Available online on 15.02.2025 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

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Research Article

Formulation and Evaluation of Polyherbal Face Scrub Gel for Skin Exfoliation

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Article Info:

Article History:

Received 02 Dec 2024
Reviewed 08 Jan 2025
Accepted 26 Jan 2025
Published 15 Feb 2025

Cite this article as:

Metri S, Mathew C, Sai Geethasree M, Bhavana B, E Shirisha E, Gopi Prabhas K, Formulation and Evaluation of Polyherbal Face Scrub Gel for Skin Exfoliation, Journal of Drug Delivery and Therapeutics. 2025; 15(2):54-59
DOI: http://dx.doi.org/10.22270/jddt.v15i2.7013

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Abstract

Nowadays, many herbs are finding their way into the preparation of herbal cosmetics, as these are the safest to use with no side effects and influence the biological function of skin. The present study involved the preparation and evaluation of polyherbal face scrub gel. The scrub exfoliate and rejuvenate the skin. The grittiness of the scrub removes the dead skin cells and unblock the skin pores and reduce the sebum deposition on the skin making skin more complexion and radiant. The natural ingredients like orange peel, marigold flowers, and liquorice were used in preparation, which possesses anti-microbial, anti-oxidant, and anti-aging properties. The alcoholic extract of herbs was prepared using maceration and added to the gel prepared with Carbopol. Other ingredients such as sodium benzoate, propylene glycol, triethanolamine, and sodium lauryl sulfate were added to the gel. The prepared scrub was evaluated for its appearance, pH, viscosity, spreadability, washability, irritability, grittiness, stability, and patch test. Among the three formulated scrub gels, the FSG3 gave effective results, and it can be used as an effective scrub for all types of skin.

Keywords: Exfoliation, Liquorice, orange peel, marigold flowers, polyherbal scrub.

INTRODUCTION

Cosmetics are defined as the products used for the purposes of cleansing, beautifying, promoting attractiveness or alternating the appearance[1]. From ancient times, different herbs have been used for cleaning, beautifying and to manage them. The health of an individual can be measured by the face skin. Cosmetics present in various forms have their own role on the skin. Face scrub is one of the common and regularly used cosmetics to beauty or for the treatment, which cleanses and exfoliates the skin of the face[2]. Herbal Face Scrub is a gentle exfoliator that you can use regularly for a smoother and even skin. It gently buffs the skin surface to remove impurities that clog the skin and gives healthy complexion. Herbal scrubs are several advantages over synthetic scrubs. They are safe to use, eco-friendly, no adverse effects, cheap, less side effects, highly effective and easily available[3, 4].

Gels are semi-solid dosage forms and are most predominant among all the semi-solid dosage forms and thus facial scrub in gel form have many advantages and the presence of small particles made it more demand as it removes the dead skin leaving back the healthy glowing skin[5].

Citrus sinensis, (Orange peels, Figure1) belongs to the family of Rutaceae. is rich in fiber, vitamin C, folate, vitamin B6, calcium and other essential nutrients. The skin of the oranges contains a good amount of polyphenols that protects against several diseases. Peels have anti-cancer properties, due to the presence of limonene, a naturally occurring chemical. It contains Vitamin C and natural AHAs (Alpha Hydroxy Acids) which lighten skin. Use of orange peels in cosmetics have many benefits. It heals dry, flaky, and itchy skin, hydrates dehydrated skin, prevents oxidative stress in skin cells, helps in renewing worn-out cells and works as a skin lightening agent[6].

Glycyrrhiza glabra (Liquorice, Figure 2) belongs to the family of Leguminosae) consists of important constituents such as, glycyrrhizic acid, made of one molecule of glycyrrhetinic acid and two molecules of glucuronic acid, liquretin, a flavonoid glycoside. Nowadays it is extensively used in the cosmtics as it an anti-inflammatory agent, reduces hyperpigmentation, anti-ageing and skin lightening due to the presence of

glycyrrhizin and flavonoids present in the drug is a skin protectant[7, 8].

Tagetes erecta (Marigold, Figure 3), family: Asteraceae, is annual or perennial, mostly herbaceous plants in the sunflower family Asteraceae. They are among several groups of plants known in English as marigolds. The flower has several benefits as it has antibacterial and anti-inflammatory properties, antiseptic and effective astringent and reported for its antioxidant activity. Hence, it is beneficial for skin problems and also enhances one's beauty. The presence of various chemical constituents, flavonoids, carotenoids triterpenoids, ethyl gallate make its usage to treat skin problems like wounds, burns, sores, eczema and ulcers traditionally and it is a beauty enhancer[9, 10].

Figure 1: Orange peels

Figure 2:Liquorice Roots & stems

Figure 3:*Tagetes erecta* flowers

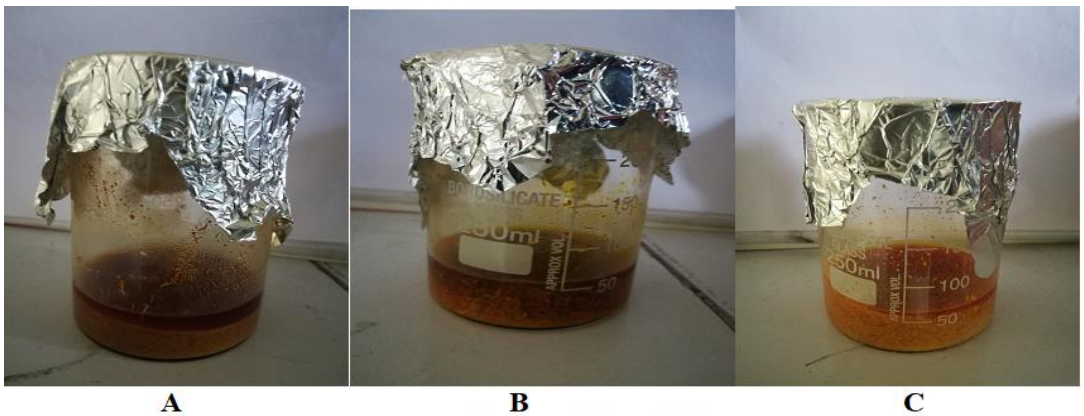
MATERIAL AND METHODS

Procurement of herbs:

The herbs required for the present study were obtained from the nursery garden and from the local market, Hyderabad. They were identified by comparison with standard official books available in the library.

Preparation of extract:

- About 100 g of each powdered herb namely peels of *Citrus sinensis* (Orange), stems and roots of *Glycyrrhiza glabra* (Liquorice) and flowers of *Targetes erecta* (Marigold) were homogenized
- Each powdered material was kept for maceration with 80% alcohol for 48 hours with frequent shaking (Figure 2).
- After 48 hours the solution was filtered and filtrate was evaporated to dryness on a water bath and dried at 30^0 C and used in the formulation of polyherbal scrub[11].



A B C

Figure 2: Maceration of herbs
A. Liquorice B. Orange peel C. Marigold

Identification tests:

Qualitative chemical tests were carried out for the alcoholic extract of all the three herbs to identify the presence of various chemical constituents like carbohydrates, proteins and amino-acids, fixed oils and fats, saponins, flavonoids, phytosterols and triterpenoids, alkaloids, phenolic compounds and tannins[12].

Detection of carbohydrates

Alcoholic extract was dissolved in 5 ml of distilled water and filtered. The filtrate was subjected to Molisch's test and Fehling's test.

Molisch's test:

The filtrate was treated with the solution of α- Naphthol prepared in ethanol. To this solution conc. sulfuric acid was added carefully from sides of the test tube. The formation of reddish violet ring indicates the presence of carbohydrates.

Fehling's test:

The filtrate was hydrolysed with dilute hydrochloric acid by heating and then neutralized. This solution was treated with Fehling's A and B solution. The formation brick red colour after heating indicate the presence of reducing sugars.

Detection of proteins and amino acids

Acoholic extract was dissolved in 10 ml of distilled water and filtered. The filtrate was subjected to the following tests.

Biuret Test:

The above extract was treated with few drops of Biuret reagent. The formation of pink or purple colour indicates the presence of amino acids and proteins.

Ninhydrin Test:

The above extract was treated with few drops of Ninhydrin reagent and heated on water bath. The presence of pinkish red colour indicates the presence of amino acids and proteins.

Detection of fixed oils and fats

Small quantities of extract were pressed between the two filter papers. The checked for the oil stain.

Detection of alkaloids

Mayer's test:

Few drops of Mayer's reagent was added to the extract. It gives a cream-colored precipitate.

Dragendorff's test:

Few drops of Dragendorff's reagent were added to extract. It gives orange-brown precipitate.

Detection of flavonoids

Alkaline reagent test:

Take extract and add a few drops of sodium hydroxide, it gives yellow color which then turns colorless with the addition of a few drops of dilute acid. This indicates the presence of flavonoids.

Detection of tannins

Ferric chloride test (Braymer's test):

The extract was treated with ferric chloride solution; it gives blue color (presence of hydrolyzable tannins) or green color.

Gelatin test:

To the extract 1% gelatin solution containing 10% sodium chloride was added. The precipitate was formed.

Detection of Saponins

Froth test:

Few ml of extract was dissolved in 1ml of ethanol and diluted with 20 ml of distilled water, shake for 15 minutes in a graduated cylinder. A two-layer of foam appears which is stable for 10-15 minutes indicating the presence of saponins.

Detection of triterpenoids

Salkowski test:

The extract was added with a few drops of concentrated sulphuric acid and shake, lower layer turns to golden yellow colour.

FORMULATION OF POLYHERBAL SCRUB

Formulation of the polyherbal scrub was done as per the formula given in the table 1. Three formula, FSG1, FSG2, and FSG3 were planned to formulate the scrub gel and the following steps were involved in the preparation of the formulation.

- Required quantity of sodium benzoate was weighed and dissolved water in a beaker.
- Weighed quantity of carbopol was added to this above solution and stirred continuously for 15-25 minutes until it forms a uniform gel and kept a side for 1hr.
- Weighed quantity of sodium lauryl sulphate was dissolved in water in the another breaker and was added to the above gel
- Required quantity of propylene glycol was added with continuous stirring to the above gel and it was neutralized with triethanolamine.
- The mixture of required quantity of herbal extracts was dissolved in 80% alcohol and added to the prepared gel with continuous stirring until extracts uniformly mixed with the gel.
- It was followed by addition of dry powder of orange peel and mixed uniformly[11, 13].
- The scrub was prepared and subjected for evaluation.

Table 1: List of ingredients used in polyherbal face scrub gel

Sr. No.	Ingredients	Quantity (%)		
		FSG1	FSG2	FSG3
1	Orange peel extract	2	2	2
2	Mari gold Flower extract	2	2	2
3	Liquorice root extract	2	2	2
4	Orange peel powder	3	2	1
5	Carbapol	1	2	3
6	Sodium benzoate	0.1	0.1	0.1
7	Sodium lauryl sulphate	1	2	3
8	Triethanol amine	2	2	2
9	Propylene glycol	2	2	2
10	Distilled water	q. s	q. s	q. s

EVALUATION OF POLYHERBAL SCRUB

The prepared polyherbal scrub according to the formula FSG1, FSG2, and FSG3 were evaluated for physical appearance, pH, and consistency and particular tests were performed such as spreadability, extrudability irritability, washability, foamability to guarantee the nature of scrub using standard protocol.

Appearance:

Visual observation was done to evaluate colour, odour, and consistency of the prepared scrub gel.

pH:

The pH of gel was determined using digital pH meter. 2 gm gel was stirred in distilled water till a uniform suspension is formed. The volume was made up to 40 ml and pH of the solution was measured.

Irritability:

Small portion of the prepared gel was applied on the skin and kept for few hours to check the irritation of the skin[14].

Spreadability:

Small amount of the gel was placed on the glass slide and another glass slide was placed on the gel. A wooden weight was placed on it. The time required for the gel to spread and the area was measured. The amount and the area of gel on the glass slide represents the efficiency of spreadability.

Extrudability:

Small amount of gel was filled in collapsible ointment tube and sealed. The little pressure was applied from the closed end and time was noted to extrude the gel from the open end of the tube and also amount of the gel extruded from the tube[15].

Viscosity:

The viscosity of gel was measured using Brookfield viscometer.

Washability:

Little quantity of gel was spread on the skin and was washed with water to check whether formulated gel was easily washable.

Grittiness:

The presence of gritty particles which provides exfoliating effect was checked by applying on the skin.

Foamability

Small amount of gel was shaken with water in a graduated measuring cylinder and the foam was measured.

Patch test:

Patch test was performed to check the ant allergic of the prepared gel. A small amount of the gel was patch of the gel was applied near the elbow and checked for allergy after 2 days

Stability test:

It was performed by keeping the scrub gel in the plastic container in the humidity chamber at temperature of 45°C with 75% relative humidity and stability was checked for a month[16].

RESULTS AND DISCUSSION

Before using the herbs in the formulation, the methanolic extracts of all the three herbs were subjected for phytochemical study and the various constituents present in the herb were identified by applying various chemical tests and results are given in table 2.

Table 2: Identification tests of alcoholic herbal extracts

TESTS	Orange peel extract	Marigold extract	Liquorice extract
Carbohydrates	+	+	+
Amino acids and proteins	+	+	+
Fixed oils and fats	+	+	+
Alkaloids	-	-	-
Flavonoids	+	+	+
Saponins	-	-	+
Tannins	+	+	+
Triterpenoids	-	-	+

Formulation and Evaluation of Polyherbal Scrub

The polyherbal scrub gel FSG1, FSG2 and FSG3 was formulated according to the formula given in table 1 and evaluated for various parameters. The results of which are given in table 3.

Table 3: Physical properties of polyherbal scrub gel

S. No.	Parameters	FSG1	FSG2	FSG3
1.	Color	Yellowish	Yellowish	Yellowish
2.	Odour	Pleasant	Pleasant	Pleasant
3.	Texture	Smooth	Smooth	Smooth
4.	State	Semisolid	Semisolid	Semisolid
5	pH	6.5	6.5	6.5
6	Consistency	Less	Less	Good
7	Viscosity (Poise)	1.27	1.29	1.28
8	Spreadability (g.cm/sec)	5.2	5.5	6.7
9	Washability	Easily washable	Easily washable	Easily washable
10	Grittiness	More grittiness	More grittiness	Smooth grittiness
11	Foam ability (ml/min)	20 ml	20 mL	20 mL
12	Irritancy	No irritation	No irritation	No irritation
13	Extraudability	Easily extruded but non-consistent	Easily extruded but non-consistent	Easily extruded with consistent
14	Stability	Stable	Stable	Stable
15	Patch test	No allergic reactions	No allergic reactions	No allergic reactions

The efficacy of gels depends on their spread. The uniform spreading of the gel on the skin after the application in less time, indicates its better spreadability. All the three prepared gels showed a good spreadability, but FSG3 was found to be good with 6.7 gcm/sec spreadability compared to FSG1 and FSG2. All formulated scrub gel showed good extrudability but FSG3 (Figure 3) showed better with better consistency, which is one of the important parameters that all semisolid formulation should have. As formulated gel is a scrub and it is necessary for the scrub to have the grittiness to exfoliate the skin.

Figure 3: A polyherbal scrub formulated with FSG3

Varying amount of dry orange peel was added to the prepared scrub gel to give the grittiness to the gel. Among all the three scrub the FSG3 showed smooth grittiness. All formulated scrub gel gave a pleasant smell attributed to the natural odour of the orange peel due to which no other perfume was added in the formulation. The formulated gel showed adequate foamability, viscosity, easy washability, non-irritating, stable and non-allergic.

CONCLUSION

The used actives, orange peel, liquorice and marigold flower in the formulation are well-known for exfoliation and are easily available in the local market. These provide better cleansing effects and are safer than synthetic agents. Among the three formulated scrub gel, FSG3 was found to be good and satisfied with all evaluating parameters used, in the study. It can be used effectively without any unpleasant effects to cleanse and exfoliate the skin. Further study will involve the addition of turmeric, one of the well-known herb for the skin, in the formulation and check the efficiency of the formulation in the presence of turmeric.

Acknowledgement: The authors would like to acknowledge the management of Gokaraju Rangaraju College of Pharmacy for the laboratory facilities.

Conflict of Interest: The authors declare that there is no conflict of interest.

Author Contributions: All authors have equal contribution in the preparation of manuscript and compilation.

Source of Support: Nil

Funding: The authors declared that this study has received no financial support.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Ethical approval: Not applicable

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