

DEVELOPMENT OF A NANOEMULSION GEL FOR DUAL DELIVERY OF SALICYLIC ACID, VITAMIN E, AND CALAMIN IN PSORIASIS MANAGEMENT

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ABSTRACT

Psoriasis is a chronic autoimmune inflammatory skin disease. It primarily manifests as hyper proliferation and abnormal keratinocyte differentiation, leading to scaly, inflamed, and thickened skin. Commonly appearing in individuals under 40, psoriasis is often lifelong, causing significant physical and psychological distress, including depression and suicidal tendencies. The condition presents as white, patchy scars on various body parts, notably the scalp, elbows, knees, and lower back. The exact etiology of psoriasis remains unclear, though it is believed to have genetic and immunological origins. Triggers such as stress, infections, skin injuries, and certain medications can exacerbate the condition.

Keywords: Psoriasis, autoimmune disease, dermatological disorder, plaque psoriasis, treatment, inflammation.

INTRODUCTION

Psoriasis is a Chronic disease it covers mainly 1-5% of the individual worldwide. Psoriasis which generally hyper proliferation and abnormal keratinocyte variations. This disease is primarily seen in individual passing through the puberty and Adulthood. (< 40 years of age) and it remains as a (white patchy) scars for lifelong skin disease which mainly causes some severe itching, thickened, scaly, inflamed, deformed. Psoriasis Disease are five types Plague Psoriasis, Guttate Psoriasis, Pustular Psoriasis, Inverse Psoriasis, and Erythrodermic Psoriasis. Scientists are still do not determine the exactly causes of psoriasis disease. [1] The treatment of psoriasis is totally depend upon the severity and type of psoriasis affecting on the body. In the following below mentioned the topical formulation of nano emulsion gel for the treatment of Psoriasis disease. The API were taken combination of three

substances are Salicylic acid, Vitamin E, and Calamine which shows greater efficacy and bioavailability in the Psoriasis disease management.[12]

Tropical formulation proven best treatment for Psoriasis. because it directly work onto the skin and provide a better medication on the affected area .it's a most common and also a first line treatment for Psoriasis. Topical treatment involves including corticosteroids creams , gels Vitamin D shows the best effect and result when given in combination they become the first optional choice for the treatment of psoriasis. [2]

MATERIAL

The development of the nano emulsion gel the materials were used Salicylic acid, Vitamin E, and Calamine in the form API along with excipients are used such as tween 80 as a surfactant, in the oil phase mint oil were used. [2] These are all the reagents are provided from the help of institutional laboratory materials and equipment with grade or higher and pure deionized water was use throughout all the experiments. It used of instrumental devices from the laborartory as according the process involved for the development of nano emulsion gel. [4]

PRE FORMULATION TESTS

pH test - Salicylic Acid- Prepared a solution of salicylic acid solute and solvent distilled water with known concentration and pH buffer solution used.

Vitamin E- Dilute in distilled water ratio (1:10 consistency) and it is too viscous. Measurement – Immerse the pH electrode in into solution and allow to stabilize and record the pH value.

Solubility test- Salicylic acid - Salicylic acid include determining its solubility in different solvents, with water, ethanol, and other organic solvents, Test: Test dilute HCl and observed reduced solubility.

Vitamin E- is a fat soluble vitamin is primarily non-polar. Checked the vitamin e solubility in solution.



Fig 1: Ph test of Salicylic acid.

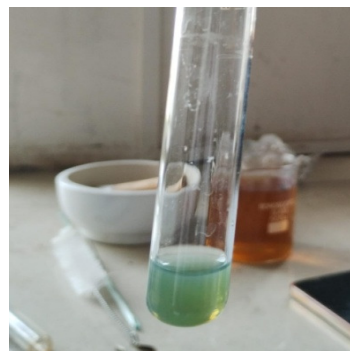


Fig 2: Ph test of Calamine.

Solubility test- Salicylic acid - salicylic acid include determining its solubility in different solvents, with water, ethanol, and other organic solvents, Test: Test dilute HCl and observed reduced solubility.

Vitamin E- is a fat soluble vitamin is primarily non-polar. Checked the vitamin e solubility in solution. [10]

METHOD OF PREPARATION

The formulation is prepared by adding 3 selected API and by mixing them thoroughly in mint oil. *Salicylic Acid* is measured and transferred into the beaker, *Calamine* is weight and transfer into the beaker and few drops of *mint oil* and *vitamin E* is added in the solution. The mixture of Salicylic Acid, Calamine and Mint oil is set to be rotate for 15 min without temperature. A continuous observation is required during the whole observation process cause have a chance that during formulation the mixture may form a bubble or separation of phases take place. Tween 80 (surfactant and dissolving agent) is added in mixture after 15 min rotation, the temperature 40–50degree Celsius is provided for preventing caking of the mixture and for better mixing of the chemical the temperature provided for 10 min. The Nano-Emulsion is prepared for further evaluation study. [11]

S.no	Chemical Name	Quantity in (ml, gm)
1.	Salicylic Acid	10mg
2.	Calamine	10ml
3.	Mint Oil	0.50ml
4.	Tween 80	0.30ml
5.	Vitamin E	10

Fig3: Table of ingredients quantity.



Fig 4: Nano emulsion Gel.



Fig 5: Mixing nano API and

NANO EMULSION

Nano- emulsions are a kind of emulsion with the particle size range in between 10-200 nanometer. Emulsions are the biphasic liquid dosage form consist of two immiscible solution. The two phases are water and oil. The emulsion with the nano particles they are called nano-emulsion, Nano-emulsions have various benefits are there such as high surface area because they have a small droplet size which provides a volume -ratio. [9] These nano particles were use in the formulation of the soap, liquid, gels and sprays also in inhalers. Nano emulsion are non- stick and non- irritant onto and into the skin. It enhanced skin penetration nano emulsion of active ingredients and increase the bioavailability of drug which can reduce the amount of medication needed. [5] [8]

RESULT

The preparation and optimization along with characterization for management of psoriasis disease has been formulated used of Salicylic acid (SA), Vitamin D (VD) and Calamine (C). The nano emulsion gel loaded with mentioned above API were formulated wherein enhanced SA-VD-C along lower poly dispersity with constant and homogenous distribution.

The mentioned API and Polymer Tween 80 presentative is used for the preservative is used to preservation, in the oil phase Mint oil were used for stability and mixing. The formulation of nano emulsion gel prepared and evaluation test were conducted on the nano emulsion for therapeutic characterizations activity, side effect on the skin for testing the viscosity of gel, spreadability, pH, partition co – efficient, elasticity and melting point of formulation. The evaluation test shows some good positive results which supports the action of nano emulsion gel.

DISCUSSION

The studies were conducted to make sure the quality of active pharmaceutical. However, the formulation does not meet to its aimed throughout expectation where it prepared on large volume it creates some error such as phase separation of lipophilic and hydrophilic phases and due to incorporation of vortex cause phase separation. The unavailability of required instrument for vortex cause solubility does not dispersed. For that reasons penetration on the skin were poor. penetration on the skin were poor. Pre formulation test was done for evaluation its physical properties such as its appearance colour, odour, taste skin, size, shapes, for demonstration the organoleptic properties which is positive and Ph test is tested to ensure the characterization of active ingredients.

CONCLUSION

Nano-emulsions are biphasic in nature which contains both the water and oil phase brilliantly and provide perfect balance of both the mixture. Nano- emulsion contains a small droplet range between 2-100 Nanometer and because of its particle it enhanced the penetration effect onto the skin surface and provide a better effect to the patient. Researchers are still going on Nano-emulsion for enhancing the bioavailability, biostability and reactivity in the skin. By Studying the previous research paper it is already proven that it is providing advance and effective treatment to various diseases.

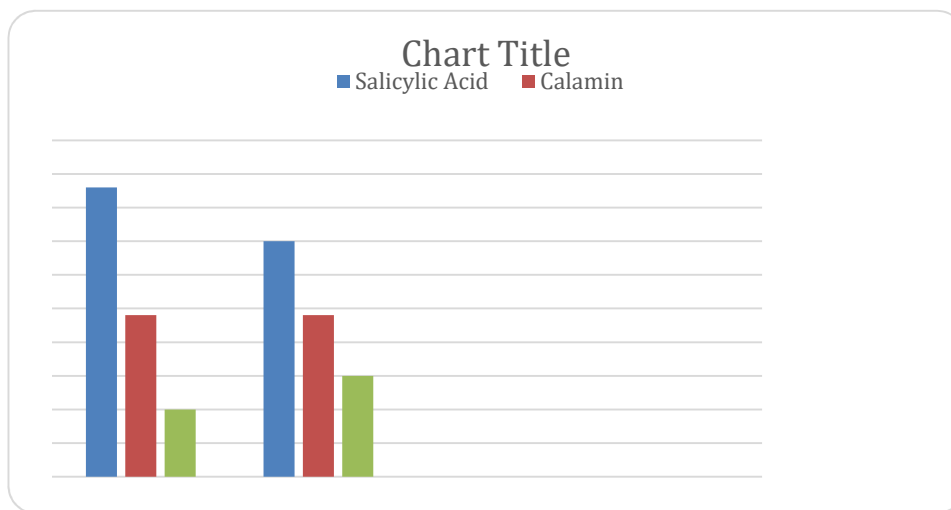


Fig 6: Statistic of API showing different characteristic from the pH test and stability te

The gel foundation also enhanced localized action with low systemic absorption, patient compliance, and ease of application. All things considered, this novel formulation provides a multi-targeted strategy to psoriasis treatment, which may enhance clinical results while lowering the negative effects

of traditional treatments. A promising method for the topical treatment of psoriasis is the based on nanoemulsion that contains calamine, vitamin E, and salicylic acid.

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