INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

Formulation Of Herbal Gel and Evaluation Parameter

Ritesh Gadekar, Rohit Damodar, Ritesh Huse, Samid Abrar Ahemad Khan, Rohan Susgohar, Dr. R. H. Kale, Arif Shekh*

PRMSS, Anuradha College of Pharmacy, Chikhli, Dist. Buldhana

ARTICLE INFO

Published: 05 Jun. 2025
Keywords:
Herbal Gel, Evaluation Parameter, People having skin from acne
DOI:
10.5281/zenodo.15603319

ABSTRACT

Cosmetic play a vital role for everyone to have a joyful and sanguine life. In present scenario herbal cosmeceuticals have more demand they have no side effects. People having skin from acne, smooth and moisturizer more essential. In our present study we formulated 4 different formulation F1, F2, F3, F4 in gel form by using aloe vera, marigold, azadirachta indica, gelatine, glycerine, sodium benzoate, tartaric acid, acacia, HPMC and evaluated by using variouse parameters such as physical appearance, viscosity, pH, Spreadability , washability, stability studies and got result with all tests. The gel F1 was found to show excellent effects on controlling dryness and pimple. The herbal formulation F1 was having characteristic odour, reddish brown in colour. The smooth to touch and in gel form it spreads. Thus, the formulated gel F1 can be without a side effect which makes glowing skins.

INTRODUCTION

Herbal cosmetics:

Herbal cosmetics are the preparations containing phytochemical from a variety of botanical sources, which influences the functions of skin and also provide nutrients necessary for the healthy skin and body. The natural herbs and their products or extract when used for their aromatic value in cosmetic preparation are called as herbal cosmetics. There has been a common belief that the chemical-based cosmetics may be harmful to the skin and turned in increased awareness among consumers for herbal products which triggered the demand for natural products and natural extracts in cosmetics preparations. Skin is the largest organ in the body and covers the body's entire external surface. It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in their anatomy and function. The skin's structure is made up of an intricate network which serves as the body's initial barrier against pathogens, UV light, and chemicals, and mechanical injury. It also regulates

***Corresponding Author:** Arif Shekh
Address: *PRMSS, Anuradha College of Pharmacy, Chikhli, Dist. Buldhana.*
Email : riteshkumarhuse@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

temperature and the amount of water released into the environment. This article discusses the relevant anatomical structures of the skin's epidermal layer, its structure, function, embryology, vascular supply, innervation, surgical considerations, and clinical relevance

Skin Thickness

The thickness of each layer of the skin varies depending on body region and categorized based on the thickness of the epidermal and dermal layers. Hairless skin found in the palms of the hands and soles of the feet is thickest because the epidermis contains an extra layer, the stratum lucidum. The upper back is considered thickest based on the thickness of the dermis, but it is considered "thin skin" histologically because the epidermal thickness lacks the stratum lucidum layer and is thinner than hairless skin.

Layers of Epidermis

The layers of the epidermis include the stratum basale (the deepest portion of the epidermis), stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum (the most - superficial portion of the epidermis).

Stratum basale, also known as stratum germinativum, is the deepest layer, separated from the dermis by the basement membrane (basal lamina) and attached to the basement membrane by hemidesmosomes. The cells found in this layer are cuboidal to columnar mitotically active stem cells that are constantly producing keratinocytes. This layer also contains melanocytes**.**

Stratum spinosum,

8-10 cell layers, also known as the prickle cell layer contains irregular, polyhedral cells with cytoplasmic processes, sometimes called "spines", that extend outward and contact neighboring cells by desmosomes. Dendritic cells can be found in this layer.

Stratum granulosum,

3-5 cell layers, contains diamond shaped cells with keratohyalin granules and lamellar granules. Keratohyalin granules contain keratin precursors that eventually aggregate, crosslink, and form bundles. The lamellar granules contain the glycolipids that get secreted to the surface of the cells and function as a glue, keeping the cells stuck together.

Stratum lucidum,

2-3 cell layers, present in thicker skin found in the palms and soles, is a thin clear layer consisting of eleidin which is a transformation product of keratohyalin.

Stratum corneum,

20-30 cell layers, is the uppermost layer, made up of keratin and horny scales made up of dead keratinocytes, known as anucleate squamous cells. This is the layer which varies most in thickness, especially in callused skin. Within this layer, the dead keratinocytes secrete defensins which are part of our first immune defense

Cells of the Epidermis

- Keratinocytes
- Melanocytes
- Langerhans'

Structure and Function

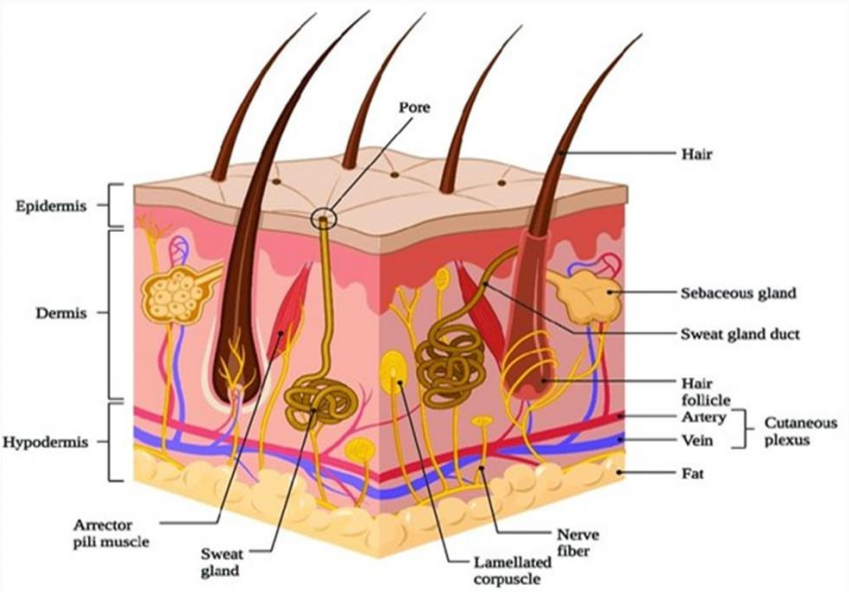

Fig. Skin

The skin is the largest organ of the body. It has three main layers, the epidermis, the dermis and the subcutaneous layer.

The epidermis is an elastic layer on the outside that is continually being regenerated. It includes the following:

• Keratinocytes - the main cells of the epidermis formed by cell division at its base. New cells continually move towards the surface. As they move they gradually die and become flattened.

• Corneocytes - the flattened dead keratinocytes that together make up the very outer layer of the epidermis is called the stratum corneum or horny layer. This protective layer is continually worn away or shed.

• Melanocytes – produce the pigment melanin that protects against UV radiation and gives skin its colour. The dermis is the inner layer that includes the following:

• Sweat glands – produce sweat that travels via sweat ducts to openings in the epidermis called pores. They play a role in temperature regulation.

• Hair follicles – are pits in which hairs grow. Hairs also play a role in temperature regulation.

• Sebaceous glands – produce sebum (an oil) to keep hairs free from dust and bacteria. Sebum and sweat make up the 'surface film'.

FUNCTION:

• Provides a protective barrier against mechanical, thermal and physical injury and hazardous substances.

• Prevents loss of moisture.

• Reduces harmful effects of UV radiation.

• Acts as a sensory organ (touch, detects temperature).

• Helps regulate temperature.

• An immune organ to detect infections etc.

• Production of vitamin D.

Skin Is The Largest Organ In The Body.• Microscopically Skin Is Composed Of Three Main Histological Layers: Epidermis, Dermis And Hypodermis (Subcutaneous Layer). At The Skin Surface, Drug Molecules Come In Contact With Cellular Debris, Microorganisms, And Other Materials, Which Effect Permeation.

The Applied Medicinal Substance Has Three Pathways To The Viable Tissue1) Through Hair Follicles, 2) Via Sweat Duct Sand 3) Across Continuous Stratum Corneum.

Gel is a two-phase elastic colloidal material, consisting of dispersed liquid incorporated in solid phase. Pharmaceutical gels are semisolid systems in which there is interaction between colloidal particles eithin a liquid vehicle. Some gelling agent (carbomers) require a “neutralizer” or a pH adjusting chemical to create the gel after the gelling agent has been wetter in the dispersing medium. Gelling Agent: These are substance which, when added to an aqueous mixture, increase its viscosity without substantially modifying its other properties, such astaste.

Classification of Gel

Gel can be classification based on nature of continuous phase

1. Hydrogel (water based)
2. Organogels (with a non-aqueous solvent)
3. Biological Xerogels

Hydrogel

A hydrogel is a network of polymer chains that are hydrophilic, sometimes found as colloid gel in which water is the dispersion medium. A three-dimensional solid results from the hydrophilic polymer chains being held together by cross-links Because of the inherent cross-links, the structural integrity of the hydrogel network does not dissolve from the high concentration of water. Hydrogels are highly absorbent (they can contain over 90% water) natural or synthetic polymeric networks. Hydrogels also possess a degree of flexibility very similar to natural tissue, due to their significant water content. As responsive "smart materials" hydrogels can encapsulate chemical systems which upon stimulation by external factors such as a change of pH may cause specific compounds such as glucose to be liberated to the environment, in most cases by a gel-sol transition to the liquid state. Chemome chanical polymers are mostly also hydrogels, which upon stimulation change their volume and can serve as actuators. The first appearance of the term 'hydrogel' in the literature was in 1894.

Organogel

An organogel is a non-crystalline, non-glassy thermoreversible solid material composed of a liquid orgnic phase entrapped in a three-dimensionally cross-linked network. The liquid can be, for example, an organic solvent or vegetable oil. The solubility and particle dimensions of the structurant are important characteristics for the elastic properties and firmness of the organogel. Often, these systems are based on self-assembly of the structurant molecules. An example of formation of an undesired thermoreversible network is the occurrence of wax crystallization in petroleum.

Xerogels

A xerogel is a solid formed from a gel by drying with unhindered shrinkage. Xerogels usually retain high porosity (15–50%) and enormous surface area (150–900 m2 /g), along with very small pore size (1–10 nm). When solvent removal occurs under supercritical conditions, the network does not shrink and a highly porous, low-density material known as an is produced. Heat treatment of a xerogel at elevated temperature produces viscous (shrinkage of the xerogel due to a small amount of viscous flow) which results in a denser and more robust solid, the density and porosity achieved depend on the sintering conditions. Gels are defined as “polymers and their swollen matters with three-dimensional (3D) network structures that are insoluble in any solvents.” Gels are cross-linked 3D networks that absorb solvents and swell to a limited degree without dissolution. They exist in states that are somewhere between a solid and a liquid. Gels are classified based on the type of cross-linking that creates their 3D networks, as

well as whether they are natural or artificial, the shape and size of the gel.The chapter discusses classifications of gels in detail. When water is the medium for a gel, it is called a hydrogel. It is necessary for gels to have intermolecular cross link structures of polymers, that is, polymer networks. These networks can range in size from a large scale of 103 –106 m(Internet-sized) to human networks used for direct interaction at 1–10 m. Various functions are observed in an organism in which gels originate; they include filtering, diffusion, and atomic or molecular order interactions between polymer chains and the enclosed solute or solvent. Polymer gels are different from normal solids and liquids, and show various characteristics and behaviors. The properties of a polymer gel depend largely on the structure of the polymer network that makes up the gel and the interaction of the network and the solvent. The polymer network's mobility is restricted by its cross-link structure. The different methods of classifying polymer gels include classification based on the liquids that fill three-dimensional (3D) networks, classification based on the polymers that form gels, and classification based on the formation method of polymer networks. Network structures by chemical bonding are formed through cross-linking methods during polymerization reactions and cross-linking by chemical reaction after linear polymer chains are synthesized.

GEL FORMING SUBSTANCES

Polymers Are Used To Give The Structural Network, Which Is Essential For The Preparation Of Gels.

Gel Forming Polymers Are Classified As Follows:

Natural Polymer

A. Proteins :- 1. Gelatin
2. Collagen

B. Polysaccharides :- 1. Alginic Acid 2. Agar 3. Tragacanth 4. Sodium Or Potassium Carrageenan 5. Pectin 6. Gellum Gum 7. Xanthin 8. Cassia Tora 9. Guar Gum

Semi-synthetic Polymers

A. Cellulose Derivatives:- 1. Hydroxyethyl Cellulose 2. Methylcellulose 3. Hydroxypropyl Methy Cellulose 4. Hydroxypropyl Cellulose 5. Carboxymethyl Cellulose. Synthetic Polymers:A. Carbomer I. Carbopol -941 Ii. Carbopol -940 Iii. Carbopol -934 B. Poloxamer C. Polyvinyl Alcohol D. Polyacrylamide
E. Polyethylene And Its Co-polymers
B. Inorganic Substances A. Bentonite B. Aluminum Hydroxide C. Surfactants A. Brij-96 B. Cetostearyl Alcohol.

Advantages of face gel:

- Face gels help with skin hydration.
- They are easily absorbed into the skin.
- Unlike cream-based or oil-based cream, they do not leave any greasy or oily residue.

Face gel provide a soothing and calming effect on the skin due to the presence of skin-condition.

MATERIAL AND METHOD

❖ COLLECTION OF PLANT MATERIALS:

For the preparation of polyherbal face gel various plant materials were collected viz., Aleo vera ,

Azadirachat indica, Marigold were collected from botanical garden of B. pharmacy college Rampura, kakanpur

- **Aleo Vera**

Biological name: Aloe barbadensis miller

Biological source: Dried juice collected by incision from the bases of the leaves of various species of Aloe.

Family : Asphodelaceae (Liliaceae)

Chemical constituents: • Aloinoside A

• Aloinoside B
• Capaloresinotannol with p-coumaric acid
Use: Using aloe vera on the face can help moisturize skin. Reduce under eye bags.

• Azadirachta indica

Biological name : Azadirachta indica
Family : Meliaceae
Chemical constituents:
• Leaf : Quercetin, Nimbin
• Flower : Nimbosterol
• Bark : Nimbin
• Seeds : Azadirachtin, Azadiradione nimbin
Use: Reducing fine lines, treats acne, fight signs of ageing, moisturises skin.

- **Marigolds**

Biological name: Tagetes
Chemical constituents: • Lutein
• Zeaxanthin
• Quercetagetin
Family: Asteraceae
Use: It is used revitalized dull and sagging skin .It also soothes dry, sensitive and damaged skin. It reduces acne, rashes, pimples and blemished.

EXTRACTION Of AZADIRACHTA

Preparation of Azadirachta Indica extract:

• The extract was prepared by maceration proess.
• The leaves were rinsed with water, sundried to remove the moisture and powdered using a blender.
• Azadirachta indica leaf powder was air tight container for further studies.
• 25gm of the powder in add ethanol.
• A mixture store in 3day.

• The extract was filtered out by using simple cotton cloth and funnel three times
• Obtained extract collected in conical flask.

EXTRACTION Of MARIGOLD

Preparation of marigold extract:

• The extract was prepare by maceration process.
• The petals were rinsed with distilled water remove the dust.
• Marigold petals put into the blender and blend.
• Take a clean sterilized glass jar.
• Put the crushed marigold into the jar.
• Also add 40gm propylene glycol.
• Add 35gm ethanol then mix well.
• A mixture seal the jar tight and store at room temper rature.
• The extract was filtered out by using simple cotton cloth and funnel three times.
• Obtained extract collected in conical flask.

FORMULATION

• Gelatin dissolved in aloe vera in 1-hour preparation of gel divided in two phase.
• Gel divided in to two phase frist phase is a sodium benzoate, acacia, glycerine and HPMC on water bath and second phase are azadirachita indica extract and marigold extract are added n neutralizer gelatine gel base.
• They are slowly mix a second to frist phase continuous stirring.
• Last are added in tartaric acid.
• Final formulation was prepared and evaluated and then filled in the transperant plastic container.

Composition of formulation

INGREDIENT	F1	F2	F3	F4
Aleovera	15ml	15ml	15ml	15ml
Gelatine	1.0gm	1.3gm	0.7gm	0.5gm
Glycerine	0.5ml	0.5ml	0.5ml	0.5ml
Sodium benzoate	0.3gm	0.3gm	0.3gm	0.3gm
Tartarice acide	0.2gm	0.2gm	0.2gm	0.2gm
Acaia	0.7gm	0.5gm	1gm	0.5gm
Hpmc	0.8gm	0.2gm	0.3gm	0.5gm
Neem	2ml	2ml	2ml	2ml
Marigold	5ml	5ml	5ml	5ml

EVALUATION TEST

Colour: The colour of the face gel was checked visually.

Odour: The formulation was evaluated for its odour by smelling it.

pH: 1% solution of our sample was measured by using a digital pH meter at constant temperature.

Consistency: It was tested manually.

Spreadability: Two slider are taken and herbal sample was placed on one slide. Other slide was placed on the first slide.100g of weight was kept on the slider so that it spreads as a thin layer.

Weight was been eliminated much hight than the prisons. Next weight of 20g was kept on the upper slide. It was performed for 3 time and average was calculated.

Formula: $S=M3\times L$

Where,

S- Spreadability

M- Weight tied to the upper slide 20g; Length of the glass (6.5 cm);Time in sec.

Viscosity: Brookfiled viscometer was used to measure the viscosity of our sample. Viscosity of sample and water taken in poise.

Washability: Formulation when applied on the skin can be easily removed by washing with water were tested manually.

CONCLUSION

• In the current study herbal face gel was formulated, evaluated for various parameters

• The prepared poly-herbal formulation nourish, moisturize, protect the skin against premature aging, acne, and pimples.

• All the ingredients used in this poly herbal face gel our natural ingredients. So, the chances for its side effects are less.F4 is more effective than F1,F2 and F3.We can use this herbal face gel getting best result for skin. The effort are on to reformulate the gel form in odour to achieve better spreadibility and smoothing action.

REFERENCES

1. Sawarkar H. A., Khadabadi S. S., " Development and biological evaluation of herbal anti acne – gel", International journal of pharma tech research , 2010, pg: 2028 - 2031.
2. Yadav N., Singh A., Chatterjee A., et al, " Evaluation of efficacy and safety of perfact face gel and perfact face tablets in management of acne", Clinical & Experimental Dermatology Research, 2011, pg: 1- 7.
3. Pounikar Y., Jain P., Khurana N., " Formulation and characterization of aloe vera cosmetic herbal hydrogel", International journal of pharmacy and pharmaceutical science , 2012, pg: 84- 86.
4. V.k chandegara and A.k varshney "Aleo vera L. processing and product"Int.J.Med.Arom. Plants,2013,Vol.3,No.4,Pg :.492-506.
5. Hemendrasinh J Rathod and Dhruti P Mehta "A review on Pharmaceutical Gel" International Journal of Pharmaceutical Science,2015, Vol.1.pg :33-47.
6. Subhash Chandra, Neha Sodiyal, Shivanand Patil "A Review on Pharmaceutical Gel" International Journal of Pharmaceutical Science, 2015,Vol.1,pg :33-47.
7. Jamadar J. M., Shaikh R. H., " Preparation and evaluation of herbal gel formulation" Journal of pharmaceutical research & education , 2017, pg: 201 -224.
8. Sara Nurmala,Moerfiah,Restu T. Purnama "Anti-inflammatory Activity of the Gel Containing a Combination of Neem Leaf Extract and Shallot Extract."Phaemacology and Clinical Pharmacy Research,2020,Vol.5,pg :45-48
9. Rajeshree Y.Saoji;Dr.Amar Zalte and Dr.Vishal Golechha"Formulation of Marigold face-wash and its efficacy comparison with

Coconut and Basil Oil"ISOR Journal Of Pharmacy,2021,Vol.11,Pg:21-24.

10. Vibhavri M Chatur "Formulation and Physical Characterization of herbal face gel toner, 2021, pg :138-145.
11. Ghodke s. k., Bagwan L. R., et al "Research of formulation and evaluation of anti – acne gel", International journal of creative research thoughts, 2021, pg: 649 – 665.
12. Mate A., Ade .p, et al, " Formulation and evaluation of polyherbal gel for the management of acne", International journal of current research and review, 2021, pg: 117 – 122.
13. Ms.Shreya B.Pathare and Ms.Ambika Nagrabhadiya "Review on Formulation and Evalution of Polyherbal Anti-Acne Face Wash "International Journal of Pharmaceutical Research and Application.2022, Vol.7, pg:640-645.
14. Tegeli V. S., Shete P. S., et al, " Formulation and evaluation of anti – acne gel cleanser using bael leaves extract", Research of topical and cosmetic sciences, 2022, pg: 62- 66.
15. Gourob Dixi, Ganesh Misa,Vijay Gulkari and Kanchan Upadhye "International,Journal of Pharmaceutical Science and Research, 2023, Vol.4, pg:1186-1191.
16. Vats A and Sharma P. "Formulation and evaluation of topical Anti-acne formulation of coriander extract". International Journal of the pharmaceutical sciences Review and Research.2012:16(12) – 97- 103.
17. Vallisuta O, Nukoolkarn V, Mitrevej A, Sarisuta N,Pimporn L, Phrutivorapongkul P, Sinchaipanid N (2014).In vitro studies on cytoxicity, and elastase and tyrosinase inhibitory activity of marigold flower extract. Experimental and Theraputical Medicine, 7, 246-250.

HOW TO CITE: Ritesh Gadekar, Rohit Damodar, Ritesh Huse, Samid Abrar Ahemad Khan, Rohan Susgohar, Dr. R. H. Kale, Arif Shekh*, Formulation Of Herbal Gel and Evaluation Parameter, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 6, 1023-1031. https://doi.org/10.5281/zenodo.15603319