Formulation and Evaluation of Topical Herbal Gel for Treatment of Rheumatoid Arthritis by using Leaf Extract

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Abstract:
The present investigations were aimed to formulate the topical herbal anti- arthritis gel. Gels were formulated using different type of excipient and carbapol-934 as gelling agent and 2 different plant extract in different concentration. Before the formulation, the quality of raw material was standardized by their analysis. All the formulations developed have pH within the range of skin pH non-staining and having good spreadability. The gels were evaluated their physical properties, pharmacological potency, safety, efficacy in-vivo and invitro studies. The stability studies were done in accordance with ICH guidelines. Since no significant changes were observed after 1 month. So it concluded that the formulation were stable.

Keywords:
herbal, anti-arthritis gel, Topical, Anacyclus pyrethrum, cardio dichotoma, natural, Penetrating agent.

INTRODUCTION

The drug delivery by **topical route** is a convenient way for both local and systemic treatment. The topical gel is a localized system for drug DELIVERY anywhere in the body via **skin**, **rectal**, **ophthalmic** and **vaginal routes**. Skin is the most extensive and easily accessible organ for topical drug administration and gel formulation are stable and provides better absorption and **bio-availability** of drug as compared to other topical route formulations.

1.Akarkara Plant leaves(scientific name: Anacyclus pyrethrum, Family: Asteraceae)

2. Bhokar Plant leaves(scientific name: cardio dichotoma, Family: Boraginaceae)

- It possesses various medicinal activities as per traditional system and some of them have been proven by modern research.
- It has also shown highly significant analgesic, anti-arthritis, antipyretic and anti-inflammatory activity. It was found rich in **phenolics**, **flavonoids**, **alkaloids**, **Glycosides** and **steroids** with good antioxidant effect as compared to other extracts of leaf.
- So the leaf extract was selected for topical gel formulation.

AIM AND OBJECTIVE

Fig. Akarkara Plant leaf

Fig. Bhokar Plant leaf

Aim: To formulation and evaluation of topical herbal gel for treatment of rheumatoid arthritis By using plant leaf extract.

Objective:

- To formulate herbal gel.
- To study the effectiveness of herbal gel.
- Prepared gel by using plant extract and natural penetrating agent.
- To evaluate the anti-arthritis property of Anacyclus pyrethrum and cordia dichotoma.

MATERIAL AND METHODS

plant material: Cardio dichotoma, Anacyclus pyrethrum, peppermint
Chemicals: Carbapol-934, Sodium benzoate, Triethanolamine, Glycerine, Propylene glycol, Distilled water
Instrument: Viscometer, Ph meter, Heating metal, Weighing balance.

Preparation of Aqueous extract of plant drug:

All the plant leaves Were placed in dark shade for dry about a week. After each place in different beaker in about 150 ml of distilled water and heat in heating metal around the 80-90 °C until volume is made its 1/10th. Filtered with filter paper with the help of tripod stand and funnel in small beaker.

Preparation of gel base:

The herbal gel prepared in using gel base(Carbapol-934). was added in 20 ml distilled water in the beaker and put the beaker aside for 15 min to soaked. After 15 min vigorously stirred for 1-2 hr for gel base formation.

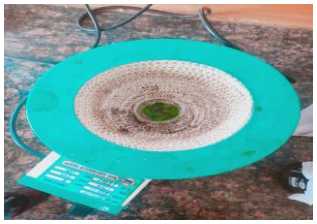

Fig. Decoction method.

Fig. Filtered extract.

Fig. Gel base

Formulation of Herbal gel:

The each plant drug extract in different concentration was added with constant stirring in gel base. Get 4ml of permeasion enhancer in beaker and dissolve preservative in it. Then above mixtures was mix with gel base and make the volume upto 50ml with distilled water.(EDTA were added if needed as a chelating agent). It was neutralize with Triethanolamine solution with constant stirring and to glycerine was added to form a clear gel. The final gels were sparkling, transparent and light yellowish in color.

Fig. Formulation table

	Carbapol-934	Anacyclus pyrethrum extract	Cardio dichotoma extract	Pappermint oil	Propylene glycol	Sodium benzoate	Triethanolamine	Glycerin	Distilled water
G1	1gm	3ml	3ml	4ml	----	1gm	0.5ml	5ml	50ml
G2	1gm	4ml	4ml	----	4ml	1gm	0.5ml	5ml	50ml
G3	1gm	3ml	3ml	4ml	----	1gm	0.5ml	5ml	50ml
G4	1gm	4ml	4ml	----	4ml	1gm	0.5ml	5ml	50ml
Role	Gelling agent	Anti-arthritis	Anti-arthritis	Permeation enhancer	Permeation enhancer	Preservative	Ph balance	Clearing agent	Vehicle


Fig. Batch G1.


Fig. Batch G2

Fig. Batch G3.


Fig. Batch G4


EVALUATION OF GEL

1. Physical evaluation:

Colour- The colour of the formulations was checked out against white background.

Consistency- The consistency was checked by applying on skin.

Greasiness- The greasiness was assessed by the application on to the skin.

Odour- The odour of the gels was checked by mixing the gel in water and taking the smell.

2. pH: The pH of the gel was measured using **pH meter**. Gel was taken into a beaker and the pH was noted.

3. Washability: Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

4. Spreadability: An excess of gel was placed between two glass slides and a **1000 gm** weight was placed on the slide for **5 minutes** to compress the sample to a uniform thickness. The bottom slide was anchored to the apparatus and weights were placed in the pan. A time in second needed to separates to slide was taken as a measure of spreadability.

$$S = W \times L/t$$

Where, S = Spreadability, W = Weight tied to upper

slides, t = Time taken in second to separates two slides,

L = Length of slide

5. Viscosity: Viscosity of all the formulated gels was studied by using Brookfield Viscometer by using spindle no. **7** at **10** rpm.

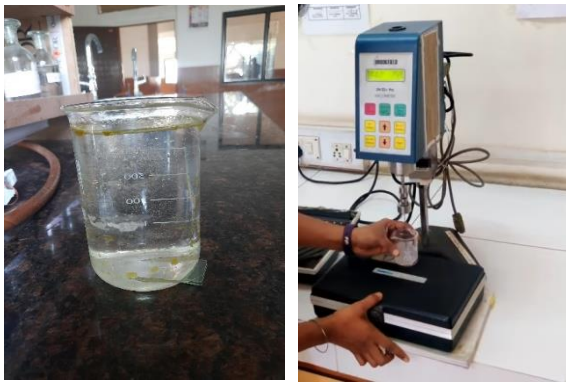

Fig. Viscosity test

6. Irritation: Irritant test Is determined by applying a herbal gel on human skin and observed the effect.

7. Swelling and Syneresis: All the formulations were tested for swelling and syneresis. **5 gm** of sample was from each of formulation was taken in cylinder and volume was made up to **100 ml** using water, the samples were observed up to the half month. Neither swelling nor syneresis was observed in any of the formulation.

	Colour	Ph	Washability	Spreadability	Viscosity	Irritation
G1	Dark yellowish	6.9	Good	Good	0.3850	No
G2	Transparant yellowish	7.1	Excellent	Excellent	0.3885	No
G3	Light yellowish	7.3	Good	Excellent	0.3960	No
G4	Light yellowish	6.8	Good	Good	0.3860	No

RESULT

Herbal gel was prepared and evaluated. From the result it is clear that all the gel formulation shows good gelling property and homogeneity. The pH of all formulations was in the range compatible with normal pH range of the skin. The drug content released

was also above average. The rheological behaviors of the gel formulations were also studied with **Brookfield viscometer**. The results indicated the viscosity of gel formulations was consistent neither too thick nor too thin. A comparative study of viscosity and spreadability showed that with the increase in the viscosity of formulation, the spreadability decreased and vice versa. Thus the gel formulation **G2** has all the desirable properties that must be present in an ideal gel formulation.

Fig. Evaluation parameters

CONCLUSION

Anti-arthritic gel containing different concentration of the **bhokar**, **akarkara** leaves extract was successfully developed. The developed gel showed good **consistency**, **homogeneity**, good skin feel, and left a soothing trail on the applied skin surface. It exhibited a good drug release of more than **99 %** in less than **2h**.The prepared topical herbal gel is a simple, easily formulated, convenient and economical alternative that needs to be weighed in the treatment of **rheumatoid arthritis**.

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