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Research Article

Formulation And Evaluation Of Herbal Face Serum Containing Basil Seeds Gel

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ABSTRACT

Photodamage and ultraviolet rays can cause unwanted skin ageing and wrinkles on the face. Herbal face serum has high skin penetration ability and consists of highly concentrated active herbal ingredients. The basil seeds have reported high anti-oxidant, anti-ageing, anti-microbial, anti-inflammatory, cell regeneration and skin elasticity properties. The basil seed gel was extracted and the oil in water emulsion was prepared by adding the oily phase dropwise to the aqueous phase and homogenised by using a homogeniser. Basil seeds, almond oil and vitamin E are used as active ingredients. Almond oil is high in vitamin D, E and minerals. 9,11-Octadecadienoic acid present in almond oil prevents many skin disorders, it prevents against UV radiations and also provides moisturizing effect to the skin. Vitamin E boosts collagen production, a protein that gives elasticity to the skin. The physio-chemical properties like physical appearance, homogeneity, pH, globule size, viscosity, stability, Spreadability, washability and skin irritation test of the herbal face serum were evaluated. The preclinical study for skin irritation test was performed by using Wistar rats. The stability studies resulted in no change in the formulation and its properties. This serum can be used for anti-inflammatory, anti-oxidant as well as for anti-ageing effects.

INTRODUCTION

Serum is a formulation which has thin consistency and high penetration property^[1]. Serums are of different types such as oil serum, water-based serum, emulsion type serums, gel serums and pressed balm serum^[2]. Serums are used topically for hydrating, anti-ageing, brightening, anti-acne and for many more effects^[3].

Ocimum tenuiflorum, commonly known as holy basil or tulsi, is an aromatic perennial plant in the family Lamiaceae^[4]. The plant and its oil contain diverse phytochemicals, including tannins, flavonoids, eugenol, caryophyllenes, carvacrol, linalool, camphor, and cinnamyl acetate, among others^[5]. One study reported that the plant contains an eponymous family of 10 neolignan compounds called tulsinol A-J.

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Almond oil contains fatty acids and minerals which help to reduce scars, stretch marks, wrinkles and many other skin conditions [6]. Vitamin E boosts collagen production in the skin [7].



Fig 1. Basil seeds

added to the aqueous phase drop by drop under homogenization at 3.4 to get oil in water biphasic emulsion.



Fig 2. Basil seeds in water bath

MATERIALS AND METHODS

Materials

PLANT MATERIALS: Basil seeds gel

OTHER MATERIALS: Vitamin E, glycerine, Almond oil, Tween 20, Preservative, Demineralized water

ANIMAL MATERIALS: 1 Wistar Rat weighing about 220-250 gm. The animals were housed under standardized conditions of light and temperature.

METHOD OF EXTRACTION -

Boil water in a water bath. Take a beaker add basil seeds and water to it and boil for 6-8 minutes with continuous stirring. Then turn off the flame and let it cool for 2-3 minutes. Take a clean muslin cloth and transfer the boiled basil seeds on this muslin cloth. Now remove all the extra water from it by gently pressing the cloth. Extract the gel with the help of a clean spatula.

EMULSION PREPARATION:

Emulsion o/w, according to the formula given below. In a beaker take almond oil, vitamin E and tween 20, mix well to make oil phase. In another beaker take basil seeds gel, glycerine and preservative and mix it well. The oily phase was



Fig 3. Gel after extraction

Table 1: Formula for preparing Herbal serum

Sr. No.	Ingredients	Percentage %
1.	Basil seeds gel	50%
2.	Vitamin E	01%
3.	Glycerine	25%
4.	Almond oil	01%
5.	Tween 20	01%
6.	Preservative	0.01%
7.	Demineralized	QS to 100 ml

EVALUATION

Physical appearance:

The colour and appearance of the serum was observed visually. It was found to be a viscous

liquid preparation and the colour translucent white.



Fig 4. Serum

Viscosity:

Viscosity is defined as the resistance to flow^[8]. Viscosity is determined by using Ostwald viscometer^[9].

PART 1: Determination of density of liquid

1. Weight of empty specific gravity bottle (W1) = 16 gm

2. Weight of specific gravity bottle + distilled water (W2) = 47.65 gm
3. Weight of specific gravity bottle + sample (W3) = 48.04 gm

- Density of sample (serum) [ρ2] = $\frac{W3 - W1}{W2 - W1}$
 $= \frac{32.04}{31.65}$
 $= 1.0123 \text{g/mol}$

- Density of water at R.T. = 0.997g/mol

PART 2: Determination of viscosity of liquid by Ostwald viscometer

Viscosity of liquid [η2] = $\frac{\rho_2 t_2}{\rho_1 t_1} * \eta_1$

Where,

ρ1 = density of water

ρ2 = density of sample

η1 = viscosity of water

η2 = viscosity of sample

t1 = mean time of flow of water from point A to B

t2 = mean time of flow of water from point A to B

Table 2: Viscosity calculation

Liquid sample	Time of Flow (sec)			Mean time (sec)	Density (g/mol)	Viscosity (cp)
	1.	2.	3.			
Distilled water	32.51	31.58	32.41	32.16	ρ1 = 0.997	η1 = 0.8937
Serum	132	131	134	132.33	ρ2 = 1.0123	η2 = 3.732

Viscosity of liquid:

[η2] = $\frac{\rho_2 t_2}{\rho_1 t_1} * \eta_1$

= $\frac{1.012(132.33)}{0.997(32.16)} * 0.8937$

= $\frac{1333.917}{32.063} * 0.8937$

= $4.1766 * 0.8937 = 3.732 \text{ cp}$

Homogeneity

The formulation was homogenous and had even distribution of the extract. The homogeneity of the serum was examined visually and there was no presence of any particulate matter.

pH:

The normal pH of the skin ranges between 4.0 to 7.0^[10]. The pH of this serum was evaluated by using a pH meter and found to be 6.9.



Fig 5. pH meter

Globule Size Determination:

The prepared serum was evaluated under the microscope for determining its globule size. First the calibration factor was found. One drop of the

serum was put on the slide and a cover slip was placed on it and observed under the microscope. 20 globules were measured and its average size was determined and found to be 0.1274 μm .

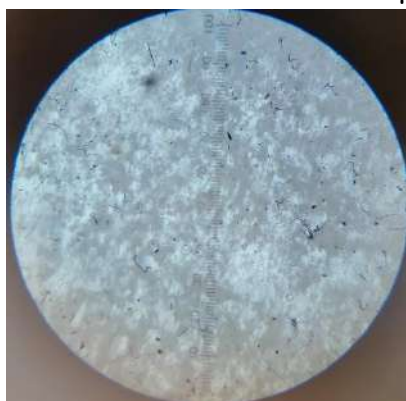


Fig 6. Globules under microscope

Spreadability:

The Spreadability capacity of the formulated serum was measured by using a Spreadability apparatus^[11]. The spreading diameter of 1gm of formulation was evaluated by placing it between two 7*3cm glass plates. The weight tied on the upper plate was 20gm and the length of plate was 7cm. The following equation was used to access the Spreadability: $S=m \cdot l/t$

Were,

S= Spreadability (g.cm/sec)

m= Weight tied to the upper plate(gm)

l= Length of the glass plate(cm)

t= Time taken for the upper plate to slide the entire length (sec)

Table 3: Spreadability Calculations

Formulation	Spreadability	Spreadability
	(g.cm/sec) Weight=10gm	(g.cm/sec) Weight=20gm
Marketed	14.01	37.14
Formula 1	13.53	36.26



Fig 7. Spreadability test

Washability:

The serum was applied to the dorsal region of the hand and allowed to rinse under tap water for 10 minutes and the time taken for the serum to wash off completely was recorded.

Skin irritation test:

The skin irritation test was performed on wistar rat^[12].The rat was first anaesthetised and the hair from the dorsal region of the skin was removed. Clean it with few drops of water and then apply the serum by using a dropper. observe the animal for 3-4 minutes after applying the serum. Apply the serum thrice a day for one day and observe it for next 72 hours. No redness, inflammation and irritation was observed.



Fig 8. Day 1



Fig 9. After 14 days

Stability studies:

The physical and chemical stability of the serum was visually examined for 3 months under different temperature conditions. The samples were taken on regular interval basis and examined for various parameters. The samples were stored at 4-5°C and 25-27°C and 60% RH.

Table 4: Stability studies

Temperature	Parameter	Observation (months)			
		0	1	2	3
4-5°C	Visual appearance	Translucent white	Translucent white	Translucent white	Translucent white
	Phase separation	No	No	No	No
	Homogeneity	Good	Good	Good	Good
25-27°C	Visual appearance	Translucent white	Translucent white	Translucent white	Translucent white
	Phase separation	No	No	No	No
	Homogeneity	Good	Good	Good	Good

RESULT**Table 5: Result**

Sr. No.	Test	Observation
1.	Physical appearance	White in colour Viscous liquid formulation
2.	Homogeneity	Homogeneous
3.	Spreadability	20 gm
		10 gm
4.	Washability	1.31 minutes
5.	Skin irritancy test	No redness No inflammation No irritation
6.	Viscosity	3.732 cp
7.	pH	6.21
8.	Globule size	0.1274 µm

DISCUSSION

Herbal face serums are serums with high concentrations of active ingredients. Serums have high ability to penetrate into the skin and show its effects^[13]. The types of serums include oil serum, gel serum, water-based serum, emulsion serum, pressed balm serum^[14]. Oil based serums are lightweight, non-comedogenic oils that are easily absorbed by the skin without clogging pores, like

jojoba, argan, and rosehip, are often found in oil-based serums^[15]. These oils can control oil production, enhance the tone and texture of the skin, and moisturize and nourish the skin^[16]. Selecting an oil-based serum that is designed especially for oily skin is crucial^[17]. Out of all the face serums, the oil serum is the easiest to prepare^[18]. Usually, it begins with a base consisting solely of high-quality, quickly absorbing carrier oils,

sometimes known as "dry" oils^[19]. The premium oils included in the serum contain polyphenols, essential fatty acids, and other ingredients that the skin may be able to break down in addition to their moisturizing and barrier-repairing properties. Gel based serums are face serums that are gel-based and are nearly always hydrous, meaning they either contain water or chemicals derived from water^[20]. They often include essential oils, carrier oils, concentrated or active plant extracts, and occasionally hydrosols (also known as distillate waters), aloe vera, etc^[21]. Gel serums give the skin a "tightening" feeling that makes your consumer's skin appear temporarily lifted or constricted in specific facial areas^[22]. Because this formulation is water-based, the gel serum gives you the opportunity to incorporate some amazing water-based (hydrophilic) plant extracts^[23]. Water-based serums serve as a base for other creams and moisturizers, holding their properties in place and providing nourishment to the skin through high-concentration ingredients like glycolic acid and hyaluronic acid that help to maintain the skin's water balance^[24]. Gel and water-based serums are similar, albeit the former may or may not contain thickeners and gums^[25]. A water-based face serum would be used to apply high-performance hydrophilic plant extracts that are trapped against the skin beneath a cream or lotion^[26]. The best way to encourage more penetration of water-based compounds into the skin and deliver their high-performance components a little bit deeper into the layers of the skin is to layer an anti-aging face mist under an emulsion and then under an oil. Higher component penetration will be encouraged by the occlusive barrier that the oils will create^[27]. Emulsion serum is a milky, water-based moisturizer with a gel-like consistency that is denser than essences but lighter than conventional creams^[28]. Because of its special non-comedogenic formulation, they can nourish your skin's deepest layers without clogging your pores

^[29]. An emulsion-based face serum is a type of moisturizer that delivers high-performance ingredients to the skin and fortifies the skin's barrier function^[30]. An emulsion is created by combining two "immiscible" phases—phases like water and oil—that don't want to mix^[31]. Water and oil are bound together and kept in a stable form by the application of an emulsifier^[32]. An emulsion has the highest potential of introducing potent active ingredients deeply into the skin's tissues^[33]. Since the skin acts as a barrier, it is quite difficult for any cosmetic ingredient to get through the dermis; nonetheless, an oil and water combination works well to achieve this amazing result^[34]. The moisturizing properties of the emulsion will reinforce the skin's barrier function^[35]. For making this herbal serum the gel from the basil seeds was extracted by boiling the seeds for 2-3 minutes and then cooling it for other 3-4 minutes and extracting the gel with the help of a spatula. In a beaker the aqueous phase was made by adding the gel, glycerine and preservative, mix well. In another beaker add Vitamin E, almond oil and tween 20 and stir it. The oily phase was added to the aqueous phase drop by drop under homogenization until the desired consistency of a serum was achieved. The serum was then transferred into an amber coloured bottle. The evaluation parameters such as pH, globule size, skin irritation test, Spreadability, washability, homogeneity, viscosity and stability studies were performed^[36]. The pH of the skin is generally between 4.0-7.0. If the pH goes above this it will cause skin irritation. The pH of this serum was found to be 6.9. The serum was homogenous and did not contain any particulate matter. The Spreadability of a serum is important as it determines the ability of a serum to spread on the skin^[37]. It should not increase friction during the rubbing action and should spread readily without excessive drag. Washability test was performed by applying the serum on dorsal region of the hand



and washing it under tap water. Viscosity was performed by first calculating the density of the serum by using a specific gravity bottle and then measuring the viscosity with the help of an Ostwald viscometer^[38]. The viscosity was found to be 3.732 cp which can penetrate into the skin easily. The viscosity determines the ability of a serum to penetrate deep into the skin^[39]. The standard range of the globule size of a serum is 0.1-0.3µm, this range of particles strengthens the formulation's ability to penetrate and the globule size of this serum was found to be 0.1274 µm. The skin irritancy test was performed on a Wistar rat. The rat was first anaesthetised by using 2-3ml of diethyl ether. Then the hair from the dorsal region of the rat were removed. It was then cleaned with few drops of water. The serum was applied to this patch with the help of a dropper and allowed it to penetrate. The rat was observed for 3-4 minutes after application of a serum and it was observed that it did not cause any redness, inflammation or irritation to the skin. This process of applying the serum and observing it was followed thrice a day for one day and kept under observation for 14 days. The stability studies were performed for 90 days under accelerated temperature conditions and resulted in no physical and chemical change of the formulation. The result outcome suggests that the serum has a consistency which would enable easy penetration when applied topically. The pH of the serum is 6.9 which will cause no irritation to the skin. Skin irritation test was performed on a wistar rat which resulted in no redness, inflammation and irritation which proves the serum to be non-irritant^[40]. The stability studies suggests that the serum will not undergo any physical and chemical changes for atleast 3 months. Easy penetration enables fast anti-ageing and anti-inflammatory effects.

CONCLUSION

The aim of the study was to formulate a herbal serum using basil seeds and other essential oils for

its anti-ageing and anti-inflammatory activity on skin. Basil seeds gel contains tannins, flavonoids, eugenol, caryophyllenes, carv acrol, linalool, camphor, and cinnamyl acetate which helps to reduce wrinkles. This serum protects against the photodamage caused by UV radiations and provides moisturizing effect to the skin. It also boosts collagen production in the skin which provides elasticity to the skin.

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