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FORMULATION AND EVALUATION OF FACIAL SERUM FOR RHYTIDS BY USING IPOMOEA BATATAS AND TRIGONELLA FOENUM GRACEUM

[1]N. Anuradha, [2]Dr.D. Narendra, [3]M. Sindhu Priya, [4]N. Parvathi, [5]N. Sunitha, [6]N. Vennela, [7]P. Suneetha

[1]Assistant Professor, [2]Principal, [3,4,5,6,7]B. Pharm final year students

[1]Pharmaceutics, [2]Pharmacognosy

[1]Vj's College of Pharmacy, Rajahmundry, India

Abstract: The study investigated the potential of fenugreek mucilage too beside sweet potato as a key ingredient in a novel facial serum for rhytids. The objective of the research was to formulate and evaluate the efficacy of a facial serum containing sweet potato extract. The serum was formulated using fenugreek seeds, sweet potato, HPMC, Aloe Vera, rose water, Glycerin, Tween80, and sodium benzoate. Invitro tests was conducted to assess P^H, visual appearance, spreadability, compatibility studies, washability, viscosity, and phase separation. Results documented that the sweet potato extract exhibited significant anti-oxidant activity, anti-neoplastic activity, anti-bacterial activity, anti-inflammatory activity, and anti-aging property.
These findings suggest that the sweet potato is a promising natural ingredient for facial serum formulation, offering potential benefits for skin health and having anti- aging applications.

KEYWORDS: cosmetic, anti-inflammatory anti- bacterial, anti-oxidant fenugreek extract, sweet potato extract, face serum.

1.INTRODUCTION

Rhytids is a wrinkle in the skin. The skin is composed of three layers of skin which is the epidermis, the dermis, and subcutaneous fat. Each layer of skin is affected by aging, genetics, and environmental factors. The medical term of wrinkles is known as rhytids, which means creases in the skin. Aging of the skin, hair, and nails is a natural process. Primarily associated with the natural aging process, involving the breakdown of collagen and elastin, along with the effects of sun exposure and gravity.
Used in more technical, medical, or dermatological contexts to describe specific types of wrinkles, especially those resulting from aging.
Aging refers to the process of becoming older or more mature over time. It involves the gradual accumulation of changes in an organism or system, typically leading to a decline in biological function and the ability to adapt to environmental changes. In humans, aging is often associated with physical, cognitive, and emotional changes, as well as an increased vulnerability to disease and disability. It can be influenced by genetic, environmental, and lifestyle factors.
Wrinkles: wrinkles Can refer to both shallow and deep lines that occur at any age or due to various factors (e.g., sun exposure, repetitive facial expressions, dehydration). Wrinkles Can develop due to a variety of causes, including aging, facial movements, dehydration, environmental damage (e.g., sun exposure), and lifestyle factors (e.g., smoking).
The word "cosmetic" comes from the Greek language which means "the addition of something decorative to a person. the study of cosmetics is known as cosmetology. The cosmetology the study of cosmetology is the study and practice of aesthetic medicine. The cosmetology is a study of cosmetics and how they work, and also the art of science of enhancing and beautifying the skin, nails, and hair.
SERUM: The serum describes a highly concentrated product that is important in professional skincare and frequently used in the cosmetology industry. One powerful skincare product that stands out for its high concentration is cosmetic serum. Serums can efficiently and rapidly address cosmetic issues since they typically contain ten times more active ingredients than creams. Serums are thin liquids with an oil or water base that are quickly absorbed by the skin after application. They work well for layering and nourishing the skin because of their thinner consistency and absence of heavy oils, which promote absorption and penetration. Significant improvements can be observed by adding a few drops of face serums to our regular skincare regimen. This is due to their formulation's tiny molecules, which promote deeper skin penetration. More beneficial active ingredients and nutrients, including ceramides, amino acids, antioxidants, and others, are found in serum.

2. METHODOLOGY:

A. Extraction of fenugreek mucilage:

25gm of fenugreek seeds were boiled in water (1:10). Cool the solution and filter it. To the filtrate add 50ml ethyl alcohol. Mucilage is obtained, separate the mucilage by using muslin cloth. Approx. 15ml mucilage obtains.

B. Extraction of sweet potato:

1kg of sweet potatoes are washed, peeled, and chopped into small pieces and dried. Dried sweet potatoes are milled into a fine powder. Powder is soaked in 50ml ethanol for about 28 to 48 hours. After 48hrs mixture is filtered using a filter paper.

3. FORMULATION:

FORMULATION 1:

Take a 100ml beaker add a sweet potato and fenugreek mucilage. To the mucilage add HPMC and glycerin, stir the mixture for 5min until the temperature reaches to 400^{o}c. to the mixture add tween80, agar, sodium benzoate, and citric acid stir it vigorously. Filter the mixture. To the filtrate add rose water and make up the solution to 100ml.

FORMULATION 2:

Take a 100ml beaker add a sweet potato and fenugreek mucilage. To the mucilage add aloe Vera and glycerin, stir the mixture for 5min until the temperature reaches to 400^{o}c. to the mixture add tween80, agar, sodium benzoate, and citric acid stir it vigorously. Filter the mixture. To the filtrate add rose water and make up the solution to 100ml.

4. IDENTIFICATION TEST:

A. Test for fenugreek mucilage

B. Test for sweet potato extraction

A. TEST FOR FENUGREEK MUCILAGE:

Organoleptic properties: These characteristics were physically examined like, color, odor, taste.

1. Identification test for galactomannan:

a. Test for galactose:

- Mucic acid test: Take 5ml of sample in a 50ml glass beaker, and add 2ml of conc. Nitric acid and heat over a steam bath until to the volume 2-3ml. cool the solution.
- To room temperature and now place the sample on the glass slide, observe under the microscope.

Observation:

Appearance of gritty crystals of mucic acid (Galactose).

a. Test for galactose and mannose: Take 3ml of sample solution in a test tube and add 0.5g of phenyl hydrazine reagent + 0.1 g of sodium acetate and few drops of acetic acid contents are mixed well and placed in a boiling water bath for 15min then cool the solution to room temperature and observe the shape of the crystals under a light microscope.

Observation:

- Broad glass shaped crystals are formed within 30min(galactose).
- White colored irregular shaped crystals are formed after 45min(mannose).

B. Test for sweet potato extraction:

1. Identification test for vitamin c:

a. Iodine test: add few drops of iodine solution to the test solution. observe for color change.

- Result: disappearance of brown color indicates presence of vitamin c.

2. Identification test for β-carotenoids:

a. Acetone test: Add acetone to the sample solution. Observe for color change.

- Result: Appearance of yellow or orange color indicates the presence of beta- carotenoids.

3. Identification test for anthocyanin's:

a. Hydrochloric acid (HCL) test: Add a few drops of HCL solution to the test solution. Observe for color change.

- Result: Appearance of red color indicates the presence of anthocyanin's.

5. Evaluation parameters of water based facial serum containing fenugreek seed mucilage and sweet potato extract:

1. Drug- excipient compatibility study:

1mg of sample is mixed with 100mg of spectroscopic grade KB_r powder (1%w/w) and pressed into a 1mm disk by 8 MP_a pressure and pellet is formed for transmission infrared spectroscopy. It was scanned from 4000 to 400 cm^{-1} in a FTIR spectrophotometer. The IR spectrum of the physical mixture was compared with that of pure drug and physical mixture, peak matching was done to detect any appearance or disappearance of peaks.

2. Visual appearance:

The appearance of the formulations was considered visually.

3. P^{H} determination:

The serum formulation was taken in a beaker, the electrode tip and junction should be completely sub merged in the sample. Set the meter to begin taking a reading and the p^{H} was measured.

4. Spreadability (slip and drag method):

1gm of sample was applied between the two Glass slides and was compressed to uniform thickness. A weight was added on upper Plate and time required to separate the two slides, i.e., the time take in which the Upper slide moves over the lower slide was taken as measure of spreadability.

5.Washability:

This test is carried out by applying a small amount of serum to the dorsal region of the hand, then left for sometimes and allowed to rinse under tap water.

6. Phase separation:

The formulated serum was stored at room temperature of 25^{0C} in a suitable Container away from the light. Then phase separation was checked after 24hrs. Any change in phase separation was observed.

7. Viscosity determination:(By using Ostwald's viscometer):

Viscometer is fixed to a stand firmly in a vertical position. Transfer the help of a pipette through the wide limb. Now suck the water through the limb up to a level higher than the upper mark A and clamp the rubber tube with the finger. Release the rubber tube and allow water to flow down. Start the stop clock when the water level just passes the upper mark A. When water passes the lower mark B stop the clock. Note the time flow(t).Repeat the above procedure for the test liquid. Find the densities of the standard or reference liquid and test liquid using a specific gravity bottle.

6. RESULT AND DISCUSSIONS:

A. Test for fenugreek seed mucilage:

1. Organoleptic properties:

Organoleptic properties of fenugreek seed mucilage:

Test	Observation
Colour	Brownish yellow
Odour	Characteristic
Taste	Slightly bitter

2. Identification test for galactomannans:

Test	Observation	Result
mucic acid test	Gritty crystals	Galactose
Osazone test	Broad glass piece crystals (within 30 min)	Galactose
	White irregular shaped crystals(after45min)	Mannose

B. Test for sweet potato:

1. Organoleptic properties:

Organoleptic properties of sweet potato

Test	Observation
Colour	Whitish brown
Odour	Odourless
Taste	Tasteless

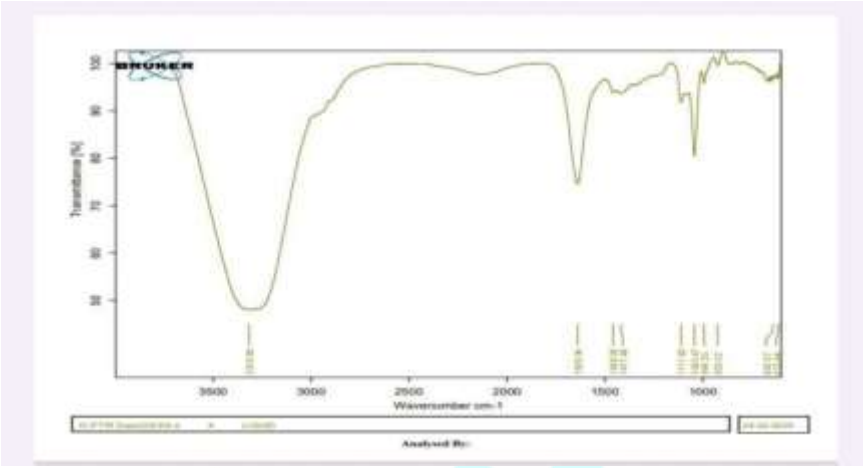
2. Identification test for B-Carotenoids:

Identification test for sweet potato

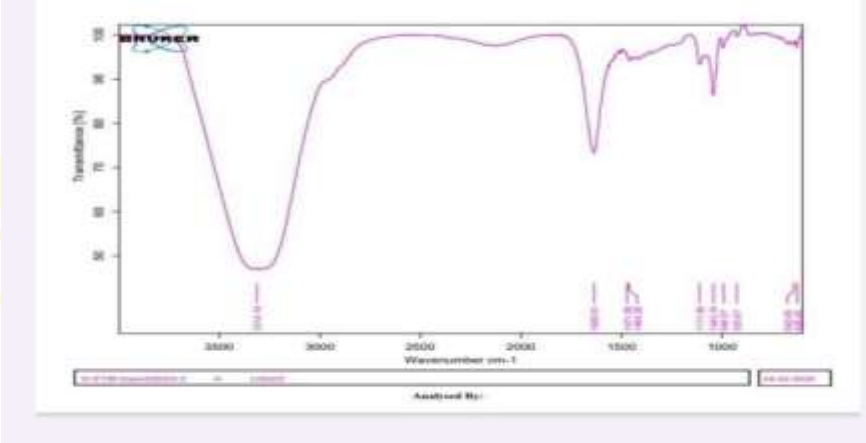
Test	Observation	Result
Acetone test	Yellow colour	Beta carotenoids
Sulfuric acid test	Reddish brown	Beta carotenoids

1. Water-based facial serum formulation:

a. Drug and excipient compatibility:



IR spectra of Formulation 1 by using HPMC



IR spectra of Formulation 2 by using aloe vera

The range of peak values were found to be the same indicating that there were no interactions of active ingredients with other excipients confirming the stability of the drug in the formulations.

b. Visual appearance:

- Fenugreek seed formulation by using HPMC(F1)
- Sweet potato seed formulation by using aloe vera(F2)

visual appearance of formulation

Formulation	Test	Observation
F1	Colour	Brown
F2	Colour	Light yellow

c. pH Determination:

Formulation	F1(HPMC)			F2(Aloe vera)		
	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3
P^H	5.24	5.28	5.26	5.42	5.44	5.48
Average	5.26			5.44		

pH of F1 is 5.23±0.4 and pH of F2 is 5.42±0.6

The pH range of formulations are found to be in between 5.2 to 6.3 which was per the suitable pH range of the skin

d. Viscosity:

Formulation	F1		F2	
	Trial 1	Trial 2	Trial 1	Trial 2
Viscosity	0.82Pa.s	0.86 Pa.s	0.53Pa.s	0.59 Pa.s
Average	0.84 Pa.s		0.56 Pa.s	

The viscosity of formulations F1 and F2 containing fenugreek mucilage and sweet potato by using HPMC 0.1 and 0.2, respectively, was found to be 0.84±0.4

The viscosity of formulations F1 and F2 containing sweet potato and fenugreek mucilage by using aloe vera 0.1 and 0.2 respectively, was found to be 0.56±0.6

e. Spredability test:

Formulations	**F1**		**F2**	
	Trial 1	Trial 2	Trial 1	Trial 2
spreadability	5.2cm	5.5cm	5.8cm	5.6cm
Average	5.35		5.7	

The spreadability of sweet potato facial serum was exhibited using a glass slide method. Average diameter was found to be F1 is 5.35± 0.3cm and F2 is 5.7± 0.2cm.

f. Washability test:

Formulations	**F1**	**F2**
Washability	+++	++

All the formulations were easily washed out from skin F1and F2 formulations were washed out with in 30 sec. Compared to F1, F2 formulation is easily spreadable and it is non-greasy in nature.

g. phase separation:

There was no phase separation in formulation from F1 and F2 until throughout the experiment.

CONCLUSION:

The goal of this study was preparing a water- based facial serum to treat Rhytids, so the herbal crude drug was selected are fenugreek seed and sweet potato and containing different concentration of gelling agent (HPMC and Aloe Vera).

This thesis successfully developed and evaluated a novel facial serum by utilizing the synergistic properties of sweet potato and fenugreek extract, incorporated into base of aloe Vera and HPMC. The formulation aimed to leverage anti-wrinkle benefits of sweet potato rich in vitamin - C, anti- oxidants, beta-carotenoids. And benefits of fenugreek rich in anthocyanins, flavonoids, anti-oxidants and carotenoids having anti-wrinkle properties.

HPMC was chosen as a thickening agent to provide suitable viscosity and texture. And aloe Vera served as a soothing agent and hydrating base.

The facial serum was prepared and evaluated, assessed visually for organoleptic properties, pH determination, viscosity, washability, phase separation, and spreadability.

This research contributes to the development of natural, plant based anti-wrinkle formulation. Further work could also explore different concentrations of active ingredient and investigate the serum performance on various skin type. The finding of this thesis hold promises for the pharmaceutical and cosmetic industries in developing effect in natural skin care products.

Among the F1 and F2 formulations, F2 shows best formulation because it contains aloe Vera as a natural gelling agent and hydrating base.

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