Formulation and Evaluation of Herbal Anti-Inflammatory Gel Contaning Achyranthes Aspera Leaves Extract

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Abstract
The present study has been undertaken with the aim to formulate and evaluate the anti-inflammatory gel containing Achyranthes aspera leaves extract.The gel formulation was designed by using water extract of leaves of Achyranthes aspera. Topical anti-inflammatory activity of gel was also evaluated. The gel was prepared by using Carbopol 940 (1% w/v), Achyranthes aspera extract propylene glycol, methyl parabene, propyl parabene, tri-ethanolamine, Lavender oil and required amount of distilled water. The prepared gels were evaluated for physical appearance, pH, and spread ability, skin irritation to observe toxicity or side effects and also for anti-inflammatory activity.

1. INTRODUCTION[1,2,]

❖ INFLAMMATION:

It a local response to tissue injury. Any tissue that reacts to cellular injury or injurious agent will cause inflammation. It is a defence mechanism against any agent that comes from outside the body. The term is derived from the Latin "**inflammare**" meaning to **burn**

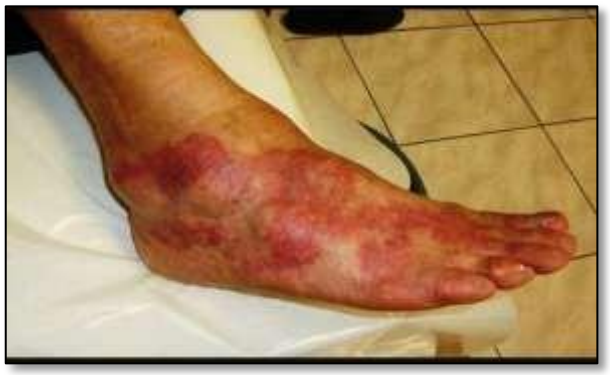

Figure No-1

➢ **Causes of inflammation:**

1] Infective agents - bacteria, viruses and their toxins, fungi.

2] **Immunological agents**- cell-mediated and antigen-antibody reactions.

3] **Physical agents** - heat, cold, radiation, mechanical trauma.

4] Chemical agents - organic and inorganic poisons.

5] Genetic /Metabolic disorder- eg gout**,** diabetes mellitus**…**

➢ **Signs of inflammation:**

- Redness
- Swelling
- Heat
- Pain
- Loss of function

Classificaton of inflammation:

Depending upon the defence capacity of the host and duration of response, inflammation can be classified as:

- Acute Inflammation
- Chronic Inflammation

1] Acute Inflammation – a). Acute inflammation is an immediate and early response to an injurious agent and it is relatively of short duration, lasting for minutes, several hours or few days.

b). It is characterized by exudation of fluids and plasma proteins and the emigration

.

2] Chronic Inflammation - a). Chronic inflammation is a prolonged inflammatory process (weeks or months) where an active inflammation, tissue destruction and attempts to repair are proceeding simultaneously.

❖ **GEL**

Gels are defined assemi-solid rigid in which the movement of the dispersing medium is restricted by three dimensional networko of particles or solvent macromolecule of the dispersrd phase . The word "gel"is derived from **"gelatin"** and "gel" and " jelly "can be drawn back to the latin gelu for "frost" and gel are meaning **"freeze"** and **"congeal."**This origin indicate the essential idea of liquid setting to a solid like materialthat does not flow,but is elastic and retain some liquid characteristics.Use of them "gel" as classification originated during the late 1800as chemist attempted to classify semisolid substance according to their phenomenological characteristics rather than their molecular composition .

➢ **PROPERTIES OF GEL**

1. Ideally, the gelling agent must be inert, safe and cannot react with other formulation constituents.
2. The gelling agent should produce a sensible solid-like nature at the time of storage which is easily broken when exposed to shear forces produced by squeezing the tube, trembling the bottle or at the time of topical application.
3. It should have suitable anti-microbial agent.

4. The topical gel must not be stickily.

➢ **USES OF GEL**

1. As delivery systems for orally administered drugs.
2. For topical drugs applied directly to the skin, mucous membrane or the eye .
3. As long acting forms of drug injected intramuscularly or implanted into the body.
4. As binders in tablet granulation, protective colloids in suspensions, thickeners in oral liquid and suppository hazes.

2. MATERIAL AND METHODOLOGY[4]

1. Achyranthes aspera **:- Family –** Amaranthaceae **Class–** Mangoliophyta **Subclass –** Caryophyllidae **Order –** Caryophyllales **Genus –**Achyranthes **Species –** Aspera

Constituent- Alkaloid, Flavanoid , Terpenoid , Squalene, Amino acid.

Figure No-1

Medicinal Uses:

- It uses as Anti – inflammatory agent
- It used in treatment in asthma, anemia, jaundice and snake bite
- It uses as antihistaminic,diuretics and antisyphlitic.
- It used to treat the piles,fever ,fistula skin and nose infection
- It used in treatment of nightblindness.

2.Lavender Oil :-

Family - Lamiaceae

Class-Mangoliopsida**Subclass-** Asteridae

Order – Lamiales

Genus- Lavandula

Species- Lavandula angustifolia

Location- Jammu and Kashmir

Constituent-Linalool, Linalyl aceatae, Terpene,Camphor

Medicinal Uses:

- It used as Anti -inflammatory
- Reduces mental stress and anxiety
- Treats acne and hair loss
- Aids in treating insomnia

Figure No-3

	Dragendroff's Test	1 ml of test solution taken in test tube + Few drops of dragendroff's dragendro reagent	Reddish brown
	Alkali Reagent Test	1 ml test solution taken in test tube + a drop of NaOH solution + a drop of dilute HCL solution	Intense yellow colour
	Lead Acetate Test	1 ml test solution taken in test tube + Few drops of lead acetate solution, Yellow color formed	Yellow colour Formed
	Test for Terpenoids	1 ml test solution taken in test tube +2 ml chloroform add in test tube +Few drop of conc.sulphuric acid +Shaken and allow stand for some time	Reddish brown color

3. **Test Table :-**

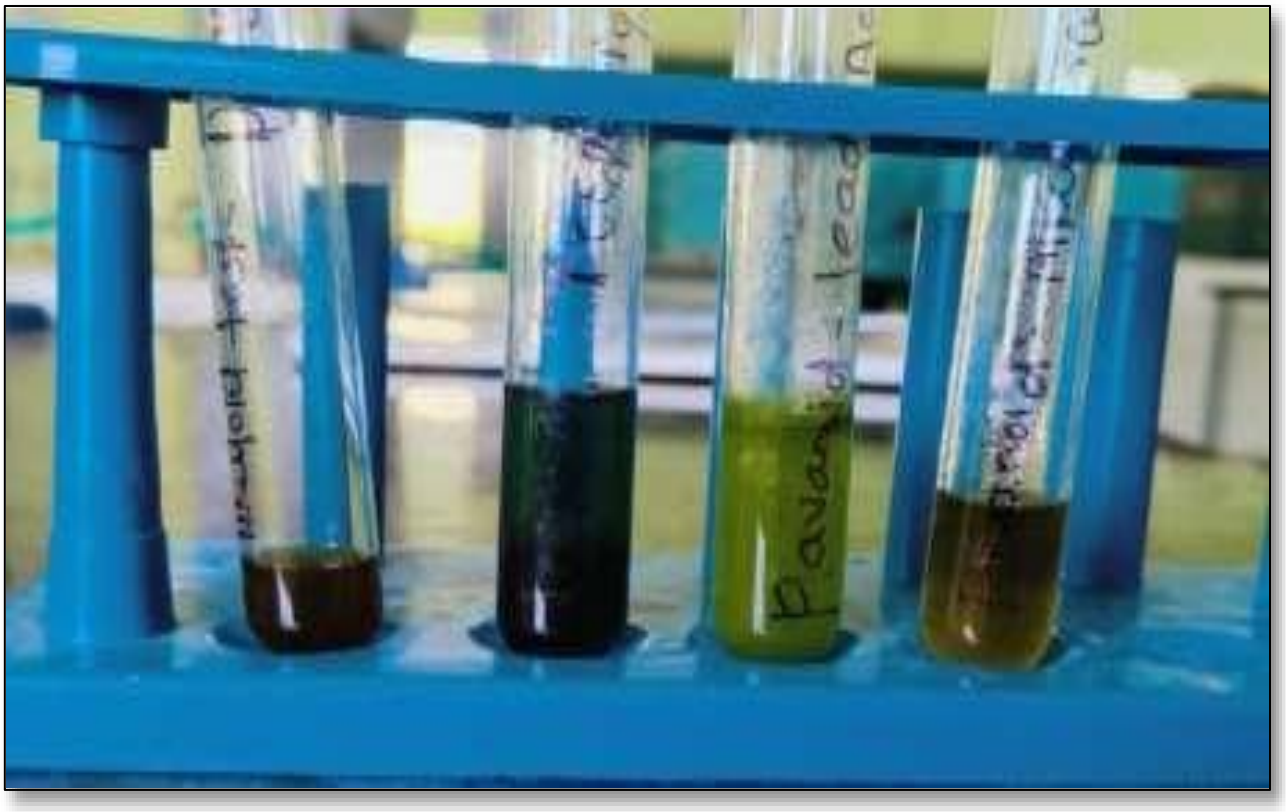

Figure No-4

EXTRACTION METHOD:

Decoction method:[5]

In this process, the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered. This procedure is suitable for extracting water- soluble, heatstable constituents.

The leaves of Achyranthes aspera collected,Washed dried under shade for 4-5 days

↓

The dried leaves grind into fine powdered using electrical grinder and powdered passes through sieve No-80

↓

The 100 gram powdered boiled in 1000 ml distilled water separately in two flasks for 2 h hours

Seven hundred and fifty millilitres of filtrate was obtained which was then filtered using filter paper

11gram solid residue obtained by heating 60°C hot air oven then use preparing gel

Figure No-5

4.EXPERIMENTAL WORK

FORMULATION OF HERBAL GEL

Table No-1

Ingredients	F1	F2	F3	F4	F5
1] A .aspera powder	0.5g	1g	2g	1.5g	2g
2]Carbapol 934	1g	1g	1g	1g	1g
3]Methyl parabene	0.2g	0.2g	0.2g	0.2g	0.2g
4]Propyl parabene	0.2g	0.1g	0.3g	0.4g	0.4g
5] propylene glycol	5ml	5ml	5ml	5ml	5ml
6] Triethanolamine	1.2ml	1.2ml	1.2ml	1.2ml	1.2ml
7] Lavender oil	1ml	1.5ml	1ml	1.5ml	1ml

8] Distilled water	Qs	Qs	Qs	qs	Qs

Procedure -

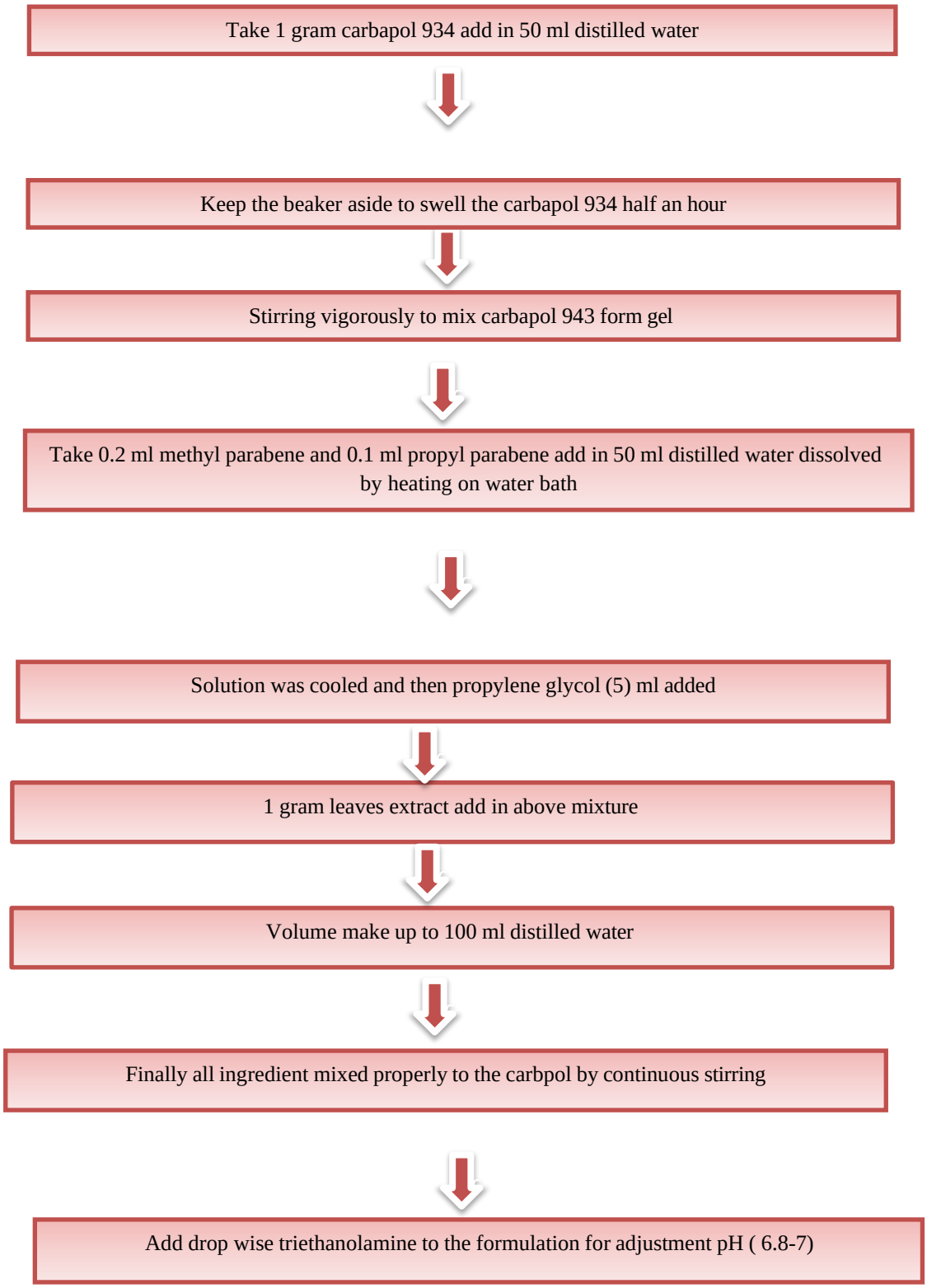

Figure No-6

5. EVALUVATION PARAMETER

1] Physical appearance:

Physical parameters such as appearance and color were checked.[7]

Table No -2

Color	Oduor	Consistency
Dark brown	Pleasant	Semi- solid

2] Microscopic analysis:

The microscopic study by the optic microscope with magnification of 10 & 40 for uniformly gel texture & bubbles.

Figure No-7

3] Clarity of gel:

The clarity of gel was determined by visual inspection.[8] Clarity of gel reported in Table No 3.

Figure No-8

4] Homogeneity:

Gel formulations were tested for homogeneity by visual inspection after the gels have been set in to the container. They were tested for their presence and appearance of any aggregates. Homogeneity of gel reported in table No -3

5] Extrudability study:

The formulations are fill in the collapsible tubes, after it was set in the container. Extrudability is determine in terms of weight in gram required to extrude a 0.5 cm ribbon of gel in 10 second. Reported in Table No-3

Figure No-9

6] Gel Strength:

Gel strength was determined by the time in seconds required by the weight to penetrate in the gel. A Sample amount of 5 gm of each of the optimize batches was taken and 3.5 gm weight was placed on the surface of gel. The time in seconds required by the weight to penetrate 0.5 cm in the gel.[9] reported in Table-3

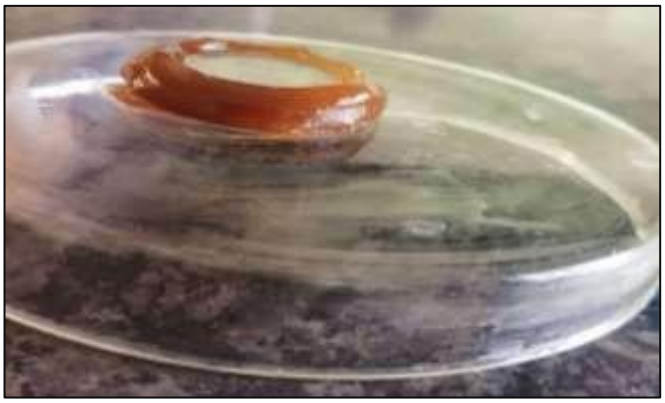

Figure No-10

Table No-3

Batch	Clarity of gel	Homogeneity	Extrudability	Gel Strength (sec)
F1	Fair	Average	Average	38
F2	Clear	Good	Good	42
F3	Poor	Fair	Average	48
F4	Poor	Poor	Poor	53
F5	Very poor	Poor	Poor	56

7] Measurement of PH :

The pH was determined by using a digital pH meter. Dissolve 1g of gel in 100 ml of distilled water and stored for 2h. done the measurement of pH in triplicate and calculate the average values. reported in Table No -4

Figure No-14

8] Viscosity:

Viscosity was determined by using Brookfield viscometer. Formulated gels were tested for their rheological behaviors at 250C. The measurement was made over range of speed from 10rpm to 100rpm with 30seconds between 2 successive speeds and then in a reverse orders. reported in Table No-4

Figure No-15

9]Spredability:

It indicates the extent of the area to which gel readily spreads on application to the skin or affected part. The therapeutic potency also depends upon spreading value. The time in see taken by two slides to slip off from gel which is placed in between the slides under the direction of certain load is expressed as spreadahility. Lesser the time taken for the separation of two slides, better the spread ability. The following formula is used to calculate the spread ability.[10].Reported in Table No -4

Spreadability (S)-ML/T

Where,

M =weight tied to upper slide

L =length of glass slides

T =time taken to separate the slides

Figure No-16

Table No - 4

Batch	Measurement of Ph	Viscosity(cps)	Spreadability
F1	6.4	1882	16.6
F2	6.72	1898	20.4
F3	6.66	1780	21.9
F4	7.2	1760	18.3
F5	7.25	1720	17.2

Result :

1] It was found that formulation **F2** have a better **PH**

2] It was found that formulation **F2** have a better **viscos**

3] It was found that formulation **F2** have a better **Spreadabilty**

10Stability:

Stability studies were done with open and close container. Here, by subjecting the product to room temperature for 1 month.[13]

Stability study for 1 month		
Batch	Open containiner	Closed container
F2	Not stable	Stable

Figure No -17

Figure No-18

Optimal Batch Results:

Batch No	Sr .No	Test	Result
F2	1	Colour	Dark brown
	2	Odour	Pleasant
	3	Consistancy	Semi-solid
	4	Microscopic analysis	Good
	5	Clarity of gel	Clear
	6	Homogeneity	Good
	7	Extrudability study:	Good
	8	Gel Strength:	42 sec
	9	pH	6.72
	10	Viscosity	1898 cps
	11	Spreadability	20.4
	12	Stability	Stable

CONCLUSION:

Achyranthes aspera gel is herbal product and it extracted from leaves of achyranthes aspera .It show the anti- inflammatory activity. It contain 53 percentage Anti-inflammatory activity. This product having significant benefits Alkaloids constituent present in herbs reported as anti-inflammatory activity and Terpenoids significantly inhibit the development of chronic joint swelling.

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