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"Formulate and evaluate Herbal Hair-Gel"

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ABSTRACT:
The present work has been undertaken with the aim to formulate hair growth gel formulation containing extracts of Hibiscus rosa sinensis flower 1%, Eclipta alba whole plant 1% and Solanum nigrum plant berries 0.5% which are preferably used in case of Alopecia, i.e., baldness pattern as an effective herbal therapy showing 5 α-reductase inhibitory activity. The formulated gel was evaluated for parameters such as pH which was found to be 6.68, viscosity 4731 cps, spreadability 11.05 (g-cm/sec) whereas consistent homogeneity was found with no skin irritation. Simultaneous quantification of bioactive markers was done by HPTLC.

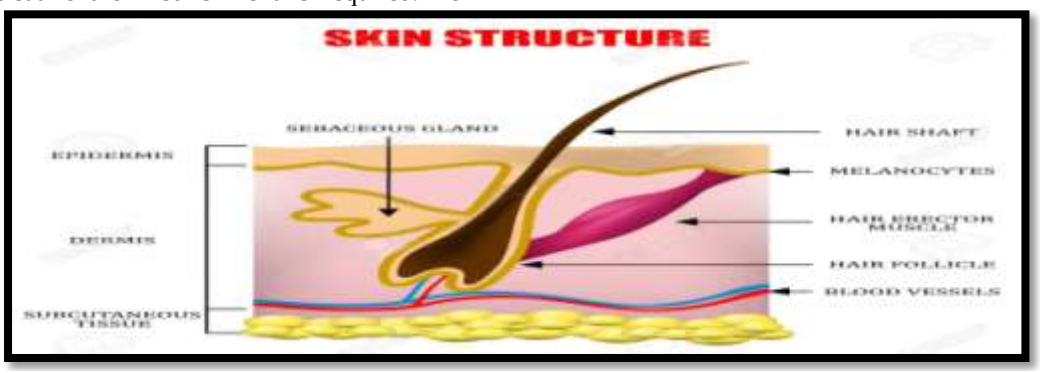
Keywords: herbal hair Gel,Excepients, evaluation.

I. INTRODUCTION:

The hair has a protective role against the adverse effect of environment, for example temperature and most important role is the aesthetic purpose and if the hair encounters any abnormalities, the confidence of the person will disturbed or most common abnormality is a depigmentation (gray-hair), dandruff. Now a day's number of people who had suffered from hair loss or hair thinning problem even baldness also is increasing in world wide. Hair loss is a dermatological disorder and this is the measure problem, hair loss is the reduction of hair volume. [1, 2] Hair treatment or nourishment is required. To prevent the hair loss or alopecia is a common patient complaint due to psychological and physical distress. By using hair shampoo or conditioner treatment is not possible and not enough to hair growth as well as roots are living cells that need to be nourished in order to stay healthy; therefore, the administration of hair tonic is also required. to treat the such hair loss alopecia hair fall [3]Anti-oxidant present the seeds of T. foenum graecum have been very used as anti-lice, anti dandruff activity as well as hair growth and soothing effects produce, Trigonella foenum-graecum, belonging to family Fabaceae, has been used traditionally for various pharmacological effects, such as anti-diabetic, anti-cancer, anti-fungal, anti-pyretic, ant bacterial.

1 Topical drug delivery system:

Topical drug delivery systems of skin is easily applicable or route of administration of drug or a localized drug delivery system any part of the body through rectal vaginal ophthalmic use on skin as topical routes. The skin is largest organ on the body to deliver the drug easily. The main route of topical drug delivery system for drug administration is skin. Topical drug delivery system is effectively provide drug as locally or proper concentration as we required, the main principles of topical drug delivery system permeation of drug through the skin, the clinical evidence indicates that topical gel is a safe and effective treatment.



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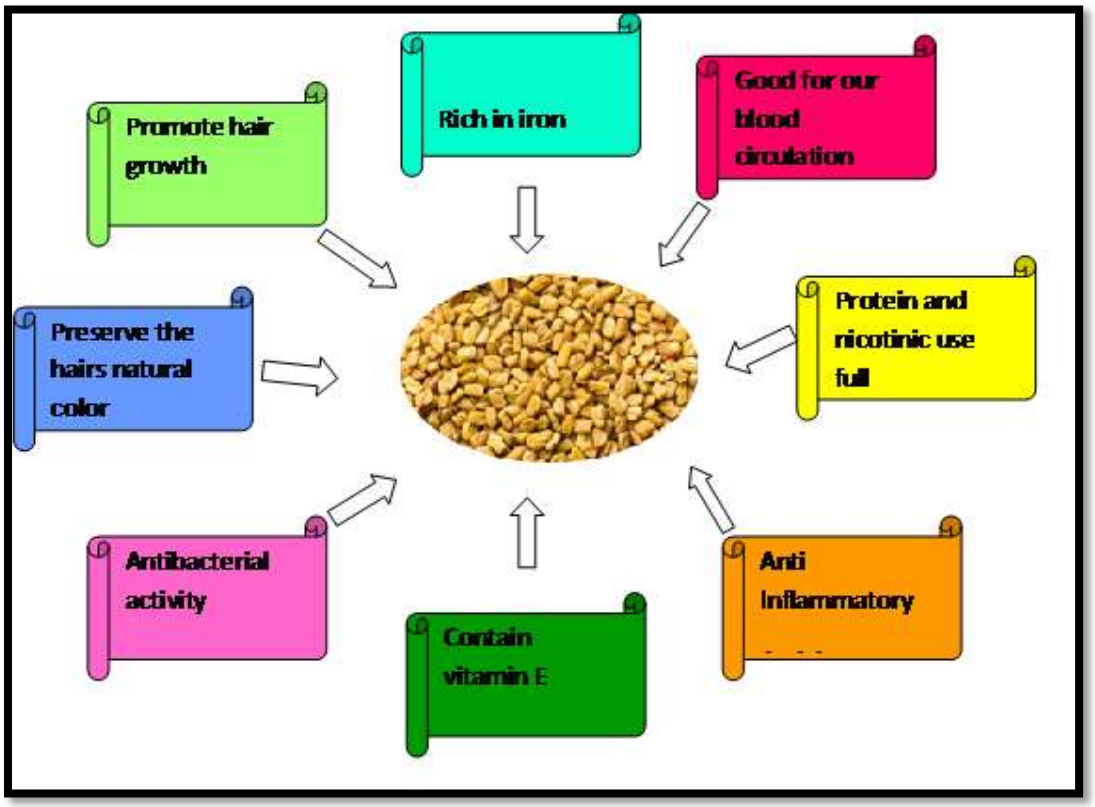
Type 1 Straight		
1a	Straight (fine/ thin)	Hairs tends to be very soft, shiny, oily and poor at holding curls
1b	Straight (Medium)	Hair characterized by Volume and body
1c	Straight (Coarse)	Hairs tends to be bone-straight and difficult to curl
Type 2 Wavy		
2a	Wavy (fine/ thin)	Hair has definite "S" pattern and is usually receptive to a variety of styles
2b	Wavy (Medium)	Can tend to be frizzy and little resistant to styling
2c	Wavy (Coarse)	Very frizzy with thicker waves often more resistant to style
Type3 Curly		
3a	Curly (Loose)	Curly hairs that usually present defiantly in "S" pattern
3b	Curly (Tight)	3a as tighter like a spiral
Type 4 Kinky		
4a	Curly (soft)	Hairs tends to be very fragile tightly coiled and future curly pattern
4b	Curly (wiry)	As 4a with less visible (no curly) pattern
4c	Curly (wiry)	As 4a and 4b but almost defined curly pattern



EXCIPENTS AND INSRUMENTS LIST

Table Materials used for this study

Sr.No.	Materials	Supplied By	Category
1	Fenugreek Extract	SUNPURE Mumbai	API
	Carbopol	Loba chemie Mumbai	Gelling agent
2	Glycerin	Ozone international, Mumbai.	Humectants

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3	PVP	Ozone international, Mumbai	Conditioner
4	Methyl paraben	Ozone international	Preservative
5	Poly ethylene glycol	Molychem	Penetration enhancer
6	Triethanolamine	Meher chemie, Mumbai	Adjustment for pH
7	Flavouring agent	Cosmo chem. Pune	Flavour

Table Instruments used for this study

Sr. No.	Name of instruments	Make / Model
1	Digital balance	Shimadzu Corporation Japan.
2	pH meter	Electro lab
3	Fourier Transfer Infrared Spectroscopy	Perkin Elmer IR Series Model no- 21 Spectroscopy
4	UV Spectroscopy	Shimadzo Module no- UV-1800
5	Brookfield viscometer	Engineering laboratories
6	Magnetic starrier	Labtob
7	Sonicator	Athena technology model, ISO9001:2015

Preparation of Herbal Hair Gel Formulation.

Initially prepare different six herbal hair gel formulation was prepare by the different concentration gelling agents are taken. By different ration

It was prepared by simple gel formulation method the gel was prepared by using fenugreek seed extract in which the gel formulation carbopol is used as base or gelling agent or other excipients are such as methyl paraben, glycerin, polyethylene glycol, Triethanolamine carbopol 934, and pvp these are the excipients are used to formulate the herbal hair gel. Step wise procedure first of all weight accurately of carbopol 934 of fenugreek seed extract dissolve in up to 100ml of distilled water. By continuous starring 1 hour with the help of magnetic starrer 600 rpm after that 3ml of glycerin is add after that add measured quantity of methyl paraben , 5mg pvp add or 6ml PEG add one by one continuously stirrer. Finally add 1 ml Triethanolamine drop wise for pH adjuster gel is formed.

Table FORMULATION TABLE

Ingredients	F1	F2	F3	F4	F5	F6
Fenugreek extract	10%	10%	10%	10%	10%	10%
Carbopol-934	0.5%	0.8%	1.1%	1.4%	1.7%	2%
PVP	5mg	5mg	5mg	5mg	5mg	5mg
Glycerin	3ml	3ml	3ml	3ml	3ml	3ml
Methyl paraben	10mg	20mg	10mg	20mg	10mg	20mg
PEG	6ml	6ml	6ml	6ml	6ml	6ml
Triethanolamine	1.5ml	1.5ml	1.5ml	1.5ml	1.5ml	1.5ml
Flavoring agent	q.s	q.s	q.s	q.s	q.s	q.s

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Water	Up to 100	Up to 100	Up to 100	Up to 100	Up to 100	Up to 100

Table List of Ingredient with Their Function

Sr.no.	Ingredient	Function
1	Fenugreek extract	API
2	Carbopol 934	Gelling agent
3	Glycerin	Humectants
4	Methyl paraben	Preservative
5	PVP	Hair conditioner
6	Poly Ethylene Glycol	Penetration enhancer
7	Triethanolamine	Adjustment for pH
8	Distilled water	Solvent

EVALUATION TEST

a) PH

The pH value of herbal hair gel is determining by the pH meter. The measurement was performed at 1, 30,60,60,90 days after preparation to detect any pH changes with time.

b) VISCOSITY

The measurement of viscosity of the prepared herbal hair gel was done by using Backfield viscometer (model RVTDV II).the reading was taken at 100 rpm using the spindle no.6.

c) APPEARANCE AND HOMOGENECITY

The prepared gels were tested by physical appearance and homogeneity by visual observation of an herbal hair gel formulation.

d) SPREAD ABILITY

Spread-ability was determined by the apparatus which consists of a wooden block, which was provided by a pulley at one end. By this method spread-ability was measured on the basis of slip and drag characteristics of gels. An excess of gel (about 2 g) under study was placed on this ground slide. The gel was then sandwiched between this slide and another glass slide having the dimension of fixed ground slide and provided with the hook. Weight of 1 kg was placed on the top of the slide for 5 minutes to expel air and to provide a uniform film of the gel between the slides. Excess of the gel was scrapped off from the edges. The top plate was then subjected to pull of 50 g. With the help of string attached to the hook and the time (in seconds) required by the top slide to cover a distance of 6.5 cm be noted. A shorter interval indicates better spread-ability.

Spread ability was calculated using the following formula:

$S = M \times L / T$

Where, S = Spread-ability, M = Weight in the pan (tied to the upper slide), L = Length moved by the glass slide and T = Time (in sec.) taken to separate the slide completely each other.

DIFFUSION STUDY: -

The diffusion study was important to determine the drug release of prepared herbal hair gel formulation. It carried out such way taken Franz tube in which 1gm of herbal hair gel was taken packed on the bottom with cellophane membrane. Membrane is work as skin. The tube surface is deep in to the solution. 250ml phosphate buffer solution use to absorption media of drug and maintain the PH 7.4 of solution .remove the 5 ml sample from the media time to time half hours 1, 2,3,4,5,6,7,8 hours determine drug release of herbal hair gel.

STABILITY STUDY

Optimized formulation was subjected to stability as per ICH guidelines at the following conditions (ICH, 2003). It showed No significance change in properties of the optimized formulation & the drug release. Sufficient quantity of herbal hair gel formulation were packed in stability container and kept in a Stability chamber atSamples were kept in

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stability chamber at following conditions for 3 months-

1. 40 ± 2°C and 75 ± 5% RH (Accelerated temperature)
2. Room temperature

Formulations were analysed at 1, 2 and 3 months for following tests-

i) Visual appearance
ii) Drug diffusion study

II. RESULT :

Preformulation Study:

Physical appearance of fenugreek Extract:

Table. Preformulation studies

Sr. No.	parameters	Specification as per IP 1996 mn	Result
1	Appearance	Yellowish brown	Yellowish brown
2	Odour	Characteristic	Characteristic
3	Taste	Bitter	Bitter
4	Touch	Soft	Soft

Solubility profile:

Solubility of fenugreek seed extract in different was solvents are given below:

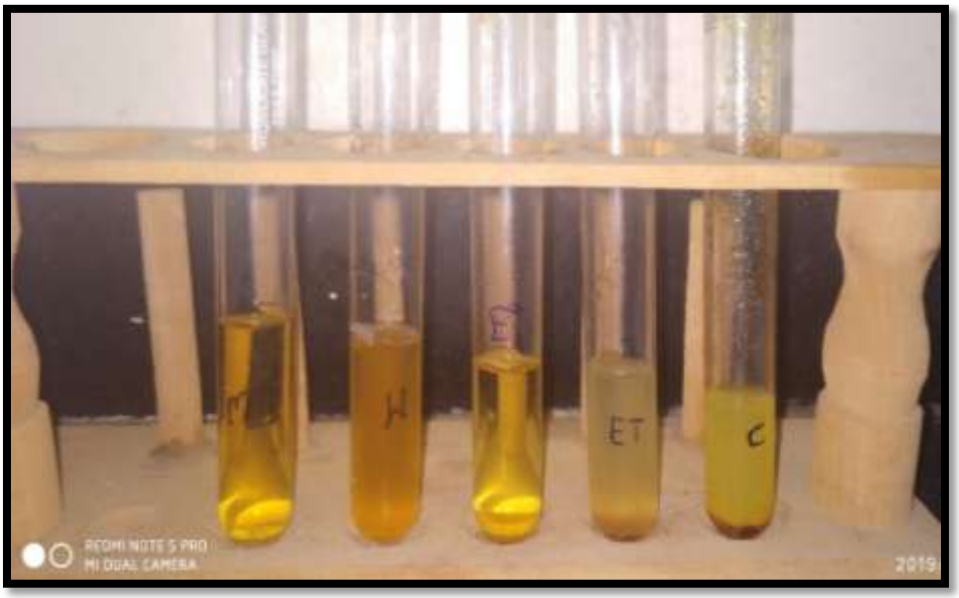

Fig. Solubility profile

Table. Solubility of fenugreek extract

Sr. No.	Solvents	Result

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1	Methanol	soluble
2	water	Soluble
3	Ethanol	soluble
4	Ether	Insoluble
4	chloroform	Insoluble

Identification test for fenugreek extract

Table

Sr. No.	Test	Observation	Result
1	Alkaloid	Brown Black formed	+
2	Saponins	Foam persisted	+
3	Flavonoids	Observed pink color	+
4	Triterpenoid	Brownish Ring	+
5	Tannin	Black blue color	+
6	Glycoside	Blue or green color	-

Determination of various ash values:

a) Ash value:

Ash value of pure drug was found to be-

The percentage of total ash was calculated with reference to air dried sample.

= Weight of Empty crucible (A) =16.138 gm

= Weight of Drug taken (B) =1 gm

= Weight of dish +drug (C) =17.137 gm

= Weight of dish + ash [after complete the incineration] (D) =16.219 gm

Calculations:

= Weight of total ash = (D)-(A)

= 16.219-16.138

= 0.081gm

= 1 gm of extracts=weight of total ash

=100 gm of tamarind seed extracts=?

= 100 ×weight of total ash

1

= 100×0.08 1

1

Total Ash Value = 8.1%

b) Acid insoluble:

Total Acid insoluble Ash = 0.358%

c) Loss on drying:

The mean loss on drying was found to be 2.90%

d) Bulk density and tapped density

Bulk density=weight of sample/bulk volume

=10/22

=0.454

Tapped density=weight of sample/tapped volume

=10/17

=0.5882

e) Hausner ratio

Hausner ratio = Tapped density/Bulk density

=0.5882/0.454

=1.2955

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Interpretation of FTIR Spectra

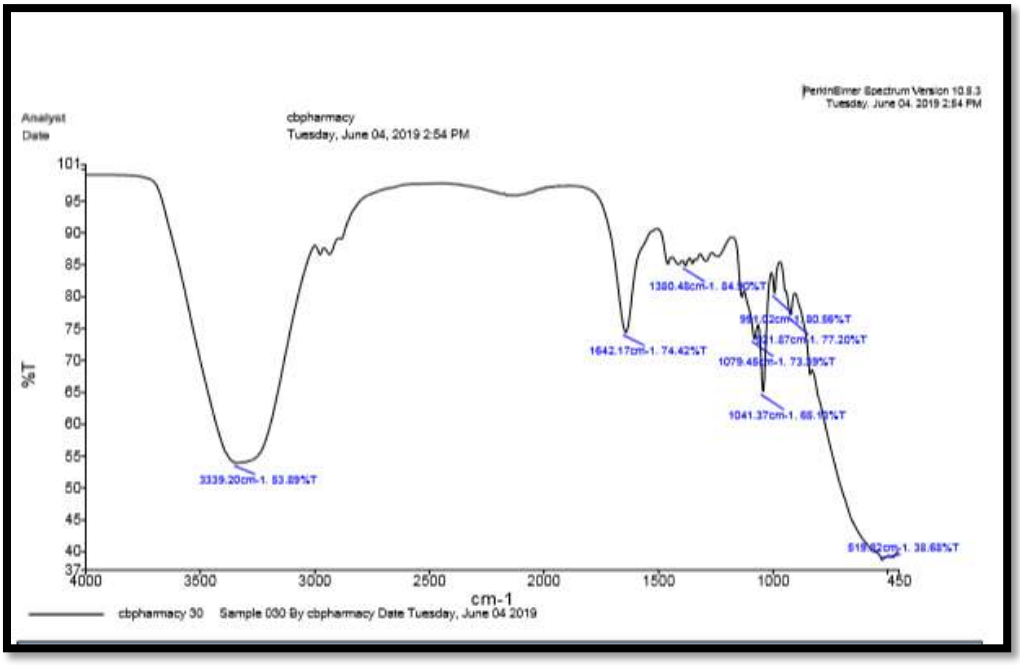

Fig FTIR of pure Trigonella Foenum Graecum extract

Table Interpretation of fenugreek

SR.NO	Functional Group	Standard Frequency	Observed Peak
1	N-H stretching	3350-3310	3339.20
2	C = O stretching	1648-1638	1642.17
3	O-H bending	1390-1310	1380.48
4	C-H,C=O,C-H no stretching	1085-1050	1079.45
5	C-O-O-CO` stretching	1050-1040	1041.37
6	C=C stretching	995-985	991.02

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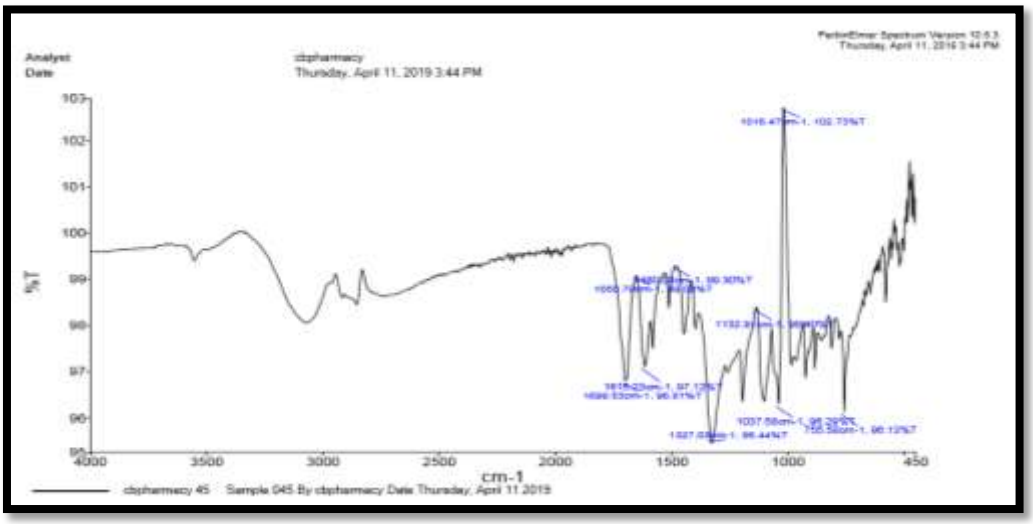

Fig. FTIR Trigonella Foenum Graecum + Glycerin

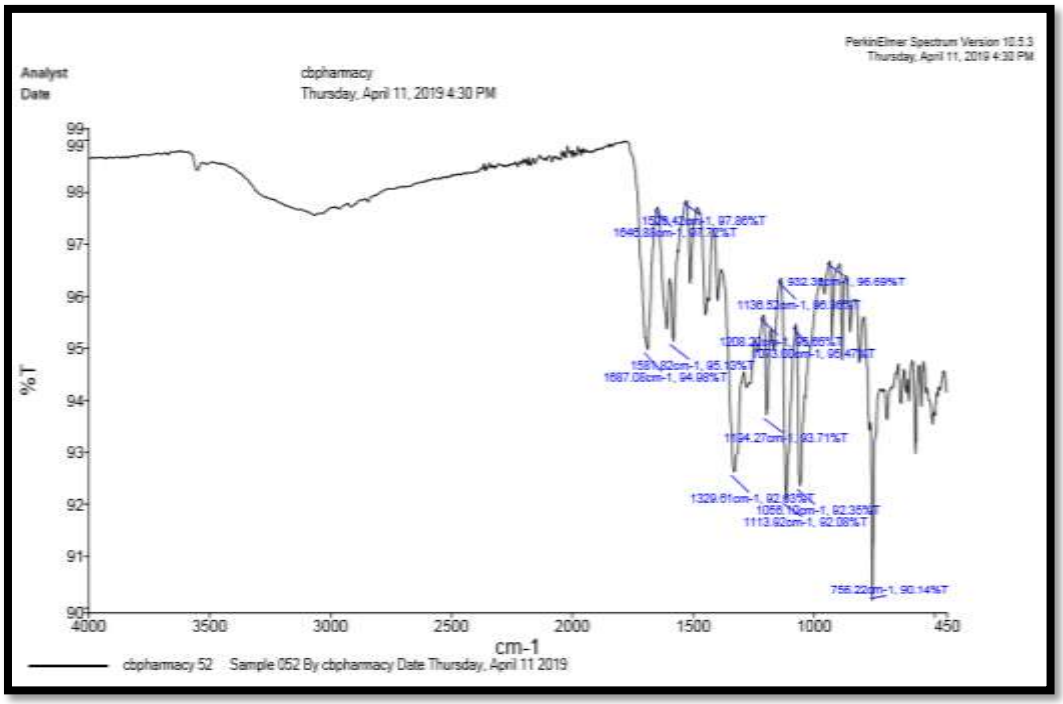

Fig.FTIR TrigonellaFoenum Graecum + methyl paraben

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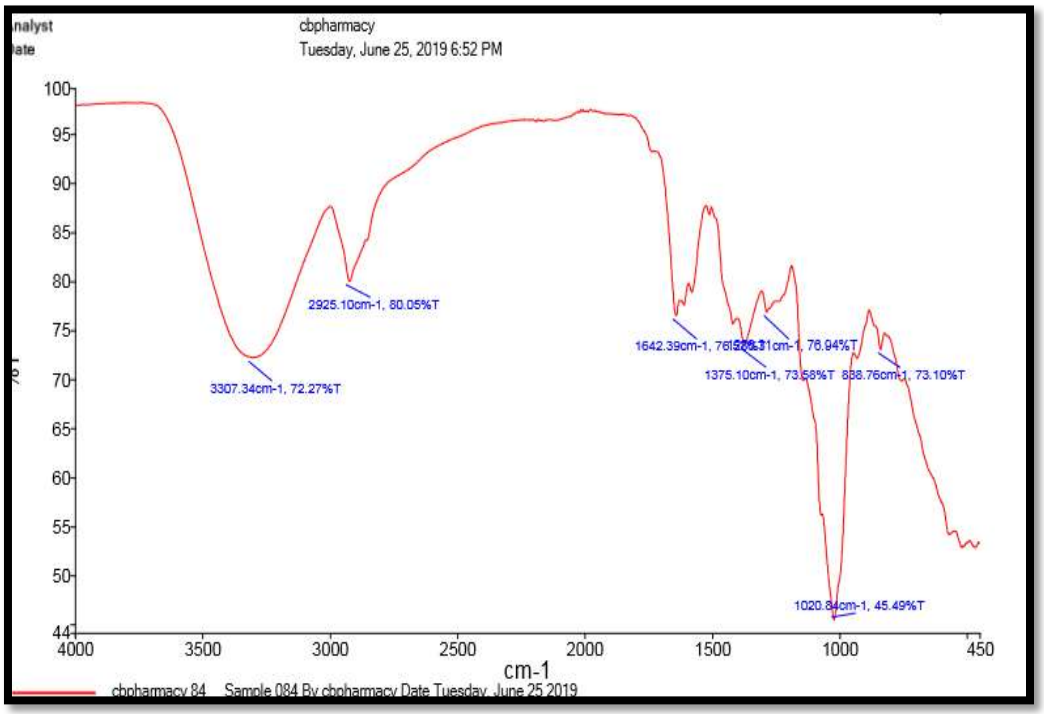

Fig. FTIR TrigonellaFoenum Graecum+pvp

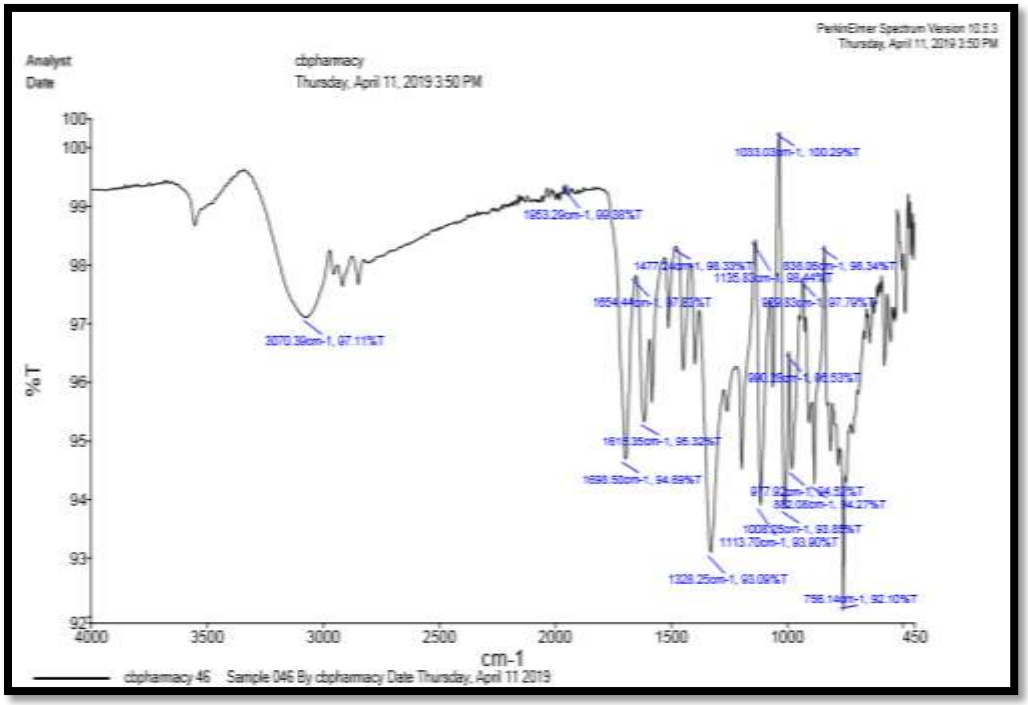

Fig.FTIR TrigonellaFoenum Graecum + PEG

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Fig.FTIR Trigonella Foenum Graecum + Triethanolamine

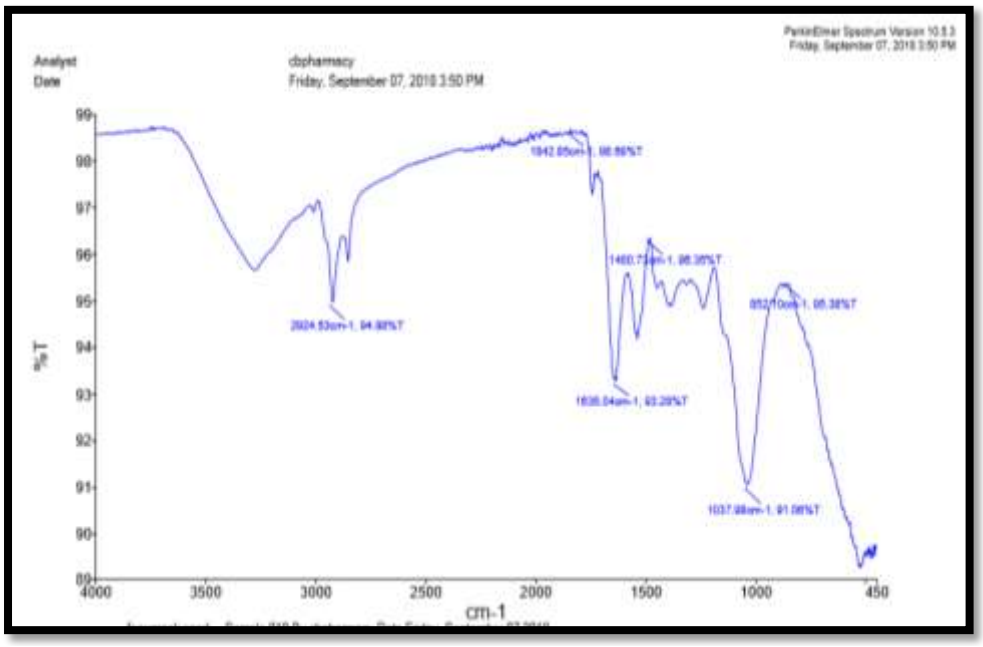

Fig. FTIR of TrigonellaFoenum Graecum hair gel

Evaluation test of fenugreek herbal hair gel:

Table

Sr. No	Formulation	Appearance	pH	Viscosity cps	Homogeneisity	Spradability	consistency

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1	F1	Dark yellow	6.1	12300	Good	No Good	Smooth
2	F2	Dark yellow	5.9	17100	Good	No Good	Smooth
3	F3	Dark yellow	6.7	23600	Good	Good	Smooth
4	F4	Dark yellow	7.2	31831	Good	Good	Smooth
5	F5	Dark yellow	5.3	42948	Good	Good	Smooth
6	F6	Dark yellow	6.6	47500	Excellent	Good	Smooth

Estimation by UV spectroscopy:

Calibration of fenugreek seed extract: -

Table Calibration of fenugreek seed Extract

Sr.no	**Concentration (ug/ml)**	**Absorbance (λmax observed at 365.nm**
1	2	0.258
2	4	0.356
3	6	0.484
4	8	0.593
5	10	0.682
6	12	0.781

Calibration curve: -

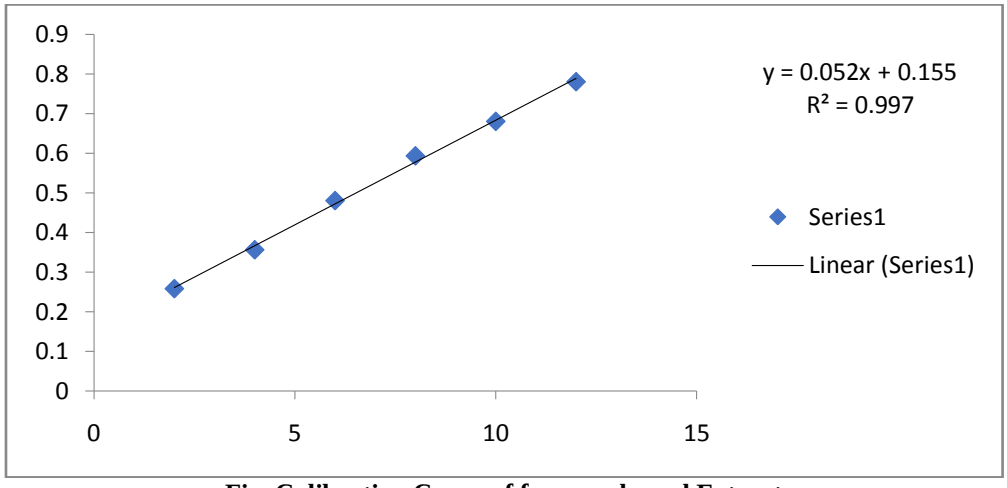

Fig. Calibration Curve of fenugreek seed Extract

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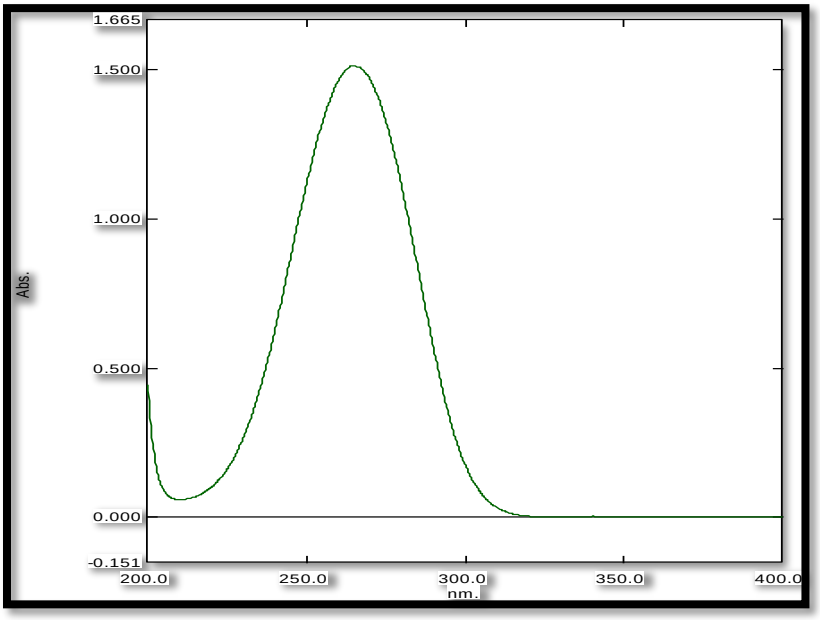
Fenugreek seed extract curve graph:



Diffusion study:

Fenugreek Herbal hair gel:

Table

Time in hour	% OF DRUG DIFFUSION					
	F1	**F2**	**F3**	**F4**	**F5**	**F6**
0	0	0	0	0	0	0
1	11.39	17.96	17.62	20.11	18.69	24.18
2	28.16	26.56	32.18	30.12	27.19	35.76
3	39.74	32.67	44.81	49.18	34.63	48.89
4	43.92	39.84	53.64	56.29	49.28	57.69
5	51.49	48.17	69.37	62.84	58.71	71.23
6	68.32	65.49	76.94	79.43	77.18	84.17
7	71.10	69.21	84.79	89.32	83.20	91.12
8	80.11	77.26	89.44	84.54	80.68	93.14

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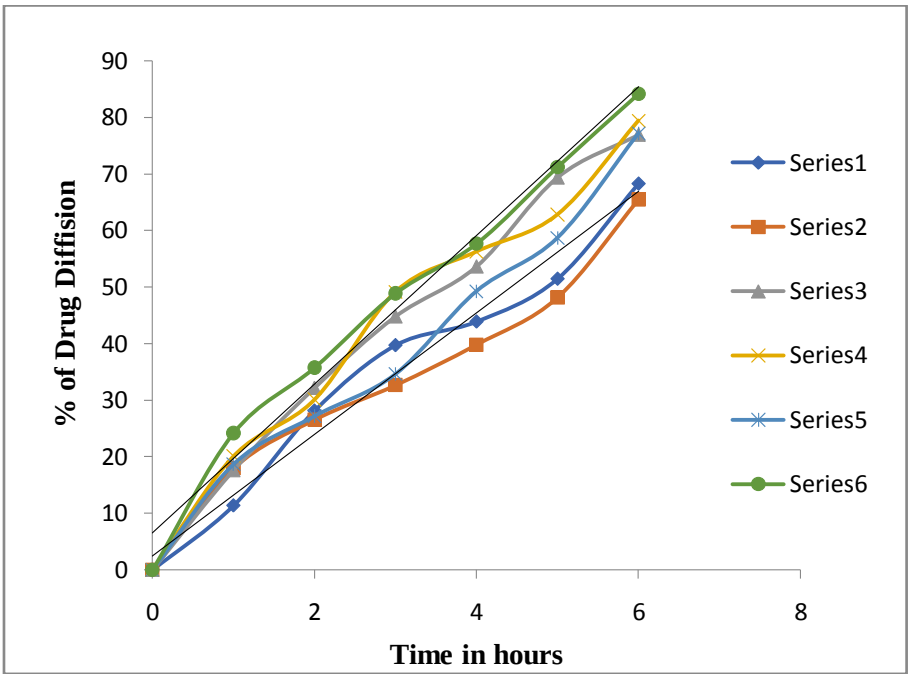

Stability study:

Table

Sr no	Time in days	Physical changes	pH	spredability	viscosity	consistency
1	01	Yellowish Brown	7.2	Good	39100	Smooth
2	15	Yellowish Brown	7.1	Good	42030	Smooth
3	30	Yellowish Brown	7.1	Good	45687	Smooth
4	45	Yellowish Brown	6.6	Good	47700	Smooth
5	60	Yellowish Brown	6.1	Good	51456	Smooth
6	75	Yellowish Brown	6.0	Good	55500	Smooth
7	90	Yellowish Brown	5.8	Good	56201	Smooth

Evaluation of Optimize Formula: Table 17

Sr .No	Time in Hours	% drug release initial	% drug release after 15 days	% drug release after 30 days	% drug release after 45days	% drug release after 60 days	% drug release after 75days	% drug release after 90 days
1	00	00	00	00	00	00	00	00
2	1	24.18	24.08	23.93	23.86	23.72	23.67	23.60
3	2	35.76	35.67	35.59	35.48	35.40	35.31	35.26
4	3	48.89	48.71	48.63	48.56	48.44	48.38	48.21

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5	4	57.69	57.58	57.41	57.35	57.29	57.18	57.02
6	5	71.23	71.11	70.90	70.82	70.73	70.61	70.44
7	6	84.17	83.00	83.88	83.73	83.60	83.39	83.22
8	7	91.12	90.88	90.70	90.58	90.49	90.41	90.22

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