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FABRICATION AND EVALUATION OF HERBAL FOOT CREAM OF *CARICA PAPAYA* LEAF EXTRACT

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ABSTRACT

Background: The antioxidant activity of methanolic extract of papaya leaf lies in early leaf extract of *Carica papaya*. **Aim:** The study was designed to formulate herbal foot cream of ethanolic extract of *Carica papaya* and evaluate its physicochemical properties. **Materials and methods:** Three formulations were prepared with 1%, 1.5%, 2% of alcoholic extract of *Carica papaya*. All the formulated creams were evaluated for appearance, pH, viscosity, Spreadability, irritancy, moisture absorption study, antimicrobial and stability study. **Results:** The pH of formulations was found to be suitable for topical preparation. The prepared formulation showed good spreadability and consistency and didn't show any irritation to the skin. **Conclusion:** Out of three formulations F3 containing 2% *Carica papaya* has showed better properties. The optimized formulation was subjected to antimicrobial study and stability study. The cream showed good antimicrobial activity and was found to be stable.

KEYWORDS

Carica papaya, Foot cream and Antimicrobial.

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INTRODUCTION

Herbal cosmetic products are prepared using various cosmetic ingredients allowed to form a base from herbal ingredients and gives desired cosmetic benefits. To improve health and provide patient satisfaction, the usage of herbal cosmetics is suggested due to its lesser side effects compared to synthetic cosmetics. It includes alkaloids, flavonoids, terpenoid, steroids, saponins, etc. which is assessed for phytochemical screening for its adverse effects found[1,2].

Feet are the important organ of human body which is exposed to lot of friction and external

atmosphere. Due to lack of oil glands on the sole of the foot, it's predisposed to dry skin. Many disorders generally occur due to improper footwear and can suffer from infection because of the external penetration of the dirt, microorganisms through this cuts and wounds. Neglection of feet causes unpleasant conditions such as penetrating odor of the sweaty feet due to the bacterial decomposition of the sweat and skin debris, burning and itching sensation between the toes, painful tired and swollen feet, moist skin irritation, which leads to fungal infections[3].

A foot cream or foot lotion is a specially formulated cream solution that targets the rough and dehydrated feet and makes them soft. It make them feel softer and smoother. With regular use, the cream treats hardness, roughness, and calluses of the feet[4].

Papaya (*Carica papaya* Linn.) belongs to the family Caricaceae and is well known for its therapeutic as well as nutritional properties. The various parts of the papaya plant have been used since ancient times for its therapeutic applications. *Carica papaya* leaf contains active ingredients such as alkaloids, glycosides, tannins, saponins, and flavonoids, which are responsible for its medicinal activity. Also, the leaf juice of papaya increases the platelet counts in dengue fever. It also has many medicinal properties such as antibacterial, antifungal, antiviral, antitumor, hypoglycaemic and anti-inflammatory activity[5].

A protein-dissolving enzyme in papaya leaf known as papain could be used topically as an exfoliant to remove dead skin cells and to decrease the occurrence of clogged pores, ingrown hairs, and acne. Also, papaya leaf enzymes have been used to promote wound healing. Enzymes in papaya leaf acts as an exfoliant to remove dead skin cells, prevents acne and minimizes the appearance of scars[6,7].

The best antioxidant activity of methanolic extract of papaya leaf lies in early leaf extract of *Carica papaya*. Phenol is the main compound that bears antioxidant activity by neutralizing lipids from free radicals and thus prevents decomposition of hydroperoxide into free radicals, whereas flavonoids have hydroxyl group that donate electrons and act as free radical scavengers[8,7].

Maintaining healthy skin is important for healthy body. The skin underneath feet is often dry, rough and chapped. Disorders like Athlete's foot, psoriasis, eczema, thyroid and diabetes can be the reason for cracked heel. Natural treatment is cheap and it has been found to be safe. It has been reported *Carica papaya* has antifungal, antioxidant and antibacterial activity. The present study aims to develop foot cream with the extracts of *Carica papaya* leaf[3].

MATERIAL AND METHODS

The excipients such as Stearic acid, cetyl alcohol, Beeswax, Liquid paraffin, Triethanolamine, PEG 200, Glycerin, methyl paraben and ethanol were procured from Pooja Scientific.

Preparation of *Carica Papaya* Leaf Extract

The fresh leaves of *Carica papaya* were procured. It was washed, sun dried and made into small pieces. The leaves of *Carica papaya* were extracted with absolute ethanol in Soxhlet extractor for about 48 hours. The extract solution was filtered and concentrated[8].

Fabrication of herbal foot cream of *carica papaya* leaf extract

The ingredients of oil phase (Stearic acid, cetyl alcohol, Beeswax, Liquid paraffin) was taken in china dish and heated to 70□ for complete melting. The aqueous phase ingredients (Triethanolamine, PEG 200, Glycerin, methyl paraben) was taken in separate beaker and heated to 70□.

Then oil phase ingredients were added to water phase with constant stirring until cream is formed. The different concentration of *Carica papaya* leaf extract was added in cream formulation at 35□ during trituration until uniform dispersion is achieved. The prepared creams were filled and kept in air tight container. The formulations were further evaluated[9].

Evaluation Parameters

Organoleptic Evaluation

The organoleptic parameters like odour, colour and texture of the cream was evaluated[3].

pH

pH value was determined using digital pH meter. Apparatus was calibrated using buffer solution of pH 4,9and 7. 0.5 g cream was taken and dispersed in 50ml distilled water and then pH was measured by immersing electrodes in the solution[10].

Spreadability

Two sets of glass slides of standard dimension were taken and the cream formulation was placed on the slide. Then other slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slide was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by upper slide to slip off was noted[10].

Spreadability= m × l/t

Where, m= standard weight which is tied to or placed over the upper slide (20g)

l= length of a glass slide (5cm)

t= time taken in seconds.

Irritancy

The cream was applied to skin and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24 h and reported[10].

Moisture absorption study

5g of crack cream was taken on a watch glass. A 100ml beaker was taken with full of water and was kept in a desiccator without adsorbents and allowed to get saturated. Watch glass with cream were kept into the desiccators. It was left for 24hrs.After 24 hr, moisture absorption was noted[11].

Viscosity

Viscosity of cream was done by using Brooke field viscometer DV-E at a temperature of 25 □ using spindle S-64 at 20rpm[10].

Antimicrobial study

0.2gm of cream was weighed and 0.8 ml of sterile distilled water was added to it. Antimicrobial activity of cream was observed by using well plate method, for studying zone of inhibition. Microorganisms (*E.Coli, Staphylococcus aureus*) were grown in a suitable culture medium. The wells were filled with the diluted formulation, the plates were incubated at 37□ for 48 hrs. The activity of cream is indicated by clear zone of inhibition around wells and this zone of inhibition was measured[9].

Stability study

Formulated foot cream were kept in stability chamber at 40°C ± 2°C/60% RH 75± 5% RH for 6 months. Samples were withdrawn after third and sixth month and evaluated for its physico-chemical properties such as organoleptic characteristics, pH, spreadability, rheological measurement and moisture absorption study[12].

RESULTS AND DISCUSSION

Organoleptic Evaluation

Results showed that cream had a cosmetically appealing appearance and smooth texture

pH

pH of all formulation was found within the range of 6.24 to 6.29, which is good for skin pH.pH value is found to be suitable for topical preparation as skin pH is between 4.5-6.

Spreadability

It reveals that formulation has good spreadability. Lesser the time taken for separation of two slides, better would be spreadability. The value refer to extent to which formulation readily spread on application surface by applying a small amount of shear.

Irritancy

None of formulation showed irritation, erythema and edema during irritancy study. Hence its safe to use for skin.

Viscosity

The viscosity of cream was in the range of 1257 to 1635 cps.

It reveals that cream can be easily spread by small amount of shear

Antimicrobial study

The results reveals that the formulated foot cream provides antimicrobial activity against the studied micro organism.

Stability study

The study reveals that there are no significant changes in the studied properties and hence the product is found to be stable.

Composition of foot cream

Table No.1: Compositions of foot cream

S.No	Ingredients	F1 (%w/w)	F2 (%w/w)	F3 (%w/w)
1	Stearic Acid	10	10	10
2	Cetyl Alcohol	1	1	1
3	Bees Wax	2	2	2
4	Liquid paraffin	5	5	5
5	Triethanolamine	0.7	0.7	0.7
6	PEG-200	5	5	5
7	Glycerine	5	5	5
8	Methyl Paraben	0.4	0.4	0.4
9	Distilled Water	69.9	69.4	68.9
10	*Carica papaya* leaf extract	1	1.5	2

Table No.2: Organoleptic evaluation

Colour	Faint Green
Odour	Pleasant
Texture	Smooth

Table No.3: pH

S.No	Formulation	pH* mean ± SD
1	F1	6.29± 0.02
2	F2	6.26± 0.05
3	F3	6.24± 0.03

* n=3

Table No.4: Spreadablity

S.No	Formulation	Spreadability (gmx cm/S)* mean ± SD
1	F1	11.1± 0.1
2	F2	12.5± 0.3
3	F3	16.6± 0.41

* n=3

Table No.5: Irritancy

Formulation	Irritation	Erythema	Edema
F1	NIL	NIL	NIL
F2	NIL	NIL	NIL
F3	NIL	NIL	NIL

Moisture absorption study

Table No.6: Moisture Absorption

Formulation	Observation
F1	No moisture absorption
F2	No moisture absorption
F3	No moisture absorption

Table No.7: Viscosity

Formulation	Viscosity(cps)* mean ± SD
F1	1635± 0.02
F2	1589± 0.03
F3	1257± 0.05

*n=3

Table No.8: Antimicrobial study

S.No	Micro organism	Zone of Inhibition
1	*Staphylococcus aureus*	14.5mm
2	*E.Coli*	16m

Table No.9: Accelerated stability study

S.No	Characteristics	Initial	After 3 months	After 6 months
1	colour	Faint green	Faint green	Faint green
2	pH	6.24	6.24	6.23
3	Spreadability	16.6gcm/S	16.6gcm/S	16.6gcm/S
4	viscosity	1257cps	1256 cps	1254 cps
5	Moisture absorption study	No absorption	No absorption	No absorption

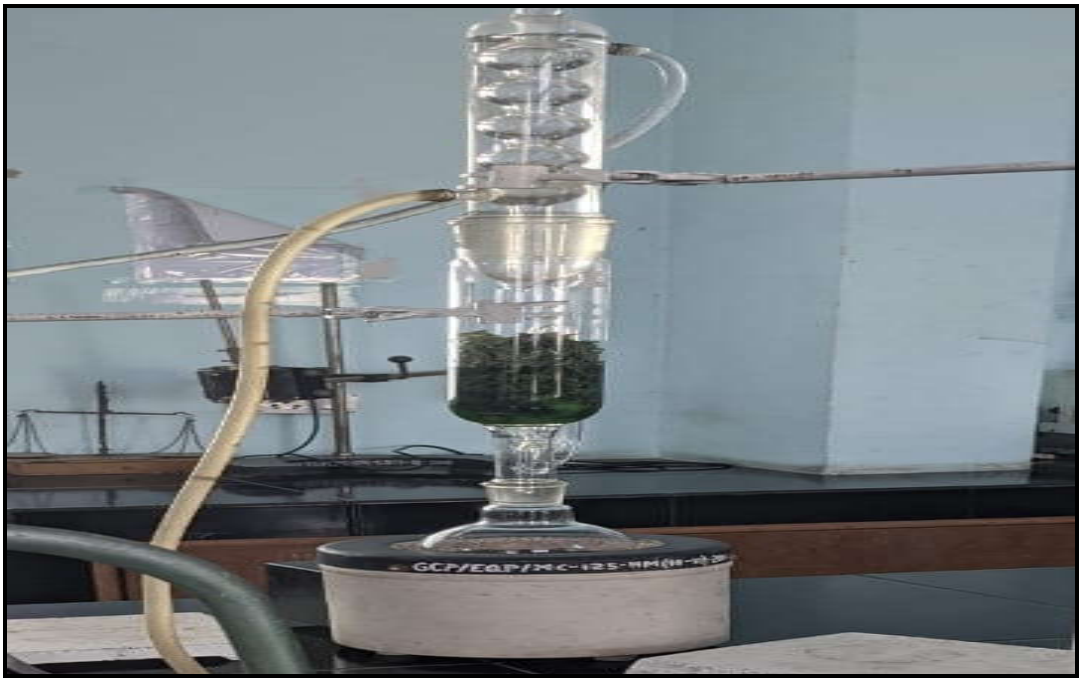

Figure No.1: *Carica papaya* leaf extraction

Figure No.2: Foot cream with *Carica papaya* leaf

SUMMARY AND CONCLUSION

The present work was designed to fabricate herbal foot cream of *Carica papaya* which overcomes the lacunae of available chemical based foot creams and evaluate its physicochemical properties. The alcoholic extract of papaya leaf *(Carica papaya)* was formulated into foot cream.

Three formulations F1, F2 and F3 were prepared with different concentrations of alcoholic leaf extract of *Carica papaya*. All formulations were subjected to evaluations like organoleptic, pH, viscosity, irritancy, Spreadablity, moisture absorption study, antimicrobial and stability study. The pH of formulations was found to be suitable for topical preparation. The prepared formulation showed good spreadability and consistency and didn't showed any irritation to the skin. Out of three formulations F3 containing 2% *Carica papaya* has showed better properties. The optimized formulation was subjected to antimicrobial study and stability study. The cream showed good antimicrobial activity and was found to be stable.

The herbal cream has good nutritional value using less chemical which protects skin from various skin problems. As it was prepared using simple ingredients and simple method, its economical. *Carica papaya* leaf extract also posses antimicrobial, antioxidant and antifungal properties further research will be carried out to check scientifically the action of the formulation.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

REFERENCES

1. Shivanand P, Nilam M, Viral D. Herbs play an important role in the field of cosmetics, *International Journal of Pharm Tech Research,* 2(1), 2010, 632-639.
2. Sahu Alakh N, Dubey S D. Formulation and evaluation of curcuminoid based herbal face cream, *Indo-Global Journal of Pharmaceutical Sciences,* 1(1), 2011, 77-84.
3. Diksha G R, Nibha D B. Formulation and evaluation of foot cream from ficus glomerata extract, *IAJPS,* 8(9), 2018, 1727-1736.
4. Mukkirwar S P, Srushti S M, Vibhavari M C, Sanjay G. Development and evaluation of herbal foot crack gel, *World Journal of Pharmaceutical Research,* 11(2), 2022, 1558-1565.
5. Aravind G, Bhowmik D, Duraival S, Harish G. Traditional and medicinal uses of *Carica papaya*, *JMPS,* 1(1), 2013, 7-15.

6. Manish K D, Shruti S, Shringika M, Digvesh K P, Prashant K S. Antioxidant, antibacterial activity and phytochemical characterization of *Carica papaya* flowers, *Beni-Suef University JBAS,* 9(23), 2020, 1-11.
7. Akhila S, Vijayalakshmi N G. Phytochemical studies on *Carica Papaya* leaf juice, *IJPSR,* 6(2), 2015, 880-883.
8. Dewi M, Rian T W, Diah F, Tari J K. Formulation of foot lotion containing papaya leaf extract (*Carica Papaya l*) with tri ethanol amine concentration variation as emulgator and its physical stability, *ASSEHR,* 521, 2020, 58-61.
9. Parate S, Misar K, Chavan D. Formulation, development and evaluation of foot cream with ficusreligiosa, *IJRBAT,* 6, 2015, 292-294.
10. Kajal N T, Talekar S K, Shinde A L, Prof. Akshada D S. Formulation and evaluation of herbal moisturizing cream, *JETIR,* 9(6), 2022, 79-99.
11. Virendra V P, Yogesh S T, Nagesh S K, *et al*. Formulation and evaluation of crack cream fromplant extract, *IJCPR,* 12(3), 2020, 130-132.
12. Anupriya K, Nikunj S, Navneet V. Formulation and assessment of stability parameters for acitretin-loaded NLC gel, *AJP,* 15(2), 2021, 199-204.

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