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FORMULATION AND EVALUATION OF MUCIN LOADED MOISTURIZING STICK

[1]Reshma E.S, [2]Nihala Nazeer, [3]Blessy A.B ,[4] Sandra mol ,[5] Soumya U ,[6] Sreelaksahmi ,[7]Vishnupriya

[1]Assistant professor, [2]Assistant professor, [3]Student ,[4] Student ,[5] Student ,[6] Student ,[7] Student

[1]Department of pharmaceutics,

[1]Nehru college of pharmacy, pampady, India

Abstract: A moisturizer stick is a type of cosmetic product designed to provide hydration and nourishment to the skin. It is a convenient and easy- to- use alternative to traditional moisturizers that come in bottles or jars. The moisturizer stick is typically a solid waxy formula that can be applied directly to the skin, providing a targeted and mess-free application. Moisturizer sticks are often small and portable, making them perfect for on-the-go hydration. Moisturizer sticks contain variety of ingredients like snail mucin, emulsifying wax etc .,that work together to sooth and moisturize the skin. Snail mucin is widely used in skincare due to its healing, moisturizing, regenerative, brightening, anti-acne and anti-aging properties. Its compounds make it a powerful natural active ingredient in skincare. Snail mucus is naturally rich in allantoin, glycolic acid, proteins, peptides and anti-oxidants-all components that are beneficial to your skin.

Materials and method: Mucin is isolated from snail. Oil in water emulsion was prepared by initially melting emulsifying wax at 70-80ºc and to the molten mass added stearic acid,liquid paraffin,lanoline,glyceryl monostearate. Aqueous phase along with propylene glycol,isopropyl myristate,triethanolamine,glycerine heated at same temperature as oil phase. Both the phases are mixed slowly and mucin is added with continuous stirring to form homogenous dispersion. Perfume was added when the temperature downs at 35ºc.Preservatives added in the water phase before mixing

I. INTRODUCTION

The word cosmetics was derived from Greek word “kosmtikos” meaning having the power, arrange, skill in decorating. Cosmeceuticals are topical cosmetic pharmaceutical hybrids intended to enhance the beauty through ingredients that provide additional health related functions or benefits. Among the products included in this definition are skin moisturizers, perfumes, lipsticks, eye and facial makeup preparations, shampoo, premanent waves, deodrants as well as any material for use a component of a cosmetic product. Cosmeceuticals are described as hybrids between drugs and cosmetic product and are able to enhance both health and beauty of the skin by external application. Cosmetics products are an important element in human society.[2] The use of cosmetics has implications of health hazards; modern cosmetic technology is in search of naturally derived cosmetics. Cosmetics derived from synthetic polymers, polysaccharide- based polymers protein and silicone-based materials. Particularly synthetic polymers have changed the personal care industry dramatically by in increased the use of favourable synthetic polymers that are soluble in various organic solvents like methyl chloride, ethyl alcohol, toluene and so forth. The route is environment friendly, however, there is a tilt in the use of aqueous based solvents in the cosmetic industry. Polysaccharide-based polymers are readily available from common natural sources .[4]They have been used from centuries, have healing properties, and are nontoxic and noncarcinogenic. Silicone, being the most abundantly known element, is a suitable candidate for use in cosmetic products. For protein-based cosmetics, their use for such applications is well known from great ancient civilizations.[18]

II. MOISTURIZING STICK

Treatment of skin can be performed with stay on products such as ointments, creams, lotions, sticks, oils and gels. Moisturizers are topically applied products designed to increase the water content of the skin. Ingredients used in these products have a range of actions, including preventing transepidermal waterloss .When moisturizers are used on the so called dry skin, many distinct disorders that manifest themselves with the generally recognized symptoms of dryness are treated. Oils, emulsifiers, humectants influence the aesthetic properties of the moisturizer and the stability of the formulation.[5] Durning the development stage, the concentration of fats and type of emulsifiers, humectants are considered as well as the impact of other excipients such as chelating substances,fragnance and other agents found in emulsions

III. SNAIL MUCIN IMPORTANCE IN MOISTURIZING STICK

Snail mucin is widely used in skincare due to its healing, moisturizing, regenerative, brightening, anti-acne and anti-aging properties. Its compounds make it a powerful natural active ingredient in skincare. Snail mucus is naturally rich in allantoin, glycolic acid, proteins, peptides and anti-oxidants-all components that are beneficial to your skin.

An all -in-one-skincare ingredients

Due to its naturally rich composition snail mucus has a multi action function and can help us with different skin concerns. Benefits of snail mucus extract:

1. Regenerates, repairs and rejuvenates skin
2. Reduces hyperpigmentation and dark spots
3. Heals acne and prevent acne breakouts
4. It has incredible anti-aging properties
5. Moisturizes and deeply hydrates skin
6. Has anti-inflammatory and anti-bacterial properties
7. Provides anti-oxidative protection from free-radicals

IV. MUCIN AS A DRUG DELIVERY VEHICLE

The adaptability of snail mucin biopolymers make them uniquely promising candidates for normal drug delivery systems. During mating, male snails shoot a dart to deliver mucus containing accessory proteins into the female, which in turn increase the fertility of female snail. This process relies on a multifunctional systems with each component playing a defined role. The dart act as a needle, piercing tissue and injecting the mucus that carries the accessory proteins into the female snail. In a similar manner mucus could be adapted to act as a delivery vector for bioactive molecules. Snail mucus are known to pair exceptionally well with any medication that is absorbed via mucosal membrane because of their ability to facilitate diffusion across membranes. For eg: Metformin hydrochloride, a diabetics medication was attached to giant African land snail mucin using polyethylene glycol(PEG) to increase bioavailability of the drug.[11]

3.1 GENERAL EXTRACTION OF SNAIL MUCIN

The extraction of snail mucin for cosmetics use typically involves a process that a process that ensures the safety and purity of the final product. Here is a general overview of the snail mucin extraction process:

1. **Snail farming**: Snails are raised in controlled environments to ensure their well-being and to avoid exposure to contaminants. Snail farms may vary in terms of size and farming practices.
2. **mucin collection**: The collection of snail mucin can be done in several ways. One common method involves gently stimulating the snails to produce mucin by applying a mild electrical or mechanical stimulation to their bodies. Another method involves allowing the snails to crawl on a clean surface, and their mucin is collected from the trail they leave behind.
3. **Filtration and purification**: After collection, the mucin undergoes a filtration process to remove impurities and debris. This step helps to obtain a more refined and purified mucin extract. Filtration can be done through various methods such as centrifugation, microfiltration, or ultrafiltration.
4. **Sterilization and preservation**: To ensure the safety and stability of the snail mucin extract, it undergoes sterilization to eliminate any potential microorganisms. Common sterilization methods include heat treatment, filtration through sterilizing-grade filters, or the use of antimicrobial agents. Additionally, preservatives may be added to prevent microbial growth and extend the shelf life of the product.
5. **Formulation and cosmetic products**: Once the snail mucin extract is prepared, it can be incorporated into various cosmetic products such as moisturizers, serums, creams, or masks. The extract is typically combined with other ingredients to create a formulation that provides specific skincare benefits.[10]

3.2 MUCIN AS AN ANTIMICROBIAL AGENT

Antibiotic-resistant bacteria are becoming an increasingly prevalent issue without many viable solutions. Because mollusks lack adaptive immunity, they depend on physical barriers and innate immunity for protection against pathogenic agents .For most snails, the foot has the most contact with surfaces that are contaminated with pathogens and parasites, and secretion of mucus along the feet protects against such microbes. One of the earliest mucuses evaluated for antimicrobial activity was that of Achatina fulica. Mucus from A.fulica demonstrated promising antibacterial activity against the Gram-positive bacteria, Bacillus subtilis and Staphylococcus aureus, and the Gram-negative bacteria, Escherichia coli and Pseudomonas aeruginosa. The mucus secretions of A. fulica inhibited the bacterial growth of both S. aureus and S. epidermidis when applied via wound dressing films on a mouse model.[13]

3.3 MATERIALS AND METHOD

Sl.NO	INGREDIENTS	QUANTITY
1	Mucin	4g
2	Stearic acid	2g
3	Emulsifying wax	1.3g
4	Lanoline	0.2g
5	Glycereyl monostearate	1.5g
6	Glycerin	1.5ml
7	Propylene glycol	0.75ml
8	Isopropyl myristate	1.2ml
9	Triethanolamine	0.3ml
10	Methyl paraben	0.5ml
11	Liquid paraffin	1.6ml
12	Perfume	qs

ISOLATION PROCEDURE OF SNAIL MUCIN

The snails were sprayed with an acid-stimulating solution, citric acid (5–10%), potassium sorbate (0.1–1%), or sodium benzoate (0.1–1%) for 30 min . The stimulating solution provided a significant amount of slime without creating any stress and damage to the snail as well as preserving the final extracted product. A complete extraction cycle required 1 h, and afterwards the slime collected in the appropriate containers was transferred to a different container with the use of the filtering apparatus.

PREPARATION OF MUCIN LOADED MOISTURIZING STICK

•Oil and water emulsion was prepared by initially melting emulsifying wax at 70-80°C and to the molten mass added stearic acid, liquid paraffin, lanoline etc.,

•Aqueous phase along with propylene glycol, isopropyl myristate, triethanolamine, glycerin heated at same temperature as oil phase.

•Both the phases are mixed slowly and mucin is added with continuous stirring to form homogenous dispersion.

•Perfume was added when the temperature downs at 35°C. Preservatives added in water phase before mixing

3.1FORMULATION TABLE

	INGREDIENTS

FORMULATION NO:	Mucin (ml)	Emulsifying wax(g)	Stearic acid (g)	Glycerey l monoste arate(g)	Glycerin (ml)	Lanoline (g)	Perfume
F1	-	1.3 g	2g	1.5g	1,5ml	0.2g	qs
F2	4g	-	2g	1.5g	1.5ml	0.2g	qs
F3	4g	1.3g	2g	1.5g	1.5ml	0.2g	qs

3.2 EVALUATION OF MUCIN LOADED MOISTURIZING STICK

1.Physical Appearance

The three samples were prepared and their physical appearance was evaluated.

2.Determination of pH

The pH of the moisturizing stick was determined at 25□C using a pH meter, standardized using pH 4.0 and 7.0 standard buffers before use and average of triplicates were determined.

3.Determination of spreadability of mucin loaded moisturizing stick

The spreadability of test samples was determined using 0.5g test formulation was placed within a circle of 1cm diameter premarked on a glass plate over which a second glass plate was placed. A weight of 500g was allowed to rest on the upper glass plate for 5 minute. Spreadability refers to the area covered by a fixed amount of sample after the uniform spread of sample on the glass slide. The increase in the diameter due to spreading of the test formulation was noted. Average of three determinations was noted.

4.Skin irritation test28

The test was carried out by applying the product on back of palm and leaves for 15 minutes.

5.Study of stability testing of mucin loaded moisturizing stick

Samples of moisturizer stick was kept in stability chamber at a temperature of 28ºC±2ºC and relative humidity 60±65 RH for one month and the changes obtained if any noted.

6. Determination of antimicrobial activity

F1, F2, F3 was evaluated and F3 sample has larger zone of inhibition and is m7. Hydration test of mucin loaded moisturizing stick

7.Hydration test of mucin loaded moisturizing stick

By corneometer: A Corneometer is a device used to measure the hydration level of the stratum corneum. It works by sending a weak electrical current through the skin and measuring the resistance, which provides an indication of the skin's hydration level. The principle involved in a Corneometer is based on electrical conductance. The device measures the electrical conductance of the stratum corneum,

By skin test: Gently twist the moisturizing stick. Apply a thin layer to the skin area. Make sure not to rub the product. Allow the moisturizing stick to absorb into the skin, usually around 30 minutes to 1 hour. This will give the product enough time to penetrate the skin and provide hydration. After the waiting period, observe the skin area. Look for any visible changes in the skin's appearance, Gently touch the skin area with clean fingertips to assess its hydration level. ore microbial susceptible than F1 & F2

3.3 RESULT AND DISCUSSION

1.Physical Appearance

Color and texture of F1, F2 & F3 was evaluated and sample F3 was found to be better.

2.Determination of Ph

The pH reading of F1, F2 and F3 was noted. The normal pH range of moisturizing stick is 5-7. Of the three samples of moisturizing stick tested F3 was found in the range of 5-7. Thus F3 was found to be better sample.

3.Determination of Spreadability

Spreadability is the ability to spread on the skin. It plays an important role in the Administration of a standard dose of medicated formulation to the skin's and the Topical therapy.

Spreadability is measured by:

The mean Adequate amount of sample is taken between two glass slides and a weight of 500 gm is applied on the slides for 5 minutes. Spreadability can be expressed as,

$S = m*l/t$

Where, m = weight applied to upper slide
L = length moved on the glass slide
T = time taken
Here, m = 500gm
L = 0.2cm
T = 5min
So spreadability of F3 is 20gcm/sec

4. Skin irritation test

F1, F2, F3 was tested for skin irritation and no irritation was found.

5.Hydration test

Apply the mucin loaded moisturizing stick to the skin and rub it to have visible even distribution. And wait for 30 minutes, After the waiting period , observe the skin area where you applied the moisturizing stick. Look for any of visible changes in the skin's appearance, such as increased smoothness, Gently touch the skin area with clean fingertips to assess its hydration level. When the F1, F2 and F3 was evaluated F3 was found to be producing more hydrating effect.

7.Stability testing

F3 sample maintains its physical appearance, pH and produce effervescence better than F2 and F1 for a study period of one month.

Parameter	F1		F2		F3	
	W2	**W4**	**W2**	**W4**	**W2**	**W4**
Change in colour	Nil	Slight change	Nil	Nil	Nil	Nil
Change in pH	Nil	Slight change	Nil	Slight change	Nil	Nil
Change in hydration	Nil	Slight change	Nil	Slight change	Nil	Nil

3.4 SUMMARY AND CONCLUSION

In the present work, it was decided to formulate and evaluate the mucin loaded moisturizing stick. The moisturizing stick was made with snail mucin and various other ingredients like glycereyl monostearate, stearic acid, emulsifying wax, isopropyl myristate etc., The moisturizing stick prepared haven't produced any skin irritation or promote the growth of any microorganisms during the study period. Stability parameters like physical appearance, texture, nature and odour, pH and hydrating effect of the formulation showed that there were no significant variations during the study period. The prepared formulation of mucin loaded moisturizing stick showed a proper pH range approximately 6.7 and produced moisturizing effect and smoothness to the skin.

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