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 carbopol-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

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: Carbopol-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.

Formulation of Herbal gel:
The each plant drug extract in different concentration was added with constant stirring in gel base. Get 4ml of permeation 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.

<table>
<thead>
<tr>
<th>Role</th>
<th>Carbapol-934</th>
<th>Anacyclus pyrethrum extract</th>
<th>Cardio dichotoma extract</th>
<th>P peppermint oil</th>
<th>Propylene glycol</th>
<th>Sodium benzoate</th>
<th>Triethanolamine</th>
<th>Glycerin</th>
<th>Distilled water</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>1gm</td>
<td>3ml</td>
<td>3ml</td>
<td>4ml</td>
<td>----</td>
<td>1gm</td>
<td>0.5ml</td>
<td>5ml</td>
<td>50ml</td>
</tr>
<tr>
<td>G2</td>
<td>1gm</td>
<td>4ml</td>
<td>4ml</td>
<td>----</td>
<td>4ml</td>
<td>1gm</td>
<td>0.5ml</td>
<td>5ml</td>
<td>50ml</td>
</tr>
<tr>
<td>G3</td>
<td>1gm</td>
<td>3ml</td>
<td>3ml</td>
<td>4ml</td>
<td>----</td>
<td>1gm</td>
<td>0.5ml</td>
<td>5ml</td>
<td>50ml</td>
</tr>
<tr>
<td>G4</td>
<td>1gm</td>
<td>4ml</td>
<td>4ml</td>
<td>----</td>
<td>4ml</td>
<td>1gm</td>
<td>0.5ml</td>
<td>5ml</td>
<td>50ml</td>
</tr>
<tr>
<td>Role</td>
<td>Gelling agent</td>
<td>Anti-arthritis</td>
<td>Anti-arthritis</td>
<td>Permeation enhancer</td>
<td>Permeation enhancer</td>
<td>Preservative</td>
<td>Ph balance</td>
<td>Clearing agent</td>
<td>Vehicle</td>
</tr>
</tbody>
</table>
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 $1000 \text{ gm}$ 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.

$$S = \frac{W \times L}{t}$$

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.

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.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Ph</th>
<th>Washability</th>
<th>Spreadability</th>
<th>Viscosity</th>
<th>Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1  Dark yellowish</td>
<td>6.9</td>
<td>Good</td>
<td>Good</td>
<td>0.3850</td>
<td>No</td>
</tr>
<tr>
<td>G2  Transparent yellowish</td>
<td>7.1</td>
<td>Excellent</td>
<td>Excellent</td>
<td>0.3885</td>
<td>No</td>
</tr>
<tr>
<td>G3  Light yellowish</td>
<td>7.3</td>
<td>Good</td>
<td>Excellent</td>
<td>0.3960</td>
<td>No</td>
</tr>
<tr>
<td>G4  Light yellowish</td>
<td>6.8</td>
<td>Good</td>
<td>Good</td>
<td>0.3860</td>
<td>No</td>
</tr>
</tbody>
</table>

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.

CONCLUSION

Anti-arthritis 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.

ACKNOWLEDGMENT

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REFERENCE