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Comparative Study of Emollient Property of Beeswax, Coconut Oil, Sesame Oil with Lanolin

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Abstract: Age and environment deplete the skin essential oils, nutrients and moisture while the sun, pollution, seasonal changes, heavy exfoliation etc leads to skin dry. The cumulative damage to the skin cause dryness, redness, irritation, cracks and wrinkles. Thus, moisturizer and emollient are a key component used for maintaining the required amount of hydration back to the skin. The most widely used of cosmetics are for the properties like moisturizing or conditioning. So there are many types of cosmetics which fulfill the emollient requirement of the skin by using different combinations of emollient ingredients in the formulation. The use of moisturizers is the core of treatment for skin and also for daily maintenance of skin.

Keywords: Skin Care, Cosmetic, Cream, Emollient, Moisturizer, Beeswax, Coconut Oil, Sesame Oil, Lanolin

I. INTRODUCTION

The skin is not simply a protective wrap for the body it is a busy frontier, which mediates between the organism and the environment. A closer look reveals that the skin is not a completely smooth covering. It prevents a penetration of noxious foreign material and radiation. It controls the loss of valuable fluids due to continuous contact with environment it becomes rough, dry and loses smoothness. Skin is very elastic, durable and complex. It wraps adult body in about 20 square ft of tissue that weighs about 6 to 7 pounds. Skin is our principle organ of body, touch etc. ¹

The skin is composed of three layers:

- 1) Outer epidermis
- 2) The inner dermis
- 3) The subcutaneous deep the inner skin ²

A. Emollients

Emollience is rather neulous term. The general understanding of the word is imparting of smoothness and general sense of well being to the skin is determined by touch. It is a phenomenon that perhaps can be better described by its affect the instantaneous and sustained sensation that is perceived on the skin after oily vehicle is applied to its surface. The effect is based primarily on the capacity of the material to leave a thin lipid film of limited water permeability on the skin. The softness and flexibility of skin is dependent although not exclusively on the presence of an adequate amount of moisture. Moisture balance in the stratum corneum is controlled by action of sebum and other skin lipids through passive miniaturization the retention of moisture by indirect means. The emollient are bland fatty substance used in the prevention or relief of dryness as well as for the protection of skin. Emollient exert a number of effect in and on the skin, including skin hydration, skin cooling and lipidization.

Among the most popular water soluble emollient are glycerin, sorbitol and various ethoxylated derivative of lipids. Oil soluble emollients include hydrocarbon oils and waxes, silicone oils, vegetables oils and fats, alkyl esters, fatty acids and alcohols together with ethers of fatty alcohols. ³

1) *Action of Emollient:* Water is the only material, which will plasticize the outer dead layer of the epidermis to give such desired attribute, is soft smooth skin. If Trans epidermal water is lost rapidly from the stratum corneum than it is received from the lower layers of the epidermis the skin becomes dehydrated and loses its flexibility. The approach to restoring trans epidermal water to dry skin has taken three different routes:

- a) Occlusion
- b) Humectancy
- c) Restoration of deficient material

Emollient restores Trans epidermal water of the skin by occlusion property.

B. Occlusion

Occlusion consist in reducing the rate of Trans epidermal water loss through old or damaged skin or in protecting otherwise healthy skin from the effect of a severally drying environment. It has been demonstration that the occlusion of skin in this way result in an immediate decrease in the rate of Trans epidermal water loss through the epidermis. This has the desire effect of causing the stratum corneum to become more hydrated making it softer and more supple. However the eventual effect of this extra hydration is to increase diffusion coefficient of Trans epidermal water across the epidermis so that within the three hours of the application of the petroleum jelly in healthy skin the rate of Trans epidermal water loss actually increases to a value higher than the pervious treatment value. Many occlusion non water permeable substance can be used among mineral and vegetable oils, lanolin and silicone. ⁴ Some of these which were used in the study mentioned below:

C. Lanoline

Its hydrous wool fat is the purified fat like substance obtained from the wool of the sheep *Ovis aries* linn family Bovidae. It contains between 25% to 30% of water. It is the secretion of sebaceous glands of sheep deposited onto the wool fibers. It is practically insoluble in water but soluble in chloroform and solvent ether with separation of water. Hydrous wool fat contains mainly esters of cholesterol and isocholesterol with caranubic, oleic, myristic, palmitic, lanoceric and lanopalmitic acids. It also contains 50% of water. Lanolin is used as water absorbable ointment base. It is a common ingredient and base for several water soluble creams and cosmetic preparations. ⁵

D. Beeswax

Yellow beeswax is purified wax and obtained from the honey comb of the bees *Apis mellifuca* and other species of *Apis*, belonging to family Apidae. It is soluble in hot alcohol, ether, chloroform, carbon tetrachloride, fixed and volatile oils. It consist of esters of straight-chain monohydric alcohols with straight chain acid. The chief constituent of the bees wax is myricin that is myrcyl palmitate (about 80%). Free cerotic acid, small quantities of melissic acid aromatic substance cerolein are the other constituents. Indian bees wax is characterized by its low acid value, while European bees wax has the acid value of 17 to 22. Bees wax is used in preparation of ointments, plasters and polishes. It is used in ointment for hardening purposes and the manufacture of candles, moulds. It is also used in cosmetics for preparation of lipsticks and face creams. ⁶

E. Sesame Oil

It is fixed oil obtained by expression from the seeds of *sesamum indicum* Linn belonging to family Pedaliaceae. It is slightly soluble in alcohol, miscible with chloroform, solvent ether, light petroleum (40 – 60%) and carban disulphide. Gingelly oil contains glycerides of higher fatty acids mainly oleic, linoleic, palmitic stearic and arachidic acids. It contains about 5% of olein and a phenol known as sesamol which is responsible for stability of oil. It also contains lifnan derivatives of sesamin and sesamol. It is nutritive, laxative, demulcent and has got emollient properties. It is used in the preparation of liniments, plasters, ointment and soaps' similar to olive oil. ⁷

F. Coconut Oil

It is an edible oil extracted from the kernel of mature coconut harvested from the coconut plam (*Cocs mucifera*) ⁸. It is a member of family Arececea and the only species of the genus *Cocos* ⁹. It is slightly soluble in alcohol, miscible with chloroform, solvent ether, light petrolum (40- 60%) and carbon disulphate. Coconut oil contains caprylic saturated C8- 7%, decanoic saturated C10- 8%, lauric saturated C12- 48%, myristic saturated C14- 12%, palmitic saturated C 16- 9.5%, oleic monounsaturated C18- 6.8 % ¹⁰. It is used as emollient agent. Used as a deep cleanser used as a major ingredient in natural makeup remover. It act as a natural for moisturizer all skin type. It is a natural remedy to lessen the facial wrinkle and fine lines.

Age and environment deplete the skin's essential oils, nutrients and moisture, while the sun and heavy exfoliation leaves the skin dry. The cumulative damage to the skin cause dryness, redness, irritation, cracks and wrinkles. Thus, moisturizer and emollient are a key component of basic skin care especially when there is alteration of the epidermal barrier and reduced water content in the epidermis. The list of emollient is almost endless, since virtually every liquid, semisolids or lower melting point solid of a bland nature and cosmetic quality has been used for this purpose. Among the most popular water soluble emollients are beeswax, lanolin, coconut oil, sesame oil and various derivatives of lipids. Oil soluble emollients include hydrocarbon oils and waxes, vegetables oils and fats, alkyl esters, fatty acids and alcohols together with ethers of fatty alcohols. ¹¹ It is necessary to study the comparative effectiveness of the commonly used ingredient in cosmetic. Thus to maintain the skin in good and healthy condition, use of a emollient product with good effective emollient agent is must.

II. MATERIALS AND METHODS

Success of any cosmetic active largely depends upon the suitable base formulation. The high degree of quality expected of modern cosmetics is attended by careful selection and control of the quality of the manufacturing. According to well defined process and most important by adequate consideration of many variable that may influences the composition stability and the utility of the product. Hence in order to develop a product the following factors are kept in mind.

- 1) It should be stable appealing color.
- 2) It should not give tacky film on the surface of the skin.
- 3) It should not irritate the skin.
- 4) It should be of good texture.

Creams usually signifies solid or the semi solid emulsions, which are to be applied on the skin for various purpose skin are of different type and are selected on the following factors.

- a) Skin type
- b) Ultimate use of product
- c) Active present
- d) Beneficial properties ¹²

A. Selection of base formula

- 1) For the selection of base following points has to be considered.
- 2) It should have the aesthetic appeal.
- 3) As a vehicle for the active ingredient it must be able to dissolve them or at least finally disperse them.
- 4) It must be compatible with other ingredients of the formulation with the packaging
- 5) material, etc.
- 6) Base should not hamper the effectiveness of the active ingredient.

B. Formulation and Development

Formulation and development of emollient cream containing coconut oil, beeswax, lanolin, sesame oil.

C. Selection of Base

To study the effect of coconut oil, beeswax, sesame oil, lanolin on the skin. They were all incorporated in an O/W semisolid emulsion base separately that will give moisturizing, emollient and protective properties to skin. ¹³

Considering all above properties and uses of active, formulation of cream was selected. After various trial and errors methods formulation as per Table no 1 was selected as final formulation.

TABLE NO.I
Formulation of O/W Emollient Cream Base

S.No	Ingredients	Function	Quantity (%)
Phase I			
1	Stearic Acid	Emulsifier	7.0
2	Propyl Paraben	Preservative	0.15
3	Active	Emollient	6.0
Phase II			
4	Glycerin	Humectant	2.0
5	Triethanol Amine	Stabilizer	1.5
6	Methyl Paraben	Preservative	0.15
7	Water	Solvent	Up to 100

Active such as coconut oil, sesame oil, lanolin, beeswax were further incorporated in above cream base at 6% concentration and were evaluated.

- 1) *Incorporation of Actives in the Base:* The final product was prepared by incorporating the actives (lanolin, Coconut oil, beeswax, Sesame oil) at 6% concentration.

D. Method of Formulation

- 1) The content of phase A and phase B were accurately weighted.
- 2) Phase A and Phase B were heated to above 80-90 °C.
- 3) Phase A was added to Phase B and was stirred well.
- 4) Cream was formed
- 5) Cream was then stored in a container and kept at room temperature (27 ± 2 °C), oven (45 ± 2 °C), and refrigerator (10 ± 2 °C) changes in various parameters were recorded.¹⁵

III. EVALUATION OF STABILITY PARAMETERS OF ACTIVE IN CREAM FORMULATION

The stability of final formulation was observed at two different temperatures that is 45 ± 2 °C and 10 ± 2 °C. Various parameters such as pH, color and odor was observed. There was no significant change observed in above mentioned parameters of the product at 45 ± 2 °C and 10 ± 2 °C temperatures. Accelerated stability studies showed that formulation with active was stable during the period of study.¹⁶

A. Subjective Evaluation

As moisturizers and emollients are not exactly the same terms but purpose of both is same. Moisturizers are used to provide moisture to the skin surface as they get absorb in the skin layer and also prevent a Trans Epidermis Water Loss of the skin. Emollients are the substance, which form a greasy film on the skin surface and prevent a Trans Epidermis Water Loss. For this purpose to evaluate emollient property of the skin after application of emollient cream having actives.¹⁷

- 1) **Procedure:** Six volunteers in the age group of 20-25 years were selected for the study. The volunteers were allowed to rest for at least 10-20 minutes before study, so that their blood circulation can regain a normal level. The volunteers were asked not to wash the forearm at least four hours prior to the study and not to apply any cosmetic or soap to the inner forearm during protocol. Prior to the trials, the baseline values of the volunteers were taken using 2 x 2 cm test areas (2 cm apart) on the inner forearm. Each designated areas were then treated with standard and test formulation (dose 2 mg/ cm²) along with blank that is nothing was applied. The TEWL values were measured immediately at 0 minutes and then after every 30 minutes using cutometer. The subjective evaluation was carrying out for a week at the same time of the day. All the values of TEWL during 6 days study were noted down. Mean of these values was calculated and plotted against time.

IV. RESULTS

Accelerated stability studies showed that formulation with active was stable in respect to pH, color, odor and separation. Subjective evaluations also indicated that volunteers were satisfied with the TEWL capacity of the active. There was no significant change observed in previously mentioned parameters for the final formulations at 45 ± 2 °C and 10 ± 2 °C temperatures. Obtained results were tabulated and are mentioned below.

A. pH

pH values determines the potential of hydrogen ions in the formulations.

TABLE NO. II
pH Values of Formulations having Actives were kept at 45 ± 2 °C

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	5.55	5.53	5.56	5.54
16	5.55	5.53	5.56	5.54
30	5.55	5.54	5.56	5.55
45	5.56	5.54	5.57	5.55
60	5.56	5.54	5.57	5.57
90	5.57	5.54	5.58	5.57
120	5.58	5.56	5.58	5.57

TABLE NO. III
pH Values of Formulations having Actives were kept at $10 \pm 2^\circ\text{C}$

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	5.55	5.53	5.56	5.54
16	5.55	5.53	5.56	5.54
30	5.56	5.53	5.56	5.54
45	5.56	5.53	5.56	5.54
60	5.56	5.54	5.57	5.55
90	5.56	5.54	5.57	5.55
120	5.56	5.54	5.57	5.56

B. Colour of the Formulation Having Active

Color change of Cream were observed visually

TABLE NO. IV
Formulations having Actives were kept at $45 \pm 2^\circ\text{C}$

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	OC	OC	OC	OC
16	NC	NC	NC	NC
30	NC	NC	NC	NC
45	NC	NC	NC	NC
60	NC	NC	NC	NC
90	SDOC	SDOC	SDOC	SDOC
120	SDOC	SDOC	SDOC	SDOC

TABLE NO. V
Formulations having Actives were kept at $10 \pm 2^\circ\text{C}$

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	OC	OC	OC	OC
16	NC	NC	NC	NC
30	NC	NC	NC	NC
45	NC	NC	NC	NC
60	NC	NC	NC	NC
90	NC	NC	NC	NC
120	SDOC	SDOC	SDOC	SDOC

OC – Original Color, N C- No Change, S D O C- Slightly Dark of Original Color

C. Odor of the Formulation Having Active

Odor change of Cream were noted by smelling the product

TABLE NO. VI
Formulations having Actives were kept at $45 \pm 2^\circ\text{C}$

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	OC	OC	OC	OC
16	NC	NC	NC	NC
30	NC	NC	NC	NC
45	NC	NC	NC	NC
60	NC	NC	NC	NC
90	SDOC	SDOC	SDOC	SDOC
120	SDOC	SDOC	SDOC	SDOC

TABLE NO. VII
Formulations having Actives were kept at 10 ± 2 °C

No. of Days	Lanolin	Coconut Oil	Beeswax	Sesame Oil
0	OC	OC	OC	OC
16	NC	NC	NC	NC
30	NC	NC	NC	NC
45	NC	NC	NC	NC
60	NC	NC	NC	NC
90	NC	NC	NC	NC
120	SDOC	SDOC	SDOC	SDOC

OC – Original Color, N C- No Change, S D O C- Slightly Dark of Original Color

D. Subjective Evaluation

The subjective evaluation was done on the group of 6 subjects. It was found that 97% of volunteers were showing that they were satisfied with the TEWL property of the product. The volunteers were comfortable throughout the study. Readings obtained from subjective evaluations shows the positive results.

TABLE NO. VIII

No. of Subjective	Lanolin	Coconut Oil	Beeswax	Sesame Oil
1	46.6	42.7	32.7	46.5
2	46.7	42.3	32.5	46.6
3	46.1	42.3	32.2	46.2
4	46.1	42.6	33.1	46.0
5	46.5	42.4	32.9	46.3
6	46.0	42.3	32.4	46.7

V. DISCUSSION AND CONCLUSION

Nature offers the skin a higher level of protection against drying. However, the various stresses and strain to which the skin is exposed nowadays often weaken the natural moisturizing mechanism of the skin. The result water evaporates and the surface of the skin dries. To keep the skin healthy and fresh it needs adequate quantities of lipids and moisture through a well balanced cream emulsion. There are many oils and petroleum products that used as emollient agent. The molecules of these are too large to seep in the skin; instead they sit on the skin surface trapping in the dirt and bacteria. The present work was designed to formulate and develop a emollient cream with different emollient agent. So a simple cream base was formulated by trial and error method. It was subjected to accelerated stability tests. At the end of it, the base was found to be stable in all aspects and ready for further experimentation. The product was developed using same base with 6 % concentration of lanolin, beeswax, coconut oil, sesame oil. They were subjected to accelerated stability tests. It was observed that all the formulation were stable in term of color and pH . The variation in pH reading was observed. The performance evaluation of coconut oil, sesame oil, beeswax were tested along with lanolin for comparison using cutometer. When assessed with cutometer, it was observed that Sesame oil gives emollient properly as compared to lanolin.

It can be concluded from present study that:

- 1) The product containing sesame oil (with 6 %) is most stable and efficient.
- 2) It give satisfactory emollient property to skin after application.
- 3) It help to fight out dryness of the skin.

The efficiency of product was compared to lanolin . It was observed that sesame oil was more efficient.



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