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DEVELOPMENT AND EVALUTION OF FACE SERUM BY USING NUTMEG EXTRACT, FLAXSEED MUCILAGE, SAFFRON EXTRACT

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ABSTRACT

The demand for skincare products is rapidly increasing, driven by a desire to enhance appearance while maintaining skin health. Cosmetic science encompasses various disciplines to create products that improve aesthetics without compromising skin integrity. A cosmetic serum, often an oil-in-water emulsion, offers deep skin penetration, rapid absorption, and a non-oily finish, containing a high concentration of active ingredients. This study aimed to develop a serum utilizing polyherbal extracts of Nutmeg and Saffron and Mucilage of Saffron. Nutmeg, with its anti-inflammatory and antimicrobial properties, was chosen alongside flax seed mucilage for UV protection and saffron for skin brightening and anti-aging effects. Phytochemical analysis revealed the presence of alkaloids, saponins, glycosides, flavonoids, tannins, and phenolic compounds in the aqueous extract. The formulated serum underwent standard evaluations for pH, homogeneity, viscosity, irritancy, spreadability, and physical stability, exhibiting promising results. This research suggests the potential of the formulated serum for cosmetic product development.

KEYWORDS

Face serum, Nutmeg, Flaxseed, Saffron, Acne, Ethanolic extract

INTRODUCTION

The skin is largest and most important organ of the body consist of 15% of total body weight. So that is constantly attempting to repair and preserve itself. Dry patches of skin can appear from a variety of causes, such as UV rays and pollution. Additionally, sleeping in makeup can irritate skin or cause an allergic reaction [1]. There are numerous types of skin care products available worldwide for safeguarding the skin, including gel, sunscreen lotion, face wash, skin serum, and anti-pigmentation lotions. A serum is a type of skin care item that has a gel, light lotion, or moisturizing consistency that can transfer active ingredients to the skin

more deeply [1]. Serum functions as an anti-aging skin product and offers your skin a smoother, denser texture, reduces pore creation, intensively hydrates, and prevents wrinkle. The active chemical constituent in the flax seeds as omega-3 fatty acid, which has great anti-inflammatory properties[1]. Since acne is primarily caused by inflammation, maintaining an omega-3 rich diet helps prevent or reduce the severity of acne. The omega-3 fatty acid in flaxseeds helps your body to produce collagen that keeps skin smooth and elastic. The active chemical constituents in the Nutmeg belon to family myristicaceae contain a volatile oil, fixed oil, fats, nutmeg yield 5-15% of volatile oil containing, myristicin, sabinene. Myristicin which has antibacterial property hence it prevents the acne causing bacteria [7]. Saffron is well for its skin -brightening property and ability to promote a more and beautiful complexation

Serum

Serum is concentrated product widely used in cosmetology. Serum is defined as light, easily absorbed oil or water based liquids that spread on the skin. It gets rapidly absorbed and easily penetrate into the deeper layers of the skin .Also has non-greasy O/w emulsion preparation. Which contain high concentration of active constituent. It contains skin smoothing ingredients which enhance skin texture and makes skin soft, silky smooth and fair the skin. The formulation has good spreadability and makes the pores appear smaller and increase moisture level. Face serum delivers the active ingredient into the skin and removes the use of hazardous chemicals in giving instant results [6]

Benefits of face serum [6]

- Soothes irritated skin.
- Absorbs quickly into the skin.
- Improves the appearance of fine lines and wrinkles.
- Protects the skin from free radicals and future damage.
- Has the potential to provide more visible results.
- Feels light on the skin.

MATERIAL & METHOD

Plant materials

Samples of the dried Fruit of Myristica fragrans[7,13] (Nutmeg) F: Myristicaceae, Linum usitatissimum (Flaxseed) F. Linaceae, Crocus Sativus (kesar) F: Iridaceae, this plant material obtains from the various commercial sources. Washed herbal material several times to eliminate soil and impurity. Then dried at 50°C for 24 h using a hot air oven for storage for further extraction.

Fig1: Nutmeg fruit

Fig2: Flaxseed

Fig3 Saffron

Methods of extraction

Extraction of active constituent.

Ethanolic extract of nutmeg.

By Soxhlet extraction method

50gm of coarse powdered herb was placed inside a thimble made from thick filter paper, which is loaded into the main chamber of the Soxhlet apparatus. The extraction take place in Soxhlet apparatus by using 200 ml of ethanol at temperature of 75 ^{0}C for six hours. Alcohol soluble extractive value was found to be 40 ml. The extract is filtered and concentrated under reduced pressure and stored in cold condition for further use.

Flaxseed mucilage preparation

15 gm of the brown flaxseed grains were boiled in 300 ml of distilled water for 60 min at 75 ^{0}C stirred at a speed of 500 rpm on a mechanical stirrer. The seeds were then separated from the colloidal solution by filtration through Nylon cloth. In order to preserve the filter sample for future research, 1% sodium benzoate was added to an airtight container [10]

Aqueous extract of Saffron:

1gm of the floral stigmas of saffron were placed in 25ml of distilled water and percolated for 2 hours by applying heat. After that keep the extract 24 hour in air tight container by frequently shaking extract in beaker then after next day filtrate extract by using filter paper and stored in cold condition for further use.

Formulation of fairness serum

Procedure: Mechanical Homogenization method:

Serum was prepared as per the formula given in table oil phase and water phase prepare separately. Oily phase consisting Vitamin E and emulsifiers tween 20, jojoba oil, nutmeg extract was mix together by using mechanical stirrer till 10 minutes to get a homogenous solution. At the same time aqueous phase was prepared by mixing Flax seed mucilage, Saffron extract, propylene glycol, glycerine, and small quantity of distilled water homogeneously. The oily phase was added to aqueous phase drop by drop under mechanical stirring at 400 rpm for 30 min to get an oil in water based biphasic emulsion after completion of formulation 1% preservative added in it [12].

Sr no	Ingredients	Amount(%W/W)		Uses
		F1	F2	
1	Nutmeg extract	10%	10%	Anti-acne
2	Flax seed mucilage	10%	10%	Anti-inflammatory
3	Saffron extract	6.5%	6.5%	Anti-aging
4	Glycerine	8.5%	10.6%	Thickening agent
5	Tween 20	6.5%	10%	Solubilising agent
6	Propylene glycol	15%	13.2%	Emulsifier agent
7	Vitamin E	2%	2.5%	Antioxidant
8	Jojoba oil	1 to 2 drops	1 to 2 drops	Improve skin elasticity

Table 1: working formula of serum

F1 **F2**

Evaluation of face serum: -

The standard procedure was followed to evaluate all the parameters. The following parameters were used to evaluate face serum.

Physical observation: The O/W based serum were observed for odour, color, texture and clarity.

Parameter	Result	
	F1	F2
Odour	Pleasant	Pleasant
Colour	Yellow brown	Pale yellow
Clarity	Clear	Clear
Texture	Smooth	Smooth

Table2: Physical observation.

Determination of ph: -The pH meter was calibrated using standard ph paper. About 1ml of the serum was taken and dissolved in 50ml of distilled water. Deep ph paper in it turn paper yellow to red.[3].

Determination emulsion type (dye test): The emulsion type was determined by using dye test. The scarlet red dye is mixed with the serum. Placed a drop of serum on a microscopic slide covers it with a cover slip and examined it under a microscope. If the disperse globules appears red the ground colourless, the serum is o/w type [11].

Homogeneity: The formulations were tested for the homogeneity by visual appearance and by touch [6].

Viscosity and flow measurement: The viscosity and rheological properties of the formulations were assessed using a Brookfield viscometer. Put sample of serum in beaker deep viscometer spindle no L1 in it determine viscosity rotated the spindle at 6 rpm at constant temperature. Solution was found to be viscous. The measurements were performed at room temperature 32^0C. viscosity of formulation found to be F1 42.6 Cp, F2 31.4 Cp [14]

Antimicrobial activity:

I Preparation of Agar Plate: Agar plates was prepared by using nutrient agar, peptone, sodium chloride and distilled water. Agar solution was heated for homogenous mixing and allow to cool. Cooled agar solution poured into petri dish to form culture media.

ii. Inoculation and development of microbes: Microbial strain direct obtained from curd sample are spread on petri dish and petri dish allow to growth of microbes in incubator for 48 hours at a room temperature of 37 ^{0}C.

iii. Agar well diffusion method: After complete growth of microbes, small wells of 5-6 mm diameter were created in petri dish and sample of formulation was placed in the well. further observation takes place for zone of inhibition.

Zone of Inhibition:

Zone of inhibition of formulation for lactobacillus was found as given below:

Parameter	Result	
	F1	F2
Zone of Inhibition	4mm ± 0.3 mm	3mm ± 0.3 mm

Table3: Zone of inhibition

Stability study: Stability study over a period of three months was conducted. The physical appearance, pH value, drug content, were determined periodically after the 1st, 2nd & 3rd month after face serum. The stability of the formulated face serum was tested under different temperature which are 2°C, 25°C and 37° [3]

Spreadability: Spread ability is measured by utilized by two glass slides. Slipping of one slide over another slide note the time in sec. Weight of upper slide 500 gm, 1ml of sample place in lower slide put the upper slide over lower slide note the time for spread the sample put up in lower slide lesser time taken for separation of two slides, denotes the better the spread ability by measuring the time in second [14].

$S = M \times L/T$

Were

M = weight tied to upper slide,

L = length of glass slides,

T= time taken to separate the slides,

Irritancy test: An area (1to2 cm) on the dorsal left-hand surface was marked. The serum was applied to the specified area and the time was noted. Irritancy, erythema, edema was checked for regular intervals up to 24 hr person show no irritation heance the serum passes test[11]

AFTER FEEL: The serum after distribution amongst individuals and their application, had a soothing and pleasant effect as informed to us by the individuals, indicating that it had an emollient and moisturizing action and also it was non-irritating and non-sensitive to the skin [3].

Globule size determination: The prepare Serum has analysed under microscope to confirm the globule size by placing drop of serum was placed on glass slide diluted with water and cover the slide by cover slip and was finally observed under microscope to determine globule size [3]

RESULT AND OBSERVATION:

Phytochemical analysis of crud extract drug

Extracts	Alkaloid	Flavonoid	Tannin	Saponin	Terpenoid	Volatile Oil	Carbohydrate	protein	Glycoside	Fatty acid
Nutmeg	+	+	+	+	+	+	+	+	+	+
Flaxseed	+	-	-	+	+	_	-	+	_	+
Saffron	_	-	-	_	+	-	_	-	_	-

Table4: phytochemical screening

Evaluation of the formulated face serum:

Parameter	Observation	
	F1	F2
PH	5	6.2
Dye test	O/W	O/W
Homogeneity	Homogeneous	Homogenous
Viscosity	30.2 cp at 6 RPM	42.6cp at 6 RPM
Anti-bacterial	4mm (± 0.3 mm)	3mm (± 0.3 mm)
Stability Study	Stable throughout the study	Stable throughout the study
Spread ability	10.712	8.143
Irritation	No irritation	No irritation
Removal[11]	Easily removed with water	Easily removed with water
After feel	Emollient and slipperiness	Emollient and slipperiness
Globule size	0.3	0.5

Table5: Evaluation parameter

CONCLUSION

The study state that, topical application of the formulated face serum from nutmeg fruit extract, flaxseed mucilage and saffron extract will help in overcoming UV damage skin also prevent acne causing bacterial growth and reduced inflammation and can be considered as another source in cosmetic industries. The nutmeg fruit extract showed high amount of Myristicin so they prevent inflammation, Throughout the study focused on masking the colour and aromatic Odor of the face serum to make it more attractive and tempting the consumer. Moreover, the formulation of the face serum can also be focused to increase the potency of the anti-inflammatory activity, which will create more importance in the future cosmetic product development.

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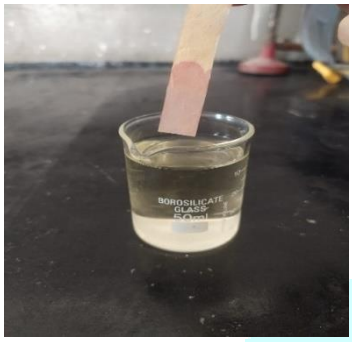

Fig4 Ph

Fig5 viscosity

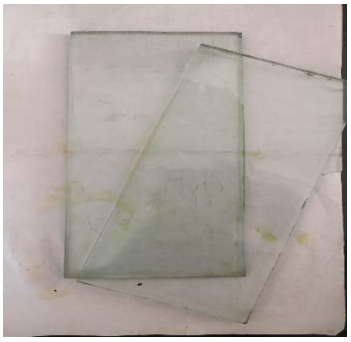

Fig6 spread ability

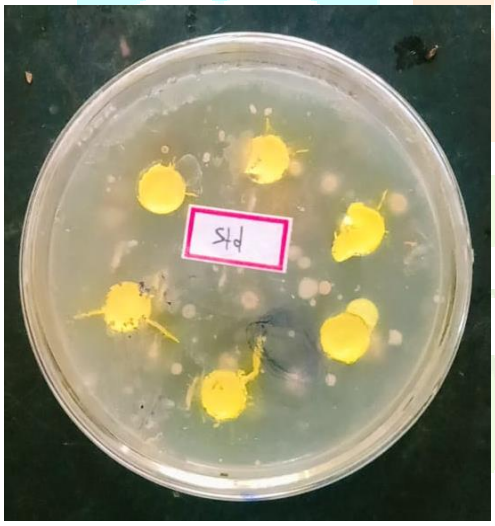

Fig8 Test

Fig9 Control

Antimicrobial test

Fig7 skin irritancy test

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