IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
July 2021 Vol.:21, Issue:4

Design, Characterisation, and Evaluation of Calamine Lotion with Containing Aloe and Vitamin E

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Suman Sahu[1*], Suman Samanta[1], Dhiraj Kumar Palui[1] Aveek Datta[1], Susovan Maity[1]

1. Department of Pharmacy, Bharat Technology, Uluberia, Howrah, West Bengal, India, 711316

Submitted: 21 June 2021
Accepted: 27 June 2021
Published: 30 July 2021

Keywords: Calamine, Aloe vera, Lotion (Herbal Formulation), *in-vitro* studies

ABSTRACT

Calamine lotion is widely used as an antiseptic and protective for its cooling and soothing effect in this study to procure calamine lotion for being natural humectants, e.g. aloe-vera gel and vitamin E. Herbal cosmetics are the preparations which are used to enhance the human appearance. The purpose of this study is to compare the semi-synthetic activity of glycerine with other humectants in terms of their emollient properties to ensure whether calamine lotion can be formulated using natural humectants or not. Calamine lotion is also a bland, antipruritic lotion that is commonly used for several dermatological conditions. Skin reactions due to this preparation are very rare. Calamine is made up of zinc oxide and ferric chloride, the exact compound that might have caused the adverse drug reaction (ADR) is not found till now.

INTRODUCTION:

The concept of beauty and cosmetics dates back to ancient mankind's civilization. Generally, herbal cosmetics are also referred to as herbal cosmetics [1,2]. Herbal cosmetics are formulated, using different cosmetic ingredients to form the base in which one or more herbal ingredients are used to cure the various type of skin ailments. The name itself suggests that herbal cosmetics are natural and free from all harmful synthetic chemicals. Instead of traditional synthetic products, different plant parts and plant extracts are used in these products, e.g. *Aloe vera* gel and vitamin E. There are a rising number of consumers concerned about ingredients such as synthetic chemicals, mineral oils who demand more natural ingredients, free from harmful chemicals and with an emphasis on the properties of botanicals [3,4].

Calamine is basic zinc carbonate coloured with ferric oxide. Calamine had mild astringent and antipruritic actions and is used as a dusting powder, cream, lotion, and ointment in a variety of skin conditions [5]. Diphenhydramine is an H1 antihistaminic that is used in allergic conditions, known to cause skin hypersensitivity. Contact dermatitis is an acute or chronic skin inflammation, which is occurring due to contact with an irritant or allergic substances [6]. Topical antibiotics and topical anaesthetics are usually implicated in contact dermatitis [7]. Contact dermatitis due to calamine lotion is not reported in the literature. There are rare reports of contact dermatitis due to diphenhydramine [8].

PLANT PROFILE:

Botanical name: *Aloe barbadensis miller*

Family: Asphodelaceae.

Common names: Aloe vera and Ghritkumari.

Cultivation: It mainly grows in the dry regions of Africa, Asia, Europe, and America. In India, it is found mainly in Rajasthan, Andhra Pradesh, Gujrat, Maharashtra, and Tamil Nadu.

Active constituents: Vitamins (vitamin A, vitamin C, vitamin E, and vitamin B12), enzymes, minerals, sugars, lignin, saponins, salicylic acids, amino acids, folic acids, and choline.

Figure No. 1: Aloe vera

MATERIALS AND METHODS:

MATERIALS:

1. Calamine:

Calamine powder is a composition of zinc oxide combined with some amounts of ferric oxide. The presence of iron (in the form of ferric oxide) in Calamine powder.

2. Aloe gel + Vit E:

I. Prepare the aloe leaves-

To use a fresh aloe leaf from a plant, first cut off one of the outer leaves from the base of the plant.

We can also use a store-bought leaf.

After washing it well, removing any dirt, and then stand it upright in a cup or bowl for 10–15 minutes. This allows the yellow-tinted resin to drain out of the leaf.

The resin contains latex, which can irritate our skin, so completing this step is important.

After the resin has drained completely, wash off any remains on the leaf and peel off the thick skin using a small knife or vegetable peeler.

II. Make the gel-

Once the leaf has been peeled, we can see the natural *Aloe vera* gel.

Using a small spoon, scoop it into your blender. We should be careful not to include any pieces of the *Aloe vera* skin.

Blend the gel until it's frothy and liquefied, which should only take a few seconds.

At this point, our gel is ready to use. However, if we plan on keeping it for more than 1 week, we should add preservatives.

3. Bentonite:

It is an absorbent swelling clay consisting mostly of montmorillonite. It usually forms from weathering of volcanic ash in seawater, which converts the volcanic glass present in the ash to clay minerals.

4. Zinc Oxide:

Zinc oxide is a *zinc* molecular entity. ChEBI. *Zinc oxide* is an inorganic compound used in several manufacturing processes. It can be found in rubbers, plastics, ceramics, glass, cement, lubricants, paints, ointments, adhesives, sealants, pigments, foods, batteries, ferrites, fire retardants, and first-aid tapes.

5. Sodium Citrate:

Sodium citrate is the sodium salt of citric acid. It is white, crystalline powder or white, granular crystals, slightly deliquescent in moist air, freely soluble in water, practically insoluble in alcohol. Like citric acid, it has a sour taste.

6. Liquid Phenol:

A colorless liquid when pure, otherwise pink or red. Combustible. Flash point 175°F. Must be heated before ignition may occur easily. Vapors are heavier than air. Corrosive to the skin but because of anaesthetic qualities will numb rather than burn. Upon contact, the skin may turn white. May be lethal by skin absorption. Do not react with water. Stable in normal transportation. Reactive with various chemicals and may be corrosive to lead, aluminium and its alloys, certain plastics, and rubber. The freezing point is about 105°F. Density 8.9 lb/gal. Used to make plastics, adhesives, and other chemicals.

7. Instruments: Beaker, test tube, weighing machine, mortar & pestle, funnel, burette, pipette, ring stand, watch glass, glass slide, pH meter, hot air oven.

METHOD:

1.PHYSICAL APPEARANCE:

I. Calamine:

Colour- Peachy pink

Odour- Characteristics

Texture- Powder

II. Aloe gel:

Colour: Light greenish

Odour: Characteristics

Texture: Viscous liquid

2. pH:

Normally pH of aloe is 4.50

3. IDENTIFICATION TESTS:

I. Identification tests for calamine:

A. To 2 ml add 2ml of periodic acid reagent, shake, centrifuge, and add 0.5 ml of the supernatant liquid to 2 ml of ammonical silver nitrate solution in a test tube; a silver mirror is produced on the walls of the tube.

B. Mix 2 ml with 50 ml of water, centrifuge and decant the supernatant liquid. Suspend the residue in 20 ml of water, add 1ml of hydrochloric acid, mix, and filter. 5 ml of the filtrate, after neutralization by dropwise addition of 2 M sodium hydroxide, gives the reactions of zinc salts.

Figure No. 2: Identification tests for calamine

II. Identification tests for aloe gel:

Borax Test: Take 10 ml of aloe solution and to it add 0.5 gm of borax and heat; a green colored fluorescence is produced indicating the presence of aloe-emodin anthranol.

Bromine Test: To 5 ml of aloe solution, add an equal volume of bromine solution; a bulky yellow precipitate is formed due to the presence of tetrabromaloin.

4. SOLUBILITY TEST:

I. Calamine: Practically insoluble in *water*; soluble with effervescence in *mineral acids*.

II. Aloe gel: *Aloe vera* is a desert plant that contains some 95% water that, without a proper water-tight container, would evaporate in a jiffy. The **gel** is where aloe vera stores its 95% water and its water-soluble nutrients (e.g. water-soluble vitamins). The **rind** is the barrier that stops the *Aloe vera* gel (water) from evaporating, so obviously, the rind is not water-soluble but lipid-based. So that's where its lipid-soluble nutrients (e.g. fat-soluble nutrients) reside.

5. FORMULATION:

Table No. 1:

INGREDIENTS	QUANTITY
Calamine powder	33.75 gm
Aloe gel + Vit E	3.75 gm
Zinc oxide	10 gm
Bentonite	10 gm
Sodium citrate	1.25 gm
Liquid phenol	1.25 gm
Glycerin	1.25 gm
Rosewater	1ml
Water	Q.S. to 250 ml

6. PROCEDURE:

I. All glassware was washed and dried.

II. Required quantity of chemicals were taken and weighed.

III. Weigh and mix the calamine, zinc oxide, and bentonite in a mortar so that the bentonite is well distributed.

IV. Dissolve sodium citrate in 700 ml rosewater, and gradually add to the mixture in the mortar so that a smooth paste is produced.

V. Add the liquefied phenol and glycerin and mix well.

VI. Add sufficient rosewater to produce the required volume.

VII. The preparation was then transferred to a light-resistant container.

VIII. Container was labeled.

Figure No. 3:

7. EVALUATION STUDY:

I. pH:

5 ± 0.01 gm of the lotion was weighted accurately in a 100 ml beaker. 45 ml of water was added and dispersed the lotion in it. The pH of the suspension was determined at 27°c using the pH meter[9-12].

II. Viscosity:

Viscosity is a measure of fluid's resistance to flow. It is to drive a spindle (which is immersed in the test fluid) through a calibrated spring. The viscous drag of the fluid against the spindle is measured by the spring deflection. Spring deflection is measured with a rotary transducer[13-17].

III. Physical Appearance:

The visual appearance of the formulation at each stability test condition was assessed by comparing the color of the lotion to the initial color and appearance of the *C. niloticus* oil lotion. Photos were taken of each formulation, placed at the same location in the laboratory each time that appearance was evaluated. A digital camera was placed approximately 15 cm away from the formulations [18,23].

IV. Stability Test:

The thermal stability of the formulation was determined by the humidity chamber controlled at 40°C for 7 days. [19-22]

V) Spreadability Test:[23-25]

The spreadability test has been done and the result has been found.

VI. Skin Irritation Test:[26-27]

2 ml of the formulation was taken, applied to the skin of the hand first then to the backside of the ear. It produces no skin irritation after 30 min.

Figure No. 4: iii. physical appearance iv. Stability test

Figure No. 5: v. spreadibility test vi. skin irritation test

RESULT:

Add to about 1.5 g, accurately weighed, 50 mL of sulfuric acid (0.5 mol/l) VS, heat gently until no further precipitation occurs, and filter. Wash the residue with hot water until the last washing is neutral to litmus paper R. Combine the wash liquid and the filtrate, add 2.5 g of ammonium chloride R, cool, and back-titrate with sodium hydroxide (1 mol/l) VS using methyl orange/ethanol TS as an indicator.

Each mL of sulfuric acid (0.5 mol/l) VS is equivalent to 40.69 mg of ZnO.

Titre value = 12 ml;

Specific Gravity = 3.05;

Equivalent weight = 40.69mg;

Weight of Sample Taken =1.5gm;

Calculation-

$$\frac{12\times 3.05\times 40.69\times 100}{1.5\times 1000}$$

=99.2836 %w/v

CONCLUSION:

Here in the work done it has been concluded that calamine lotion can be prepared from herbal natural extract like *Aloe vera*. The formulation showed the best results when compared with other formulations. It showed the pH similar to skin pH and no skin sensitivity with greater stability. Calamine/diphenhydramine is commonly prescribed as systemic antihistaminic which is available as an over-the-counter medication in many countries for countless conditions including nasal allergy and the common cold. We should be aware of its particular adverse reactions and as far as the possible combination of calamine and diphenhydramine is to be avoided.

REFERENCES:

1. Ajazuddin, Alexander A, Qureshi A, Saraf S, Saraf S Role of Herbal bioactive as a potential bioavailability enhancer for active Pharmaceutical ingredients. Fitoterapia, 2014.
2. Ajazuddin, Giri, TK, Saraf, S, Saraf, S, Tripathi, DK. Approaches for breaking the barriers of drug permeation through transdermal drug delivery. Journal of Controlled Release. 164, 2012:26-40.
3. Ajazuddin, Saraf S. Legal regulations of complementary and alternative medicines in different countries. Pharmacognosy Review.6 (12); 2012:154-160.
4. Alexander A, Singh A. Herbal drugs used for the treatment of asthma: An overview. Int J Cur Biomed Phar Res. 1 (2), 2011: 67-79.
5. Sweetman SC. Editor. Martindale The Complete Drug Reference. 33rd edition. London, Pharmaceutical Press; 2002. ISBN 0-85369-499-0
6. Beers MH, Berkow R. The Merck manual of diagnosis and therapy. 17th edition. Newjersy: Merck research laboratories; 1999
7. Medical Encyclopedia. Contact dermatitis. Available on http://www.nlm.nih.gov/medlineplus/ency/article/000 869.htm
8. DRUGDEX® System: Klasco RK (Ed): DRUGDEX® System. Thomson Micromedex, Greenwood Village, Colorado (Edition expires [December 2006].
9. DiFazio R, Vessey J, Zurakowski D, Hresko MT, Matheney T. Incidence of skin complications and associated charges in children treated with hip spica casts for femur fractures. J PediatrOrthop 2011;31:17–22.
10. Carmichael KD, Goucher NR. Cast abscess: a case report. OrthopNurs 2006;25:137–9
11. Kruse RW, Fracchia M, Boos M, Guille JT, Bowen JR. Goretex fabric as a cast underliner in children. J PediatrOrthop 1991;11:786–7.
12. Haley CA, DeJong ES, Ward JA, Kragh JF Jr. Waterproof versus cotton cast liners: a randomized, prospective comparison. Am J Orthop (Belle Mead NJ) 2006;35:137–40.
13. Amarji B, Raghuwanshi D, Vyas SP, Kanaujia P. Lipid nano spheres (LNSs) for enhanced oral bioavailability of amphotericin B: development and characterization. Journal of Biomedical Nanotechnology. 3 (3), 2007:264-269.
14. Angare D, Giri T, Tripathi DK, Ajazuddin. Unexplored areas and new findings in lipid emulsion serving as a potential drug carrier for lipophilic drugs: a review. Trends Med Res.2012.
15. B Kumar Senthil, Anand D.C Prem, Kumar K.L Senthil, M Saravanakumar and R Thirumurthy, Formulation and Evaluation Of Diltiazem Hydrochloride Extended Release Tablets By Melt Granulation Technique. IJPIR. 2011; 1(1): 211-221.
16. D. Kuntawar Rohan, V. Mulgund Sugandha, UV Spectrophotometric Estimation of Diltiazem Hydrochloride in bulk and tablet dosage form. World Journal of Pharmaceutical Sciences. 2011: 3(9); 634-641.
17. Giri TK, Thakur D, Alexander A, Badwaik H, Tripathy M, Tripathi DK. Biodegradable IPN hydrogel beads of pectin and grafted alginate for controlled delivery of diclofenac sodium. Journal of Materials Science: Materials in Medicine. 24(5), 2013:1179-1190.
18. Badwaik HR, Sakure K, Alexander A, Ajazuddin, Dhongde H, Tripathi DK. Synthesis and characterization of poly(acrylamide) grafted carboxymethyl xanthan gum copolymer. Int J BiolMacromol. 2016; 85: 361-369.
19. Indian Pharmacopoeia. The Indian Pharmacopoeia Commission Sector-23, Raj Nagar, Ghaziabad-201002, India, 2007 Edition.
20. Kumar T, Alexander A, Dewangan D, Nagri K. Anthelmintic activity of the whole plant of Bauhinia purpurea (Linn.). Asian Journal of Pharmaceutical and Clinical Research. 4 (3),2011: 110—111.
21. Modi V. C. and Dr. Seth A.K. Formulation and Evaluation of Diltiazem Sustained Release Tablets. International Journal of Pharma and Bio Sciences. 2010:1(3); 102-111.
22. Nikhade Ashwini and Mulgand, UV Spectrophotometric Estimation of Diltiazem Hydrochloride in bulk and tablet dosage form using area under curve method. World Journal of Pharmaceutical Sciences. Vol
23. SankulaKameswararao and Priscilla M. Geethika, Formulation and Dissolution of Diltiazem Hydrochloride Immediate Release Tablets. The Pharma Innovation Journal 2014; 3(5): 05-10.
24. Shukla P, Singh A, Gawri S, Sonwane S. In vitro propagation of Barleriaprionitis Linn and its antibacterial activity, Int. J. Pharma Prof. Res. 2011; 2:198-200.

25. Badwaik HR, Thakur D, Sakure K, Giri TK, Nakhate KT, Tripathi DK. Microwave Assisted Synthesis of Polyacrylamide Grafted Guar Gum and its Application as Flocculent for Waste Water Treatment. Research Journal of Pharmacy and Technology. 2014;7: 401-407.
26. Kumar T, Alexander A, Dewangan D, Khan J, Sharma M. Investigation of in-vitro anthelmintic activity of Bauhinia racemosa Linn. Journal of Applied Pharmaceutical Science. 2011; 1(2): 73.
27. G. Zurao Prashant, Preparation of Diltiazem Hydrochloride Extended Release Pellets by Novel Hot-Melt Extrusion Spheronization Process. International Journal of PharmTech Research. 2010: 2(3); 1733-1737.