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Formulation and Evaluation of Anti-inflammatory Gel

Pratyush Jain, Anjana Bhardwaj, Alok Pal Jain*

Sarvepalli Radhakrishnan University, Bhopal (M.P.) India

ABSTRACT

The current study has been undertaken with the aim to formulate and evaluate the etoricoxib gel containing *Buchanania lanzan* extract. The gel formulation was designed by using etoricoxib, menthol, linseed oil with different polymers in the composition of gel. Formulated gel was evaluated in terms of various physicochemical parameters, pH, viscosity and spreadibility. Further formulated gel was investigated for anti-inflammatory activity by using Carrageenan-induced rat paw edema method. The obtained findings state that formulated gel is the suitable choice for the treatment of inflammation and such other indications.

Keywords: Inflammation, Gel, Herbal, Formulation

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***Address for Correspondence:**

Dr. Alok Pal Jain, Sarvepalli Radhakrishnan University, Bhopal (M.P.) India

INTRODUCTION

Inflammation is an essential response provided by the immune systems that ensures the survival during infection and tissue injury. When an inflammation occurs in your body, many different immune system cells may be involved. They release various substances, known as inflammatory mediators. These include the hormones bradykinin and histamine. They cause the small blood vessels in the tissue to become wider (dilate), allowing more blood to reach the injured tissue. For this reason, inflamed areas turn red and feel hot. A drug or substance that reduces inflammation (redness, swelling, and pain) in the body. Anti-inflammatory agents block certain substances in the body that cause inflammation. They are used to treat many different conditions. An effective anti-inflammatory drug should be able to inhibit the development of inflammation without interfering in normal homeostasis. [1, 2]

A gel is a solid or semisolid system of at least two constituents, consisting of a condensed mass enclosing and interpenetrated by a liquid. A gel, in its solution form, requires a specific concentration of polymer to increase the viscosity of the gel. During the gel formation, swelling occurs as a result of solvent penetration causing the polymer network to stretch and hold its shape and entwine the drug particles in them.[3, 4] Topical application of gel overcomes the problems to be associates with other dosage forms. Hence a study on formulation and evaluation of gel with a potential drug etoricoxib was selected as the principle object of present investigation with plant extract.

MATERIALS AND METHOD

Collection of Etoricoxib and other drug sample

The drugs etoricoxib, menthol and linseed oil were received from Rouzel Pharma, Chandigarh as gift sample.

Preparation of aqueous extract of plant drug

The collected leaves parts were washed with tap water. The leaves were prepared in to small pieces and air-dried thoroughly under shade for 15 days. The shade dried materials were converted into moderately coarse powder. 50g of powdered material of *Buchanania lanzan* was taken in beaker having 2 L capacities and 500 ml of distilled water was added, soaked for 48 h with occasional shaking and stirring. The soaked material of plant was filtered through several layers of muslin cloth one by one for coarse filtration. The filtered extracts were concentrated under reduced pressure. Obtained semi-solid mass was stored in a refrigerator until use.

Formulation of gel

Gel was prepared by cold mechanical method. Required quantity of polymer (HPMC) was weighed and it was sprinkled slowly on surface of purified water for 2 hrs. After which it was continuously stirred by mechanical stirrer, till

the polymer soaked in the water. Triethanolamine was added with continuous stirring to neutralize the gel and it maintains the pH of the gel. Then the appropriate quantity of DMSO (Dimethyl sulfoxide) was added to the gel, which behaves as the penetration enhancer, followed by the required quantity of methyl paraben as a preservative. Finally the drug Etoricoxib, Menthol, Linseed oil and aqueous extract of *Buchanania lanzan* were added to the gel with continuous stirring till all the ingredients get dispersed in gel completely.[5] The formula of herbal gel is given in table 1.

Table 1 Composition of Etoricoxib Herbal Gel (EHG)

S.N.	Ingredients	Qty
1	Etoricoxib	1%
2	Menthol	1%
3	Linseed oil	1%
4	Standardized Extract of *Buchanania lanzan*	1%
5	HPMC	2%
6	DMSO	2%
7	Triethanolamine	1.5%
8	Methyl Paraben	0.5%
9	Methanol-Water mixture	Q.S.

Evaluation of gel

Formulated gel was evaluated in terms of various physicochemical parameters, pH, viscosity and spreadibility.[6-8]

Animals and treatment protocol

Albino Wister rats (100-150 g) of either sex are used in the present studies. The animals were fed with standard pellet diet and water ad libitum. The experimental protocols were approved by Institutional Animal Ethics Committee. The grouping of animals was done as per the following;

Group I: Control (Received gel base only)

Group II: Standard Drug (Piroxicam gel)

Group III: Formulated etoricoxib herbal gel

Determination of anti-inflammatory activity of formulated herbal gel by Carrageenan-induced rat paw edema method

The anti-inflammatory activity of the formulated gel was evaluated in wistar rats. The control, standard and treated group were topically applied with gel base, standard gel and formulated etoricoxib herbal gel 2% respectively. The acute inflammation was induced by the sub-plantar administration of 0.1 ml of 1% carrageenan in the right paw. Paw volume was calculated by using digital plethysmometer before administration of carrageenan and after 1, 2, and 3 hrs intervals.[9, 10] The efficacy of formulated herbal gel was tested on its ability to inhibit paw edema as compared to control group.

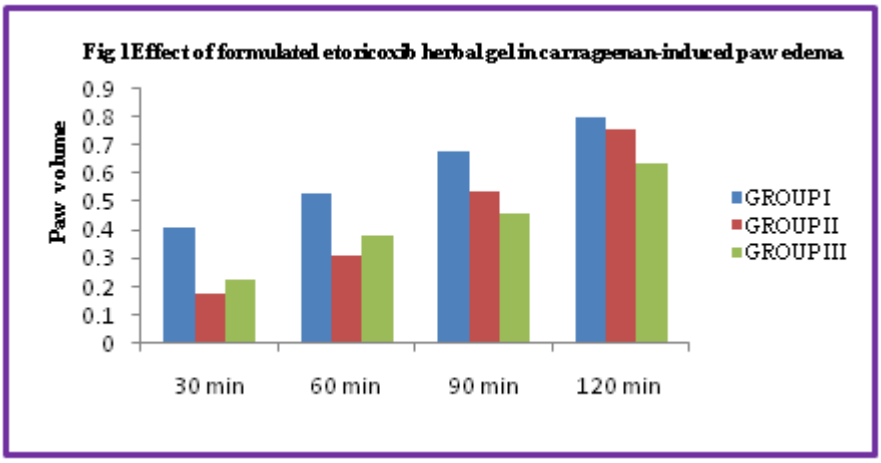
Volume of edema = Final Paw Volume - Initial Paw Volume

RESULTS AND DISCUSSION

Formulated herbal gel was found light brown colour with smooth consistency. The pH of formulated herbal gel was found 5.8 and maintained throughout the study. Viscosity and spreadibility were also found 23800 cps and 18.8 g/sec respectively. All the results were shown in table 2. The effect of formulated gel preparation was on carrageenan induced paw edema in rats were shown in Table and Figure. The control group was compared with standard and formulated etoricoxib herbal gel as per statistical analysis. The formulated herbal gel has been shown significant ($p<0.05$) effect after 2 h of drug administration. Paw size in control group was found 0.41 ± 0.2, 0.53 ± 0.1, 0.68 ± 0.2, 0.80 ± 0.5 in mm after 30, 60, 90 and 120 minutes respectively where as standard group was found 0.18 ± 0.05, 0.31 ± 0.2, 0.54 ± 0.1, 0.76 ± 0.2 in mm after 30, 60, 90 and 120 minutes respectively. The etoricoxib herbal gel group III was found 0. 23 ± 0.2, 0.38 ± 0.4, 0. 46 ± 0.2, 0.64 ± 0.15 paw size in mm after 30, 60, 90 and 120 minutes respectively. The findings were shown in fig 1.

Table 2 Evaluation Parameters of Formulated Herbal Gel

Colour	Light brown
Consistency	Smooth
pH	5.8
Viscosity (cps)	23800
Spreadibility g/sec	18.8



CONCLUSION

The findings presented in this study demonstrate that *Buchanania lanzan* leaves extract in the form of gel possess significant topical anti-inflammatory properties, supporting their conventional use for the treatment.

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