



REVIEW ON FORMULATION OF VIT. C, E, AND ALOEVERA HERBAL FACE GEL

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ABSTRACT:

The demand for herbal formulations is rising on the global market. To prevent negative effects, face washes made with herbal ingredients are preferable to those made with synthetic ones. The creation and assessment of a face gel containing three extracts of vitamin C, vitamin E, and aloe vera are the focus of the current study. The plant is said to have strong antibacterial, antioxidant, antiseptic, and anti-inflammatory properties in the literature. The most frequent problem is acne. The oil glands are the primary culprits. Acne is more common on the face and neck. The aforementioned characteristics of plants are essential for maintaining smooth and appealing skin. Gel is defined as a solid or semi-solid mixture of two or more components. Turmeric is derived from the rhizome, while aloe vera extract is made from the leaves of the plant. Aloe vera, or aloe Barbendies miller, belongs to the Liliaceae family and contains vitamins, enzymes, minerals, sugar, and emollients. Purgative and antibacterial qualities. from *Longa curcuma*. Known as natural cosmetics, herbal cosmetics with in this preparation of various constituent usage, such as rose water, tomato extract, aloe vera extract, and vitamin E tablets. That the key role is played by the ingredients.

Promoting personal hygiene is the main goal behind the development of the herbal gel. It may be just as significant for skin

KEYWORD: Rose water, aloe vera, vitamins C and E, face gel, acne, cleaning agent, and antimicrobial agent

INTRODUCTIO ^[1,2,3]

One of the most common cosmetic issues that women worry about is facial skin aging. Social interactions and self-esteem can be severely impacted by the numerous visible symptoms, which include sagging, wrinkles, uneven skin tone, and dull, dry skin. While extrinsic and internal factors contribute to skin aging, photoaging is a significant cumulative factor. Many techniques are available now that can address the underlying causes of cellular and molecular damage as well as enhance the state of aging skin. To make this gel, ingredients include rose water, glycerine, aloe vera extract, and vitamins C and E. The recurring medical condition Skin illnesses can occur in many different ways. Numerous conditions, including cancer, trauma, and bacterial infections, can cause skin diseases in a large number of people. There are numerous ways for skin damage at any age. Plantbased natural medicines are affordable, less likely to cause negative effects, and widely accepted. Aloe vera works better to treat pigmentation, wrinkles, and stretchmarks. Aloe vera also aids in wound healing and blood circulation improvement. Aloe vera is also a fantastic agent for mending wounds

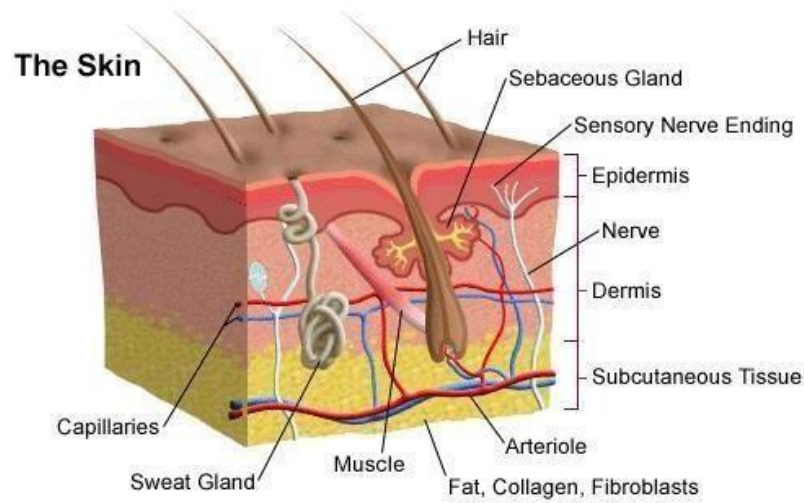


Fig.1. Anatomy of skin

Fact about the skin

The largest organ in the body is the skin. It completely envelops the body. It acts as a barrier against damage, infection, heat, and light. Also, the skin:

- Controls the body's temperature □ Holds onto fat and water.
- Is an organ of senses
- Stops water loss
- Prevents microorganisms from entering
- Serves as a partition between the living thing and its surroundings. □ Assumes solar radiation as a means of producing vitamin D.

Everywhere on your body, your skin changes in thickness, color, and texture. For instance, there are more hair follicles on your head than anywhere else. However, your feet's soles are devoid of any. Furthermore, compared to other parts of your body, the skin on the palms of your hands and the soles of your feet are somewhat thicker.

➤ There are three layers to the skin. Every layer has a certain purpose.

- Epidermis
- Dermis
- The layer of subcutaneous fat (hypodermis)

Epidermis	<p>The epidermis is the thin outer layer of the skin. It consists of 3 types of cells:</p> <ul style="list-style-type: none"> • Squamous cells. The outermost layer is continuously shed is called the stratum corneum. • Basal cells. Basal cells are found just under the squamous cells, at the base of the epidermis. • Melanocytes. Melanocytes are also found at the base of the epidermis and make melanin. This gives the skin its color.
Dermis	<p>The dermis is the middle layer of the skin. The dermis contains the following:</p> <ul style="list-style-type: none"> • Blood vessels • Lymph vessels • Hair follicles • Sweat glands • Collagen bundles • Fibroblasts • Nerves • Sebaceous glands <p>The dermis is held together by a protein called collagen. This layer gives skin flexibility and strength. The dermis also contains pain and touch receptors.</p>
Subcutaneous fat layer	<p>The subcutaneous fat layer is the deepest layer of skin. It consists of a network of collagen and fat cells. It helps conserve the body's heat and protects the body from injury by acting as a shock absorber</p>

GEL^[45]

Gels are described as semirigid systems in which a three-dimensional network of interlacing particles or solvated macromolecules of the dispersed phase restricts the mobility of the dispersing medium. The term "gel" comes from the word "gelatin," while the words "gel" and "jelly" have Latin roots that refer to "frost" (gelu) and "freeze" (gel are). This source illustrates the fundamental concept of a liquid setting to a solid-like substance that is elastic and retains some liquid properties but does not flow. The classification of semisolid substances using the term "gel" began in the late 1800s when scientists tried to group them based more on their phenomenological traits than their chemical makeup. ... The analytical techniques required to ascertain chemical structures were not available at the time. First off According to the USP, gels, also referred to as jellies, are semisolid systems that comprise either big organic molecules interpenetrated by a liquid or suspensions made up of minute inorganic particles. Gels that have a network of tiny, distinct particles inside their mass are categorized as two-phase systems. When a two-phase system has a dispersed phase with relatively large particle sizes, the gel mass is referred to as a magma. Organic macromolecules are evenly distributed throughout a liquid to generate single-phase gels; this ensures that there are no visible borders between the liquid and the distributed macromolecules. The most prevalent solutions used in medicinal applications are water and hydroalcoholic ones. Reversibility between the gel state and sol the fluid phase containing the dissolved or dispersed macromolecule is a common feature of polymer gels. On the other hand, because some polymer gels' chains are covalently connected, their production cannot be reversed. Multiple inorganic colloidal clays combine to generate the three-dimensional networks found in two-phase gels and jellies. These inorganic gels can be reversed in their production.

Properties of Gel

1. Ideally, the gelling agent must be inert, safe and cannot react with other formulation constituents.
2. The gelling agent should produce a sensible solid-like nature at the time of storage which is easily broken when exposed to shear forces produced by squeezing the tube, trembling the bottle or at the time of topical application.
3. It should have suitable anti-microbial agent.
4. The topical gel must not be sticky

5. The ophthalmic gel must be sterile.
6. The apparent viscosity or gel strength increases with an increase in the effective crosslink density of the gel. However, a rise in temperature may increase or decrease the apparent viscosity, depending on the molecular interactions between the polymer and solvent.
7. They exhibit the mechanical characteristics of the solid state.
8. Each component is continuous throughout the system.
9. There is high degree of attraction amongst the dispersed phase and water medium so the gels remain equally uniform upon standing and doesn't freely settle.

PHARMACOLOGICAL PROPERTY OF GEL ^[4,5,6,7,8]

Tannic acid and one kind of polysaccharide may be the components that work best for wound healing. The process of mending a wound is how damaged tissues found in humans. 6-phosphate mannose discovered in *A. vera*'s mucilaginous gel is thought to be the component that actively promotes wound healing. Aloe vera Collagen thickness was used to evaluate wound healing, as well as the fibroblast count. The quantity of The full-thickness defect's fibroblasts were treated with Aloe vera oil treated with ozonation was greater than Just aloe vera oil and ointment containing gentamicin. Reactive oxygen species are increased by ozonated ointment. (ROS) functioning as a secondary agent at the wound site Signal for nonlymphoid and diverse immunocytes cells that participate in the process of wound healing and play a crucial part in organizing the hiring process. aloe Vera's woundhealing and ulcer-prevention properties help speed up the healing of cutaneous injuries (such as burns, frostbite, and skin infections), diabetic ulcers, surgical wounds, inflammation, and herpes pressure sores, persistent wounds, and foot ulcers) has been documented..

OBJECTIVES ^[47]

1. Objective of vitamin C

Vitamin C is a dermatologist-favorite and scientifically supported component that may help prevent sun damage, delay the onset of early aging of the skin, and improve the look of wrinkles, dark spots, and acne.

2. Objectives of vitamin E

As a moisturizer, vitamin E oil helps to lessen and avoid dry skin. The anti-inflammatory qualities of vitamin E oil calm inflamed skin and lessen its flakiness. This oil is frequently used to treat skin diseases like eczema and psoriasis.

3. Objectives of Aloe vera

Aloe Vera gel is anti-inflammatory and has cooling qualities. As a result, it is one of the most organic treatments for burned or sunburned skin. Applying this gel promotes moisture retention and helps the skin form a protective barrier. Antioxidants are abundant in it.

DRUG AND EXCIPIENT

Tomato (Vitamin C) ^[9,10,11,12]

Family: Solanaceae

Class: Magnoliopsida

Kingdom: Plantae

Genus: Tomato

Species: *S.lycopersicum* Common Name: Tomato

Habitat: The plant requires relatively warm weather and much sunlight; it is grown chiefly in cooler climates.

Locality: The species originated in Western South America, Mexico, and central America.

Constituents: It is important source of vitamin c, potassium, Folic acid, and carotenoids such as lycopene.



Fig.2. tomato (vitamin C)

MEDICINAL USES:

- Protects the heart. Rich in antioxidants, tomatoes help to maintain healthy blood vessels.
- Regulates blood pressure.
- Healthy skin.
- Prevents eye problems.
- Anti-inflammatory action.
- Bone Health.
- Helps prevent some types of cancer.

VITAMIN E [13,14,15,16,17]

Four tocopherols and four tocotrienols are among the eight fat-soluble compounds that make up vitamin E. Neural impairments can result from a vitamin E shortage, which is uncommon and typically caused by an underlying issue with fat digestion in the diet rather than by a low-vitamin E diet. Antioxidant vitamin E that is fat soluble may shield cell membranes from reactive oxygen species. International government agencies advise adults to take between 3 and 15 mg daily. Based on a global assessment of over 100 studies, the median daily food intake of alpha-tocopherol as of 2016 was 6.2 mg, which is below recommended levels. Though there is no scientific proof, vitamin E is used in cosmetics and wound care products.

Function

As a vitamin, vitamin E may have a number of purposes. Numerous biological roles have been proposed, one of which is that of a fat-soluble antioxidant. In this capacity, vitamin E scavenges radicals by giving free radicals an atom of hydrogen (H). Tocopherols' O-H bond is approximately 10% weaker than that of the majority of other phenols, with 323 kJ/mol. Because of this weak link, the vitamin can reduce the harmful effects of the peroxy radical and other free radicals by giving them a hydrogen atom. By means of a redox reaction with a hydrogen donor, like vitamin C, the resulting tocopheryl radical is regenerated back into tocopherol.



Fig.3. vitamin E

Source

Alpha-tocopherol consumption is below recommended levels globally, according to a synthesis of over 100 research, with a median daily dietary intake of 6.2 mg. Although alpha-tocopherol (α -tocopherol) is the most physiologically active form of vitamin E, gamma-tocopherol (γ -tocopherol) is the form most frequently found in the food of North Americans. One source of tocotrienols is palm oil.

A database on food composition is kept up to date by Agricultural Research Services of the U.S. Department of Agriculture (USDA). September 2015's Release 28 was the most recent significant update. Certain ready-to-eat cereals, baby formulae, liquid nutrition products, and other foods are fortified with alpha-tocopherol in addition to the naturally occurring sources listed in the table.

Medicinal uses:

Vitamin E is a fat-soluble vitamin that acts as an antioxidant. It helping protect cells from damage throughout your body. It's found in our sebum (skin oil), which creates a natural barrier to keep moisture in your skin.

- Moisturizing skin.
- Wound healing.
- Skin cancer prevention.
- Reducing skin itching.
- Eczema.
- Psoriasis.
- Preventing or minimizing the appearance of scars.
- Preventing or treating fine lines and wrinkles.

Chemistry of vitamin E

The term "tocopherol" does not mean "vitamin E." Rather, it refers to the methyl-substituted derivatives of tocol. Two homologous series make up natural tocopherols: tocotrienols with an unsaturated side chain and tocopherols with a saturated side chain. The fundamental chemical structure of tocopherols and tocotrienols is identical and is defined by a lengthy isoprenoid side chain that is joined to a 6-chromanol ring at position 2.

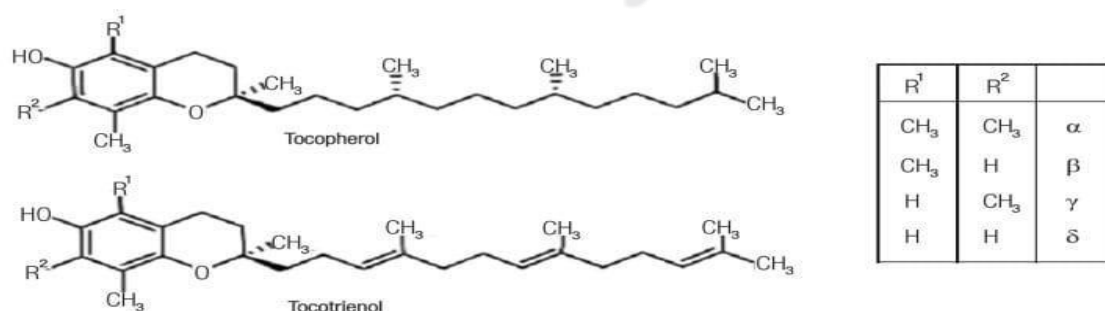


Fig.4 chemistry of vitamin E

Tocotrienols are not the same as tocopherols since they have a farnesyl side chain instead of a saturated isoprenoid C16 side chain. While manufactured tocopherol, known as all-rac-alpha-tocopherol, comprises eight distinct stereoisomers, natural tocopherols are

found in the RRR-configuration. Tocotrienols only have the chiral stereocenter at C-2, and the 2R,3'E,7'E configuration is the only one found in naturally occurring tocotrienols. In a process known as chiral recognition, the body's extremely stereoselective receptors and enzymes only engage with one of a chiral molecule's enantiomers. Because of this, the body responds to only one enantiomer in the intended way, with the other enantiomers perhaps having no impact at all or a negative one. Within the human body, the isoforms of vitamin E are not interchangeable.

ALOE VERA [18,19,20] Scientific name: Aloe Vera.

Order: Asparagales.

Family: Asphodelaceae Subfamily: Asphodeloideae.

Kingdom: Plantae.

Family: Asphodelaceae.

Botanical name: Aloe barbadensis miller .



Fig.5 Aloe vera

Uses: Benefits of aloe vera for the face include [21,22]

1. Its anti-inflammatory properties aid in the reduction of pain, swelling, and soreness in wounds and injuries while also encouraging the production and release of collagen.
2. It has the potential to expedite the healing process of Trusted Source wounds and minimize scarring. It expedites the first- and second-degree process.
3. Its antioxidant properties can help heal UV damage and slow down the aging process of the skin. It protects the skin from the damaging effects of radiation treatment.
4. Its 98 percent water content hydrates, calms, and moisturizes the skin. Instead of making the skin rigid and leathery, it leaves the skin more supple and flexible. Cooling the area helps with sunburns and rashes.
5. Aloe vera is regarded as a laxative in nature.
6. Aloe vera to maintain moisturized and clear skin
7. Patients with diabetes may experience low blood sugar after using aloe vera juice.

Chemical composition of aloe vera [23]

Vitamins, enzymes, minerals, carbohydrates, lignin, saponins, salicylic acids, and amino acids are among the 75 potentially active ingredients found in aloe vera

Vitamins: It contains antioxidant vitamins A (beta-carotene), C, and E. Vitamin B12, folic acid and choline are also present .

The aloe vera leaf is mostly made up of three layers. The thick outer layer, known as the rind, is made up of 15-20 cells that produce proteins and carbohydrates. There are vascular bundles inside the rind, including Phloem and Xylem.

Properties of aloe vera [24,25,26,27]

1. Antibacterial properties
Aloe vera inhibits the growth of some microorganisms like *Str. pyogenes*, *Shigella flexneri*, *Klebsiella sp.*, especially against Gram-positive bacteria causing food poisoning or diseases in humans and animals.
2. anti-oxidant / Antiseptic effect

Aloe vera possesses enormous antioxidant effect. Glutathione peroxidase activity, superoxide dismutase enzymes and a phenolic antioxidant were found to be present in Aloe Vera gel, which may be responsible for these anti-oxidant effects

3. Aloe vera contains 6 antiseptic agents:

Lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. They all have inhibitory action on fungi, bacteria and viruses.

4. Anti - inflammatory action.

Inflammation is an innate response of the body against an injury, characterized by swelling, pain, redness and heat, resulting in delay in the healing process.

Medicinal uses [28,29,30,31]

The properties of aloe vera include stomachic, emmenagogue, aperient, carminative, deobstruent, depurative, and diuretic effects. Juice is used to treat hepatopathy, burns, dyspepsia, amenorrhea, colic, and hyperadenosis. abdominal tumors, sciatica, lumbago, dropsy carbuncles, splenopathy, constipation, span menorrhoea, and flatulence. The plant's juice, called elio, is used as a purgative, anthelmintic, and emmenagogue for treating pediatric helminthiasis. It has been discovered that many glycoproteins found in aloe vera gel have anti-tumor and anti-ulcer properties as well as promote the growth of normal human skin cells.

Gel helps with pressure ulcers and ulcerative colitis, respectively.

Laxative effect [32,33,34,35]

The powerful laxative anthraquinones found in latex stimulate mucus secretion, raise intestinal water content, and promote intestinal peristalsis. The 1, 8-dihydroxyanthracene glycosides, aloin A and B (formerly known as barbaloin), are principally responsible for the aloe. Following oral administration, intestinal bacteria hydrolyze aloin A and B, which are not absorbed in the upper intestine, in the colon. This results in the reduction of the aloin A and B to active metabolites, the primary one being aloemodin-9-anthrone, which, like senna, stimulates and irritates the gastrointestinal tract. Laxative qualities are a well-known feature of aloe latex. Aloe rarely has a laxative effect until six hours after oral ingestion, and perhaps not until twenty-four or more hours later.

ROSE WATER [38]

It is a popular product made by *R. damascena* that has between 10 and 50 percent rose oil. Rose water is most frequently used in religious rituals. It is utilized in mosques to soothe and relax people, particularly during mourning rituals. Kashan is the place where the best rose water is made. Every year, the Kaaba (God House) is cleaned using the special rose water from Kashan. Rose water holds significant significance in the food business, as several specialty meals are made with this commodity.



Fig.6 rose water

Benefits of Rose water:

- It balances the natural oils in your skin: Rose water is well renowned for its capacity to balance and clarify the natural oils in your skin, giving it a refreshed, revitalized look.
- It may lessen the appearance of Rose water is a great method to relax and revitalize your skin if you have redness on your skin. It may also actually lessen the appearance of redness and any associated discomfort. of transient
- It naturally hydrates: Rose water is a natural hydrator, which is important for youthful, radiant skin. It restores hydration and offers you a quick boost.
- Its antioxidant qualities protect and nourish skin: Rose water is rich in antioxidants, which provide your skin the nourishment it needs and has been used for many uses for over a century!
- It can aid in the prevention of wrinkles and fine lines.
- It can assist to unclog pores and produce a smoother appearance: Rose water can help to decongest your pores and reveal a brighter, more youthful face when they become clogged with daily pollutants.
- It lessens the appearance of large pores: Rose water has the ability to lessen the cleaning, clarifying, and balancing effects of pores. presentation
- It can temporarily tighten skin: Rose water's toning qualities will briefly tighten the appearance of your skin, giving you a firm, plump appearance. silky as possible.
- It aids in purifying and primes skin for success: Rose water has the power to purify and prime skin for success. It is a great complement to any natural skin care program because it both cleanses and moisturizes the skin.

Chemical composition [39,40,41,42,43]

glycosides, flavonoids, and anthocyanins. This plant contains carboxylic acid, myrcene, vitamin c . kaempferol and quarcetin Flowers also contain a bitter principle, tanning matter, fatty oil and organic acids. Loghmani-Khouzani et al (2007) found more than 95 macro- and micro-components in the essential oil of R. damascena from the Kashan regions of. Among them, eighteen compounds represented more than 95% of the total oil. The identified compounds were: B-citronellol (14.5-47.5%), nonadecane (10.5-40.5%), geraniol (5.5-18%), and nerol and kaempferol were the major components of the oil. Analyses of rose absolute showed that phenyl ethylalcohol (78.38%), citrenellol (9.91%), nonadecane (4.35%) and geraniol (3.71%) ethanol (0.00-13.43%), and heneicosane were the major compounds . In another study, the composition of rose was phenyl ethylalcohol (72.7373.80%), citrenellol (10.62-11.26%), nerol (2.42-2.47%) and geranial (5.58-5.65%) (36). Hydrosol was also found to contain four constituents; geraniol was the major compound (30.74%) followed by citrenellol (29.44%), phenyl ethylalcohol (23.74%), and nerol (16.12%)

FORMALDEHYDE [44,45]

Formaldehyde is an organic chemical that occurs naturally and has the formula CH₂O with the structure H-CHO. Since the pure component is a colorless, smelly gas that spontaneously polymerises into paraformaldehyde (see section Forms below), it is kept in storage as formalin, an aqueous solution that is also used to keep animal specimens. It is one of the simplest carbohydrates and the simplest aldehyde (R-CHO). This substance's common name derives from its resemblance to and connection to formic acid.

An essential building block for a wide range of other substances and chemical combinations is formaldehyde. Formaldehyde output was projected to be 12 million tons annually worldwide in 2006. It is mostly employed in the manufacturing of industrial resins, such as those used in coatings and particle board.

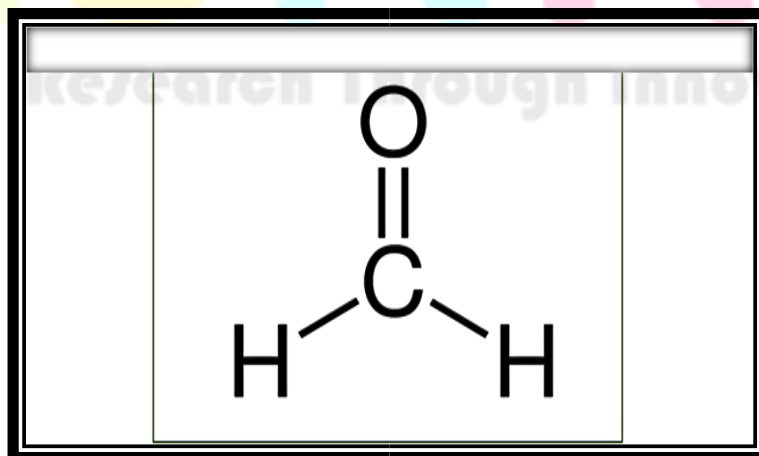


Fig.7 formaldehyde

Medicinal Uses;

- Formaldehyde is utilized in the production of automobiles, explosives, plastic, resins, chemicals, and other synthetic materials.
- Sanitary items such as tissues, paper towels, and napkins also contain it.
- In industry, formalin is employed as a disinfectant.

EVALUATION PARAMETER ^[45,46]

1. PH measurement : ○ PH measurement of the gel was carried out using a digital pH meter by dipping the glass electrode completely into the gel system to cover the electrode. The measurement was carried out in triplicate and the average of the three readings was recorded
2. Appearance and Homogeneity : ○ Physical appearance and homogeneity of the prepared gels were evaluated by visual perception.
3. Viscosity : ○ Viscosity of gel was determined using Brookfield viscometer (S-62, model LVDV-E) at 25 °C with a spindle speed of the viscometer rotated at 12 rpm
4. Spreadability: ○ Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 7.5 cm along the slides. Hundred g weight of gel was placed on the upper slides so that the gel between the two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of gel adhering to the slides was scrapped off. The two slides in position were fixed to a stand without slightest disturbance and in such a way that only upper slides to slip off freely by the force of weight tied on it. A 20 g weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 7.5 cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated for three times and the mean time was taken for calculation.

Spreadability was calculated by using the following formula: $S = m \times l/t$

where, S= spreadability, m-weight tied to upper slides (20 g), l- length of the glass slide (7.5 cm), t- time taken in sec.

5. **Skin Irritation Test :** ○ During the past years, numerous test approaches for skin irritation testing have been developed including the conventional in vivo animal test (Draize rabbit test) and in vitro test methods. For a long time, the Draize rabbit skin irritation test has been a gold standard test since it was developed in 1944. But it was later proved that animal studies are highly variable, of limited reliability, and generally poor predictors of human skin reactions. Fortunately, several alternative in vitro testing methods are available to replace of animal-based skin irritation tests. Furthermore, all of these accepted methods are validated by ECVAM and based on the reconstructed human epidermis (RHE) technology which has already been accepted by many agencies.

CONCLUSION :

Face gel is a natural treatment that works well for dark spots. It is a natural substance that has been derived from herbs. This product offers a lot of advantages. The best indicator of a healthy physique is having healthy-looking skin. Taking good care of your skin is essential to your daily lifestyle. Therefore, choose the best gel for your face and wash it twice a day.

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