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DEVELOPMENT AND EVALUATION OF ANTIECZEMATOUS HERBAL GEL CONTAINING *Cassia fistula* LEAF EXTRACT

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ABSTRACT :

Topical drug delivery can be defined as application of drug via skin directly to treat or cure the skin disorders. Cassia fistula also known as golden shower or kanikonna, belongs to the family, Fabaceae which is traditionally used to cure many diseases. The present study was undertaken to develop and evaluate herbal anti-eczematous gel using ethanolic extract of Cassia fistula. Herbal gel containing ethanolic extract of Cassia fistula used as active ingredient having antibacterial activity. Hence an attempt to formulate and evaluate the effect of this herb as face gel for anti-eczematous activity is made here in. Gel was formulated using carbopol-940 as gelling agent. These active ingredient and excipients are looked for incompatibility studies. Studies showed that all of them are compatible with each other. Prepared gel was evaluated by pH, spreadability, extrudability, viscosity, antimicrobial study and stability study.

Keywords : Gel; Eczema; *Cassia fistula;* Antibacterial; Characterization; excipients; Anti-inflammatory; Diffusion study.

1. INTRODUCTION :

Fig 1.1: Eczema

Atopic dermatitis, also known as atopic eczema, is a chronic inflammatory skin condition characterized by pruritic, erythematous, and scaly skin lesions often localized to the flexural surfaces of the body. It can present with asthma and allergic rhinitis as part of an allergic triad; an estimated 30 percent of children with atopic dermatitis develop asthma later in life. Early diagnosis and treatment may prevent significant morbidity from sleep disturbances, chronic post inflammatory skin changes, scarring from picking and scratching, and the development of secondary skin infections with *Staphylococcus*, *Streptococcus*, and herpes species.

Advantages of gel formulations

- Gels are effortless to prepare when compared to other formulations.
- Gel is elegant non-greasy formulation.
- Gels have excellent adherence property to application site.

Disadvantages of gel formulations

- Effect of gels is relatively sustained and slower.
- The gelatos or additives may cause irritation.
- Water content increases possibility of fungal or microbial attack in gel.

Plant Profile :

Fig 1.2: ***Cassia fistula leaves***

3. RESULTS AND DISCUESSION :

3.1. Fourier transform infrared spectroscopy

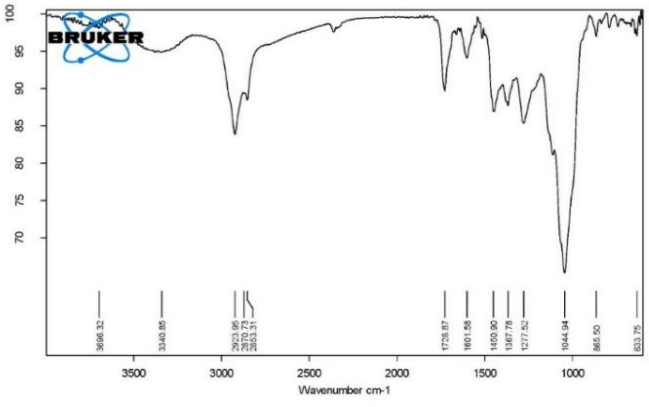


Fig 3.2 IR Spectra of excipients

Fig 5.2: ***IR***

Functional group	Observed Frequency (cm^{-1})
C=O group	1750-1705
C-O group	1080-1300
C-OH group	3200-2500
C-H group	2990-2850

Table 3.1: IR Functional group and ranges of excipients

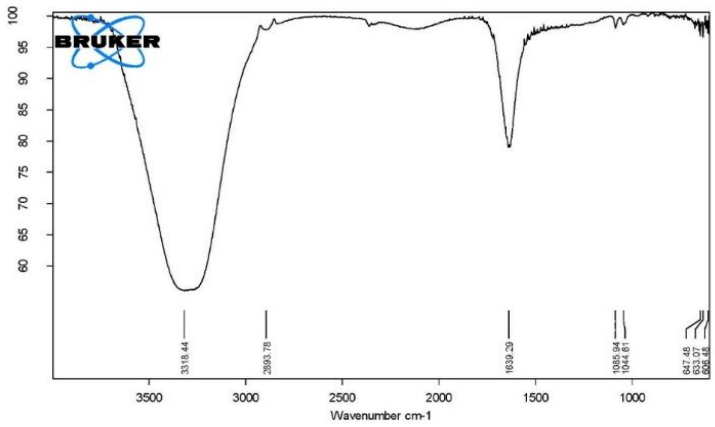


Fig 3.3: IR Spectra of extract

Functional group	Observed Frequency (cm^{-1})
C=C group	1680-1620
C-OH group	3200-2500

Table 3.2: IR Functional group and ranges of extract

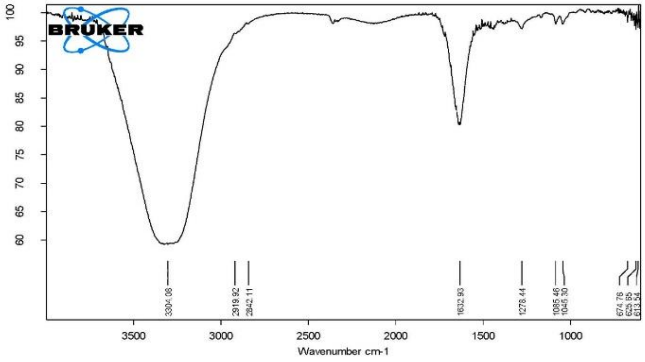


Fig 3.4: IR Spectra of extract and excipients

Functional group	Observed Frequency (cm^{-1})
C=C group	1680 -1620
C-OH group	3200 -2500

Table 3.3: IR functional group and ranges of excipients + extract

3.2. Physical appearance

Sl.no.	Characteristic	Observation		
		F1	**F2**	**F3**
1	Colour	Olive green	Golden brown	Golden brown
2	Odour	Pleasant	Pleasant	Pleasant
3	Nature	Semisolid	Semisolid	Semisolid
4	Consistency	Smooth	Smooth	Smooth
5	Grittiness	No grittiness	No grittiness	No grittiness

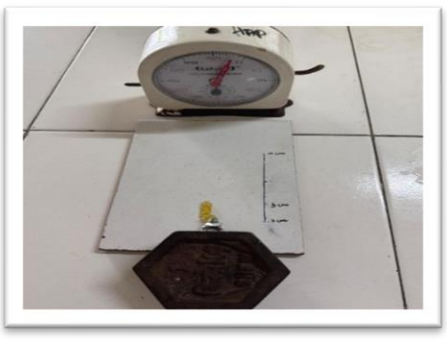
3.3. pH determination

Batch no	pH
F1	**6.6**
F2	**7.0**
F3	**7.2**

3.4. Spreadability

Batch no	Spreadability (g.cm/sec)
F1	27.29
F2	30.50
F3	34.21

3.5. Extrudability



Batch no	Extrudability (g/cm.sec)
F1	0.3
F2	0.7
F3	0.6

3.6. Viscosity measurement

Formulation	rpm	Viscosity (Cp)	Spindle no
F1	100	185.6	64
F2	100	135.3	64
F3	100	114.6	64

From this study, the viscosities of the formulations were found to be 185.6, 135.3, 114.6 Cp respectively, spindle no: 64 are used because the volume of the formulations were small and the rpm was fixed as 100.

3.7. Homogeneity

Homogeneity of all formulation was inspected visually. There is no aggregation or lumps formation.

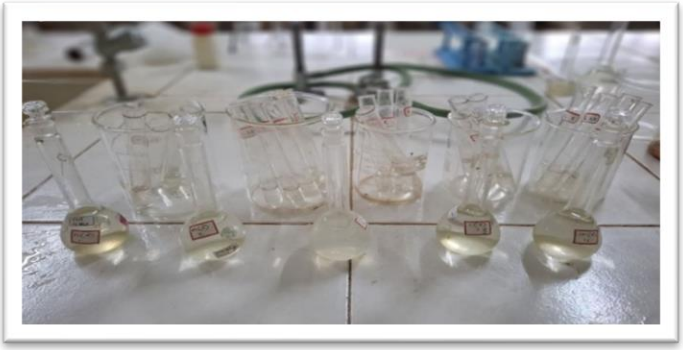
3.8. Grittiness

Prepared gel formulation doesn't show any presence of gritty particles

3.9. Diffusion study

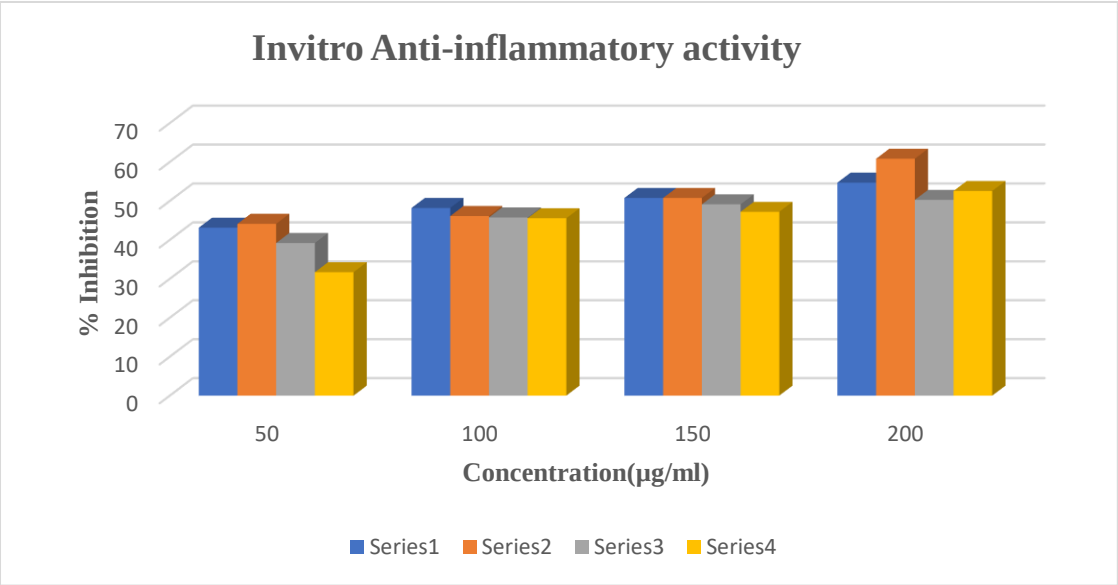
Time (mins)	F1 (% diffusion)	F2 (% diffusion)	F3 (% diffusion)
0	0	0	0
15	3.44	8.43	9.65
30	10.02	15.23	16.45
60	23.35	28.85	30.34
120	30.02	38.04	40.76
180	51.02	58.45	59.98
240	59.44	69.43	72.45
300	80.61	88.75	89.56
360	91.56	94.65	96.23

3.10. Anti-inflammatory study



SL NO.	Sample	Concentration µg/ml)	Absorbance (660 nm)	% Inhibition
1	Control	–	0.140	–
2	Standard	50	0.0796	43.14
		100	0.0725	48.21
		150	0.0689	50.78
		200	0.0634	54.71
3	F1	50	0.0782	44.14
		100	0.0754	46.14
		150	0.0689	50.78
		200	0.0548	60.85
4	F2	50	0.0851	39.21
		100	0.0751	45.78
		150	0.0712	49.14
		200	0.0696	50.28
5	F3	50	0.0861	31.70
		100	0.0762	45.57
		150	0.0739	47.21
		200	0.0664	52.57

SL NO.	SAMPLE	IC_{50} (µg/ml)
1	Standard	80.594
2	F1	89.286
3	F2	95.658
4	F3	96.502



3.11. Drug content

SL NO.	FORMULATION	ABSORBANCE	DRUG CONTENT
1	Standard	0.654	-
2	F1	0.347	53.04%
3	F2	0.529	80.88%
4	F3	0.546	83.48%

3.12. Antimicrobial study

Organism	Zone of inhibition diameter (mm)			
	Standard	F1	F2	F3
Escherichia Coli	20	10	15	16
Staphylococcus aureus	17	8	13	14

3.13. Stability study formulation

Developed formula was subjected to stability study for 30 days. Sample was taken after 30 days and evaluated for parameters like pH, spreadability, homogeneity, physical appearance, extrudability. And all the parameters were within range. There is no change in physical appearance also even after the 30 days of stability studies.

Stability study		
Formulation code	**Before**	**After**
F2	**Physical appearance**	
	Golden Brown	Golden Brown
	pH determination	
	7.0	7.0
	Spreadability	
	30.50	30.50
	Extrudability	
	0.7	0.7
	Viscosity	
	135.3	135.3
	Homogeneity	
	Homogeneous	Homogeneous
	Grittiness	
	No Grittiness	No Grittiness

4. SUMMARY AND CONCLUSION :

Phytochemical studies showed that the plant contain large number of constituents which contributes to its pharmacological properties. The whole plant parts are used to treat various disease condition. Here we are using leaf of the plant to treat eczema. When searched for literatures, it revealed that *Cassia fistula* have wide range of antibacterial activity.

Three batches of formulations were prepared and evaluated for various physicochemical parameters such as,

- Physical appearance,
- pH determination
- Viscosity,
- Spreadability
- Extrudability
- diffusion study
- anti-inflammatory
- Antimicrobial activity
- Stability study

The pH of the gel formulations was in the range of 5.9 to 6.9 which lies in the normal pH range of the skin. F3 formulation shows good viscosity, spreadability, extrudability, antimicrobial activity and stability study. The data presented in this study demonstrate that *Cassia fistula* in the form of gel possess significant anti-eczematous activity.