RESEARCH ARTICLE

Formulation and Evaluation of Herbal Gel of *Alhagi Camelorum* with its Anti-inflammatory Activity

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ABSTRACT

This paper emphasizes the anti-inflammatory effects of *Alhagi Camelorum.* Most of the diseases are caused by a continuous swelling, including cancer. There is hence a need to neutralize inflammation. *A. Camelorum*, a medicinal plant, has been historically utilized as a remedy in Ayurveda and other systems of folk medicine. Thus, several techniques were utilized by Wister rats to examine *A. Camelorum* anti-inflammatory properties. The plant material was crushed into a coarse powder in a grinder after drying and stored at a room temperature for further investigation. The powdered plant material of *A. Camelorum* was subjected to successive solvent extraction (hexane, petroleum ether, chloroform, and methanol) in soxlet extraction method. Different extracts were analyzed using a traditional procedure to evaluate the various physicochemical properties. The HPTLC report is included to the file. It was discovered that the methanol and chloroform drug extract contained flavonoids (good anti-inflammatory properties) when quercetine was used as a marker. Topical gel of methanol and chloroform drug extract of *A. Camelorum* were prepared with Carbopol 934, hydroxypropyl methylcellulose (HPMC) and carboxymethyl cellulose. These gel formers have been created, tested, and gel chosen, which showed good propagation and consistency, to get the right consistency of the gel formulation. Gel containing methanol drug extract FM2 and FM10 formulation showed highest *in-vitro* release which were selected and subjected to carrageenan induced rat paw edema method. Our study reveals the anti-inflammatory effects of methanol extract of *A. Camelorum* were found to be significant.

Keywords: *Alhagi Camelorum*, Anti-inflammatory, Flavonoids, Herbal plant.

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INTRODUCTION

The use and manufacture of various natural components in the creation of medicines in treating the awful diseases that stop us living is extremely important in medicinal plants.[1] In recent decades, pharmaceutical companies have significantly expanded as medicinal plants globally become increasingly essential. This plant has a significant medicinal significance for ayurveda due to its healing properties. Properties are presented aphrodisiac, antipyretic, laxative and diuretic.[2,3] It can eliminate this large quantity of fat and address the health issues of the brain. It's also great to use the herb for battery healing. It also helps to cure a number of other ailments, including hermicrania, leprosy, and opacity of the cornea. As of late, this image has begun to change once more. Natural medications, for instance, expanded from 1990 to 1997 by 380% of the whole US populace (with an overall 1-year recurrence of 2.5 to 12.1 percent.[4] A new US overview showed that 16.4% of patients in the home used home grown medication.[5]

Microorganisms, infections, or parasites regularly infiltrate the body, abide in certain tissues as well as course through the blood.[5] Inflammation may likewise be brought about by cycles of cell misfortune, infection, ischemia and degeneration. It is likewise conceivable to cause aggravation.[6] Inflammation grows generally through the innate safe reaction and versatile resistant reaction.[7]

Prostaglandin (PG) E2 is maybe the most explored PG with human and physiological conditions.[8-10] Prostaglandins are one of the essential provocative activity macromolecules as they are altogether expanded during amalgamation by irritation.[11,12] Differences in PGE2 action, on the other hand, are identified with states of pathology, for example, incendiary infections and unusual internal heat level changes and colorectal disease. Arachidonic corrosive from cell layer phospholipids delivering phospholipase A2 starts with the

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pathway of production of PG (PLA2).[13,14] Arachidonic acid is converted into PG by a cycloogygenase enzyme (COX). The usage of steroid (corticosteroids) or non-aspirin medications is often used for the treatment of pain and inflammatory diseases. Allergic responses, occasional hearing loss or renal failure comprise a series of severe side effects. Changing the platelet function increases the risk of bleeding (National Innovation foundation, India) The plants were an important source of a variety of organic goods Active compounds have been widely used for many ailments for thousands of years, including raw inflammation and purely isolated molecules.[15,16]

MATERIAL AND METHODOLOGY

Collection, Identification and Authentication of Plant Specimens

The *Alhagi Camelorum* plant was harvested during the month of August 2018 at Kurukshetra, Haryana, India. Dr. Sunita Garg, Emeritus Scientist, CSIR-NISCAIR, validated the identification of the species. Ex D.C., *Alhagi mauroram*, often referred to as Camel Thorn, Persian Manna Plant, Jawasa and Bharbharra, was determined to be compatible with the sample submitted at RHMD (Raw Material and Herbarium Museum, Delhi).

A. Camelorum's aerial section has been washed, cleaned and dried six days. The plant material was mixed into a coarse powder after the drying and kept for further investigations at room temperature.

Physicochemical Evaluation

A conventional method of determining the physicochemical characteristics like acid insoluble ash, water soluble ash and swelling index was used to assess *A. Camelorum* powdered plant material (Table 1).

Preparation of Crude Extract

The progressive extraction of non-polar to polar resolvents by means of a variety of solvents such as hexane, petroleum ether, chloroform and methanol was used to extract the dry powder from aerial plants. Extraction took 72 hours for each solvent at 40–45°C. Hexane were then employed in extraction then with petroleum ethers and subsequently with chloroform and methanol. After extraction was finished for further examination, the solvent was evaporated, and the residue was maintained in a desiccator.[17]

Phytochemical Screening of Extract

The extract was submitted to phytochemical checks on several medicinal component classes in *A. Camelorum*. Different test of identification of phytochemical constituents were performed to identify the active constituents present in the drug extracts.

Total Flavonoid Content

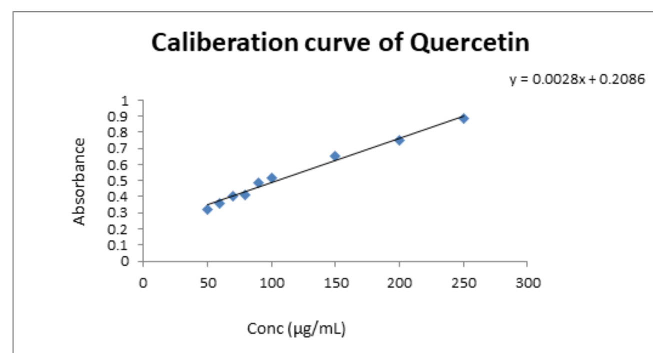
The total of flavonoid content of different extracts of hexane, petroleum ether, chloroform and methanol extract were determined using a modifying AlCl3 method. Each extract (0.25 mg) was dissolved in water (1.25 mL), then 5% NaNO3 (75 mL) was added, and the solution was mixed. The mixture was kept in a dark place for 6 min, then 10% AlCl3 (150 mL) was added to each test tube and kept again for 5 min in a dark place. Finally, 5% NaOH (0.5 mL) and water (0.275 mL) were added to each working test tube. The absorbance of each test tube was measured at 510 nm using a UV-visible spectrophotometer. Quercetin was used as standard for the determination of total flavonoids content. The determination of total flavonoids content in the crude extracts was carried out in triplicate and the results were averaged. For the calculation of total flavonoid content, the following formula was used:[18]

$$X = A \times m_o / A_O \times m$$

where

X- Amount of flavonoids in mg/gm plant extract,
A - Absorption of crude extract,
Ao - Absorption of standard,
m - Mass of extract in mg,
m_o - Mass of quercetin in mg.

It has been observed that when quercetin is employed as a marker, medication extract includes flavonoids. It is the same as conventional medicines.



HPTLC Analysis

Samples have been examined at the Govt Approved Test House on the subject of 'ARBO private pharmaceutical limited (analytical division).' Sample Quantity (75 mg) and Method Utilized Was API it was based on a typical HPTLC chromatogram fingerprint pattern. It has been observed that when quercetin is employed as a marker, medication extract includes flavonoids. The same as normal medication has been found.[19,20]

Table 1: Physichochemical evaluation of *A. Camelorum*

Parameters % w/w	*Hexane drug ext*	*Pet. Ether drug ext*	*Chloroform drug ext*	*Methanol drug ext*
Ash value -	7.02	7.13	7.06	7.05
Swelling index	0.014	0.13	0.16	0.15
Water soluble ash	3.92	3.94	4.23	4.61
Acid insoluble ash	1.83	1.84	1.88	1.87

Formulation and Optimization of Herbal Gel

Carbomer 934, HPMC and Carboxy Methyl cellulose sodium were used as viscosity enhancer and optimised for herbal gel formulation. Gel was prepared containing chloroform and methanol drug extract according to the formula given in Tables 2 and 3 respectively with different polymers in varying concentrations.

Polymers has been distributed with constant stirring in 50 mL of distilled water. Then a 5 mL methyl paraben was dissolved by water bath heating. Then the solution can be cooled and propylene glycol 400 added. In addition, different medicinal extracts (chloroform and methanol extract) were mixed correctly into gel bases Triethanolamine was then added in order to preserve the pH 6.8–7.0 and provide the necessary uniformity. This procedure was performed as control sample without drug extract.

***In-vitro* Evaluation of Herbal Gel**

Extrudability

To determine extrudability a closed collapsible tube containing formulation was pressed firmly at the crimped end. When the cap was removed, formulation extruded until the pressure dissipated. Weight in grams required to extrude a 0.5 cm ribbon of the formulation in 10 seconds was determined. The average extrusion pressure in g was reported.

pH

1.0 g gel was accurately weighed and dispersed in 100 mL purified water. The pH of the dispersion was measured using digital pH meter, which was calibrated before use with standard buffer solution at 4.0, 7.0 and 9.0. The measurements of pH were done in triplicate and average values were calculated.

The pH of the formulation was determined in order to be sure that the formulation can be used without the risk of irritancy to the skin. The pH was found to be 6.6 ± 0.5 for gel which was very near to the neutral pH, thus the formulation can be used without the risk of irritancy to the skin. This also indicated that the selected ingredients of the formulation did not alter the pH of the formulation.

Viscosity

Viscosity of gels was determined using Brookfield viscometer (Spindle type S-24 at 30 rpm) 200 g gel was taken in a beaker and the spindle was dipped inside it for about 5 minutes then reading was taken.

Spreadability

One of the criteria for a topical formulation to meet the ideal qualities is that it should possess good spreadability. It is the term expressed to denote the extent of area to which formulation readily spreads on application to skin or affected part. The therapeutic efficacy of a formulation also depends upon its spreading value. To determine the spreadability of formulation, 0.5 g of gel was placed within a circle of 1-cm diameter pre-marked on 7.5 cm long a glass slide, over which a second glass slide was placed. A 20 g weight was slide over the upper to 7.5 cm and then separated away from the lower

Table 2: Composition of gel containing chloroform drug extract

S.no	*Ingredients*	*FC1*	*FC2*	*FC3*	*FC4*	*FC5*	*FC6*	*FC7*	*FC8*	*FC9*	*FC10*	*FC11*	*FC12*
1	Carbopol 934 (g)	1	1.5	2	2.5	-	-	-	-	-	-	-	-
2	HPMC	-	-	-	-	1	1.5	2	2.5	-	-	-	-
3	carboxymethyl cellulose	-	-	-	-	-	-	-	-	1	1.5	2	2.5
4	Chloroform Drug Extract	2	2	2	2	2	2	2	2	2	2	2	2
5	Methyl paraben	0.5	0.5	0.5%	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6	Propylene glycol 400	5	5	5	5	5	5	5	5	5	5	5	5
7	Triethanolamine (q.s.) to maintain pH 7	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s
8	Purified water q.s .to	100	100	100	100	100	100	100	100	100	100	100	100

*FC- Formulation containing chloroform drug extract from 1 to 12

Table 3: Composition of gel containing methanol drug extract

S. No	*Ingredients*	*FM1*	*FM2*	*FM3*	*FM4*	*FM5*	*FM6*	*FM7*	*FM8*	*FM9*	*FM10*	*FM11*	*FM12*
1	Carbopol 934 (g)	1	1.5	2.5	3	-	-	-	-	-	-	-	-
2	HPMC	-	-	-	-	1	1.5	2	2.5	-	-	-	-
3	Carboxymethyl cellulose	-	-	-	-	-	-	-	-	1	1.5	2.5	3
4	Methanol Drug Extract	2	2	2	2	2	2	2	2	2	2	2	2
5	Methyl paraben	0.5	0.5	0.5%	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6	Propylene glycol 400	5	5	5	5	5	5	5	5	5	5	5	5
7	Triethanolamine (q.s.) to maintain pH 7	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s
8	Purified water q.s .to	100	100	100	100	100	100	100	100	100	100	100	100

*Formulation Containing Methanol Drug Extract
*FM- Formulation Containing Methanol Drug Extract From 1 To 12

Table 4: Groups and dose in Carrageenan induced rat paw edema method

S. No	*Group*	*Gel composition and dose received*
1	Control group	Received 2 g sod. Cmc. (gel base only)
2	Treated group FM2	Received 2 g drug extract with Carbopol base
3	Treated Group FM10	Received 2 g drug extract with sodium CMC base
4	Standard drug group	Received 2 g standard diclofenac with CMC base

side and time taken for the seperation was noted down. The spreadability was calculated by

$$S = M.L / T$$

Where,

S = Spreadability

M = Weight tide to the upper slide

L = Length of a glass slide

T = Time taken to separate the slide completely from each other.

Homogeneity

All developed gels were tested for homogeneity by visual inspection after the gels have been set in the container.

In-vitro Diffusion Study

Only three formulations have been chosen for the future investigation due to the aforesaid characteristics.

The Franz diffusion cell was used to conduct *in vitro* diffusion tests for all three formulations. The addition of these additives had little or no impact on the dispersion of the gel, with the exception of the methanol and chloroform formulation. As a dialysis membrane, standard cellophane membrane was used. 1–2 gm sample was place in donor compartment in phosphate buffer pH 7.4 which was placed in water bath to maintain the temperature at 37°C. Following each withdrawal at regular interval up to 240 minutes and analyzed in UV spectrophotometer. The proportion of cumulative release was calculated. The time interval (in minutes).

Pharmacological Screening

In-vitro Anti-inflammatory Study of Gel

In vitro anti-inflammatory studies were performed on selected gel formulations using percentage inhibition of albumin denaturation method and percentage inhibition of heat induced haemolysis of erythrocyte.

Inhibition of Albumin Denaturation

The suppression of albumin denaturation approach followed by several changes examined the anti-inflammatory efficacy of *A. Camelorum.* 1 percent Bovine serum albumin with 1g FM2 and FM2 and FM10 gel has been taken. pH was adjusted with the little quantity of 1 N HCl. The extract was kept at 37°C for 20 minutes, then heated for 20 minutes to 51°C. The sample was then chilled and turbidity at 660 nm was measured (UV visible spectrophotometer). The test was conducted three times for results accuracy.

The protein denaturation percentage inhibition was determined as follows:

$$\text{Percentage inhibition} = (\text{Abs control} - \text{Abs sample}) \times 100 / \text{Abs control}$$

Heat-induced Haemolysis

A 1-mL test sample of various concentrations from a reaction combination was performed for 100–500 μg/mL and 10 percent RBC 1-mL. As a conventional medication, diclofenac was utilised. All reaction mixture tubes were incubated for 30 minutes in water baths at 56°C. Then, under flowing tap water, tubes were allowed to cool. All the response combination tubes were centrifuged for 5 minutes at 2500 rpm and spongy at 560 nm (UV Spectrophotometer). The analyses were acted in sets of three. Rate hindrance of Haemolysis was determined as follows:

$$\text{Percentage inhibition} = (\text{Abs control} - \text{Abs sample}) \times 100 / \text{Abs control}$$

Acute Toxicity Studies

In acute toxicity studies, the short-term detrimental effect of a drug on mammalian species is evaluated based on a single or multiple dosage within 24 hours. Mortality is the main observer goal for the study of acute animal toxicity (i.e., rats). Both groups were chosen for the Acute Toxicity Studies (FM2 Gel and FM10 Gel). It resulted in their being safe. The dose was given to rats depending on the weight of the body. The animals were carefully observed in the first 30 minutes, then for four hours. Food was provided after 1–2 hours of dosing. After survival of the treated mouse, 4 additional rats were given the same dose under similar conditions. For any harmful consequence within 6 hours, for 7 days, 14 days and 21 days at frequent intervals, both groups were strictly observed. Surviving animals were observed to evaluate the start of adverse reactions.

Skin Irritation Studies

Animals were divided into 2 groups of 3 animals each for skin irritation studies. Hairs were depleted from the back of rats with the help of depilatories and area of 4 cm^2 was marked on both sides. One side served as control while other as test. After hair depletion 1-gm gel was applied (200 mg/gm gel). Observed it for seven days.

A - No reaction,

B - Slight, patchy erythema,

C - Slight but confluent or moderate but patchy erythema,

D - Moderate erythema,

E - Severe Erythema with or without Edema

Anti-inflammatory Activity

Carrageenan Induced Rat Paw Edema Model

Carrageenan induce rat paw edema method was used to evaluate the anti- inflammatory activity of present formulations. 0.1-mL carrageenan was induced from 1% freshly prepared

suspension of carrageenan in the sub planter right hind paw of rats (Huang G. J, Haung S, S., *et al*.). This method required minimal instrument and this method is highly predictive for anti-inflammatory activity. The dose of most NSAIDs was correlated with this model of anti-inflammatory activity.

Wister rats were taken and divided into four groups with 6 rats in each. First group received 2 g gel base only with no inflammation. The second group was inflamed by carrageenan and treated with FM2 formulation. Third group was inflamed by carrageenan and treated with FM10 formulation, and fourth group was inflamed carrageenan and treated with standard drug diclofenac.

All formulations were tested with the use of carrageen-induced paw edema for anti-inflammatory efficacy. The carrageenan paw edema is considered a sensitive approach for the investigation of non-steroidal anti-inflammatory medicinal products and exhibits biphasic responses ascribed to each mediator. In phase one hyperemia is mainly the result of histamine and serotonin release around 2 hours after carrageen injection, however in phase two prostaglandins and bradykinins are mobilized. The edema attained its maximum thickness four hours after administration of the stimuli. Topical gel formulas for *A. Camelorum* were best studied when methanol extract levels were employed and FM2 and FM10 formulae showed the same findings. *A. Camelorum* extract has been shown to have an anti-inflammatory effect.

RESULT AND DISCUSSION

Physical chemical evaluation of *A. Camelorum* were performed shown in Table 1. crude aerial parts crude powdered and extracted using soxhlet apparatus. successive extraction were performed from nonpolar solvent hexane then petroleum ether subsequently with chloroform and methanol. different extracts obtained what subjected to phytochemical screening. Test of identification showed that alkaloids were present in all the four extracts and flavonoids were present in chloroform and methanol extracts.

For further confirmation of flavonoids the methanol and chloroform drug extract were sent for HPTLC study (Arbro labs private limited New Delhi). HPTLC report confirm the presence of flavonoid in both extracts as RF value off methanol drug extract 0.32 and chloroform drug extract 0.33 were reported which is compatible to standard (quercetin used as marker) with 0.34 RF value shown in Figures 1, 2, and 3.

Based on phytochemical identification test and HPTLC report these 2 extracts that is methanol and chloroform drugs extracts were selected for formulation of herbal gel Tables 2, 3 and 4. The flavonoid content was found to be 94.12 µg/gm in methanol extract and 82.6 µg/gm in chloroform drug extract, respectively (Table 5).

Formulations prepared (Table 2 and 3) were subjected to *in vitro* evaluation studies Table 6. FC2, FC7 and FC10 (formulation with chloroform drug extract) and FM2, FM7 and FM10 (formulation containing methanol drug extract) were selected for further study as they had good consistency, spreadability and homogeneity shown in Table 7.

In vitro diffusion study of selected formulations of methanol and chloroform drug extracts shown in Table 8 and 9. It was observed that FM2 and FM10 formulation showed

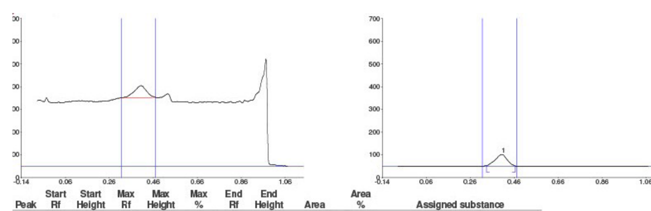


Figure 1: Track 1, ID: Methanol extract

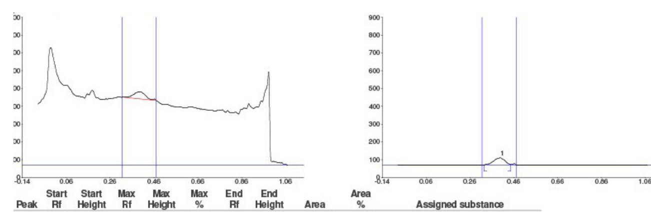


Figure 2: Track 3, ID: Chloroform extract

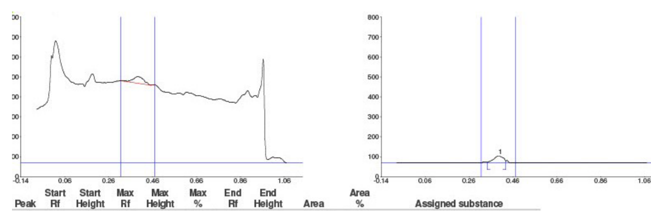


Figure 3: Track 6, ID: STD

Table 5: Total flavonoid contents.

S. No	*Drug extract*	*Flavonoid content in aerial parts (µg/gm)*
1	Water	54.1
2	Chloroform	82.60
3	Methanol	94.12

Table 6: Evaluation parameters for methanol gel extract

S. No	*Parameters*	*FC1*	*FC2*	*FC3*	*FC4*	*FC5*	*FC6*	*FC7*	*FC8*	*FC9*	*FC10*	*FC11*	*FC12*
1	pH	6.3	6.4	6.8	6.7	6.4	6.5	6.7	6.6	6.3	6.4	6.6	6.7
2	Extrudability	+	+++	++	+	++	+++	+	++	++	+++	++	++
3	Spreadability (gm cm/sec)	36.13	24.36	21.35	17.56	35.41	25.34	23.23	19.24	33.52	22.31	20.31	16.24
4	Viscosity (cps)	33160	45130	51230	55420	30130	42150	48530	51745	32530	441230	49350	53120
5	Homogeneity	+	+++	++	+	++	+++	++	++	+	+++	++	++

+++ Very good, ++ good, + satisfactory

Table 7: Evaluation parameters for methanol gel extract

S. No	*Parameters*	*FC1*	*FC2*	*FC3*	*FC4*	*FC5*	*FC6*	*FC7*	*FC8*	*FC9*	*FC10*	*FC11*	*FC12*
1	pH	6.3	6.4	6.8	6.7	6.4	6.5	6.7	6.6	6.3	6.4	6.6	6.7
2	Extrudability	+	+++	++	+	++	+++	+	++	++	+++	++	++
3	Spreadability (gm cm/sec)	36.13	24.36	21.35	17.56	35.41	25.34	23.23	19.24	33.52	22.31	20.31	16.24
4	Viscosity (cps)	33160	45130	51230	55420	30130	42150	48530	51745	32530	441230	49350	53120
5	Homogeneity	+	+++	++	+	++	+++	++	++	+	+++	++	++

+++ Very good, ++ good, + satisfactory

Table 8: *In-vitro* release study of gel containing methanol drug extract

Time	*FM2 (%)*	*FM7 (%)*	*FM10 (%)*
15	15.41	10.21	15.11
30	29.31	15.32	27.87
45	33.12	21.21	32.82
60	44.53	30.32	43.18
90	54.01	41.12	56.43
120	62.89	49.22	60.25
180	73.21	58.31	74.28
240	78.42	62.75	77.98

Table 9: *In-vitro* percentage drug release study of gel containing chloroform drug extract

Time	*FC2*	*FC7*	*FC10*
15	5.17	6.41	8.43
30	8.89	10.25	12.62
45	17.91	18.68	19.81
60	25.41	25.23	28.23
90	34.62	38.32	44.58
120	47.43	47.72	51.24
180	48.85	48.81	56.17
240	49.63	49.12	61.81

Table 10: Effect of Methanol drug extract on inhibition of albumin denaturation

S. No	*Sample*	*Absorbance at 660 nm*	*%Inhibition*
1	Control	0.372	-
2	ADFM2	0.131	64.36
3	ADFM10	0.180	50.82
4	Diclofenac gel	0.136	63.44

Table 11: Effect of methanol drug extract on heat induced haemolysis of erythrocyte

S. No	*Sample*	*Absorbance at 660 nm*	*%Inhibition*
1	Control	0.354	-
2	RHFM2	0.115	67.51
3	RHFM10	0.160	53.88
4	Diclofenac gel	0.125	64.68

Table: 12 Acute toxicity studies

				Mortality			
S. No	*Treatment*	*Dose mg/ kg*	*No. of animals*	*7 Days*	*14 days*	*21 days*	*Toxicity profile*
1	FM2 Gel	2000	5	0	0	0	Safe
2	FM10 GEL	2000	5	0	0	0	Safe

Table 13: Skin irritation studies

S. No	*Treatment*	*1 day*	*2 days*	*3 days*	*4 days*	*5 days*	*6 days*	*7 days*
1	FM2 gel	A	A	A	A	A	A	A
2	FM10 gel	A	A	A	A	A	A	A
3	Diclofenac gel	A	A	A	A	A	A	A

highest 78.42% and 77.98% drug release whereas chloroform drug extracts FC2, FC7 and FC10 showed 49.63%, 49.12% and 61.81%, respectively.

FM2 and FM10 gel was selected for *in vitro* and *in vivo* anti-inflammatory study. Percentage inhibition of albumin denaturation of FM2 gel with 64.36% which is higher than standard diclofenac gel with 63.44% (Table 10). Percentage inhibition of heat induced haemolysis of FM2 gel (ADFM2) was 67.51 % which was found to be highest than standard drug diclofenac gel with 64.68% (Table 11).

Acute toxicity studies were performed for FM2 and FM10 gel with 2000mg/kg dose (Table: 12) were found to be safe.

The prepared herbal gels were evaluated for its skin irritation effect, where no erythema or edema was observed for both FM2 and FM10 gel (Table 13). After 7 days of studies, indicating that the prepared herbal gels formulation was found to be safe.

For anti-inflammatory study carrageenan induced rat model was selected (Table 12). It was found that FM2 gel showed 48.21% reduction in paw edema than FM10 gel with 24.41%. Fm2 gel was found to be suitable for local anti-inflammatory actions as it showed more reduction in paw edema than standard drug (Table 14).

CONCLUSION

In recent decades, the business has developed significantly because of the rising interest in using medicinal herbs globally. The drafting of conservation protocols, the rapid multiplication of plants, new transformations experiments, and the identification and development of certain new secondary

Table 14: Percentage reduction of edema in carrageenan induced rat paw oedema method

S. No	Groups	Mean percentage increase in paw weight	% reduction of edema (1 hour)	% reduction of edema (2 hours)	% reduction of edema (3 hours)	% reduction of edema (4 hours)
1	Control group	33.5	0	0	0	0.0
2	Treated group FM2	18.34	22.21	38.31	41.02	48.21
3	Treated Group FM10	25.32	18.61	20.34	22.46	24.41
4	Standard drug group	17.65	21.25	35.45	40.63	47.31

phytoconstituents of high medicinal value would therefore be helpful in the present investigation without depleting natural biodiversity. FM2, FM7 and FM10 demonstrates near excellent herbal gel formulation and optimization for local anti-inflammatory action. Primer discoveries with mitigating *A. Camelorum* home grown gel show they can be utilized for better control. Natural plants are quite possibly the main wellsprings of medication. The clinical offices have been utilized to treat various old diseases due to their openness, accessibility, legacy practice, monetary possibility and saw adequacy. This article will help new and future researchers in additional examination on these essential restorative plants.

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