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FORMULATION AND EVALUATION OF *BAUHINIA VARIEGATA LINN.* LOADED ANTI-BACTERIAL CREAM

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ABSTRACT

The main objective of the present study was formulation and evaluation of the antibacterial cream of the leaf extract of the plant ***bauhinia variegata linn.*** The antibacterial activity of the leaf extract and developed formulation are tested against the gram positive and gram negative bacterial strain. The other evaluation parameter of formulation like ph of the formulation, spreadability, appearance of the cream, homogeneity, stability, viscocity, drug released and spreadability are also tested. The plant ***bauhinia variegata linn.*** are show the various biological activity like Antimicrobial activity, Anti-diabetic action, Anti oxidant, Anti-cancer activity for the treatment of disease. The ethanolic extract of the leaf are further used to formulate the antibacterial cream and evaluate the cream by using the different parameter like ph of the cream is the very important parameter for topical preparation and it was come under the range acceptable. Appearance of the cream was good homogenous, viscosity and spreadability are come under the acceptable range.

KEYWORDS: Antibacterial cream, formulation, extract, viscosity.

INTRODUCTION

TDDS is the system in which drugs are delivered via the skin. This route is popular due to its easy application. Skin is the first most essential part for delivery of the drug by the topical route and work as a barrier for many drug substances it is an ideal site for local and systemically delivery of the drug. This route is the best for administration of drug which is not produced the beneficial effect via other routes.[1]

Advantages and Disadvantages of TDDS
Advantages

- Avoid the first-pass metabolism.
- Easy to apply on skin.
- If causes any allergy is to remove.
- Site-specific action.
- Avoid the GIT irritation.

Disadvantages

- Skin irritation at the site of action.
- Less permeable drugs are difficult to penetrate.[2]

Cream are used as a pharmaceutical product and are prepared by various techniques which are developed by pharmaceutical industry. For the treatment of various skin conditions or dermatoses different type of unmedicated and medicated creams are highly used. Cream can be formulated as an Ayurvedic, herbal or allopathic which are used according to their need for their skin conditions. Cream may be classified as o/w and w/o type of emulsion on the basis of phases.

Advantages

- Avoidances of first pass metabolism.
- Avoid of risk.
- Convenient and easy to apply.
- It does not show the side effect to the other body organ.
- Easy termination of medications, when needed.
- Avoid fluctuation of drug levels inter- and intra-patent variations.

Disadvantages

- Skin irritation
- Poor permeability of some drugs through the skin.
- Possibility of allergic reactions[3]

Bauhinia variegata

Bauhinia variegata linn (Kachnar) is the medium-sized tree from the family Fabaceae. this plant is very popular in various medicine systems to treat the variety of diseases and distributed throughout India. The parts of the plant like leaves, flowers buds, flowers, stem, bark, seeds, and root shows the active participation in a biological activity like anti-diabetic, anti-inflammatory, anti-bacterial, immune-modulatory activity, anti-tumor activity, antimicrobial activity, etc. some active secondary metabolites like alkaloids, glycosides, Flavonoids, Tannin, Phenolic compound, β-sitosterol,

kaempferol-3-glucoside, tannins, carbohydrates, amides, reducing sugars, vitamin C, crude protein, fibers, calcium, phosphorus, and quercetin, are present in different parts of plant.[4]

Development of microbial resistance to antibacterial is a global concern. Plant are important sources of potentially useful constituents for the development of new therapeutic agents because most of them are safe with little side effects.

Antibacterial activity refers to the substance that slow down the growth of bacteria after administration via different route.

Nowadays a number of antibiotics are available in the market for the treatment of bacterial infection but a more number of the bacterial agents are resistant to commercial antibacterial compounds that's way Medicinally active plantsare used instend of synthetic drug for drug development.[5]

MATERIAL AND METHODS

Collection of plant material

The leaves of the plant *Bauhinia variegata* were collected from the herbal garden of GITM. Collected leaves were used to dries under suitable conditions, coarsely powdered, and stored in a tight container for the study.

Extraction of leaves of plant *bauhinia variegata linn*

The leaves of *bauhinia variegata linn.* was shade dried, powdered and extracted by using Soxhlet extractor (water, hexane, and ethanol).

Phytochemical screening:- after the extraction of the powderd leaf different chemical tests are performed like The general test for glycosides, Alkaloids, Flavonoids, Terpenoid, and Tannin etc.[6]

Formualtion and evaluation of cream

Formualtion of cream

For making the (O/W) antibacterial cream of the leaves extract of the plant *bauhinia variegata* linn. the oil soluble components (stearic acid, cetyl alcohol and almond oil) are mixed at 75^{o}C temperature. And the other side the aqueous phase (triethanolamine, glycerine, benzyl alcohol, water, and active extract) at 75^{o}C after the preparation of the both phase the aqueous phase are added to the oil phase by continuous stirring after it cool. The cream are formulated and the component list and their quantity are mention in table 1.

Table 1: Antibacterial cream formulation composition.

S.no	Components (gm)	F1	F2	F3
1.	Stearic acid (gm)	1	0.5	0.5
2.	Cetyl alcohol (gm)	0.5	1	0.5
3.	Almond oil (gm)	0.5	1	0.5
4.	Extract of *b. variegate Linn* (gm)	0.5	0.5	0.5
5.	Triethanolamine (gm)	0.2	0.2	0.1
6.	Glycerin (gm)	0.5	1	0.5
7.	Benzyl alcohol (gm)	0.2	0.2	0.2
8.	Water	qs	qs	Qs

Evaluation of cream

Determination of type of emulsion

It is conducted by two methods that is dilution test and dye solubility test.

In dilution test if the emulsion is oil in water type is stable (as water is the dispersion medium) after dilution with water and break if it diluted with oil. And the water in oil type emulsion is stable if the emulsion is diluted with oil but if diluted with water the emulsion breaks down.

In dye solubility test mix the sample with water-soluble dye amaranth and observed under the microscope. If the continuous phase appear red, the emulsion is O/W type as the water is in the external Phase and dye will be dissolved in it to give color. And if the scattered globules appear red and continuous phase colorless then it confirms the emulsion are W/O type.

Stability test

This test was examine the stability of the formulation on different temperature on weakly intervals and observed it was stable and good after testing the ph, viscosity, spreadability etc.

- **Agitation test:** This test was performed by placing the formulation onto the shaker at room temperature for 24hr (60 cycles/min). After 24hr it observed any signs of phase separation in any of the formulation. If the phase separation does not occur means the formulation was stable.
- **Centrifugation test**: This test was performed by placing the formulation into the centrifuge at room temperature and 4000 rpm. For 30min. after that observe any sign of phase separation in the formulation.
- **Accelerated stability testing:** This test was performed by storing the formulation at two different temperatures (room temperature and 40^{o} C ± 1) for 20 days and observed on 0, 5th, 10th, 15th, 20th day.

Determination of physical parameter

1. **Homogeneity**:- Homogeneity of the formulation was tested by visual appearance and touch.
2. **Appearance**:- Appearance of the formulation was observed by its color, pearlescence, and roughness.

Ph of the formulation

The ph of the cream was determined by using a digital pH meter.

Viscosity:- viscosity was determined by using the Brookfield viscometer RV model, Spindle number 7 at 100 rpm.[7]

Spreadability

For spreadability evaluation Take a glass plate or slide and marked the circle of 1 cm diameter on a glass plate. After that placed the 0.5 gm of the formulation in a circle of the glass plate. Then placed the second glass plate or slide over the first glass plate and add the 500 gm of weight over the upper glass plate for 5 min. After 5min measure, the diameter of the uniform spread sample on the glass plate. An average of 3 valves is calculated.[8]

In-vitro drug release

This test is performed by using the Franz diffusion cell and isolated egg membrane. in this method, the formulation was weighed and spread on egg membrane and then the membrane was set in between the cell, the diffusion cell is filled with the 6.8 buffer solution and maintain 37^{o}C temp, and stirred with the help of a magnetic stirrer. After that collect the sample at suitable time intervals and absorbance was determined by UV-visible spectroscopy and calculate the drug released.[9]

RESULTS

Table 2: Evaluation of the physical parameter of optimized formulation (cream).

S.no.	Parameter	F2
1	**Dilution test**	O/W type of emulsion
2	**Dye solubility test**	O/W type of emulsion
3	**Homogeneity** **By visual** **By touch**	 Homogenous Smooth
4	**Appearance**	Slightly greenish
5	**Type of smear**	Non-greasy
6	**pH**	6.39 ± 0.5
7	**Viscosity**	17480cps
8	**Spreadability**	5.4
9	**Odor**	good
11.	**Centrifugation**	No phase separation
12.	**Agitation stability**	No phase separation
13.	**In-vitro drug released**	77.846

Table 3: Stability (Accelerated stability testing) evaluation of the optimized formulation (cream).

Day	Formulation	Temperature	Homogeneity	Appearance
0th	F2	• Room temperature • 40^{o} C ± 1	Good Good	No color change No color change
5th	F2	• Room temperature • 40^{o} C ± 1	Good Good	No color change No color change
10th	F2	• Room temperature • 40^{o} C ± 1	Good Good	No color change No color change
15th	F2	• Room temperature • 40^{o} C ± 1	Good Good	No color change No color change
20th	F2	• Room temperature • 40^{o} C ± 1	Good Good	No color change No color change

DISCUSSION

After preparation and evaluation of the all parameters of the formulation antibacterial cream it confirms the formulation (F2) are come under acceptable range and shown all parameters good for topical preparation like ph, viscosity, spreadibility etc.

CONCLUSION

Cream are the topical Pharmaceutical preparation which are used for the treatment or cure of the various type topical or skin related problem for e.g. antibacterial cream. The Natural sources like plant which are medicinally active are used for the formulation of pharmaceutical cream after the separation of active component of the leaves extract of the plant *bauhinia*

variegata linn for the treatment or cure of the topical problems. The spreadibility of the formulation is (5.4) viscosity is 17480 cps, ph of the formulation is 6.39 ± 0.5 which is come in acceptable range.

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