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FORMULATION AND EVALUATION OF EMULGEL CONTAINING *CNIDOSCOLUS ACONITIFOLIUS*

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ABSTRACT

Cnidoscolus Aconitifolius also known as Chayamansa is explored for its antioxidant activity for using it as an ingredient of herbal cosmetics. Herbal extract of the plant is incorporated into an emulgel formulation using carbopol, span 80, tween 80 and liquid paraffin. Prepared six herbal emulgel formulations were evaluated for physical properties, pH, viscosity, spreadability and antioxidant activity. One of selected formulation were undergone antibacterial study against Ecoli. Satisfactory results were obtained from the evaluation tests. In conclusion the emulgel formulation prepared with extract of chayamansa leaves can be exploited for its antioxidant and antimicrobial properties.

KEYWORDS: Emulgel, Chayamansa, Herbal cosmetic.

INTRODUCTION

Cosmetics are defined as articles intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness or altering the appearance, and includes any article intended for use as a component of cosmetic. Cosmetic products are widely used for protecting the body from environment and aging process.[1]

Emulgels are emulsions either the oil in water type or water in oil type which are gelled by mixing with a gelling agent. Emulsified gel is the stable and superior vehicle for hydrophobic or poorly water soluble drugs. Thus emulgel is a combination of emulsion and gel. In recent years there has been great interest in the use of novel polymers which can function as emulsion thickners because gelling capacity of these compounds allow the formulation of stable emulsion and creams by decreasing surface and interfacial tension and the same time increases the viscosity of aqueous phase. Emulgel have better drug loading capacity, good spreadability, greaseless, thixotropic, good shelf life and pleasant appearance.[1]

Herbs are plants that have medicinal and industrial applications. Herbal cosmetics are combinations of different cosmetic materials to form a base in which many herbal components deliver natural benefits especially to the skin. The active components are extracted from different herbal plants having different therapeutic effects like antibacterial, antifungal, anti-inflammatory and tissue healing characteristics. The essential aspect of herbal cosmetic is that they are solely made from herbs, fulfil the nutrient and mineral requirement of human body and have no adverse effects.[2] They provide skin safety and skin compatibility over synthetic products.

Cnidoscolus aconitifolius also known as chayamansa or tree spinach is a medium sized herb which can be explored for its antioxidant activity to consider as herbal cosmetic. Chaya can stimulate circulation, boost digestion and is rich in vitamins, proteins and minerals. The antioxidant and anti-inflammatory properties of different herbs are exploited for making herbal cosmetic preparations.[3]

MATERIALS AND METHODS

Materials

Carbopol 934 (S. D. Fine chem. Ltd, Mumbai), Span 80(Yarrow chem products, Mumbai), Tween 80(Yarrow chem products, Mumbai), Methyl paraben(S. D. Fine chem. Ltd, Mumbai), Propylene glycol(S. D. Fine chem. Ltd, Mumbai), Liquid paraffin(Yarrow chem products, Mumbai), Triethanolamine(Ranbaxy laboratory, Punjab).

Methods

Plant used

Cnidoscolusaconitifolius

Cnidoscolusaconitifolius also known as chaya mansa is a medicinal plant it belongs to the family.

Euphorbiaceae. It is a shrubby species that is used as an ornamental, medicinal and food plant in various parts of world known in Mexico as chaya.

Collection of leaves

The plant leaves were collected for the preparation of emulgel. The plant was selected on the basis of its potent antioxidant activity reported in research article. The plant leaves collected were, washed and cleaned in a laboratory. After drying plant extract was prepared in ethanol and used for the preparation of emulgel.

Preparation of ethanolic leaf extract

Fresh leaf samples of *Cnidoscolusaconitifolius*were collected and dried. Air dried powder of fresh matured CA leaves was extracted using absolute ethanol. Extract of CA was concentrated under reduced pressure for 24 hrs. Filter the extract using whatmann filter paper and filtrate is collected in a laboratory.[4]

Phytochemical screening of extract

The prepared ethanolic extract was undergone phytochemical screening for tannins, saponins, flavonoids, anthraquinone, and glycosides.[5]

Formulation of herbal emulgel

Gel portion of the emulgel was made by dissolving Carbopol 934 in cold water with constant stirring at moderate speed until uniform mixture was made. PH adjusted to 6-6.5 using triethanolamine. The aqueous phase of emulsion was prepared by dissolving tween 80 in distilled water and oil phase was prepared by mixing span 80 in liquid paraffin. To preserve emulsion methyl paraben dissolved in propylene glycol and extract was dissolved in ethanol. Then both solutions mixed with aqueous phase. Both aqueous phase and oil phase were heated at 70ºC in water bath. Then oil phase added dropwise to aqueous phase with continuous stirring for 10 min.[6]

Evaluation of herbal emulgel

Organoleptic test

Visual inspection of the herbal emulgel was performed. thecolour and odour of the herbal emulgel was checked.

Determination of pH

In 100 ml distilled water 1g of emulgel was mixed. The pH of the mixture was examined using a previously standardized digital pH meter. 1g of emulgel was stirred in distilled water to form a uniform dispersion. And then the volume was made up to 100ml using distilled water. p^H is measured in triplicate and the mean was calculated.[7]

Determination of viscosity

Viscosity of each formulation was noted by Brookfield viscometer DV-1-LV. The measurement were carried out using spindle no 64 at speed 50 rpm. A sample of 400-600 ml in suitable container is placed under the viscometer which is then lowered to dip the spindle into the sample up to an immersion mark on the spindle shaft. Viscometer motor rotates the spindle at a defined speed (measured in rpm) or shear rate and the viscometer measures the resistance to rotation and report a viscosity value. The measurement were taken in triplicate.[8]

Spreadability

Spreadability of formulation was determined by applying 0.5g of sample on one of the glass plate. Second plate was over the other one to sandwitch sample between plates. 20g weight was placed on the top of the upper plate to provide a uniform thin film of sample between the plates. It was removed, excess of emulgel sample was scrapped off from edges. The plate was then subjected to pull by using stirring to which 50g was added. The time required by upper plate to travel a distance of cm and separate from lower plate was noted.[9]

Spreadabiliy = M.L/T

M -weight tied to upper slide, L- length of glass slide, T-time in sec

Antioxidant activity

1, 1-Diphenyl-2-picrylhydrazyl is a stable free radical (in powder form) that is red in color and turns yellow when harvested. The DPPH test uses this sign to indicate free radical scavenging activity. The scavenging reaction between (DPPH) and an antioxidant (HA) can be written as, DPPH-H + (A)(DPPH) + (H-A) Antioxidants react with DPPH and reduce it to DPPH-H and as consequence the absorbance decreases. The degree of discoloration reveals the antioxidant compound s' or extracts scavenging capacity in terms of hydrogen-donating capacity.[10]

Microbial Study

The antimicrobial efficiency of formulation was studied using microorganism Escherichia coli. The inhibitory effect of formulation on the studied microorganism was evaluated using agar well diffusion test. All the glass wares required to conduct the test were sterilized by dry heat method using hot air oven. Nutrient agar medium was prepared and sterilized by autoclaving under aseptic conditions. Nutrient agar medium was inoculated with 0.1ml of fresh overnight nutrient broth culture of bacterium in flasks and poured into sterile petriplates.

Allow them to solidify. After solidification cups were made on each plate with help of sterile borer of 6mm diameter and poured appropriate amount of formulation to the cup. Incubate the plates for 24hrs at 37 ºC. After the incubation period the plates were examined for inhibition of bacterial growth around the wells.[11]

RESULTS

Preliminary Phytochemical screening

Preliminary Phytochemical screening was evaluated and the results are given in the table 1.

The prepared emulgel with their formulation is shown in table 2.

Organoleptic properties

Inspected visually for colour, homogeneity and phase separation.

The results are discussed in table 3.

Table 1: Preliminary phytochemical screening.

Phytochemicals	Results
Alkaloids	+
Carbohydrates	+
Glycosides	+
Foam test	+
Flavonoids	+
Tannins and phenol	+

Table 2: composition design of herbal emulgel.

INGREDIENTS	F1	F2	F3	F4	F5	F6
Extract	5ml	5ml	5ml	5ml	5ml	5ml
Carbopol	0.25	0.50	0.50	0.25	0.75	0.75
Span 80	0.45	0.75	0.75	0.45	0.75	0.45
Tween 80	0.30	0.50	0.30	0.30	0.50	0.50
Methyl paraben	0.01	0.01	0.01	0.01	0.01	0.01
Propylene glycol	3.50	3.50	3.50	3.50	3.50	3.50
Liquid paraffin	7.99	7.24	7.44	7.99	7.04	7.29
Triethanolamine	q.s	q.s	q.s	q.s	q.s	q.s
Water	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml

Table 3: Organoleptic properties of different formulation batches.

Formulation	Colour	Homogeneity	Phase separation
F1	Green		No
F2	Green		No
F3	Green		No
F4	Green		No
F5	Green		No
F6	Green		No

Determination of pH

The pH of the prepared formulations were determined using a digital pH meter and the ph of the prepared formulations are shown in the table 4.

Determination of Viscosity

The viscosity of the prepared formulation of emulgel were determined using Brookfield viscometer (spindle no:64, 50 rpm,DV-1-LV). The viscosity of the prepared formulations are shown in the table 5.

Table 4: pH of the formulated emulgel.

Formulation	pH
F1	7.9
F2	8
F3	7.9
F4	8
F5	8
F6	7.9

Table 5: Viscosity of formulated emulgel.

Formulation	Viscosity (Centi poise)
F1	7.2
F2	12
F3	26
F4	5.4
F5	37
F6	22

Spreadability

Spreadability of the formulated herbal emulgel were determined by using the ‘slip and drag’ method. The time taken for the movement of upper slide is given in the following table 6.

Table 6: Spreadability of prepared formulations.

Formulation	Spreadability
F1	4.78±0.25gcm/sec
F2	4.1±0.15gcm/sec
F3	4.44±0.43gcm/sec
F4	5.28±0.18gcm/sec
F5	3.83 ±0.15gcm/sec
F6	3.73±0.05gcm/sec

Antioxidant study

The DPPH method measures the ability of a compound to scavenge free radicals. The ability of antioxidant is related to the ability of compound components to donate electrons or hydrogen. The mechanism will change the color of solution from purple to yellow. The percentage inhibition was calculated and was shown in table 7.

Table 7: Percentage inhibition calculated for prepared emulgels.

Formulation	Percentage inhibition
F1	15.73%
F2	55.17%
F3	66.33%
F4	47.11%
F5	21.08%
F6	43.52%

Antimicrobial study

The antimicrobial study of formulation F3 was carried out against Escherichia coli(gram –ve). The sample showed satisfactory zone of inhibition.

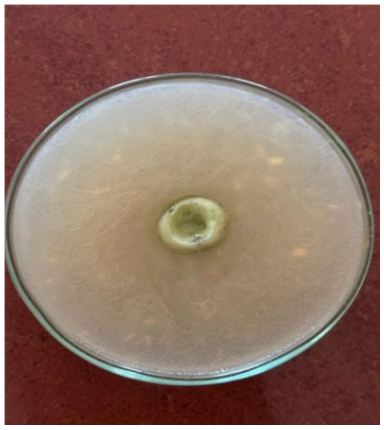

Fig.1: Zone of inhibition in formulation F3.

DISCUSSION

Topical drug delivery will be used extensively to impart better patient compliance. Since emulgel possess an edge in terms of spreadability, adhesion, viscosity and extrusion they will become a popular drug delivery system. Moreover they will become solution for loading hydrophobic drug in a water soluble gel base.

Emulgels are biphasic systems that have better drug loading capacity and better stability. Emulgel has several good properties, such as good spreadability, greaseless, thixotropic, good shelf life, odourless and apleasant appearance. Over the conventional topical formulation. Emulgel has both gel and emulsion properties and functions as dual control release system.

Natural remedies are more acceptable in the brief that they are safer with fewer side effects. Cnidoscolus aconitifolius is a plant which has been attributed different benefits such as antioxidant, antimicrobial and antidiabetic properties Incorporation of herbal extracts having good antioxidant and antimicrobial properties into emulgels results in development of herbal cosmetic products which can benefit the skin in a number of ways. The herbal extracts compared with synthetic ones provide better skin compatibility and fewer side effects. The advantages of emulgels combining with the benefits of herbal ingredients provide a better cosmetic products.

Emulgel formulations can be prepared by incorporating herbal extracts such as Cnidoscolus aconitifolius with carbopol, span 80 and tween 80. All prepared emulgel formulations were evaluated for different parameters such as organoleptic properties, pH, viscosity, spreadability and antioxidant study.

Formulations prepared with herbal extract of the plant has been shown satisfactory PH, viscosity, spreadability, antioxidant activity and antimicrobial activity. One formulation F3 was undergone antimicrobial study and showed zone of inhibition against tested microorganism Escherichia coli.

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