

A REVIEW ON HERBAL CREAM AND SOME PLANT USING FOR HERBAL CREAM FORMULATION

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ABSTRACT

The herbal formulations those when natural herbs and their products used for their aromatic value in formulation development among consumers for herbal products triggered the demand for natural products and natural extracts in many preparations. Creams are a semisolid preparation that is for external application with friction. They are applied directly on the skin with the help of some absorbent material and uses medicinally as well as cosmetics. The focus of the present review is some describe and details about herbal cream and common herbal plant which is uses for herbal cream formulation development.

Keywords: *Herbal Cosmetic, Herbal cream, Herbal formulation, herbal plant.*

INTRODUCTION

The availability of herbal cosmetics is primarily driving up the demand for cosmetics. Herbal formulations are gaining popularity in the public due to their high quality characteristics and low adverse effects. It also feeds the skin with essential nutrients and hydration (Mali AS et al., 2015). Herbal cream is a water-in-oil emulsion. Turmeric, papaya, aloe vera, tulsi, and neem are natural components used to make herbal cream. The selection of these substances is based on their particular qualities. Aloe vera is used to moisturise and prevent acne (Christaki EV and Florou-Paneri PC, 2010). Turmeric is an Asian cosmetic that adds a golden shine to the complexion. It also offers anti-inflammatory and antibacterial qualities.

TOPICAL DRUG DELIVERY

Over the previous few decades, disease has been treated by administering medications to the human body through a variety of routes, including oral, sublingual, rectal, parental, topical, and inhalation. Topical delivery is the application of a drug-containing formulation to the skin to directly treat a cutaneous disorder or the cutaneous manifestations of a general disease (e.g., psoriasis) with the intent of containing the pharmacological or the effect of the drug to the surface of the skin or within the skin. Semisolid formulations in their various forms dominate the topical administration system, but foams, sprays, medicated powders, solutions, and even medicated adhesive systems are used.[2]

Advantages of topical drug delivery system

□ Avoidance of first pass metabolism

- Simple and easy to use.
- Avoid risk.
- Inconveniences of intravenous therapy, as well as the various absorption conditions such as pH changes, the presence of enzymes, gastric emptying time, etc.
- Achieve efficacy with a lower total daily drug dosage by continuous drug intake.
- Avoid fluctuations in medication levels between and within patents.

- Skin irritation or dermatitis may be caused by the medicine or its excipients.
- Most medications have a high molecular weight and are weakly fat soluble, thus they are not absorbed through the skin or mucous membranes.
- Extremely sluggish absorption.
- It can only be used for medications that require a very low plasma concentration to function.
- Can only be used for medications that require a very low plasma concentration to work.
- The possibility of allergic reactions.
- Drugs of larger particle size not easy to absorb through the skin.[3]

PHYSIOLOGY OF HUMAN SKIN

Epidermis

The epidermis is the skin's most superficial layer, made up of stratified keratinized squamous epithelium that varies in thickness across the body. It is thickest on the palms and soles of the feet. The epidermis lacks blood arteries and nerve endings, but its deeper layers are soaked in interstitial fluid from the dermis, which gives oxygen and nutrients before draining as lymph.

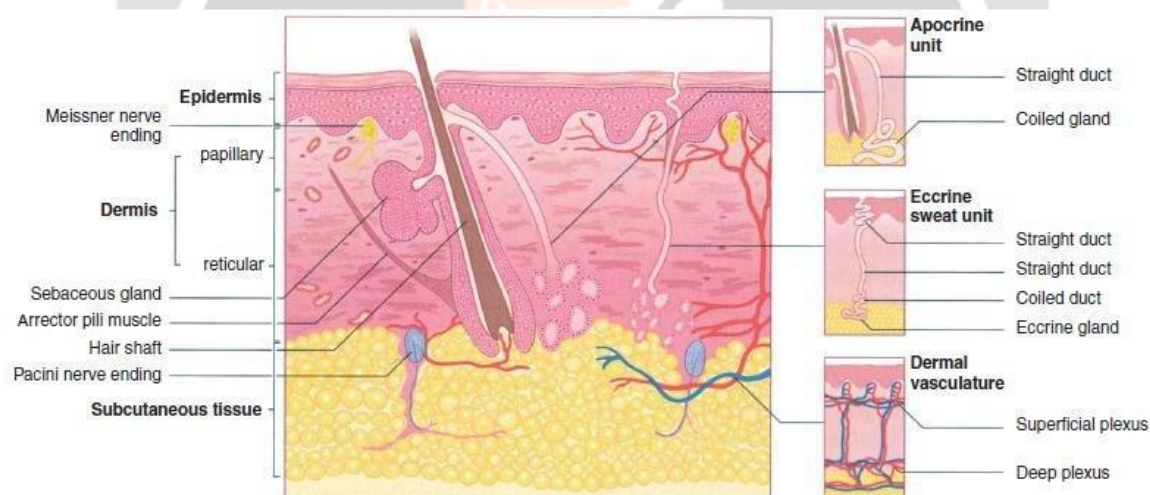


Figure 1: Cross-Section of Skin[4]

Dermis

The dermis is strong and elastic. It is made up of connective tissue, with collagen fibres interwoven with elastic fibres. Elastic fibre rupture occurs when the skin is overstretched, resulting in persistent striae, also known as stretch marks, which can be encountered during pregnancy and obesity. Collagen fibres bind water and provide the skin with tensile strength, but as this ability deteriorates with age, wrinkles appear. The dermis is made up primarily of fibroblasts, macrophages, and mast cells. Its lowest layer contains areolar tissue and varied levels of adipose (fat) tissue.

Subcutaneous gland These are secretory epithelial cells that originate in the same tissue as hair follicles. They release an oily fluid, called sebum, into the hair follicles and Except for the palms of the hands and the soles of the feet, the skin of the entire body is covered in it. They are most commonly found on the scalp, face, axillae, and groynes. Sebaceous glands that secrete sebum directly onto the surface exist in regions of transition from one kind of superficial epithelium to another, such as the lips, eyelids, nipple, labia minora, and glans penis.[5]

Skin Functions

The skin performs the following functions:

- a) **Protection:** Langerhans cells in the skin are part of the adaptive immune system and serve as an anatomical barrier between the internal and exterior environments in bodily defence.
- b) **Sensation:** It has a range of nerve endings that react to heat and cold.

DISEASES OF SKIN

a) Vitiligo

Vitiligo is a condition in which regions of the skin lose their pigment and turn white. It is common, affecting approximately 1% of the global population. Melanin is the pigment that gives your skin its natural colour and is produced by cells known as melanocytes.

b) Scabies

Scabies is a widespread, extremely irritating skin disorder caused by human scabies mites. It can affect people of all ages, but it is more prevalent in children and the elderly. The mites that cause scabies are microscopic parasites little bigger than a pinhead. Scabies rash consists of scratch scars and red scaly regions; later on, it might get infected and produce little pus spots.

c) Rosacea

Rosacea is a frequent rash.

d) Psoriasis

Psoriasis is a prevalent skin condition affecting approximately 2% of the population. It affects both men and women of various ages and has an unpredictable onset. It does not cause infection or scarring of the skin. The skin is a complicated organ composed of several different layers.

e) Melanoma.

Cutaneous malignant melanoma is a malignancy that affects the pigment cells of the skin. If addressed early,

CREAMS

Creams are topical medicines that can be applied to the skin. Creams are characterised as "viscous liquid or semi-solid emulsions of either the oil-in-water or water-in-oil type" dosage forms, with the consistency varying depending on the oil and water.[6] Creams are used for a variety of cosmetic objectives, including washing, beautifying, improving appearance, and providing protection or therapeutic function. These topical preparations are utilised for localised drug distribution into the skin's underlying layer or the mucous membrane. These items are intended to be applied topically for better site-specific medication delivery into the skin for skin conditions.[7] Creams are classified as pharmaceutical products since they are manufactured using pharmaceutical industry processes, both unmedicated and medicated.

They contain one or more drugs substances dissolved or dispersed in a suitable base. Creams may be classified as o/w or w/o type of emulsion on the basis of phases. The term 'cream' has been traditionally applied to semisolid formulated as either water-in-oil (e.g.: cold cream) or oil-in-water (e.g.: vanishing cream).[8]

TYPES OF SKIN CREAMS

They are divided into two types:

Oil-in-Water (O/W) creams are made up of small oil droplets spread in a continuous phase, whereas an oil-in-water (O/W) emulsion is made up of oil droplets dispersed throughout the aqueous phase.

Water-in-Oil (W/O) creams are made up of minute droplets of water suspended in a continuous oily phase. The water-in-oil (W/O) emulsion is formed when water is the dispersed phase and oil serves as the dispersion medium.[9-11]

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.

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.
6. Skin protective cream.
7. Hand and body creams.

1. Make-up cream-

These are primarily oil and water emulsions. It is a cream-based treatment that provides the face with a smooth, moisturised finish (whether stain matte or radiant). It nourishes the skin, is sweat-resistant, and leaves a lovely sheen.

- Vanishing creams: The name comes from the fact that when put onto the skin, they appear to vanish. Stearic acid serves as the foundation for these compositions. Following application, the cream leaves a dry but sticky residue film that also dries the skin. As a result, they are particularly useful in hot areas where perspiration occurs.
- Foundation creams: These creams are used as a base for makeup. It serves as an adhesive basis for applying make-up powders.

2. Cleansing creams

These creams are used for body cleaning purposes and it is used for personal hygiene and beautification which is important for cosmetics. Cleansing creams or lotions can be used for the removal of make-up, surface grim, oil mainly from the face and neck.

3. Winter creams

These are w/o formulations, which have a higher oil content than water. These lotions are mostly used to treat chapped and dry skin. Cold Cream: It is referred to as moisturiser or moisturising cream. Cold cream must have emollient properties. When used, it should provide a cooling feeling to the skin and leave a non-occlusive oil film.

4. All purpose creams and general creams

These lotions are more commonly used today than ever before. These creams are oily but not greasy, and they spread easily on the skin. This can also be used as a night cream, nourishing cream, sunburn prevention or relief, and roughened skin therapy.

5. Night cream or massage creams

These creams are mostly used to hydrate or treat dry skin. Night creams are creams that are applied to the skin and left for a few or many hours overnight. Massage cream is a cream that functions as an emollient when rubbed on the skin during a massage.

6. Skin protective creams

These creams are smooth, thick, and designed to give an invisible, homogeneous protective film barrier to the skin. It contributes to the maintenance of the skin's barrier against pollutants that may irritate the skin (contact and occupational dermatitis). Strengthens the skin's inherent characteristics while maintaining the balance of normal to combination skin.

7. Hand and body creams

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GENERAL INGREDIENTS USED IN SKIN CREAMS

- Water is the most important and extensively utilised basic ingredient in every cream recipe. These are the cheapest and most readily available. In skin creams, water is utilised as a solvent to dissolve other cream ingredients. Creams are made using water that is free of toxins, pollution, microorganisms, and other contaminants. Water can also create emulsions; the amount of water used in the formulation determines whether they are referred to as oil-in-water emulsions or water-in-oil emulsions, depending on the amounts of oil and water phase employed.[16]
- Oil, lipids, and waxes, as well as the derivatives they form, are crucial components of creams. Waxes work as emulsifiers, fats as thickeners, and oils as perfumes, preservatives, and so on, depending on their purpose. Oil can be of two types: mineral and glyceride.
- **Mineral oil:** Mineral oil consists of hydrocarbons derived from petroleum oil. Mineral oil is clear, odorless, and heavily refined oil and it is widely used in cosmetics. Mineral oil rarely causes allergic reactions and it cannot become solid and clog pores of the skin. It is light weight and inexpensive, it helps to reduce water loss from the body and keeps body moisturized. A number of mineral oils are used in cream formulation.

Examples:

- Light liquid paraffin
- Heavy liquid paraffin
- Liquid petroleum

Glyceride oil:

Glyceride oil is mostly vegetable oils. Examples of glyceride oils are almond oil, arachis oil, castor oil, coconut oil, olive oil etc.

Vegetable oil:

Form a barrier on the surface of the skin and slow down the loss of water, helping to maintain plumpness of skin. Vegetable oils may also be used to increase the thickness of the lipid or oil portion of cream or personal care products. E.g. Almond oil, germ oil, avocado oil, sunflower oil etc.[17]

Waxes: Which are used in preparation of cream includes beeswax, carnauba wax, ceresin, spermaceti, etc. Waxes are used in cosmetics because it helps to keep an emulsion from separation of oil and liquid components.

Fats:

Different types of fats are used in the preparation of creams. These materials can be obtained from animals, plants or mineral origin. Glyceride oils and fats may be of animals or vegetable origin. They consist of combinations of higher fatty acids and glycerin. When saponified they form soap, or fatty acid and glycerin, depending upon process used. The most common of these fatty acid are lauric, margaric, plamitic, stearic, saturated group. Oleic acid is liquid and most popular unsaturated fatty acid. More specially the oil most commonly used in other

cosmetics are olive oil, almond oil, sesame oil, peanut oil, coca butter fat, mutton tallow, lard and beef stearine.[18]

Lanolin:

It is derived from wool fat of a sheep. Lanolin are of two types- the hydrous lanolin contains between 25%- 30% water. Anhydrous lanolin has point of 38°C-42°C and has a slight odour. These ingredients act as a lubricant on the skin surface, which gives the skin soft and smooth appearance. Lanolin helps to form emulsion and blends well with other substances used in cosmetic and personal care products.

Colours:

Before the development of the modern technology, colours primarily came from substances found in nature such as turmeric, saffron, indigo, etc. After the 19th century, colours were made in the laboratory and were found to be much more stable with greater colouring intensity. They also could be produced without using plants harvested in the wild.[19]

Emollients:

Emollients, also commonly referred to as moisturizers, are products that help to soften skin or to treat skin that has become dry. Most emollients are forms of oil or grease, such as mineral oil, squalene, and lanolin. They work by increasing the ability of the skin to hold water, providing the skin with a layer of oil to prevent water loss, and lubricating the skin.[20]

Humectants:

These are important multi-functional ingredients found in most skin care formulations. Humectants are hygroscopic organic compounds. These are the materials that can absorb or retain moisture. These has many benefits such as moisturization, exfoliation, etc. Examples of humectant are glycerin, Hydroxyethyl urea, betaine, sodium PCA, Sodium-L-Lactate, etc.[21]

Perfumes:

Perfume is a substance that imparts a scent or order, including a sweet and pleasant smell.

Examples of natural perfumes used in creams are-

- White Blossoms:
- Rosy Dreams
- Orange Blossom[22]

Vitamins:

Vitamins plays an important role in maintaining the physiological function of whole body and the skin. Vitamin A, B, C, E etc. are generally used in formulation of the creams.

Preservatives:

The use of preservatives in cosmetics is essential to prevent alteration caused by microorganism and contamination during formulation, shipment, storage and consumer use. Antioxidants can also be used to protect alteration caused by exposure to oxygen. Synthetic preservatives when used in low concentration effectively preserve the products.[23]

WOUND AND WOUND HEALING PROCESS

Wounds can be defined as a loss or break in the cellular, anatomical, or functional continuity of deep skin tissue or living tissues. Wounds can be caused by physical, chemical, thermal, viral, microbial, or immunological harm to the skin's surface.[24-28] Wounds not only damage the patient physically and emotionally, but they may also be very costly, and the scars may last the patient's entire life. Wounds are defined as physical injuries that result in the opening and breaking of the skin. Wounds can be characterised primarily based on the mechanism of infliction and the causative agent as:[29-30]

1) **Closed wound:** contusion, closed fracture, etc.

2) **Open wound**

- a) Sharp cut.
- b) Laceration.
- c) Abrasion.
- d) Avulsion.
- e) Crush wound.
- f) Punctured wound.
- g) Bite wound.
- h) Burn wound.

Wound healing is the contraction, movement, and re-adhesion of cells following a skin damage or trauma. Platelet aggregation, blood clotting, fibrin production, an inflammatory reaction to damage, changes in the ground substances, angiogenesis, and re-epithelialization are all part of wound healing.[31-32] The healing process cannot be completed unless the disturbed surface is vigorously knit by collagen, followed by scar formation.[33-34] The presence of free radicals can impede wound healing by causing harm to the surrounding skin tissues. Wound healing is impacted by a variety of factors, including infections, diet, medications and hormones, wound kind and location, and specific disease states.[35] In India, for millennia, people have used natural products derived Ayurveda, a popular kind of Indian medicine, teaches the use of plants and animals to treat wounds.[36] Natural goods have been utilised for millennia in various regions of the world, and they are becoming as essential as alternative medicine due to their comparatively low side effects. Because of these reasons, natural/traditional medicine is being scientifically studied in order to enhance human health. These are used directly, as crude or raw drugs, to treat chronic conditions.[37-39]

AYURVEDIC MEDICINES FOR WOUND HEALING

1. **Aloe Vera (*A. barbadensis*)** is an important herb in Ayurveda. It has a wide range of applications in skin disorders such as burns, psoriasis, and cold sores. It can help treat fever, itchiness, and inflammation.[40-41]

2. **Peppermint (*Mentha piperita*):** This herb is widely used and comes in a variety of forms. When applied to the skin, peppermint oil offers a cooling sensation. It has various applications, including aromatherapy, bath preparations, mouthwashes, toothpaste, and topicals. It is used to treat pruritus, reduce irritation and inflammation, and promote wound healing.[42-43]

3. **Turmeric (*Curcuma longa*):** In India, turmeric is used as both a spice and a colouring agent. It has a variety of therapeutic characteristics, including anti-cancer, antidiabetic, antioxidant, anti-inflammatory, antibacterial, antiviral, and wound healing.[44-45]

4. **Jatropacourcas** has a variety of therapeutic characteristics. It has antimicrobial, anti- cancer, -HIV, anti-bacterial, and wound healing properties.[46]

5. **Honey:** Honey has been utilised as traditional medicine since antiquity. Honey has antioxidants, anti-tumor, anti-inflammatory, antimicrobial, and cardiovascular-enhancing properties. It also serves as a wound dressing and healing agent. Honey has been used to treat adult and neonatal postoperative infections, burns, necrotising fasciitis, infected and nonhealing wounds and ulcers, boils, pilonidal sinus, venous ulcers, and diabetic foot ulcers.[47-48]

6. **Marigold** (*Calendula officinalis*) is a short-lived, scented herbaceous perennial plant. The flower/plant has been used for ages for ornamental, cosmetic, and therapeutic purposes. Calendula is one of the top herbs, (49-50)

7. **Ghee**: Butter derived from cow milk has been reported to offer numerous medical effects, including energy cooling, rejuvenation, bestowing lustre and attractiveness, improving memory and stamina, increasing intelligence, and promoting lifespan. It exhibits antibacterial, immuno stimulant, antioxidant, and hepatoprotective properties. Cow ghee heals wounds faster than antibiotics do. Cow ghee includes a variety of saturated and unsaturated fatty acids that can participate in metabolic processes related to wound healing. (51-52)

RELEVANT METHODS OF PREPARATION OF CREAMS FOR WOUND-HEALING:

Preparation of o/w emulsion cream

The oil soluble components and emulsifier are combined in one beaker and melted in a water bath at 75°C. In another beaker, water, preservatives, and water-soluble components are combined and melted at 75°C. After heating, the oil phase was placed in a mortar and pestle, and the water phase was gradually added and triturated until a clicking sound was heard. Finally, once the temperature has cooled, perfumes and/or preservatives are added. In this preparation, the water content will be higher than the oil.

Preparation of w/o emulsion creams

The oil soluble components and emulsifier are combined in one beaker and melted at 75°C. In another beaker, water and water-soluble components are combined and melted at 75°C. After melting, the water phase is placed in a mortar and pestle, and the oil phase is gradually added and triturated until a clicking sound is heard. The perfuming ingredient is added once the cream's temperature has dropped. In this preparation, the water phase will be reduced while the oil phase will be increased. [53]

EVALUATION PARAMETERS OF CREAMS:

1. **Determination of pH**: The pH of the cream can be measured on a standard digital pH meter at room temperature by taking adequate amount of the formulation diluted with a suitable solvent in a suitable beaker.

2. **Physical appearance**: The physical appearance of the cream can be observed by its colour, roughness and graded.

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

$$S = m \cdot l / t$$

Where, m = weight applied to upper slide.

l = length moved on the glass slide.

t = time taken.

4. **Saponification value**: 2gm of substance refluxed with 25ml of 0.5 N alcoholic KOH for 30min, to this 1ml of phenolphthalein added and titrated immediately, with 0.5N HCl, note the reading as 'a'. Repeat the operation omitting the substance being examined. Note the reading as 'b'.

$$\text{Saponification value} = (b-a) \cdot 28.05 / w$$

Where,

w = weight of substance in gram.

5. **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. Acid value = $n \cdot 5.61 / w$

Where,

n = the no. of ml of 0.1 N KOH solution.

w = the weight of substance in gram.

- 6. Viscosity:** Viscosity of formulated creams can be determined by using Brookfield Viscometer
- 7. Homogeneity:** The formulation was tested for the homogeneity by visual appearance and by touch.
- 8. Removal:** The ease of removal of the creams applied was examined by washing the applied part with tap water.
- 9. Dye test:** The scarlet dye is mixed with the cream. Place a drop of cream in a slide and cover with a cover slip and examine it under a microscope. If the disperse globule appears red and the ground colourless then it is o/w type and the reverse condition appears in w/o type of creams.
- 10. After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.
- 11. Type of smear:** After application of cream, the type of film or smear formed on the skin were checked.
- 12. Irritancy study:** Mark an area of 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 upto 24hrs and reported.
- 13. Accelerated Stability Study:** Accelerated stability study is conducted for formulation according to ICH guidelines.[54]

CONCLUSION

Creams are semisolid compositions that are widely accepted across society. The skin is the most accessible component of the body, making it particularly prone to injury. Topical formulations such as creams are the most commonly used treatments for cuts, burns, and wounds. Because of its evident benefits, research and development into the composition of pharmaceutical creams for wound healing has increased in recent decades. Pharmaceutical creams are expected to be a fascinating and appealing subject of research for many years to come as the pharmaceutical science and industry advance. In the coming years, creams will be prepared, formulated, and evaluated using more complex technologies and methodologies. Creams containing herbal components are likewise in high demand.

REFERENCES

1. Shah RN, Methal BM, A Hand book of Cosmetics Page No.1
2. Myers D, Surfactant Science and Technology, VCH Publishers: 1992, Pp. 209-247
3. Sahu T, Patel T, Sahu S, Gidwani B, "Skin Cream as Topical Drug Delivery System: A Review" Journal of Pharmaceutical and Biological Sciences, Published by Atom and Cell Publishers, ISSN: 2320-1924
4. James WD, Berger TG, and Elston DM, Andrews' Diseases of the Skin: Clinical Dermatology. (10th ed.) 2006, Philadelphia; Elsevier Saunders: 2006, p. 1.
5. Ross and Wilson. Anatomy and Physiology in Health and Illness, 11e
6. Ansel HC, Popovich NG, Allen LV. Pharmaceutical dosage forms and drug delivery systems. Lippincott Williams & Wilkins; 1995.
7. Rai R, Poudyal AP, Das S, Pharmaceutical Creams and their use in wound healing: A Review, Journal of Drug Delivery and Therapeutics, 2019; 9(3-s): 907-912 <http://dx.doi.org/10.22270/jddt.v9i3-s.3042>
8. Sahu T, Patel T, Sahu S, Gidwani B, "Skin cream as Topical Drug Delivery System: A Review" Journal of Pharmaceutical and Biological Sciences, 2016; 4(5):149-154
9. Mohiuddin AK, "Skin Care Creams: Formulation and Use" American Journal of Dermatological Research and Reviews, 2019, 2:8

10. Chapter 11. Semi-solid dosage forms. In: Alekha Dash, Somnath Singh, Justin Tolman. *Pharmaceutics: Basic Principles and Application to Pharmacy Practice*, published by Academic Press, 2013 ISBN 0123868912, 9780123868916
11. Swarbrick J, Rubino JT, Rubino OP. Chapter 22. Coarse Dispersions. In: *Remington: The Science and Practice of Pharmacy Volume 1*, edited by David B. Troy, Paul Beringer, published by Lippincott Williams & Wilkins, 2006 ISBN 0781746736, 9780781746731
12. Jamshiya S, "Formulation and Evaluation of Herbal Skin Cream for Wound Healing" (Doctoral dissertation, RVS College of Pharmaceutical Sciences, Coimbatore)
13. Rani S, Singh N, Gautam SP, "Formulation, Evaluation Optimization and Evaluation of Dendricream for wound healing activity of Artemisia Indica" *World journal of pharmacy and pharmaceutical sciences*, 2016; 5(8):1483-1497.
14. Esimone CO, Ibezim EC, Chah KF, "Factors affecting wound healing" *Journal of Pharma Allied Sciences*, 2005; (1):294-299
15. Avinash G, Priyanka B, "Wound healing potential of Indian medicinal plants" *International Journal of Pharmacy Review & Res*, 2013; 2:75-87.
16. Pal A, Soni M, Patidar K, "Formulation and evaluation of polyherbal cream" *International Journal Pharmaceutical and Biological Archives*, 2014; 5:67-71.
17. Patel RP, Kamani R, "Formulation Optimization and Evaluation of Mometazone Furoate Cream" *Journal of Pharmacy Research*, 2009; 10:1565-1569.
18. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream" *Der Pharmacia Lettre*, 2013; 5(1):838
19. Sherrow V, "For Appearance' Sake: The Historical Encyclopedia of Good Looks" *Beauty, and Grooming*, 1995; 4:238-39.
20. Jamshiya S, "Formulation and Evaluation of Herbal Skin Cream for Wound Healing" (Doctoral dissertation, RVS College of Pharmaceutical Sciences, Coimbatore).
21. Avinash G, Priyanka B, "Wound healing potential of Indian medicinal plants" *International Journal of Pharmacy Review & Res*, 2013; 2:75-87.
22. Mittal A, Sardana S, "Herbal boon for wounds" *International Journal of Pharmacy and Pharmaceutical Sciences*, 2013; 5:1-12
23. Tiwari VK, "Burn wound: How it differs from other wounds?" *Indian journal of plastic surgery: official publication of the Association of Plastic Surgeons of India*. 2012 May; 45(2):364.
24. Sarabahi S, Tiwari VK, "Principles and practice of wound care" *JP Medical Ltd*; 2012 May 15.
25. Kiran K, Asad M, "Wound healing activity of Sesamum indicum L seed and oil in rats"
26. James OM, Victoria IA, "Excision and incision wound healing potential of Saba florida (Benth) leaf extract in Rattusnovergicus" *Inter J Pharm Biomed Res*, 2010; 1(4):101-7
27. Saini S, Dhiman A, Nanda S, "Traditional Indian medicinal plants with potential wound healing activity: a review" *International Journal of Pharmaceutical Sciences and Research*, 2016; 7(5):1809
28. DiPietro LA, Burns AL, editors. *Wound healing: methods and protocols*. Springer Science & Business Media; 2003
29. Builders PF, Kabele-Toge B, Builders M, Chindo BA, Anwunobi PA, Isimi YC, "Wound healing potential of formulated extract from hibiscus sabdariffa calyx" *Indian journal of pharmaceutical sciences*, 2013; 75(1):45.

30. Biswas TK, Mukherjee B, "Plant medicines of Indian origin for wound healing activity: a review" The international journal of lower extremity wounds, 2003; 2(1):25-39.
31. Prasad V, Dorle AK, "Evaluation of ghee based formulation for wound healing activity" Journal of ethnopharmacology, 2006; 107(1):38-47.
32. Duke JA. Handbook of medicinal herbs. CRC press; 2002 Jun 27.
33. Govindarajan R, Vijayakumar M, Rao CV, Shirwaikar AN, Mehrotra S, Pushpangadan P, "Healing potential of Anogeissus latifolia for dermal wounds in rats" Acta Pharm. 2004; 54(4):331-8
34. Kulkarni PH, "The Encyclopedia of Ayurveda" Sri Satguru publication, 2005; 1:288-9.
35. Oryan A, Mohammadalipour A, Moshiri A, Tabandeh MR, "Topical application of Aloe vera accelerated wound healing, modeling, and remodeling: an experimental study" Annals of plastic surgery, 2016; 77(1):37-46
36. Herro E, Jacob SE. Menthapiperita (peppermint). Dermatitis. 2010; 21(6):327-9.
37. Modarresi M, Farahpour MR, Baradaran B, "Topical application of Menthapiperita essential oil accelerates wound healing in infected mice model" Inflammopharmacology, 2018; 6:1-7.
38. Saidi M, Aouacheri O, Saka S, "Protective Effect of Curcuma Against Chromium Hepatotoxicity in Rats" Phytothérapie. 2019.
39. Luthra PM, Singh R, Chandra R. Therapeutic uses of Curcuma longa (turmeric). Indian Journal of Clinical Biochemistry. 2001; 16(2):153-60
40. Shetty S, Udupa SL, Udupa AL, Vollala VR, "Wound healing activities of Bark Extract of Jatropha curcas Linn in albino rats" Saudi Medical Journal, 2006; 27(10):1473-6
41. Bodeker G, Ryan T, Ong CK, "Traditional approaches to wound healing. Clinics in dermatology" 1999; 17(1):93-8.
42. Kwakman PH, Zaat SA, "Antibacterial components of honey" IUBMB life. 2012; 64(1):48-55
43. Parente LM, Júnior L, de Souza R, Tresvenzol LM, Vinaud MC, de Paula JR, Paulo NM, "Wound healing and anti-inflammatory effect in animal models of Calendula officinalis L. growing in Brazil" Evidence-based complementary and alternative medicine, 2012;
44. Preethi KC, Kuttan R, "Wound healing activity of flower extract of Calendula officinalis" Journal of basic and clinical physiology and pharmacology, 2009; 20(1):73-80
45. Prasad V, Dorle AK, "Evaluation of ghee based formulation for wound healing activity" Journal of ethnopharmacology, 2006; 107(1):38-47
46. World Health Organization. General guidelines for methodologies on research and evaluation of traditional medicine. Geneva: World Health Organization; 2000
47. Inpanya P, Faikrua A, Ounaroan A, Sittichokechaiwut A, and Viyoch J, Effects of the blended fibroin/aloe gel film on wound healing in streptozotocin-induced diabetic rats. Biomed Mater. 2012; 7:035008.
48. Tarameshloo M, Norouzian M, Zarein-Dolab S, Dadpay M, Mohsenifar J, and Gazor R, "Aloe vera gel and thyroid hormone cream may improve wound healing in Wistar rats" Anat Cell Biol, 2012; 45:170.
49. Atiba A, Nishimura M, Kakinuma S, Hiraoka T, Goryo M, Shimada Y, Ueno H, and Uzuka Y, "Aloevera oral administration accelerates acute radiation-delayed wound healing by stimulating transforming growth factor- β and fibroblast growth factor production" Am J Surg, 2011; 201:809.
50. Eshghi F, Hosseinimehr SJ, Rahmani N, Khademloo M, Norozi MS, and Hojati O, "Effects of Aloe vera cream on posthemorrhoidectomy pain and wound healing: results of a randomized, blind, placebo-control study" J Altern Complement Med, 2010; 16:647.

51. Takzare N, Hosseini MJ, Hasanzadeh G, Mortazavi H, Takzare A, and Habibi P, "Influence of Aloe vera gel on dermal wound healing process in rat" *Toxicol Mech Methods*, 2009; 19:73
52. Upadhyay NK, Kumar R, Mandotra SK, Meena RN, Siddiqui MS, Sawhney RC, and Gupta A, "Safety and healing efficacy of Sea buckthorn (*Hippophaerhamnoides L.*) seed oil on burn wounds in rats" *Food Chem Toxicol*, 2009; 47:1146.
53. Pal A, Soni M, Patidar K, "Formulation and evaluation of polyherbal cream" *International Journal Pharmaceutical and Biological Archives*, 2014; 5: 67-71
54. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream" *Der Pharmacia Lettre*, 2013; 5(1):838.

