

Formulation and Evaluation of Hair Removal Cream for All Skin Types

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ABSTRACT:

In the personal care and cosmetics industries, the market for hair removal products is growing. Teenage girls and women frequently struggle with unwanted hair development. Removal of hair using hair removal product is always painless and high efficacious. As this project mainly focuses on preparation of hair removal cream for all skin types having skin lightning, skin protecting and skin softening activity. Thioglycolic acid salts are the active components found in the majority of chemical depilators. Lemmon extract, Manjistha extract and oatmeal powder were also added to formulation along with other chemicals. The formulation of hair removal cream was assessed for pH, spreadability, washability, stability, skin irritation, time required for action. F4 formulation was found to be more stable efficacious and takes very less time for action and impart skin lightning, protecting, softening effect.

KEYWORDS: Hair Removal Cream, Thioglycolic Acid, All Skin Types, Multipurpose.

I. INTROUCTION

Depilatories, another name for chemical hair removal products, are cosmetic preparations that are used to eliminate hair from the skin. They function by breaking down sulfur bonds in the keratin of the hair that are vulnerable to potent alkaline and deoxidation chemicals. The substance that actively breaks down the sulfur bonds is a thioglycolic acid salt. Strong alkalis, like sodium hydroxide, are employed to achieve a high concentration of hydroxide ions for maintaining thioglycolic acid as an active dianion in the product. Due to the active component thioglycolate, hair removal creams have been considered for use as penetration enhancers for transepidermal medication administration.^[1]

Creams consist of semi-solid oil-water emulsions. Oil-in-water (O/W) creams include small droplets of oil distributed in a continuous water phase. Oil-in-water lotions are more

cosmetically acceptable and comfortable to use because they are less greasy and simpler to remove with water.^[2]

HAIR ANATOMY

There are two distinct structures in every hair strand. The hair follicle is located beneath the skin's surface, while the hair shaft is the visible portion that is outside of the skin. An inner and an outer root sheath are also present in the hair follicle.

Above and below the epidermis, hair is made up of both living and non-living substances. The hair shaft, which lies above the epidermis, is a thin, flexible cylinder made of keratinized epithelial cells that are dead. A portion of a living hair follicle that grows at the base to form the hair bulb is located beneath the epidermis.^[3,4]

The hair shaft is made up of a cortex, cuticle cells that surround it, and sometimes in thicker hair, a core medulla. The majority of this hair fiber is a part of the cortical layer, which is essential in defining the mechanical and physical characteristics of hair, including its strength, texture, and color. The majority of the shaft is made up of macrofibrils, which are primarily rods of microfibrils woven into a matrix.^[4,5]

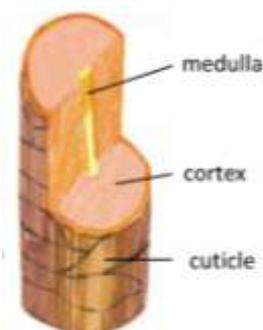


Fig No 1: Structure Of Hair Shaft^[6]

To start the process of hair formation, the basal cells in the hair bulb generate keratinocytes.

When new cells are deposited at the hair bulb, the hair shaft is pushed through the follicle and out toward the surface. Most chemical hair removers just remove hair from the surface; however, tugging and electrolysis also attempt to destroy the hair bulb in order to prevent hair from growing back. Many purposes are served by hair, such as thermoregulation, sensory input, and protection.^[7,8]

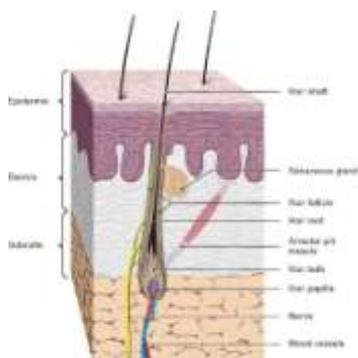


Fig No 2: Structure Of Hair Integrated In The Skin^[9]

MECHANISM OF ACTION OF CHEMICAL DEPILATORIES

Keratin, a fibrous protein containing substantial amounts of the amino acid cysteine, is the main structural ingredient that makes up hair strands. Keratin is a structural protein that is stabilised by disulphide bonds and gives hair its strength. Because cysteine includes sulphur, the presence of several cysteine residues permits disulfide bridges to develop between them. These disulphide bonds offer hair both stiffness and thermal stability, in addition to hydrogen bonding between amino acid residues in the structure.^[10]

Creams for hair removal work by initiating chemical reactions that break down the keratin structure of hair. The mechanism of action of hair removal creams is the disulfide bond breaking, and calcium thioglycolate is a frequently used ingredient in this process. The structure of the hair disrupts as a result of the thioglycolate salt breaking down the disulfide bonds in keratin. Once these bonds are broken, the hair becomes weak and it can be easily removed from the skin by wiping and rinsing off the cream with water.^[11]

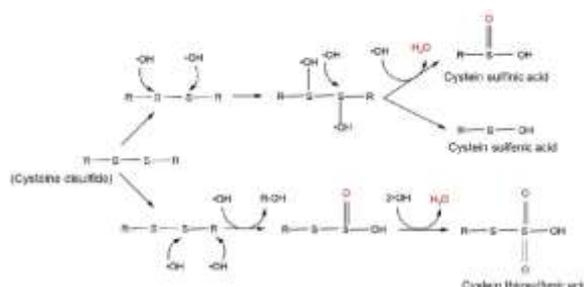


Figure No 3: The Mechanism Of Disulfide Bond Breakage Upon Addition Of Hair Removal Cream To The Skin.^[12]

II. MATERIALS AND METHOD

MATERIAL

All required herbal extracts and powders such as Manjistha powder, Oatmeal powder and Lemon extract were procured from Dagadu Teli Shop, Nashik. Remaining chemicals like Calcium Hydroxide, Thioglycolic Acid, Sodium Hydroxide, Cetostearyl Alcohol, Cetomacrogol 1000, Cetyl Alcohol, Hard Paraffin, Light Liquid Paraffin, Glycerol Monostearate, Glycerin, Sorbitol, Sodium Silicate, Magnesium Trisilicate, Titanium Oxide were collected from laboratory of NGSPM's college of pharmacy, Nashik.

METHOD

Preparation Of Slurry

Accurate weight of sodium hydroxide and calcium hydroxide were measured accurately and dissolved into distilled water. Then thioglycolic acid was added dropwise with continuous stirring and then solution was cooled.



Fig No 4 : Preparation Of Slurry

Preparation Of Oil Phase

The oil soluble ingredient such as cetomacrogol 1000, cetostearyl alcohol, cetyl alcohol, hard paraffin, light liquid paraffin and glycerol monostearate were put into one beaker and then mixture was melted at 70°C.



Fig No 5 : Preparation Of Oil Phase

Preparation Of Aqueous Phase

The water soluble ingredients like glycerin, sorbitol and sodium silicate were transferred to another beaker and heated to 70°C.



Fig No 6 : Preparation Of Aqueous Phase

Preparation Of Hair Removal Cream

Finally oil phase was added to aqueous phase with continuous stirring at 70°C and then slurry was added slowly with continuous stirring by an electric stirrer. Then herbal extract, perfume and Colour were added. After addition it was allowed to come to room temperature while being stirred. And finally formulation of hair removal cream transferred into suitable container.



Fig No 7 : Preparation Of Hair Removal Cream

FORMULATION TABLE

Ingredients	F1	F2	F3	F4
Calcium Hydroxide	3.2 %	3.5%	3%	3.5%
Thioglycolic acid	4.2%	4.5%	4.5%	4.5%
Water	15%	15%	13%	15%
Sodium hydroxide	2%	2%	2.5%	2%
Cetostearyl alcohol	2.5%	3.5%	5%	5%
Cetomacrogol 1000	2.3%	2.5%	2.5%	2.5%
Cetyl alcohol	1%	1%	0.5%	2.5%
Hard paraffin	0.8%	1%	1%	1.0%
Light liquid paraffin	4.5%	5%	5.5%	5%

Glycerol monostearate	0.6%	0.6%	1%	1.0%
Glycerin	1%	1%	0.5%	1%
Sorbitol	3.1%	3.5%	3.3%	3.5%
Sodium silicate	2%	2.25%	2.5%	2.25%
Magnesium trisilicate	0.2%	—	0.1%	—
Titanium dioxide	0.2%	—	0.1%	—
Oatmeal powder	1%	0.5%	1%	0.5%
Manjistha extract	0.5%	0.5%	0.5%	0.5%
Lemon extract	0.5%	1%	1%	0.5%
Lemon perfume	0.02%	0.02%	0.02%	0.02%
colour	—	—	0.05%	0.05%
Water	q.s.	q.s.	q.s.	q.s.

EVALUATION OF HAIR REMOVAL CREAM

Organoleptic characteristics

A] Colour- Colour of formulation was checked by visual observation.

B] Odour- The smell of formulation was checked by applying preparation on hand and feels the fragrance of perfume.

Determination Of pH

1 gram of formulation was dissolved in 9 ml of water and pH was checked by pH paper.



Fig No 8 : Determination Of pH with pH Paper

Adequate amount of sample was taken between two glass slides and a weight of 100gm was applied on the slides for 5 minutes. Spreadability can be expressed as,

$$S = \frac{m}{L \times T}$$

Where, m = weight applied to upper slide.

L = length moved on the glass slide.

T = time taken.



Fig No 9 : Determination Of Spreadability With Spreadability Apparatus

Washability

This test was performed directly on skin, preparation applied on skin and wash with normal water.

Skin irritation test

Area of 1sq.cm was marked on the left hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema was checked, if any, for regular intervals upto 24hrs.

Homogeneity

The formulation was tested for the homogeneity by visual appearance and by touch as well as it was tested by pressing a small quantity of the formulated cream between the thumb and index finger

Determination of stability

Stability of prepared hair removal cream was observed by checking condition of cream day by day.

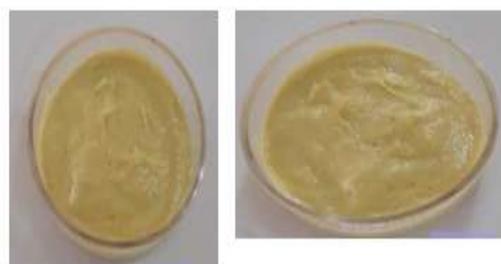


Fig No 10 : Stability At First Day Fig No 11 : Stability After Three Months

III. RESULT AND DISCUSSION

Parameter	F1	F2	F3	F4
Color	White	White	Pale yellow	Pale yellow
Odour	Lemon fragrance	Lemon fragrance	Lemon fragrance	Lemon fragrance
pH	10	10	12	12
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous
Washability	Easily washable	Easily washable	Easily washable	Easily washable
Stability	Failed	Failed	Passed	Passed
Skin Irritation Test	Nil	Nil	Nil	Nil
Spreadability	24	22	26	26
Time taken	3 Min	3 Min	2 Min	2 Min



Fig No 12 : Final Preparation Of Hair Removal Cream

Organoleptic characteristics like Colour, odour and clarity were examined. pH paper was used to measure formulation. formulation with pH 10 shows slow action while formulation with pH 12 showed faster action. Homogeneity was checked by visual examination and touching. Stability was checked by observing formulation periodically for three months F1 and F2 failed while F3 and F4 remained stable. As pH is below 13 and above 10 none of formulation showed skin irritation. Washability was inspected manually and all batches found to be easily washable. Spreadability was checked using spreadability apparatus and F3 and F4 found to be more easy to spread. Out of all formulations F4 showed best attributes. This cream is more effective for hair removing as well as additionally it shows skin lightning, skin protecting and skin softening effects.



Fig No 13: Result Of F4 Batch

IV. CONCLUSION

On the present work study it can be concluded that it is possible to develop stable, compatible hair removal cream containing herbal extract of Manjistha, lemon and oatmeal and can be used for purpose of hair removal and activity of protect, lighting, and softening skin. The

composition of hair removal cream is prepared according to delicateness of skin so that it cannot cause any type of irritation. Among all batches F4 was found to be stable for longer duration as well as effective. As this cream gives more benefits beside it's hair removal activity it can be called as multipurpose cream. Composition of this cream has been taken in such a way that this cream can be used for all skin types.

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