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Fabrication, Evaluation, and In Vitro Assessment of Antimicrobial and Antifungal Potential of Plum Facial Exfoliating Peel-Off Mask Containing Grape Seed Oil



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HUMAN

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ABSTRACT

As we all know, in today's world it is a big challenge to maintain our skin health routine with a product that will boost the skin health in sufficiently less time and provide good care. Despite of busy schedule, it is obvious that everyone wishes for healthy glowing skin. This study aims to design and formulate a Plum facial exfoliating peel-off mask. A peel of mask with an exfoliating property provides simultaneous benefits of scrub and mask. The key ingredient of the formulation is Grape seed oil which has many beneficial properties for skin care. It is a good source of vit E; along with antioxidant properties it also protects the skin from UV radiation. For the purpose to obtain the optimum formulation which will give the best results, we studied the evaluating parameters for the nine formulations which were prepared with varying concentrations of Grape Seed Oil, PVA, and Carbopol. The formulations were studied for evaluating properties such as organoleptic properties, grittiness, pH, viscosity, spread ability, and drying time. The formulations were studied for their antibacterial as well as antifungal activity. The formulations showed good results for evaluating properties along with the antimicrobial activity.



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INTRODUCTION

As we all know, in today's world it is a big challenge to maintain or skin health routine with a product that will boost the skin health in sufficiently less time and will provide good care. Despite busy schedules, it is obvious that everyone wishes for healthy glowing skin. (1) There is a number of skincare products that are available in the market like facial cream, lotions, serums, and packs so as to have a good skin texture, complexion and glow. Exfoliating scrub and exfoliating mask are one of them which serves as good vehicle for skin health. (2) First of all one may notice the different advantages of facial scrubs and facial masks which serve through different mechanisms. A facial scrub contains an exfoliator i.e. scrubbing agent rubbed against the skin to get rid of dead skin cells. (3) A facial mask is nothing but a cream or gel pasted on the skin's surface. (2) It serves as a medium through which skin cells absorb the nutrients and the essential component of the compound. As it remains for a long time with the contact of the skin. It offers a good time to relax the cells of the skin. (4,5) It deep cleanses the skin, provides nourishment and offers a good texture with a glow. This study aims to design and formulate a plum facial exfoliating peel-off mask. A peel-off mask with an exfoliating property provides simultaneous benefits of scrub and mask. Peel-off masks are the preparation that is applied on the skin for a time i.e. sufficient to dry off the applied amount of the preparation. After complete drying, it is removed as the word describes the peel-off action. The key ingredient of the formulation is Grape seed oil (GSO). GSO is extracted from berries of *Vitis vinifera* L. ^{ss}p. Savita Grapes. Walnut powder is used as an abrasive material that will exert the exfoliating effects of formulation. Grape seed oil is a good source of phenolic compounds, fatty acids and vitamins, especially vit. E. along with antioxidant properties it also protects the skin from UV radiation. (6) An exfoliator mask with properties such as antioxidant, hydration, moisturization of skin, improves skin texture, the brightness of dark spot, enhance elasticity, refine large pore, exfoliates dead skin cells, unclog pores with benefits such as antibacterial and antifungal actions. The study aims to obtain optimum formulations with good results of tested parameters. The formulations were prepared with varying concentrations of Grapeseed oil (GSO), polyvinyl alcohol (PVA), and Carbopol.

MATERIALS AND METHODS

Instruments: pH meter, Homogenizer, Brookfield viscometer.

Ingredients: GSO, PVA, Carbopol, Glycerine, Polyethylene glycol, Disodium EDTA, Methylparaben Propylparaben, Triethanolamine.

Preparation of Exfoliant:

The walnut shell powder was used as an exfoliant. The walnut shells were crushed in a mortar pestle so as to obtain powder not too hard or too soft effectively acting as an abrasive material for scrubbing action. (7)

Preparation of Carbopol gel:

The weighed Qty. of Carbopol was dissolved in $\frac{3}{4}$ quantity of distilled water and soaked overnight. The next day Carbopol was turned into gel form. (8)

Preparation of emulgel:

The weighed amount of PVA was added to the water and heat to 80°C until the PVA was dissolved. The preservatives were added to oil base followed by the emollient. Each phase was heated and the oil phase was added to the water phase. The mixture was stirred using a homogenizer at 1000 rpm. The emulgel was made by adding Carbopol gel gradually using homogenizer at 1000 rpm until the homogenous emulgel was formed. (9)



Fig. 1: Processing of Plum Facial Exfoliating Peel off the mask



Fig. 2: Different batches of prepared Plum Facial Exfoliating Peel off mask

Table 1: Formulation of Plum facial exfoliator peel-off mask

Ingredients	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)	F6 (%)	F7 (%)	F8 (%)	F9 (%)
Grape seed oil	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Walnut shell powder	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Polyvinyl alcohol	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Carbopol 934	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6
Glycerin	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Polyethylene glycol	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Methyl paraben	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Propyl paraben	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Disodium EDTA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Distilled Water	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.

Evaluation Parameters:

The emulgel was tested for the following parameters;

1) Organoleptic test:

The emulgel was tested for organoleptic properties such as colour odour and smell. (4)

2) Homogeneity test:

The weighed amount of emulgel spread on the surface of the object glass and its homogeneity was observed. (4)

3) pH test:

The pH measurements were recorded by using a digital pH meter. Before use pH meter was calibrated using the appropriate buffer solution. (9)

4) Viscosity test:

Viscosity determination was carried out using Brookfield Viscometer with an appropriate spindle and speed. Measured values were recorded as the viscosity of the emulgel. (9)

5) Spreadability test:

The weighed amt of preparation was placed on a glass slide and covered with another. A weight of 125 gm was given to it and the diameter of the circle then formed was recorded to determine the spreading efficiency of preparations. (10)

6) Extrudability test:

An extrudability test is performed to know the ability of the preparations to extrude from a collapsible tube when the pressure is applied on its crimped end. (7)

7) Drying time:

To determine the drying time the weighed amt of preparation was applied on the forearm and left for a few minutes until it develops a firm elastic layer to get easily peeled off. The time required to completely dry was recorded as drying time.(9)

8) Grittiness:

The emulgel was observed to show the gritty particles of an exfoliator. (7)

Antibacterial activity by agar well diffusion study:

Antibacterial activity by agar well diffusion method- The nutrient agar plates was prepared and 24 hr fresh culture of Escherichia coli were spread on agar plates aseptically. Then the wells with a diameter of 10 mm on plates were prepared by using a sterile cork borer. The 09 samples with standard streptomycin were added into the wells on plates spread with E.Coli. The plates were kept at 4 degrees C for 10 minutes for diffusion. Then the plates were kept for incubation in an incubator at 37 °C for 24 hrs. After 24 hrs of incubation, the plates were observed for the zone of inhibition. (11,12)

Antifungal activity by agar well diffusion study:

Antifungal activity by agar well diffusion method. The nutrient agar plates were prepared and 24 hr fresh culture of candid Albicans were spread on agar plates aseptically. Then the wells with a diameter 10 mm on plates were prepared by using a sterile cork borer. The 09 samples with standard erythromycin is added into the wells on plates spread with candida albicans. The plates were kept at 4°C for 10 minutes for diffusion. Then the plates were kept for incubation in incubator at 37°C for 24 hrs. After 24 hrs of incubation, the plates were observed for zone of inhibition. (11,12)

RESULT AND DISCUSSION

This study aims to formulate a Plum facial exfoliating peel of mask with grape seed oil as a key ingredient. The nine formulations were prepared with varying concentrations of Grape Seed Oil, Polyvinyl alcohol, and Carbopol. The nine of formulations were successfully prepared. The formulation showed milky white colour with a characteristic odour. The exfoliating particles of walnut powder were evenly distributed in the homogeneous formulations. The pH was measured using a digital pH meter. The observation showed a pH range of 5 -7 which shows good adaption of skin care. However, the acidic nature of Carbopol and the basic nature of polyvinyl alcohol resulted in pH variation in prepared formulations. As with increasing concentration of polyvinyl alcohol, the formulations showed a greater effect on the viscosity i.e. the viscosity was increased with an increasing concentration of PVA. The viscosity was measured using a Brookfield viscometer. As we can see in Table -2 as we go through F1 to F9 initial formulations shows greater spreadability and it keep decreasing as we move to next formulation. This shows the co relation of spreadability with viscosity.

Greater the viscosity less is the spreadability. The average drying time i.e. the time required for complete drying of film formed was observed to be 15 min.

Table 2: Evaluation of plum facial exfoliating peel off mask.

Parameters	F1	F2	F3	F4	F5	F6	F7	F8	F9
Color	Milky White	Milky White	Milky White	Milky White	Milky White	Milky White	Milky White	Milky White	Milky White
Odour	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics
Consistency	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous
Gritty Particles	Observed	Observed	Observed	Observed	Observed	Observed	Observed	Observed	Observed
pH	5.23 ± 0.08	5.36 ± 0.15	5.67 ± 0.06	6.08 ± 0.07	6.13 ± 0.05	6.28 ± 0.08	6.32 ± 0.12	6.42 ± 0.09	6.40 ± 0.08
Viscosity	17	28	36	1200	23995	>23995	>23995	>23995	>23995
Spreadability (cm)	6.0	5.6	5.4	4.8	4.5	4.3	4.2	4.2	3.8
Drying Time (min)	15	15	15	15	15	15	15	15	15

Antibacterial activity: The antibacterial activity was checked by using agar well diffusion method. The prepared formulations were tested for the antibacterial activity and observed for zone of inhibition with standard streptomycin. The optimum results were obtained for the antibacterial activity.

Table 3: Inhibitory activity of formulations against test bacteria *E. coli*

Standard/Sample	Zone of inhibition (mm)
Standard Streptomycin	30
F1	6
F2	4
F3	4
F4	8
F5	5
F6	6
F7	7
F8	6
F9	6



Fig 3: Nutrient agar plate observed for zone of inhibition (mm) against test bacteria *E. coli*

Antifungal activity: The antifungal activity was checked by using agar well diffusion method. The prepared formulations were tested for the antifungal activity and observed for

zone of inhibition with standard erythromycin. The formulation showed optimum results for the antifungal activity. Formulation 2,3,7,8 showed the good result for the antifungal activity.

Table 4: Inhibitory activity of formulations against test bacteria *C. albicans*

Standard/Sample	Zone of inhibition(mm)
Standard Erythromycin	10
F1	7
F2	8
F3	8
F4	6
F5	6
F6	5
F7	8
F8	6
F9	8

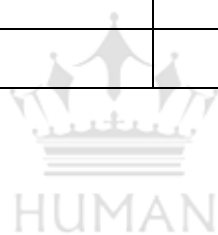




Fig 4: Nutrient agar plate observed for zone of inhibition (mm) against test fungi *C. albicans*.

CONCLUSION

The facial exfoliating peel off mask was successfully prepared as nine formulations with the key ingredients such as grape seed oil and walnut powder. The varying concentration of Grape Seed Oil, PVA and Carbopol greatly influenced the evaluating parameters. Various evaluation test such as organoleptic properties, homogeneity, pH, viscosity, spreadability, drying time, grittiness, extrudability were performed on each formulation. Among the nine formulations prepared with varying conc of GSO, PVA, Carbopol the formulation No. 04 came out as optimized batch. The optimized formulation F4 was homogenous, Color of formulation was milky white, odor was characteristic, pH was 6.08, viscosity was 1200 cp, spreadability was 4.8 cm, gritty particles were observed, Antibacterial and antifungal activities were found in 6 mm zone of inhibition and 8 mm zone of inhibition respectively. Formulations prepared showed good antimicrobial activity although formulation no 2,3,7,8 showed good antifungal activity.

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