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PREPARATION OF ALOE VERA COSMETIC HERBAL HYDROGEL

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ABSTRACT

The aloe vera cosmetic herbal hydrogel have been formulated using inner part of aloe vera leaf, acacia, hydroxy propyl methyl cellulose (HPMC), carbopol 934, glycerine, tartaric acid, potassium sorbate and sodium benzoate. Aloe vera gel was prepared by heating at low temperature and the hydrogel was prepared by simple dissolving method of other ingredients in a specific manner. The formulation was evaluated. The present study showed smooth and effective formulation. Therefore, on the basis of evaluation of AVG, it can be used for cosmetic purpose as herbal preparation.

INTRODUCTION

Aloe vera (AV) is a perennial, drought-resisting, succulent plant belonging to the Liliaceae family and historically, has been used for a variety of medicinal purposes [1,2]. The leaves which are lance-shaped with sharp points contain an essentially clear viscous gel known as *aloe vera* gel (AVG)[3]. The *Aloe vera* exudate is a transparent, slippery mucilage or gel produced by the thin-walled tubular cells in the inner central zone (parenchyma) of the leaf. The raw "gel" resembles color-less gelatin with hair-like connective matrices and is also sometimes called "juice."[4,5,6]. It bears bright yellow and orange flowers, which are arranged in auxiliary spike [7,8]. It bears thick fleshy leaves in rosette, which gives it a distinct appearance. The leaves are green to grey-green, with some varieties showing white flecks on the upper and lower stem surfaces [9]. The margin of the leaf is serrated and has small white teeth [10]. Its bitterness is due to the presence of aloin, aloe-emodin and related compounds [11,7]. It has been observed in clinical evaluations that the pharmacological active ingredients are concentrated in both the gel and rind of the AV leaves. These active ingredients have been shown to have analgesic and anti-inflammatory effects [1]. This is considered as an important medicinal plant. It has larger demands and is traded in medicinal drug markets of the world for flavouring liquid and a source of ‘aloin’ (4.5 to 25 per cent) [12]. The plant is also used in the treatment of healing properties, effects on skin exposure to UV and gamma radiation, anti-aging effect, antiseptic, enhance immune system, hypoglycemic, cytotoxic, antiulcer and antidiabetic effects, antibacterial effect, antioxidant, cardiovascular effect [4,5,13,14]. Furthermore traditional uses, physicians use AV-based creams to heal serious thermal injuries, such as burns and frostbite. Dermatologist’s preferred AV products for the treatment of clear acne, and optometrists find the products helpful in soothing eye inflammations. Also, dentists employ AVG to reduce swelling and inflammation of the gums. Professional sports trainers also use aloe vera to treat their athlete’s muscle aches and sprains, skin abrasions, and blisters. Therefore, due to its beneficial effect of aloe vera, cosmetics companies incorporate it into, cosmetic and skin care products. It is also for the marketing appeal the words “made with aloe” attract the consumer. Moreover, drinking aloe vera with honey is said to have the therapeutic effects on arthritis, ulcers, diabetes, and other health conditions [15,16] Therefore, the present study was conducted to formulate a suitable AV cosmetic herbal hydrogel formulation using gelling agents like acacia, hydroxy propyl methyl cellulose (HPMC), carbopol 934. The prepared gel was evaluated for percentage moisture content, transparency, smoothness, weight on drying, viscosity and pH.

MATERIAL AND METHOD

AV Plants were collected from the local area of Sahauran, Kharar, Mohali, Punajb, India (March 2015) and authenticated from Pharmacognosy Unit of University School of Pharmaceutical Sciences, by Dr. Shoaib Ahmad, Rayat and Bahra University, Mohali, Punjab, India.

Chemicals and all other ingredients

Acacia, HPMC, Carbopol 934, Glycerine, Albumin, Ascorbic acid, Potassium Sorbate, Sodium Benzoate, etc were purchased from CDH and Himedia Pvt. Ltd., India. All other chemicals used in present study were of analytical grade.

METHODS

Separation of *Aloe vera* gel from Aloe Vera Plant

The inner mucilaginous parenchymatous tissues of leaves of *aloe vera* plants were separated out with the help of sterile knife. This mucilaginous, viscous parenchymatous tissue was homogenized in a blender at maximum 30 rpm. This homogenized mass was separated by G3 sintered glass filter with the help of vacuum.

Preparation of *Aloe vera* herbal gel

An AVG is converted into liquid form by heating at a low temperature for two hours. It is necessary that it should be heated at a low temperature in order to retain thermo sensitive ingredients present in it. Tartaric acid is added to the AV concentrate to adjust the pH within the range from 5.5 to 6.0. In separate container, the hydrogel forming polymers were dissolved in small amount of double distilled water in various proportions as shown in Table no.1, and then remaining ingredients i.e. glycerin, potassium sorbate and sodium benzoate were added. Now, AV liquid extract was added to it and make up the volume up to 100 ml. The pH of this gel preparation was maintained 6±0.4 and stored in a well closed container [17,18].

Evaluation of *Aloe vera* herbal gel

The aloe vera herbal gel was evaluated as follows:

Prepared AVG gel was evaluated for appearance, pH, drug content uniformity, viscosity, spreadability and permeability studies. All the gels were visually inspected for clarity, colour homogeneity, presence of particles and fibers.

Appearance

The AVG gel having Carbopol 934 and HPMC were milky white and yellowish transparent respectively. Sodium alginate and methyl cellulose gel was opaque in appearance.

Percentage Moisture Content

Percentage moisture loss from the formulation was determined by the method reported by [19]. Two gram formulation was weighed accurately and kept in a desiccators containing 50gm anhydrous calcium chloride. After three days, the formulation was weighed. The percentage moisture loss was calculated using the formula as follows:

$$\text{Percentage moisture loss} = \frac{\text{Initial weight - Final weight}}{\text{Final weight}} \times 100$$

Transparency on drying of AVG

The 5ml gel formulation taken in the 10ml (Borosil^{R}) test tube and visually checked for its transparency.

Smoothness on drying of AVG

The smoothness of the gel formulation was tested by rubbing between the fingers and observes whether the gel is smooth, clumped, homogenous or rough.

Weighing on drying of AVG

The relative density of the formulation or weight/ml of the formulation was determined by taking the weight in gm of 10ml formulation & 10ml distilled water using RD bottle.

Viscosity assessment of AVG

Viscosity is an important feature to determine the resistance of flow of gel formulation so that it can spread on the skin properly. It was determined with the help of viscometer (Brookfield) using 2 number spindles.

pH Assessment of AVG

The pH values of AVG was checked by using a pH Meter at constant temperature.

RESULT AND DISCUSSION

AV herbal gel prepared from AV leaf extract (liquid) from inner part of leaf, natural ingredients and small amount of synthetic ingredients. AV liquid extract was prepared by heating inner part of AV leaf at low temperature in order to retain thermo labile ingredients present in it. The pH of the herbal gel formulation maintained at 6 so as to make skin compliant formulation. The herbal gel formulation was prepared and composition as shown in Table 1. The formulation was evaluated for percentage moisture loss, transparency, smoothness, weight on drying, viscosity, pH moreover the evaluation results are shown in Table No. 2. Viscosity is one of the most important parameter as it reflects the semisolid nature of the formulation and spread ability upon the skin surface. Viscosity of the herbal gel

formulations determined with the help of Brookfield viscometer using spindle number 2. The value of viscosity found to be 1046 cp (centipoise), because, the higher the viscosity gives more thickness and consistency to the gel and require less concentration of the polymers to get optimum viscosity.

The formulation found to be translucent and smooth in nature which may be due to the composition of the ingredients. Weight before and after drying and density of the formulation was evaluated so as to maintain batch to batch uniformity. Percent moisture loss of the formulation was found to be 95. The pH of the formulation was adjusted 6±0.4. Next day pH was again observed which was found to be 6. The formulation contained 1% w/v preservatives i.e. potassium sorbate and sodium benzoate.

AV herbal gel can be prepared easily with higher quantity of herbal component without using toxic ingredient. It may be usable for cleaning, softening and improving texture of the skin.

Table 1: Composition of *Aloe Vera* herbal hydrogel formulation.

Aloe vera (ml)	75
Acacia (gm)	0.5
HPMC (gm)	0.5
Carbopol 934 (gm)	0.5
Glycerine (ml)	5
Albumin, Ascorbic acid, Tartaric acid (gm)	1.5
Potassium sorbate (gm)	0.5
Sodium benzoate (gm)	0.5
Double distilled water q.s. up to ml	100

Table 2: Evaluation chart of *Aloe Vera* herbal hydrogel formulation.

Rheology, Viscosity in cpu	1046
Transperancy	Translucent
Smoothness/ Roughness	Smooth
Density	10.29
% Moisture Loss Value	95
pH Value	6.0

CONCLUSION

Aloe vera topical hydrogel was formulated using polymer. The present gels showed good physico-chemical properties which were assessed in term of Transparency, smoothness, density, moisture content and pH. These results suggest the feasibility of the topical of AVG. However further preclinical evaluations is needed for pharmacological activity**.**

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