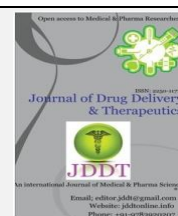


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Research Article

FORMULATION AND EVALUATION OF HERBAL GEL CONTAINING *Allium cepa* EXTRACT

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ABSTRACT

Herbal medicines widely improved for primary health care because of better cultural acceptability and better compatibility with human body and lesser side effects. The aim of present study was to formulate and evaluate of herbal gel containing *Allium cepa* extract. Topical gel formulation was designed by using *Allium cepa* extract and carbopol 934 as a gelling agent and different excipients. The herbaceous plant *Allium cepa* (onion). It has great health significance and is consumed for nutritional and health benefits for last centuries. It contains flavonoids compound. Plant extract used for prevention of hair loss. Raw onion eaten in salad form this is play very important role in health benefits. Gel was prepared by incorporating extract of *Allium cepa* in gel at a particular step in order to prepare non greasy formulation. Gel Formulation F3 Batch was optimized in the concentration 1.5% of Carbopol 934. Different gel formulations were evaluated for their physical appearance; pH, Spreadability, Homogeneity *in-vitro* diffusion, Viscosity and Drug Excipients comparability study are carried out.

Keywords: *Allium cepa*, Carbopol 934, Herbal gel etc.

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INTRODUCTION

Many people are choosing plant based Medicines or products to improve their health. Onion (*Allium cepa* L.) belongs to Family: Liliaceae (lilies) has been highly valued food and medicinal plant since ancient times used. It is widely cultivated, second only to tomato. Onion vegetable bulb crop known to most of the cultures and consumed worldwide for enhancing the flavour and taste of a different variety of foods. Onion is a well-known traditional nutraceutical and medicinal plant that is cultivated and used around the world. Onions contain phenolics and flavonoids Phytochemicals that have potential anti-inflammatory, anti-cholesterol, anticancer, and antioxidant properties. Onions contain 89% water, 1.5% protein, and vitamins B1, B2, and C, along with potassium and selenium. It also contains polysaccharides such as fructose and, saccharose, peptides, flavonoids (mostly quercetin), and essential oil. Onion contains numerous sulfur compounds. Onion is highly nutritional and its dietary use improves digestion and mental health and lower down toxicity of oils. Onion has potential in treating cardiovascular disease, hyperglycemia, and stomach cancer. Plant extract used for relieving headaches, coughs, and hair loss [1,2]. Gels are semisolid

systems in which a liquid phase is constrained within a three dimensional polymeric matrix (consisting of natural or synthetic gums) in which a high degree of physical or sometime chemical cross-linking has been introduced [3].



Allium cepa

Gels are relatively newer class of dosage forms created by entrapment of larger amount of aqueous hydro alcoholic liquids in a network of colloidal solid particles which may

consist of inorganic substance such as aluminium salts or organic polymers of natural or synthetic origins [4]. The concentration of the gelling agents is usually in 0.5% to 2.0% ranges with a few exceptions. External application of gel at skin offers certain advantages like quick release of drug directly to the site of action and better application property [5].

MATERIALS AND METHODS

Allium cepa extract obtained gift sample from Sunpure Extract Pvt. Ltd. New Delhi., Carbapol-934 obtained from Loba Chemical Pvt. Ltd Mumbai., Methyl paraben Obtained from Ozone international Mumbai., Propylene glycol Obtained from Molychem chemicals babu genu road Mumbai., Triethanolamine was obtained from Molychem, Mumbai.

PRE-FORMULATION STUDIES

Characterizations of *Allium cepa*

Colour: Yellow

Odour: Odourless

State: Solid

Drug-Excipients compatibility study by FTIR

FT-IR study is carried out by drug and formulation. This technique is based upon the simple fact that the substance shows marked selective absorption in the infrared region. After absorption of IR radiations, the molecules of the chemical substance vibrate at many rates of vibration, giving rise to close-packed absorption bands, called as IR absorption spectrum which may extend over a wide wavelength range. Various bands will be present in IR spectrum which will correspond to the characteristic functional groups and bonds present in the chemical substance. It is used to establish the structure of unknown compound and analysis of functional group [6,7].

Calibration Curve of *Allium cepa* extract

General procedure for the preparation of calibration curve by UV

A stock solution of (1 mg/ml) of standard drug was prepared with Phosphate buffer 7.4. Later required dilutions were made with a phosphate buffer pH 7.4. In a series of 10 ml volumetric flasks, different standard solutions were taken and the volume was made up using a phosphate buffer pH 7.4. The absorbance of these solutions was measured at wave length of maximum absorbance 257 nm, using quartz cuvette in UV- Visible spectrophotometer. Absorbance values were plotted against respective concentration to obtain standard calibration curve.

FORMULATION OF GEL

Methodology of Gel Formulation

Weighed quantity of carbopol 934 was dispersed slowly in 50ml of distilled water in a 250 ml beaker. Then the mixture was stirred using mechanical stirrer at high speed. It was kept a side to swell, which was further stirred to form a gel base. 5 ml of distilled water and required quantity of methyl paraben were dissolved with the aid of heat on water bath. Solution was cooled and propylene glycol was added to it. Further, required quantity of *Allium cepa* extract was mixed to the above mixture and volume made up to 100 ml by adding remaining distilled water. All the ingredients were mixed properly with continuous stirring. Triethanolamine was added drop wise to the formulation for the adjustment of skin pH and also to obtain a gel at required consistency.

Prepared gel was filled in container and stored at a cool and dry place.

EVALUATION OF GEL [5, 8, 9,10]

Physical appearance

The colours of all the herbal gel formulations were found to be light yellow with translucent appearance which was found to be smooth on application.

pH

The pH of various gel formulations was determined by using digital pH meter. One gram of gel was dissolved in 100 ml distilled water and stored for two hours. The measurement of pH of each formulation was done in triplicate and average values are calculated. The results are tabulated in table No.5.

Homogeneity

After the gels have been set in container, all developed gels were tested for homogeneity by visual inspection. The results are tabulated in table No.5.

Washability

Formulation was applied on the skin and then ease extends periods of washing with water was checked.

Spreadability

Spreadability refers to the extent of area to which gel readily spreads on application. Spreadability was measured on the basis of slip and drag characteristics of gels. Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 7.5 cm along the slides. 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. 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 and the time (in seconds) required by the top slide to cover a distance of 7.5 cm be noted. A shorter interval indicates better Spreadability.

Spreadability was calculated using the following formula:

$$S = M \times L / T$$

Where,

S = Spreadability,

M = Weight in the pan (To the upper slide)

L = Length moved by the glass slide and

T = Time (in sec.) taken to separate the slide completely each other. The results are tabulated in table No.5.

Viscosity

Viscosity of herbal gel was determined by using Brookfield viscometer at 5 rpm using spindle no.6. Each reading was taken after equilibrium of the sample at the end of two minutes. The results are tabulated in table No.5.

In vitro diffusion study

The diffusion studies of the prepared gels can be carried out by using cellophane membrane. Gel sample was taken in cellophane membrane and the diffusion studies were carried out at $37 \pm 1^\circ$ using 250 ml of phosphate buffer (pH 7.4) as the dissolution medium. Five milliliters of each sample was withdrawn periodically at 1, 2, 3, 4, 5, 6, 7 and 8 h and each sample was replaced with equal volume of fresh dissolution

medium. Then the samples were analyzed for the drug content by using phosphate buffer as blank. The results are tabulated in table No.6.

RESULT AND DISCUSSION

The prepared gel formulations were evaluated for various pharmaceutical parameters and results were mentioned in the table. All the developed gels were tested for P^H, Washability, Spreadability homogeneity Viscosity, by visual inspection for their appearance & *In-vitro* drug release. The gel was light yellow in colour and translucent appearance.

The homogeneity was found to be good. Gel formulation is depend upon gelling agent increases concentration gelling agent increases viscosity decreases spradability find out in different batches F1-F4. After evaluation F3 Batch shows better results as compare to other batches. These optimized formulation drug- excipients study are carried out there is no drug excipients interaction occurs in formulation.

FTIR of Pure drug *Allium cepa* Extract

The following bands were observed in the spectra

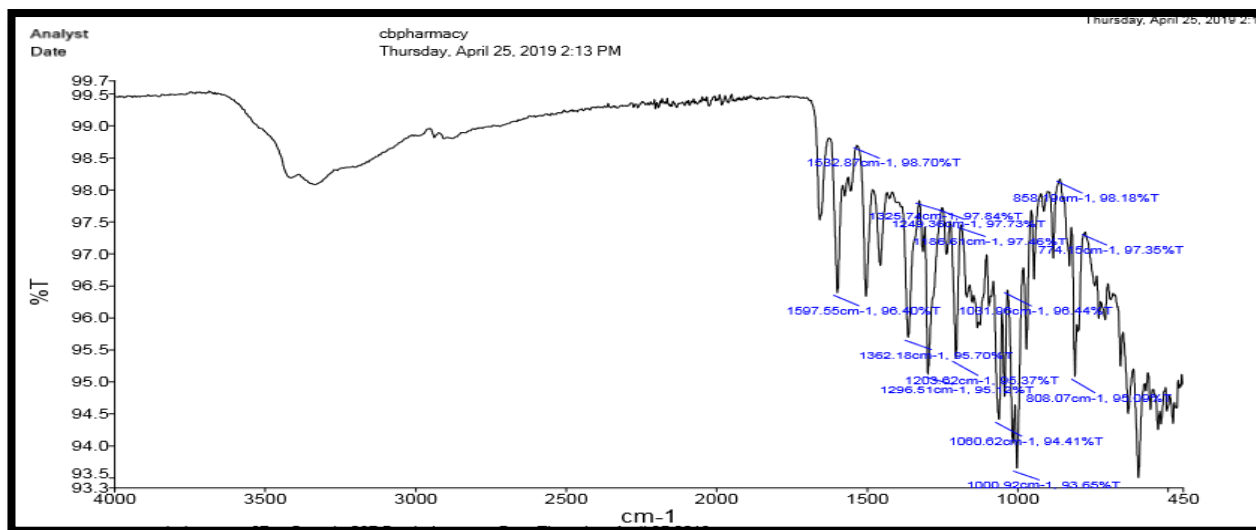


Figure No.1: FTIR of Pure drug *Allium cepa* Extract

i) Interpretation of FTIR of *Allium cepa* Extract

Table No. 1: Interpretation of FTIR of *Allium cepa* Extract

Functional Group	Standard Frequency	Observed Peak
C=C Stretching	1450-1600	1532-1597
C=O Stretching	1520-1600	1532-1597
C-O Stretching	1250-1350	1249-1362
O-H Bending	1050-1150	1031-1186
C-H Bending	700-850	808-858

From the above observation table, FTIR study of pure *Allium cepa* extract to observe their peak and comparing to their standard frequency of FTIR.

FTIR of Herbal Gel Formulation

The following bands were observed in the spectra.

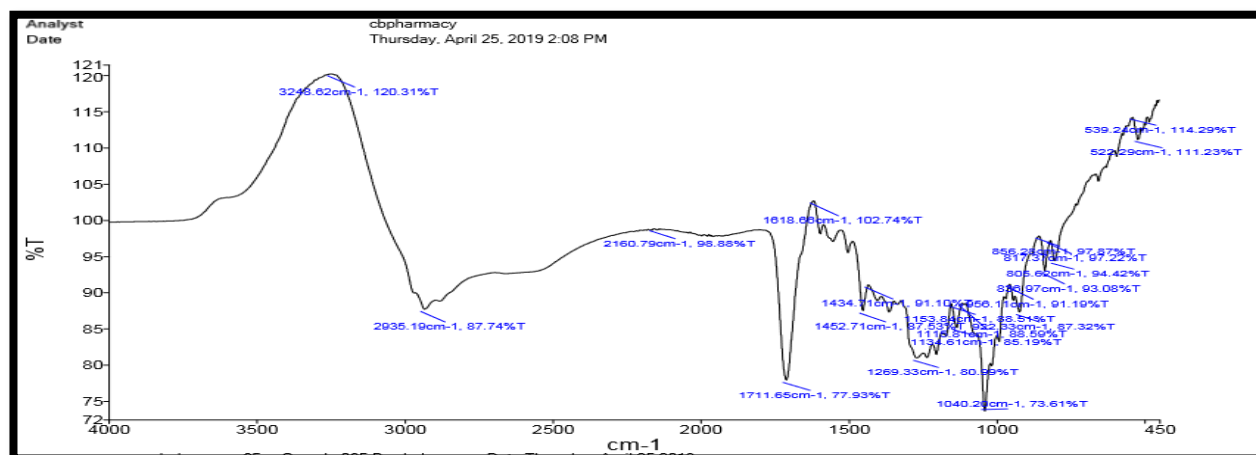


Figure No.2: FTIR of Herbal Gel Formulation

Table No. 2: Interpretation of FTIR Spectra of Formulation:

Functional Group	Standard Frequency	Observed Peak
N-H Stretching	3400-3500	3248
C-H Stretching	2850-2960	2935
C=C Stretching	2100-2200	2160
C=O Stretching	1705-1725	1711
C=O Stretching	1520-1600	1532-1597
C=C Stretching	1450-1600	1434-1618
C-O stretching	1250-1350	1269.33
O-H Bending	1050-1150	1031-1186
C-H Bending	700-850	808-858

From the above observation table, FTIR study of pure *Allium cepa* extract gel Formulation observes their peak and comparing to their standard frequency of FTIR.

Table No. 3: Calibration curve of *Allium cepa* Extract

Sr.No	Concentration (ug/ml)	Absorbance (λ_{max} observed at nm 257nm)
2	2	0.082
3	4	0.152
4	6	0.207
5	8	0.266
6	10	0.318
7	12	0.374

Calibration curve of allium cepa extract

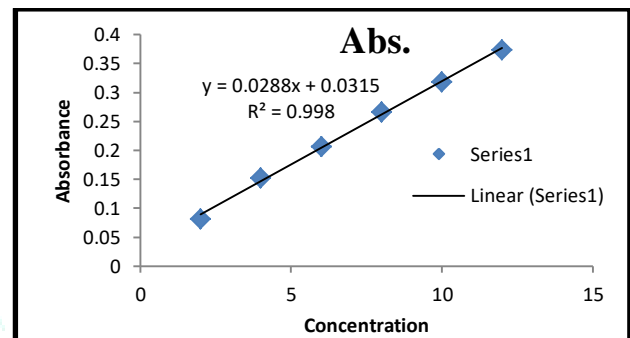


Figure No.3: Calibration curve of Allium cepa Extract

Table No.4: Formulation of Herbal Gel containing *Allium cepa* extract

Ingredients	F1	F2	F3	F4
<i>Allium cepa</i> Extract (gm)	0.50	0.50	0.50	0.50
Carbopol 934(gm)	0.5	1	1.5	2
Methyl Paraben(gm)	0.2	0.2	0.2	0.2
Propylene Glycol(ml)	5	5	5	5
Triethanolamine	q.s	q.s	q.s	q.s
Distilled Water (ml)	Upto 100	Upto 100	Upto 100	Upto 100

Table No.5: Evaluation of Herbal Gel containing *Allium cepa* extract

Formulation code	Appearance	pH	Homogeneity	Spreadability (gm.cm/sec)	Viscosity (cps)
F1	Light yellow & Translucent	6.2	Homogeneous	22.83	61400
F2	Light yellow & Translucent	6.4	Homogeneous	20.83	67300
F3	Light yellow & Translucent	6.7	Homogeneous	16.25	75400
F4	Light yellow & Translucent	6.3	Homogeneous	13.33	78300

Table No.6: In- Vitro drug release of Herbal Gel containing *Allium cepa* extract

Time (Hr)	% Cumulative Drug Release			
	F1	F2	F3	F4
0	0	0	0	0
1	14.28	15.13	16.88	14.88
2	22.35	21.33	22.88	22.13
3	34.16	36.12	43.75	35.36
4	42.32	45.67	57.14	46.12
5	53.69	54.60	65.62	53.12
6	65.02	63.07	73.66	65.41
7	72.76	71.55	82.14	74.14
8	76.91	79.14	86.16	83.41

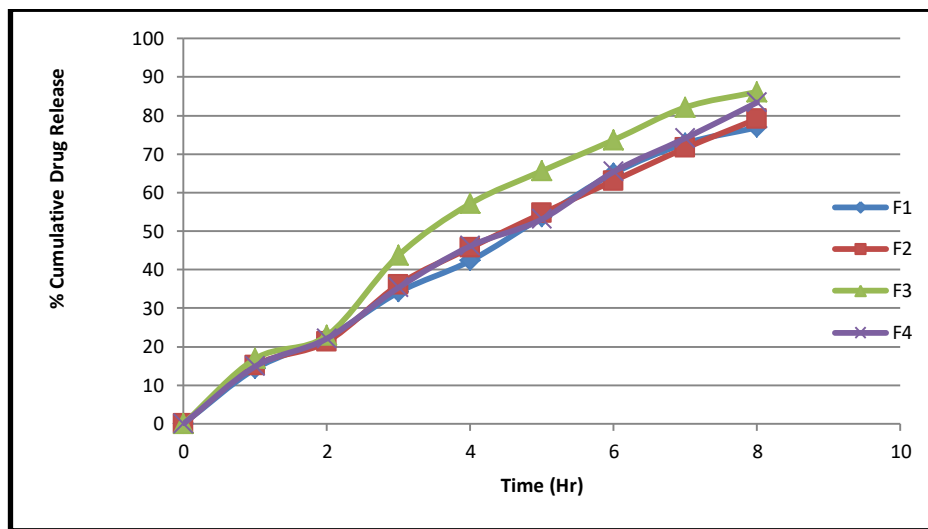


Figure No.4:-% cumulative drug release of F1 to F4 gel formulations

CONCLUSION

The use of the medicinal plant as a primary health care was popular from ancient time because plants provides many health benefits for human. This research work was carried out to develop a new topical herbal gel formulation for topical application. The prepared herbal gel was further evaluated for pH, Homogeneity, Appearance, Spreadability, Viscosity, *In-vitro* diffusion study. The gel formulation F3 was found to have good all above desirable properties. Thus it was concluded that *Allium cepa* herbal gels can be successfully prepared by using polymer which made the gel and prepared gel shows better application property.

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