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Review Article

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A Review on Preparation and Evaluation of Cream

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Abstract Creams are considered an important part of cosmetic product as topical preparations from time immemorial due to their ease of application to the skin and also their removal. From cosmetic purposes, Pharmaceutical creams have a variety of applications such as cleansing, beautifying, altering appearance, moisturizing etc. to skin protection against bacterial, fungal infections as well as healing cuts, burns, wounds on the skin. The current study's objective was to design and assess herbal cold creams that contained plant extracts made utilising the water in oil method for the goal of moisturising and nourishing the skin. Neem oil and turmeric extract are used to make the cold cream. Utilising several evaluation techniques, the created product's quality was evaluated. The herbal extract containing moisturizing cream gives the cooling and soothing effect due to slow evaporation of water present in the emulsion. The moisturizing creams are more moisturizing as they provide an oily barrier which reduces the water loss from the stratum corneum, the outermost layer of the skin. They are water-in-oil emulsion and intended for application on skin or accessible mucous membrane to provide localized and sometimes systemic effect at the site of application.

Keywords: Creams, Skin, Topical drug delivery system, Wound healing, Mucous membrane

Introduction

The word ‘Cosmetic’ is derived from the Greek word - ‘kosmesticos’ meaning adornment. Since then any substances used to enhance or enhance the appearance are known as cosmetics. The term “cosmetics” is actually derived from its use in ancient Rome. They were usually produced by female slaves known as the "cosmetae" from which the word "cosmetics" is derived. Cosmetics are used to enhance the appearance. Makeup has been around for many years. The first known people to use cosmetics to enhance their beauty were the Egyptians. The make-up of those days was simple eye color or body color. Modern cosmetics play an important role in both men and women. The number of cosmetics has increased as more and more people want to stay young and attractive. Cosmetics are easily available today in the form of creams, lips, perfumes, eye shadows, nail polishes, hair sprays etc. Some cosmetics such as face powder give light to the skin after applying a basic cream. Then we have lipstick, which is used by many women of all ages. They are made with wax and cocoa butter in the required amount. Cosmetics such as creams, gels, and cologne are used daily by both women and men. Creams work as a facial cleanser in most cases. Recently, anti-aging creams have been developed that can keep skin looking younger for years. The best cleaning products are cleansing cream, soap and water.

Cold cream is the water in oil emulsion. Cold cream gives the prolonged contact time in the site of application as compared to the other semisolid dosage form or formulation. They give elegancy to the skin and it is not that much greasy. Due to the oil phase, it gives an emollience to the skin. The function of the cold cream is for restoring moisture to dry skin, it allows to eliminate the waste materials from the pores and also cools the body. It is easily watered washable and easy to wash away. They are non-irritating when applied on the skin. The water phase provides the skin with additional protection. At body temperature, it becomes liquefiable. It enters the skin through the pores of the skin's epidermis.

Galen, a Greek physician who created the cold cream formulation in the second century, is credited with developing it. He made a mixture of water, beeswax, and rose petals. These were the main moisturiser components he used to create the cold cream. Galen's cream was the common name for this skin lotion. Cold creams can be used to remove temporary tattoo marks and then removed with a cotton ball in addition to moisturising the skin. Uses of cold creams are also related to the creation of children's face paint.

Skin structure and Infection

The skin covers the whole external surface of the body, making it the biggest organ in the body. The epidermis, dermis, and hypodermis are its three constituent layers, and each has a distinctly different architecture and function. The complex network that makes up the skin acts as the body's first line of defence against viruses, UV rays, toxins, and mechanical trauma. It also controls the volume of water released into the environment and the temperature. The pertinent anatomical structures of the epidermal layer of the skin, together with its structure, function, embryology, vascular supply, innervation, surgical considerations, and clinical significance, are covered in this article.

Layers of Epidermis

The stratum basale, which is the deepest layer of the epidermis, is followed by the stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum, which is the outermost layer of the epidermis.

Stratum basale: The lowest layer is called stratum basale, or stratum germinativum. Hemidesmosomes bind the stratum basale to the basement membrane, which separates it from the derims. The cuboidal to columnar mitotically active stem cells that make up this layer are continuously generating keratinocytes. Melanocytes are also present in this stratum.

Stratum spinosum: Known as the prickle cell layer, the stratum spinosum is made up of eight to ten layers of irregular, polyhedral cells with cytoplasmic processes.

sometimes referred to as "spines"—that extend outward and make desmosome contacts with nearby cells. This layer contains dendritic cells.

Stratum granulosum: The stratum granulosum, which consists of three to five cell layers, has diamond-shaped cells that have lamellar and keratohyalin granules. Keratin precursors seen in keratohyalin granules eventually agglomerate, crosslink, and form bundles. The glycolipids found in the lamellar granules are secreted onto the cell surface where they act as a glue to hold the cells together.

Stratum lucidum: The stratum lucidum, a thin, transparent layer with two to three cell layers that is present in thicker skin seen on the palms and soles, is made up of eleidin, a byproduct of keratohyalin transformation.

Stratum corneum: The topmost layer, known as the stratum corneum, consists of 20–30 layers of keratin and horny scales composed of dead keratinocytes, or anucleate squamous cells. The thickness of this layer fluctuates the most, notably in callused skin. The dead keratinocytes in this layer release defences, which are a component of our first line of defence.

Cells of the Epidermis

- Keratinocytes
- Melanocytes
- Langerhans’ cells
- Merkel’s cell
- Keratinocytes

Keratinocytes

The main cell type in the epidermis, keratinocytes are found in the basal layer, where they manufacture keratin and secrete lipids that help build the epidermal water barrier. Through the activation of cholesterol precursors by UVB light to generate vitamin D, keratinocytes also control the absorption of calcium.

Melanocytes

Derived from neural crest cells, melanocytes create melanin, which is the pigment that gives skin its colour. They create melanin and are located in the spaces between the stratum basale cells. As a natural sunscreen, melanin secretion is stimulated by UVB light and provides protection from UV radiation. Tyrosinase, an enzyme, transforms tyrosine into DOPA, which results in the production of melanin. The way by which melanin then moves from cell to cell depends on the lengthy procedures that connect melanocytes to nearby epidermal cells. Melanin granules from melanocytes are transported to the basal keratinocyte's cytoplasm by lengthy processes. Melanin is "pigment donated" to nearby keratinocytes through keratinocyte phagocytosis of the tips of melanocyte processes.

Langerhans' Cells

Dendritic cells, or Langerhans cells, are the skin's first line of defence and are important for antigen presentation. These cells, which are mostly located in the stratum spinosum, require certain stains to be seen. These cells belong to the mononuclear phagocytic system and are of mesenchymal origin. They were generated from bone marrow stem cells that were positive for CD34. They have cytoplasmic organelles called Birbeck granules, which resemble tennis rackets. These cells pick up skin antigens and transfer them to the lymph node. They also express MHC I and MHC II molecules.

Merkel Cells

Oval-shaped, modified epidermal cells called Merkel cells are located in the stratum basale, just above the basement membrane. These cells, which are mostly located in the fingertips but are also present in the palms, soles, oral mucosa, and vaginal mucosa, perform a sensory role as mechanoreceptors for light touch. Their membranes interact with free nerve terminals in the skin, and they are attached to nearby keratinocytes via desmosomes. They also include intermediate keratin filaments.

Dermis

The two layers of connective tissue that make up the dermis—the reticular and papillary layers—merge seamlessly with the epidermis at the level of the basement membrane. The higher, thinner layer known as the papillary layer is made up of loose connective tissue that connects to the epidermis. The thicker, less cellular, deeper layer is called the reticular layer, and it is made up of bundles of collagen fibres and dense connective tissue. Sweat glands, hair follicles, muscles, sensory neurons, and blood arteries are all located in the dermis.

Hypodermis

Also referred to as subcutaneous fascia, the hypodermis is located deep within the dermis. Adipose lobules and various skin appendages, including hair follicles, sensory neurons, and blood arteries, are found in this layer of skin, which is also the deepest one.

Each layer of skin has a different thickness based on the area of the body it covers and is classified by the thickness of the dermal and epidermal layers. The stratum lucidum, an additional layer of epidermis, gives the hairless skin on the palms of hands and soles of feet its thickness. Based on dermal thickness, the upper back is thought to be the thickest; nevertheless, histologically, it is referred to be "thin skin" since the epidermal thickness is thinner than hairless skin and does not have the stratum lucidum layer.

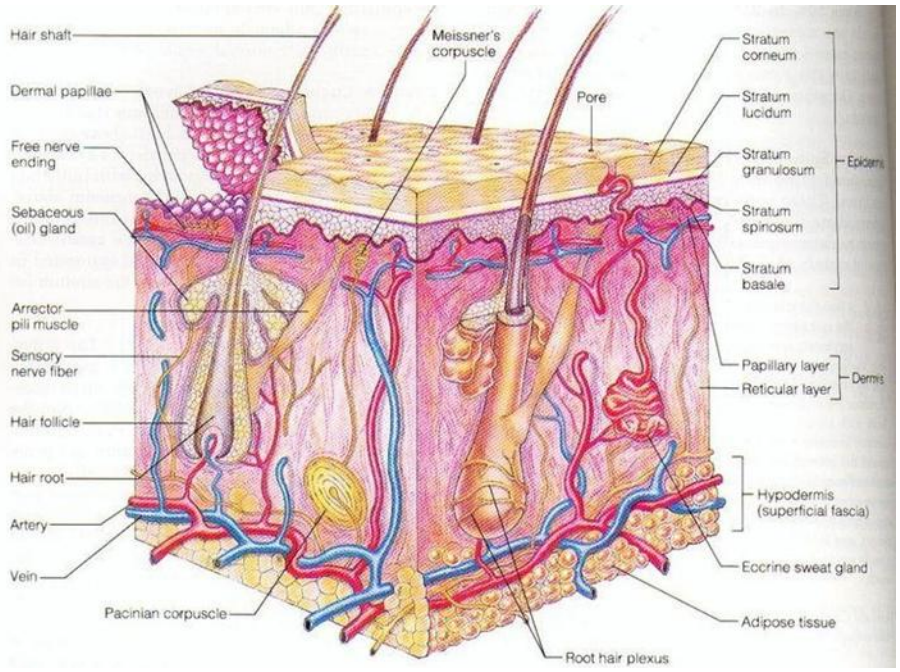

Figure 1: Labelled structure of skin

Structure and Function

The skin serves a variety of purposes. It acts as a barrier against UV light damage, water intrusion, microbial invasion, and mechanical and chemical assault. the cell envelop, a layer of insoluble proteins on the inner surface of the plasma membrane, which creates the epidermal water barrier. It contributes to the robust mechanics of the barrier and is created by the cross-linking of bigger proteins such as desmoplakin, filaggrin, and cystatin with smaller proline-rich proteins. and the lipid envelope, a hydrophobic/lipid layer affixed to the plasma membrane's outside. Along with producing keratohyalin granules, stratum spinosum keratinocytes also create lamellar bodies, which are assembled within the Golgi and include a mixture of glycosphingolipids, phospholipids, and ceramides. The contents of Lamellar bodies are then secreted into the extracellular gaps between the corneum and stratum granulosum by means of exocytosis. Because Langerhans cells, which are dendritic epidermal T lymphocytes and a component of the adaptive immune system, act in the epidermis, the skin serves as the first line of defence against immune threats.

The skin serves both exocrine and endocrine purposes, as well as maintaining the body's homeostasis by controlling temperature and water loss. One of the endocrine tasks is the synthesis of vitamin D in the keratinocytes, which, with the help of UV light from the sun, convert 7-dehydrocholesterol in the epidermis to vitamin D.

In addition to expressing the vitamin D receptor (VDR), keratinocytes have the enzymes required to change vitamin D into 1, 25 dihydroxy vitamin D, which is the active form of vitamin D. The VDR is important because stimulation of it contributes to the differentiation of keratinocytes as they migrate up the epidermis and to the proliferation of the stratum basale. The sebaceous glands and perspiration are the skin's exocrine organs. The skin's ability to sense touch, heat, cold, and pain through the activity of nociceptors is another crucial function of the skin. The general look, turgor, and other characteristics also reveal information about the body's overall health.

Classification of Creams

All the skin creams can be classified on different basis:

1. According to function, e.g. cleansing, foundation, massage, etc.

2. According to characteristics properties, e.g. cold creams, vanishing creams, etc.
3. According to the nature or type of emulsion.
a) Types of creams according to function, characteristic properties and type of emulsion:
1. Make-up cream (o/w emulsion): a) Vanishing creams. b) Foundation creams.
2. Cleansing cream, Cleansing milk, Cleansing lotion (w/o emulsion)
3. Winter cream (w/o emulsion): a) Cold cream or moisturizing creams.
4. All-purpose cream and general creams.
5. Night cream and massage creams

1. Make-up cream: These are basically an o / w type of emulsion. It is a cream-based product that leaves hydrated smooth (either stain matte or light) on the skin. It nourishes the skin and resists sweat and creates a dewy glow.
2. Vanishing creams: They are called vanishing creams because they appear to disappear when applied to the skin. These structures are based on stearic acid. After application, the cream leaves a dry but tacky film that also has a drying effect on the skin. For this reason, these are mainly used in hot areas that cause sweating on the skin.
3. Basic creams: These creams serve as the foundation for makeup. It serves as a basis for adherence to the use of artificial powders. They provide a refreshing and protective action on very oily or very dry skin. A multicolored make up applied to the face to create a uniform, even color, cover up imperfections and change skin tone.
4. Cleansing Cream: These cream are used for cleansing the body and are used for personal hygiene and essential cosmetics. Cleansing creams or lotions can be used to remove makeup, surface grim, oils especially on the face and neck.
5. Winter Creams: These are the w / o formations and in this case the oil content formed will be higher than the water content. These creams are widely used for cracked and dry skin. Cold Cream: Known for moisturizer or moisturizing cream. Cold cream should have an emollient action. The cooling sensor used should be produced and the oil film on the skin should not be covered.
6. All creams and regular creams: These creams are more widely used today than ever before. These creams are oily but not oily and can spread on the skin easily. This can also be used as a night cream, nourishing cream, protective cream to prevent or reduce sunburn or to treat sensitive skin areas.
7. Night cream or massage creams: These creams are widely used to nourish the skin or as a treatment for dry skin. The creams are usually applied to the skin and left for a few hours or nights known as night creams. The creams act as an emollient by applying a cream to the skin with a massage known as a massage cream.

Table 1: General Ingredient and uses in the cream

S. No.	Ingredient	Uses
1.	Bees wax	Emulsifying agent
2.	Borax	Emollient
3.	Methyl paraben	Preservative
4.	Liquid paraffin	Laxative
5.	Water	Diluent
6.	Perfume	Fragrance

Raw Materials Used:
Mineral and vegetable oils, together with fatty alcohols, fatty acids, and fatty esters emulsifying agents, preservatives, and filtered water, can all be used to create cold creams. There should be the following four main components:

- Oil
- Water
- Emulsifying agent/Emulsifiers
- Thickening agent

To start, we weighed each ingredient.

- Next, we add the 3.2 grammes of weighed beeswax to

Relevant methods of preparation of creams for wound-healing:

- **Preparation of o/w emulsion cream**:

The soluble components of the oil and emulsifier are taken in one bucket and melted in a water bath of 75 ° C. Also in some beaker water, the reserves and soluble components in the water are taken up and melted at 75 ° C. After heating, the oil phase was taken with mud and pestle and gradually the water phase was added and reduced until a clicking sound was heard. Finally, when the temperature cooled, perfumes and / or preservatives were added. In this preparation, the water content will be higher than the fat.

- **Preparation of w / o emulsion creams**:

The soluble components of the oil and emulsifier are taken in one oven and melted at 75 ° C. And in another pot the water-soluble portions of the water are taken up and melted at 75 ° C. After melting, the water phase is taken up with mud and pestle and gradually the oil phase is added and reduced until a clicking sound is heard. And when the temperature of the cream cools down, then a perfume agent is added. In this setting, the water level will be lower and the oil level will be higher.

Evaluation parameters of Creams

1. Determination of pH: The pH of the cream can be measured with a digital pH of room temperature by taking a sufficient amount of molded solution with the right solvent in the appropriate baker.

2. Physical appearance: The physical appearance of cream can be distinguished by its color, roughness and texture.

3. Spread ability test: A sufficient amount of sample is taken between two glass slides and a weight of 100gm is applied to the slides for 5 minutes. The spread can be expressed by,

$$S = m * l / t$$

Where, m = weight applied to the upper slide. l = length is delivered to the glass slide.
t = time taken.

4. Viscosity: Viscosity of the cream was determined with the help of Brookfield viscometer at 100 rpm with the spindle no. 7.

5. Amount of saponification: 2gm of diluted material 25ml of 0.5 N alcoholic KOH 30 minutes, in this 1ml of phenolphthalein is added and instantly titrated, at 0.5N HCl, note that read as ‘a’. Repeat surgery to remove the test item. Note the reading as 'b'. Saponification value = (b-a)*28.05/w Where, w = weight of substance in gram.

6. Acid value: 10gm of substance is dissolved in accurately weighed 50ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated, until sample was dissolved completely, to this 1ml of phenolphthalein added and titrated with 0.1N NaOH, until faintly pink colour appears after shaking for 30 seconds.

7. Irritancy test: Mark an area (1sq.cm) 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 up to 24 hrs. and reported.

8. Test for microbial growth: Agar media was prepared then the formulated cream was inoculated on the plate’s agar media by steak plate method and a controlled is prepared by omitting the cream. The plates were placed in the incubator and are incubated in 37º C for 24 hours. After the incubation period, the plates were taken out and the microbial growth were checked and compared with the control.

9. Saponification value: Take 2 gm of the substance and reflux it with the 25 ml of 0.5 N alcoholic KOH for 30 minutes. Then add 0.1 ml of phenolphthalein as an indicator and titrate it with the 0.5 N HCL.

$$\text{Saponification value} = (b-a) * 28.05/W$$

a =volume of titrate, b=volume of titrate, w =weight of substances in gram

10. Dye test: The scarlet red dye is mixed with the cream. Place a drop of the cream on a microscopic slide then covers it with a cover slip, and examines it under a microscope. If the disperse globules appear red the ground colourless. The cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colourless.

11. Homogeneity: Homogeneity was tested via the visual appearance and test.

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