good particle size & having enough antioxidant property.

Table 2: List of factors and responses with their levels and constraints.

Factors	**Levels used**	
	-1	+1
X1=Amount of grape seed (g)	0.5	2
X2=Amount of pomegranate seed (g)	0.1	0.4
X3=Amount of guava seed (g)	0.25	1
Responses	**Constraints**	
Y1=Spreadability (g.cm/sec)	165-190	
Y2=Extrudability (g/cm.sec)	0.9	

EVALUATION AND CHARACTERIZATION OF TOPICAL SCRUB FORMULATION

Physical appearance

The prepared gel formulations were inspected visually for their color, homogeneity, and consistency.

pH

pH of the freshly formulated gel was done using digital pH meter. Here the digital pH meter is calibrated to neutral pH by dipping the glass electrode end in freshly prepared distilled water for several minutes. Then the glass electrode is dipped in the emulsion and pH reading

was noted. For that, one gram of gel should be dissolved in or diluted with 100ml of distilled water and kept for 2 hr. The pH of resulting solution/dispersion should be recorded.

Spreadability

Gel is intended for topical application must be adequately spreadable. The area of the skin on which certainamount of gel can effectively and easily spread is an important characteristic and is to be measured.

Lesser the time taken for separation of two slides, better the spreadability. Spreadability was determined by the Multimer apparatus which consists of a wooden block, which was provided by a pulley at one end. Bythis method spreadability was measured on the basis of slip and drag characteristics of gels. An excess of gel under study was placed on this ground slide. The gel was then sandwiched between this slide and another glass slide having the dimension of fixed ground slide and provided with the hook. 1 Kg weighted was placed on the top of the two slides for 5 minutes to expel air and to provide a uniform film of the gel between the slides. Excess of the gel was scrapped off from the edges. The top plate was then subjected to pull by 60gms weight. With the help of string attached to the hook and the time (in seconds) required by the top slide to cover a distance of 7.5cm be noted.A shorter interval indicates better spreadability.

Spreadability was calculated using the following formula

$S=M \times L/T$

Where, S=Spreadability, M=Weight tied to the upper plate

L= Length through which the gel spreads (7.5cm)

T=Time (in sec) taken for separating

Extrudability

It is expressed as weight (gm). The tube was subjected to a load (W gm), so that the contents comes outside of thetube in the form of ribbon (Lcm) is measured along with the time (t sec). Then calculated as Extrudability=W/L.t.

Viscosity measurement

Viscosity is a principal parameter when any flow measurements of fluids, such as liquids, semisolids, gases and even solids are made. Brookfield deals with the liquids and semisolids. Brookfield viscosity usually refers to a viscosity measurement performed with a Brookfield

Viscometer, sometimes referred to as a Brookfield viscosimeter. There are several models of viscometer available from Brookfield but the majority operates in the same manner: the viscometer motor rotates the spindle at a defined speed (measured in rpm) or shear rate and the viscometer measure the resistance to rotation and reports a viscosity value. Various spindle designs can be employed, depending on the nature of the sample and the requirements. Brookfield digital viscometer was used to measure the viscosity of prepared gel formulation. The spindle no.6 was rotated at 10 rpm. The reading, near to 100% torque was noted. Samples were measured at 30 $\pm 1^0$ C.

Homogeneity

All developed gels were tested for homogeneity by visual inspection after the gels have been set in the container. They were tested for their appearance and presence of any aggregates.

Grittiness

Gel was evaluated for gritty particles.

Washability

The product was applied on hand/glass slide and was observed under running water.

Foamability

Small amount of gel was taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted. Foamability was also analyzed by applying onto skin with contact with water.

DEVELOPMENT OF THE OPTIMUM BATCH

Based on the statistical evaluations the software suggested one optimized batch which experted to give the response within the range.

EVALUATIONANDCHARACTERIZATIONOFOPTIMIZEDBATCH

The developed optimized batch is evaluated for Physical appearance, pH, Spreadability, Extrudability, Viscosity, Homogeneity, Grittiness, Washability, Foamability.

ANTIOXIDANT STUDY OF OPTIMIZED BATCH

The free radical scavenging capacity of the optimized formulation was determined using DPPH method. It was measured by a decrease in absorbance at 517 nm of a solution of

colored DPPH in methanol brought about by the sample. A stock solution of DPPH (1.3mg/ml in methanol) was prepared. The concentration of the formulation was 200mg/100ml.Fromstock solution 1.25, 2.5, 5.0, 10 and 20 ml were taken was taken in different test tubes and make up to20ml, whose concentration was then 125, 250, 500, 1000, and 2000 µg/ml, respectively. Freshly prepared DPPH solution 75µl (1.3 mg/mL) was added in each of these test tubes containing formulation were kept in dark for 30 min, the absorbance was taken at 517 nm using a spectrophotometer (UV–Visible Spectrophotometer). IC50 was calculated from % inhibition. Ascorbic acid was used as a reference standard and dissolved in distilled water to make the stock solution with the same concentration of optimized formulation. Control was prepared containing the same volume without any sample and reference ascorbic acid; % scavenging of the DPPH free radical was measured using the following equation.

% inhibition= {(A control− A sample)/ (A control)} ×100 A control=absorbance of DPPH alone.

A sample=absorbance of DPPH along with different concentrations of formulation.

STABILITY STUDY OF OPTIMIZED FORMULATION

Formulations were subjected to stability studies for a period of 30 days. 100g of optimized batch of gel was taken in a wide mouth container, one set was kept at room temperature, while the other was kept at 45^0 C. Gel was evaluated for any physico-chemical changes after one month.

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