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PREPARATION AND EVALUATION OF ALLAMANDA CATHARATICA LOADED EMULGEL

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ABSTRACT

The objective of the present work was formulation of emulsion containing allamanda cathartica in a gel topical delivery system(emulgel) for management of wound. Crude extract of Allamanda Cathartica leaves were subjected to various chemical test for the identification of different active phytoconstituents. The ethanolic extract shows the presence of tannin, Phlobatannin and saponin. Emulgel was prepared and different concentration of HPMC and propylene glycol were used. six batches were prepared with 1% concentration of gelling agent. Out of six batches (F1, F2, F3, F4, F5, F6) F5 showed good spreadibility and drug release in comparison with other batches. The selected batch was of greenish colour, semisolid consistency, neutral pH and without any grittiness. Spreadibility and in vitro release were found to be 17.20 cm and 79.40%.

WOUND

A wound can be related as a defect or a fragment in the skin, derived from physical or heat damage or as a result of the existence of a fundamental, medical or physiological condition. Wound is the result of interference of normal anatomic structure.[1]

In the normal situation wound proceeds through an in order and convenient improving activity that result in sustained fixing of anatomic and functional probity. Wound are a crucial cause of prevalence and damage quality of life and take up basic health.[2] According to level of abomination, a wound can be classified as: clean wound, contamination wound, infected wound and colonized wound.[3,4]

Allamanda cathartica

Allamanda cathartica (common name Golden trumpet) is a woody climbing evergreen shrub belongs to family Apocynaceae. It is native to Central America and Brazil, cultivated in India for showy flowers, found wild in Karnataka. Various medicinal properties as a good purgative, Antidote for poisoning, inflammation, constipation and ascites are attributed to this plant. Distilled extract of the plant claims to the cure of malignancy, fungal and bacterial diseases, for colic and acute abdominal pain. It is used for jaundice and enlarged spleen resulting from malaria. It is active *in vivo* in mice and *in vitro* against human carcinoma of the nasopharynx. The alcoholic and aqueous extract is hypertensive. It's cathartic (milky sap) possess antibacterial and possibly anticancer activity. The present investigation was undertaken to find out the antifungal potential of extracts of different parts of *A. cathartica* against some fungi.[5]

Chemical Constituents

The whole plant of *Allamanda cathartica* Linn. restrain many phytochemicals. Amid them, Plumieride, plumericin, and allamandin are required. The segment of the plant includes several phytoconstituents. Leaves inhere of ursolic acid, ß-amyrin, and ß-sitosterol. It also contains sesquiterpenes and plumericin. Plumieride and a long chain ester come to be isolated and recognize from leaves.

Wound healing Activity

The water extract of the plant established wound healing characters in both incision and excision wound models on Sprague-Dawley. Appreciable increase in the weight of the granulation tissue and hydroxyproline appease, high skin disturb influence, decrease in the session of epithelialization, high rate of wound contraction was showed in animals served with the water decoction of the plant. It was seen from the histological investigations of the granulation tissue that the treated gathering displays the presence of a lesser number of incendiary cells, and extended collagen development than the benchmark group. The leaf decoction has the most noteworthy measure of wound mending properties contrasted with the reference and control gathering.[5,6]

Emulgel

Emulgel is a mixture of emulsion and gel, which is a new methodology for skin conveyance of medications.[7]

It consist two types of drug release like emulsion and gel. Gel delivers the medication quicker in contrast with balm, cream, and moisturizer. Consolidation of medication in emulgel definition is reasonable to treat skin problems. Effective utilization of helpful specialists

gives different points of interest over the other course of the organization. The presence of a gelling agents in the watery stage changes over an old-style emulsion into an emulgel. Inside the major gathering of semisolid arrangements, similar to utilization of straightforward gels has extended both in beautifying agents and in drug arrangements.[8]

Emulgel have a few free properties for dermatological utilize, for example, being thixotropic, greaseless, effectively spreadable, without any problem removable, emollient, non-recoloring, long time span of usability, biofriendly, straightforward and satisfying appearance.[9]

MATERIALS AND METHODS

Carbopol, HPMC (Hydroxy propyl methyl cellulose), Liquid paraffin, tween-80, methyl paraben, propylene glycol, Propyl paraben, tri-ethanolamine. Span-80, distilled water.

Methods

Plant material and extraction process

The leaves of Allamanda Cathartica, were recognized and authenticated by Prof. (Dr.) Amresh Gupta, Director, Mr. O.P. Verma Associate Professor, Pharmacognosy, Goel Institute of Pharmacy & Sciences, Lucknow. The plant specimen was authenticated in herbarium with Ref. No. GIPS/Ph' Cog. / 12/2020/002. The leaves of allamanda Cathartica were shade dried. The leaves of Allamanda Cathartica were powdered with hand homogenizer. The powdered plant material (leaves of Allamanda Cathartica) was extracted by soxhlation using ethanol as the solvent.

Preparation of Carbopol 934 gel

Carbopol- 934 gel base was prepared by mixing Carbopol- 934 at 1000 rpm into a glass beaker containing distilled water (100 ml). After complete dispersion, the tri- ethanolamine was added drop dropwise. The pH was carefully maintained at this step and checked after the addition of every drop of tri- ethanolamine, until the pH of gel base reached 4- 6.6.5. Then the gel base was kept for 24 hours for formation of swelled gel complex.

Preparation of AC loaded emulsion

The aqueous phase of emulsion was prepared by heating tween-20, propylene glycol, propyl paraben, methyl paraben, HPMC and water up to 75^{o}C. Similarly, oil phase was also prepared by heating paraffin oil and span 20 at 75^{o}C. Next, *Allamanda catharatica* extract was added to the aqueous phase. Then oily phase was poured drop by drop to the aqueous phase with constant stirring at 2000 rpm until complete oily phase was added. Then the speed of the system was reduced to 1000 rpm for 5 min followed by 500 rpm for 5 min. Finally, the emulsion was cooled at room temperature.

Finally, the Allamanda catharatica loaded emulsion, was incorporated into previously prepared Carbopol- 934 gel base (1:1) under series of series of stirring speed (2000 rpm for 15 min then 1000 rpm for 5 min and finally 500 rpm for 5 min).

Optimization of formulation

Table 1: Composition of emulgel formulation.

Batch no.	Carbopol 934 (gm)	Liquid Paraffin (ml)	Span 80 (gm)	Tween 80 (gm)	Propylene Glycol (ml)	HPMC (gm)	Methyl Paraben (gm)	Propyl Paraben (gm)	Extract (gm)	Distilled Water (q.s)
F1	1	1	1	1	4	1.2	0.4	0.4	2	qs
F2	1	1	1	1	3.8	2.0	0.4	0.4	2	qs
F3	1	1	1	1	3.5	1.8	0.4	0.4	2	qs
F4	1	1	1	1	4.2	1.6	0.4	0.4	2	qs
F5	1	1	1	1	3.2	1.8	0.4	0.4	2	qs
F6	1	1	1	1	3.4	2.2	0.4	0.4	2	qs

Characterization of optimized AC emulgel

Qualitative phytochemical screening

The crude extract of leaves was introduced to different chemical tests for the identification of various active phytoconstituents.[10-11]

Physical appearance

The prepared emulgel formulation was inspected visually for their color, appearance, homogenicity.

pH Evaluation

pH of the prepared emulgel was measured using digital pH meter. 1 gm of gel was dissolved in 100 ml distilled water and it was placed for 2 hours and then dip the glass electrode into an emulgel. The measurement of pH of each formulation.

Rheological Studies

Viscosity of the emulgel was determined using Brookfield viscometer, Spindle no.7 type at 20 rpm.

Spreadability

Two glass slides were taken and butter paper of same size was cutted. 1 gm of emulgel was placed in between slides and weight of 100 g was placed on glass slide. After 5 minutes, diameter of spreaded emulgel was measured and spreadability was calculated by using formulation.

In-vitro Release/ Permeation Studies

In vitro release studies were carried out using open glass tube. Egg membrane was isolated and used for the study. Pre-weight emulgel was spread evenly on the egg membrane. The egg membrane was tied carefully at one end of open glass tube. The beaker was filled with 100 ml of pH 6.8 phosphate buffer maintained at 37^{o}C and stirred by using magnetic stirrer at 50 rpm. 1 ml sample was collected at suitable time intervals (i.e., for every 30mins until complete drug was released) and replaced with the 1 ml of fresh buffer. The collection samples were analyzed for drug content by UV- Visible Spectrophotometer at 270nm.

Globule size:- Malvern zeta sizer was used for the determination of the globule size in prepared emulgel formulation. Emulgel formulation, whose globule size was determined, dissolved in distilled water and shaked to get a uniform solution. Take well- defined amount of sample in photocell of zeta sizer. Mean globule size and its distribution in prepared emulgel was collected.

Stability Studies:- Stability studies were carried out for the optimized formulation (F5) according International Conference on Harmonization (ICH) guidelines. Short term accelerated stability studies were carried out for the period of 3 months. The sample were stored at room temperature (25±2^{o}C). Sample was withdrawn on weakly interval and analyzed for visual appearance clarity, pH, spread ability, viscosity, and drug content. Sample was withdrawn at 1,3,6,9 and 12 weeks and assessed for various parameters. At the end of 12th week they were evaluated for physical parameters and integrity of the product.[12-15]

RESULT AND DISCUSSION

Preliminary phytochemical studies

Crude extract of Allamanda Cathartica leaves were subjected to various chemical test for the identification of different active phytoconstituents. The ethanolic extract shows the presence of tannin, Phlobatannin and saponin.

Table 2: Phytochemical screening of Allamanda Cathartica leaves extract.

S.no	Phytoconstituents	Results
1.	Alkaloids	-
2.	Flavonoid	+
3.	Anthraquinone	+
4.	Saponin	+
5.	Terpenoids	-
6.	Cardiac glycosides	-
7.	Tannin	+
8.	Starch	-
9.	Phlobatannin	-
10.	Phenolic compounds	+

Color: Formulation emulgel was visually examined and it observed to be greenish in color.

pH: The pH value was determined at room temperature using digital pH meter. pH of the batch F5 was found to be 6.8.

Viscosity: Brookfield viscometer was used for measuring viscosity. 20 grams of emulgel was taken in a beaker and spindle number 7 was dipped for 5 minutes at 20 rpm and dial reading was noted. Viscosity of the batch F5 was found to be 27000.

Spreadability: Spreadability of the Batch F5 was measured by spreading of 1 g of the Emulgel on a glass plate and then a second glass plate was employed. 100 grams of weight was permitted to rest on the upper glass plate for 5 min. After that diameter of the speeded emulgel was measured and spreadibility of F5 batch was found to be 17.20

In-vitro release: Open tube with egg membrane was used for determining amount of drug release. percentage drug release through batch F5 shows 79.40% of drug release in 8 hours.

Globule size: Malvern zeta sizer is used for the determination of the globule size. Optimized batch (F5) shows globule size of 345.6 nm.

Stability studies: stability study was performed on F5 (optimized batch) at ambient condition. The result obtained after 3 months revealed that there was no significant change in the color, pH, and drug content of optimized formulation. The result concludes that the optimized formulation was stable for 3 month and applied topically.

Table 3: Evaluation of Allamanda cathartica emulgel optimized formulation.

Formulation	pH	Viscosity (cps)	Spreadability (g.cm/sec)	Globule size (nm)	Invitro release (%)	Stability
F5	6.8	27000	17.20	345.6	79.40	No change

CONCLUSION

Allamanda Cathartica loaded emulgel was successfully formulated and maybe a better approach for the management of topical lesions. In the impending years, topical delivery of drugs will be extensively used to impart better compliance. Moreover, emulgel will be a good solution for the assimilation of the hydrophobic medication in a water-soluble gel base.

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