Formulation and Evaluation of Herbal Topical Gel For The Treatment of Psoriasis

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ABSTRACT: In present gel formulation can provide better absorption characteristics and hence increase the bioavailability of the drug. Regular cures are more satisfactory in the conviction that they are more secure with less result than the engineered ones. Natural plans have developing interest on the planet market. It is a very good attempt to establish the herbal gel containing ethanolic extract of Argemone Mexicana. Argemone Mexicana gel formulations prepared with different concentrations of carbopol as gelling agent and propylene glycol as permeability enhancer showed acceptable physical properties and drug release study. All prepared gel showed acceptable physical properties concerning color, odor, and taste, pH measurement viscosity, and drug content spreadability, Extrudability, Accelerated stability test. Among all gel formulations it is concluded that increasing the Propylene glycol concentration decrease the drug release because polymer concentration increases, viscosity increases. This study revealed that the developed herbal gel formulation F5 was comparatively better than other formulation

Keywords: bioavailability, Argemone Mexicana, Extrudability ,carbopol, propylene glycol, viscosity

1. INTRODUCTION

Psoriasis is a persistent and provocative repetitive dermatosis illness much of the time influencing the skin, nails, lumbosacral territories, intergluteal separated, glans penis, knees, scalp, palm/bottoms of feet & joints. Persons of all ages may develop this disease/disorder. In World between 2 to 4 % of the general population is affected with psoriasis. It affects one in 50 persons. It is grouped under the *"Papulosquamous disorder"*

The most typical lesion is well demarked in pink colored plaque covered by loosely adherent scales that are characteristically silver white in color. Disease onset in early admitted due to genetic transmission and more than a dozen immune modifying biological agents. "In nut shell, psoriasis is a typical skin condition where the skin creates regions that become thick covered with brilliant scales."Psoriasis is viewed as a skin illness; however, it is a disarranged safe framework." The T-cells, a type of White Blood Cells (WBC) become over stimulated. Psoriasis tends to be worst in those with a disordered immune system for other reasons (Cancer, AIDS, other autoimmune diseases). [1]

Types of Psoriasis

There are six types of Psoriasis

a) Plaque: It habitually happens on skin of elbow and knee and furthermore could happen at any territory of body. For this situation skin sores are red at the base and covered by shiny scales.

b) Guttate psoriasis: Small drop shaped-lesions appear on trunk, limbs & scalp. This type of psoriasis is triggered by URI (Upper Respiratory Inflections)

c) Pustular psoriasis: Blisters of non-infection pus appears on the skin. Such type of soriasis may be triggered by medications, infections, stress, and exposure to certain chemicals.

d) Inverse Psoriasis: Smooth, red patches occur in the folds of the skin near the genitals, under the Brest and in the armpits. The symptoms may be very severe by friction and sweating.

e) Erythrodermic Psoriasis: It is far reaching blushing and scaling of the skin might be response to extreme burn from the sun or to taking corticosteroids (cortisone) or delayed time of expanded action of psoriasis.

f) Psoriatic Arthritis (PSA): Joint inflammations that produce symptoms of arthritis in patients who have all will develop psoriasis.

2. MATERIAL AND METHOD:

Extraction of Argemone Mexicana Linn

Collection and Processing of plant material:

Argemone Mexicana linn plant collected of herbal garden in SVCP Indore. The plant materials were collected and separated and is then cleaned, dried under shade drying 4-5 days. Then the dried plant materials were grinded, sieved the root sample was ground well into a coarse powder form by a grinding machine. To get nearly coarse powder. The powder was stored in air tight bottles at room temperature before extraction. Dried root were ground into powder form;

Extraction [13]

The purpose of extraction of medicinal plant matrix is to eliminate unwanted materials and to concentrate the active constituents in a soluble form. In some cases, extraction also increases the shelf life of the product, for example ethanolic extract may have a longer shelf life,

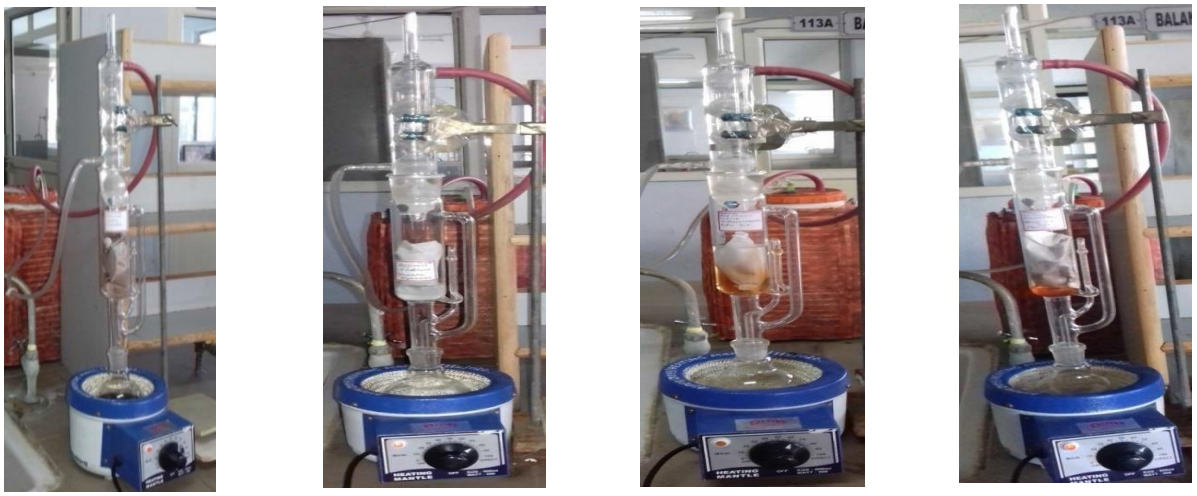
compared to raw herbal material, the resulting extracts are complex mixtures of chemical substances which may be ready for use as a medicinal agent, or they may undergo further .purification to obtain the active constituent.

Herbal plant extract

The plant materials were collected and separated and are then dried under shade drying 4-5 days. Then the dried plant materials were grinded, sieved to get nearly coarse powder. Extraction is the process of obtaining the constituents by separating them from crude drug by the use of solvents powdered material was extracted with suitable solvent of mixture of solvents for extracting the various.

Soxhlation [14]

10 gm powder was imbibed with 150 ml of methanol, ethanol, hexane and water. Finally ethanolic extract was collected and concentrated. The extract was stored in the airtight container at cool and dark place.



E1.Water Extracts E2.Hexane Extracts E3.Methanol Extracts E4.Ethanol Extracts

Fig 1 Soxhlet extraction of different Solvents.

Preparation of plant extracts: The coarse powder of plant parts will be extracted successively. All the plant extracts will be filtered using sterile filter paper (Whatman No.1) into a clean conical flask and then the solvents will be subjected to water-bath evaporation and will be utilized for the experiments.

Aqueous extract: The samples of Argemone Mexicana, will be weighed and soaked in water in a conical flask stoppered with the use of rubber corks and left undisturbed for 24 hrs, then filtered through whatman filter paper No.1 in a clean conical flask and will be evaporated using water-bath, where the water will be evaporated at its boiling temperature of 100ºC. The standard extracts obtained will be stored in air tight container at 4ºC in refrigerator for further experiments.

Solvent extract: Different solvents like ethanol, methanol and hexane will be mixed with powdered plant material separately in Erlenmeyer flask. The respective mixtures will be allowed to stand for 3-5 days in tightly sealed vessels at 40-60ºC, protected from sunlight and mixture will be stirred at 24h interval with a sterile glass rod. This mixture will be filter through Whatman filter paper no.1 and the residue, adjusted to the required concentration. The extracted liquid will be subjected to water bath evaporation at 55ºC and the plant extracts obtained will stored in air tight container in refrigerator at 4ºC for further experiments.

Method of preparation [15, 16]

Hot Continuous Extraction

(Soxhlet) In this method, the finely ground crude drug is placed in a porous bag or "thimble" made of strong filter paper, which is placed in chamber E of the Soxhlet apparatus (Figure 2). The extracting solvent in flask A is heated, and its vapors condense in condenser D. The condensed extractant drips into the thimble containing the crude drug, and extracts it by contact. When the level of liquid in chamber E rises to the top of siphon tube C, the liquid contents of chamber E siphon into fl ask A. This process is continuous and is carried out until a drop of solvent from the siphon tube does not leave residue when evaporated. The advantage of this method, compared to previously described methods, is that large amounts of drug can be extracted with a much smaller quantity of solvent. This effects tremendous economy in terms of time, energy and consequently financial inputs. At small scale, it is employed as a batch process only, but it becomes much more economical and viable when converted into a continuous extraction procedure on medium or large scale.

Phytochemical Analysis of Argemone Mexicana plant **Root** parts: [17]

a) Test for alkaloids (Dragendorff"s test): a drop of extract was spotted on a precoated TLC plate and it was then sprayed with Dragendorff's reagent. Appearance of orange spot

confirmed the presence of alkaloids.

b) Test for Cardiac glycosides (Kellar-Kiliani test): 50 mg of methanolic extract was dissolved in 2 ml of chloroform. After this sulphuric acid was added to form a layer. A brown ring at the interphase confirmed the presence of cardiac glycosides.

c) Test for Flavonoids (Shinoda test): a piece of magnesium ribbon was added to 2-3 ml of methanolic extract followed by 1 ml of concentrated hydrochloric acid. The red coloration of solution confirmed the presence of flavonoids.

d) Test for Steroids (Liebermann-Burchardt test): To 1 ml of methanolic extract, 1 ml of chloroform was added .To this, 2-3 ml of acetic anhydride and 1-2 drops of concentrated sulphuric acid was added which turned the colour of the contents to dark green indicating the presence of steroids.

e) Test for Tannins (Braemer's test): to methanolic extract of plant sample, 10% ferric chloride was added (1:1 ratio). Appearance of dark blue colour of solution confirmed the presence of tannins.

f) Test for Terpenoid (Liebermann-Burchardt test): To 1 ml of methanolic extract, 1 ml of chloroform was added .To this, 2-3 ml of acetic anhydride and 1-2 drops of concentrated sulphuric acid was added which turned the colour of the contents to red indicating the presence of terpenoids.

g) Test for Saponins: 2 g of powdered plant sample was boiled together with 20 ml of distilled water in a water bath and filtered. 10 ml of this filtered sample was mixed with 5 ml of distilled water in a test tube and shaken vigorously to obtain a stable persistent froth. The frothing was then mixed with 2-3 drops of olive oil which resulted in formation of emulsion indicating the presence of saponins.

h) Test for Reducing Sugars (Fehling test): 25 ml of diluted sulphuric acid was added to 5 ml of water extract in a test tube and was boiled for 15 minutes. Then it was cooled and neutralized with sodium hydroxide and 5 ml of Fehling solution. Appearance of brick red precipitate confirmed the presence of reducing sugar. [18, 19,]

Drug Characterization

The characterization studies were carried out in terms of tests for identification like physical appearance, melting point and solubility profile of drug.

Physical Appearance [20]

Drug sample through visual inspection the physical appearance of pure drug.

Determination of Melting Point

Melting point of drug sample was determined by using melting point apparatus. Drug sample was taken and placed in a thin walled capillary tube; the tube was approximately 10-12 cm in length with 1mm in diameter and closed at one end. The capillary was placed in melting point apparatus and heated and when drug sample was melted the melting point of sample powder was recorded**.** The Melting point of compound Argemone Mexicana was 169°C. [23]

Solubility: The root powder of Argemone Mexicana linn Soluble in Ethanol, Methanol, Chloroform and Acetone.

Drug–Excipient interaction studies

The different formulation excipient selected for the development of proposed gel were physically mixed with drug 1:1 ratio was filled in amber colored vials which were then properly capped and sealed. The vials of each sample were kept at room temperature, hot air oven, stability chamber and in refrigerator for one month period. After every week for one month the vials were withdrawn and changes in physical appearance and color of the contents were observed.

Thin layer chromatography: [21, 22]

Preparation of TLC Plates: Firstly silica gel-G slurry prepared by mixing silica gel-G with distilled water in mortar pestle and triturated continuously to make uniform slurry. Then glass slide was taken and slurry poured uniformly on glass slide and allow to dry TLC plate in hot air oven at 120ºC for activation.

- **Preparation of sample:** A sufficient amount of each compound was dissolved in absolute methanol. A capillary tube was used to spot the sample on TLC plates. The diameter of each spot was limited to 0.3 cm. The compounds were spotted at 1 cm

intervals from the bottom of the plate. Allow it dried in air.

- **Development of the solvent system:** The solvent system was prepared using Toluene: Acetone (8:2) was used as mobile phase. The 100 ml of small beaker was used and the solvent system was poured in it. The glass beaker was lined with filter paper for presaturation with the solvent system for 15-30 minutes.
- **Stationary phase –** Pre coated silica gel plate
- **Mobile phase –** Toluene : Acetone (8:2)
- **Development of thin layer plate:** Plates were developed in an ascending manner. When the solvent reached to the mark the plate was removed and the wet plates were dried.
- **Detection of spot:** The iodine chamber was prepared and TLC plate was placed in a chamber. Thereafter the plate was removed from chamber and spot was observed. [23]
- **Calculation of Rf value:** Rf value can be calculated by following formula:

Rf= Distance travelled by solute / Distance travelled by solvent

Physical observation [24]

The drug and excipient were kept at different temperature 2-8°C, at room temperature and 60°C and all samples were physically observed after 1 week for a period of 4 weeks.

3. Formulation Development

Selection of excipients:

Table No. 1 Details of excipients

S.No.	Excipients Purpose	Purpose
1.	Carbopol	Gelling agents
2.	Propylene glycol	Cosolvent penetration enhancer
3.	Methyl paraben	Preservative
4.	Propyl paraben	Preservative
5.	Triethnolamene (TEA)	Buffering agent, ph adjuster
6.	Water	Solvent

Formulation of the topical gel [24, 25, 26, 27]

Plant Material Coarse powdered Root of was extracted in a Soxhlet extractor with methanol for 72 h. the extracts were then filtered and concentrated under reduced pressure in Rotary evaporator 40°C and stored at 4-8°C for further use. Sufficient quantity of carbopol 940 was taken and stirred continuously in water for 2 hours and kept aside for 24 hrs. Then specified amount of Argemone Mexicana linn root extract was dissolved in appropriate and preweighted amounts of propylene glycol. Solvent blend was then transferred to carbopol container and stirred for additional 20 min. The dispersion was then allowed to hydrate and swell for 60 min, finally adjusted the pH with 98% TEA. During Skin pH (6.8-7) adjustment, the mixture was stirred gently with a spatula until homogeneous gel was formed. All the samples were allowed to equilibrate for at least 24 hours at room temperature prior to performing rheological measurements.

Table 2 formulation of topical gel

S. No.	Ingredients	F1	F2	F3	F4	F5
1.	Drug (Argemone Mexicana) in Root (Extract)	0.62gm	0.62gm	0.62gm	0.62gm	0.62gm
2.	Carbopol 940	0.2gm	0.2gm	0.2gm	0.2gm	0.2gm
3.	Propylene glycol (in ml)	25ml	30ml	35ml	40ml	45ml
4.	Methyl paraben	0.1gm	0.1gm	0.1gm	0.1gm	0.1gm
5.	Propyl paraben	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm
6.	Triethanolamine (TEA)(ml)	0.5ml	0.5ml	0.5ml	0.5ml	0.5ml
7.	Distilled Water up to	q.s	q.s	q.s	q.s	q.s

Evaluation parameter [28, 29, 30, 31]

- **Physical appearance:**

  The prepared gel formulations were inspected visual for their physical appearance, color, and odour.

- **pH determination:**[32,33,34]

  The pH of the gel formulations was determined by using a pH meter. For pH determination, the electrode was dipped in the gel sample for 10 minutes and then took

the readings at room temperature.

- **Spreadability:** [35]

  Spreadability refers to the extent of area to which gel readily spreads on application. It is determined by wooden block and glass slide apparatus. The time in sec. 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 spreadability. Lesser the time taken for the separation of two slides, better the spread ability. Spread ability is calculated by using the formula:

  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.

- **Extrudability study:[27]**

  A good gel extrude optimally from the gel with slight pressure applied. The Extrudability of formulations from aluminium collapsible tubes was determined using universal tube filling machine. Aluminium collapsible tubes filled with 10g gels were held between two clamps. A tube was compressed and Extrudability of the formulation was determined in terms of weight in grams required to extrude a 0.5 cm. ribbon of gel in 10 seconds.

- **Determination of viscosity:**[36]

  The viscosity of the gel formulations was determined using Brookfield viscometer with spindle no. 7 at 100 rpm at the temperature of 25°C.

- **Drug content: [**[37]

  To ensure uniform formulation of the gel, it was sampled from the different locations in the mixer and assayed for the drug content. Drug content of the gels was determined by dissolving an accurately weighed quantity of gel (about 1 gm) in about 100 ml of pH 6.8-phosphate buffer. These solutions were quantitatively transferred to volumetric flasks and appropriate dilutions were made with the same buffer solution. The resulting solutions were then filtered 0.45 mm membrane filters before subjecting the solution to spectrophotometric analysis for Argemone Mexicana linn at 257 nm. Drug content was determined from the standard curve of Argemone Mexicana linn.

- **In Vitro Release Study:** [39]

  In-vitro drug release studies are carried out by using a Franz diffusion cell. 0.5 g of gel is taken in cellophane membrane. Diffusion studies are conducted at 37±1°C employing 250 ml. phosphate buffer, pH 6.8 as the dissolution medium. At time interval of 1 hr, 1 ml pg sample is collected and replaced with new buffer solution. Collected samples are analyzed by using suitable analytical method.

- **Accelerated Stabilizing Testing:** [41,42]

  Since the period of stability testing can be as long as two years it is time consuming and expensive. Therefore it is essential to devise a method that will help rapid prediction of long term stability of drug. The accelerated stability testing is defined as the validated method by which the product stability may be predicted by the storage of the product under condition that accelerates the change in defined and predictable manner. Accelerated stability study was performed, Sample of batch F1, F2, F3, F4, F5 was packed in amber colored bottles, which were tightly plugged with cotton and capped with aluminum. They were stored at 25°C and 60% RH and 40°C & 75% for one month in Stability Chamber and evaluated for their formulation-to assess the formulation stability. At the end of one month, stability of gel was studied by exposing the sample to elevated conditions of temperature and humidity (40°± 2°C / 75% RH ±5%) for the parameters like physical appearance study, pH and drug release.

4. RESULT AND DISCUSSION:

Preformulation study

Table :3 Visual Observation of Plant:

S. No	Parameter	Observation
1.	**Size**	Length- 7cm -32cm Width 0.6cm- 4cm
2.	**Shape**	Cylindrical
3.	**Surface**	Outer surface dark brown, Inner surface- light brown
4.	**Colour**	Grey – brown
5.	**Fracture**	Short
6.	**Fractured**	Surface rough

Sensory characters of the Powdered Root

S. No	Characterstics	Observation
1.	**Colour**	Grey- brown
2.	**Taste**	Slightly bitter
3.	**Odour**	Slightly spicy

Extraction Process and Phytochemical Screening

Determination of solubility for Root powder extract:-

Solubility of root powder was determined in various solvents and the findings reported below:

Table No.4: Solubility of Extract

S. No.	Medium	Extract
1.	Distilled water	Insoluble
2.	Ethanol	**Soluble**
3.	Methanol	**Soluble**
4.	Chloroform	**Soluble**
5.	Acetone	**Soluble**
6.	Petroleum ether	Insoluble

Hot Continuous Extraction

The root sample was ground well into a coarse powder form by a grinding machine. 10 gm powder was imbibed with 150 ml of methanol, ethanol, hexane and water. Finally, ethanolic extract was collected and concentrated. The concentrate was put away in the water/air proof compartment at cool and dim spot.

Table No. 5 Phytochemical Analysis of Argemone Mexicana Plant Parts

S.No.	Phytochemical	Ethanol extract Root	Methanol extract Root	Aqueous extract Root
1.	Alkaloid	-	-	-
2.	Flavonoid	+	+	-
3.	Tannin	+	+	+
4.	Saponin	-	-	-
5.	Terpenoid	-	-	-
6.	Steroid	-	-	-
7.	Glycoside	-	-	-
8.	Reducing sugar	+	+	-

+ means present; - means absent

Table 6: Organoleptic and Physical properties of different herbal drug Extracts.

S. No.	Extract Code	pH	Colour		Odor		Taste	
			Standard	Observation	Standard	Observation	Standard	Observation
1.	E1	6.1	Greenish brown	Greenish Light brown	Not agreeable	Not agreeable	Slightly bitter	Slightly bitter
2.	E2	6.6	Greenish brown	Dark greenish brown	Peculiar	Peculiar	Slightly bitter	Slightly bitter
3.	E3	6.5	Grey brown	Brown	Slightly spicy	Slightly Spicy	Slightly bitter	Slightly bitter
4.	E4	6.7	Blackish green	Blackish green	Slightly spicy	Slightly spicy	Slightly bitter	Slightly bitter

Drug Characterization

Determination of Melting Point

The Melting point of compound Argemone Mexicana was 169°C.

Drug-excipient interaction study:

All excipients remain stable at 25°C room, hot air oven and refrigerator temp. There is no physical change observed. All formulations are remaining stable at that condition. The similarity was surveyed by TLC and the maintenance elements of all proportions discovered comparable.

Table no.7: Data of drug-excipient interaction study

S. No.	Drug/ drug+ Excipient Ratio (1:1)	Physical appearance (initial)	Present Day (Rf)	Physical appearance (final)	After15 Days (Rf)	Inference
1.	Drug (Argemone Mexicana)	Blackish green	0.64	Blackish green	0.67	No Change
2.	Pure Drug + Cabopol 934	Whitesh green	0.65	Whitesh green	0.67	No Change
3.	Pure Drug + Propylene Glycol	Greenish Transparent	0.63	Greenish Transparent	0.64	No Change
4.	Pure Drug + Methyl Paraben	Whitesh green	0.64	Whitesh green	0.63	No Change
5.	Pure Drug + Propyl Paraben	Whitesh green	0.63	Whitesh green	0.65	No Change

Formulation of gel : The Gel formulation prepared was dispersion method using polymers carbopol 940 gelling agents and all. Prepared five gel formulations (F1-F5) was evaluated with the help of parameters like physical appearance pH, viscosity, drug contents, spreadability, Extrudability study and in vitro drug release study.

Physicochemical evaluation: Organoleptic characterization of different gel formulations (F1-F5) were evaluated parameter like visual appearance, odour, pH, visibility, consistency test. All gel formulation appears as good, having smooth texture. The pH of the formulation similar to skin pH so there is no irritancy observed. There is no foreign particle observed. All were easily spreadable on skin surface, non greecy and had slightly spicy odor.

Table 8 Physical parameter of prepared gel

Parameter	F1	F2	F3	F4	F5
Color	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Visual Appearance	Clear and Slightly Transparent	Clear and Slightly Transparent	Clear and Slightly Transparent	Clear and Slightly Transparent	Clear and Slightly Transparent
Foreign particle	No foreign particle	No foreign particle	No foreign particle	No foreign particle	No foreign particle
Odor	No Change	No Change	No Change	No Change	No Change
pH	5.60	5.56	5.70	5.68	5.55
Consistency	Good	Good	Good	Good	Good

Spreadability studies: The spreadability studies performed in lab. All gel formulations showed better spreadability on skin surface and there is no greecy appearance, smooth and there were no residue left after applications.

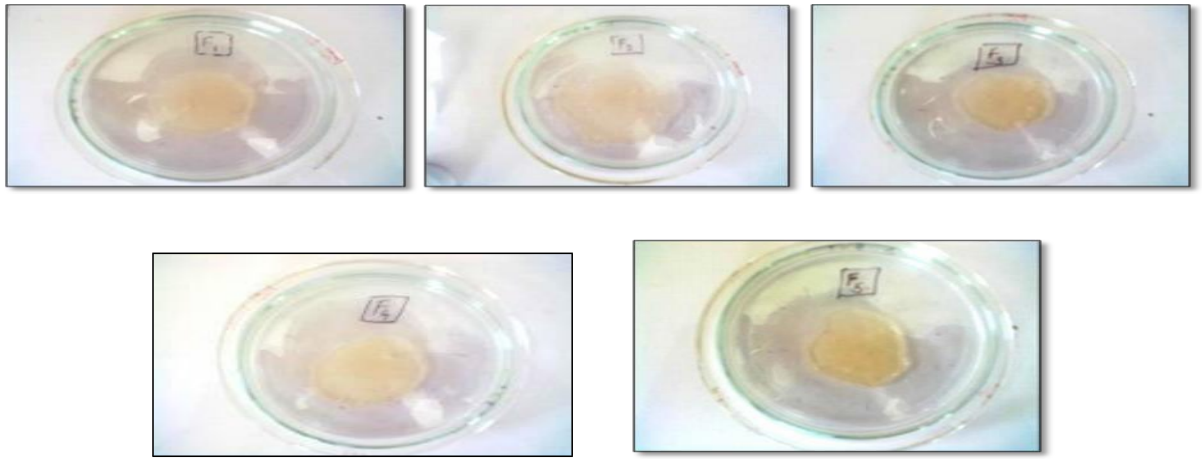


Figure 2: Spreadability of F1 to F5 gel formulations

Table 9: Spreadability study of different formulations

S.NO.	Formulation Code	Time in second	Spreadability (g cm/sec)
1.	F1	10	36.66
2.	F2	10	48.33
3.	F3	10	39.33
4.	F4	10	42.66
5.	F5	10	52.33

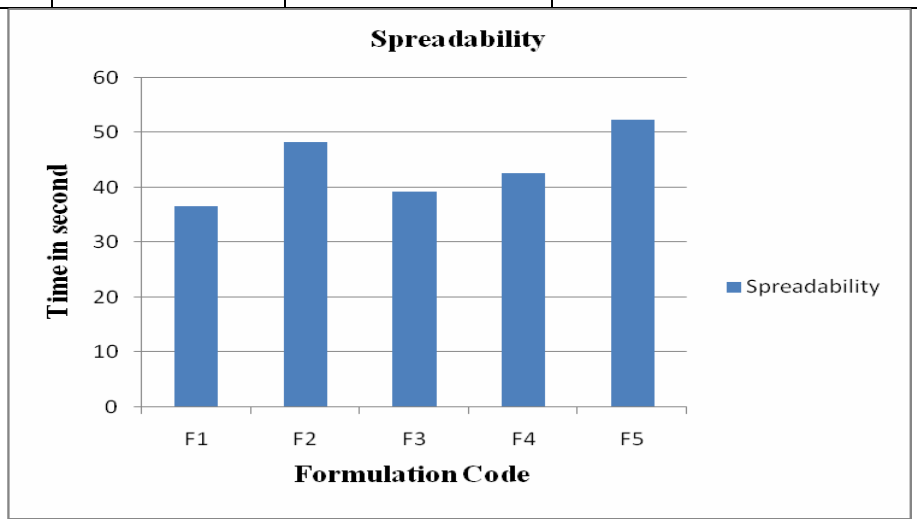


Figure 3: Spread ability graph of different formulations (F1-F5)

Extrudability study:

The gel formulations were filled into a collapsible metal tube or aluminium collapsible tube. The cylinder was squeezed to expel the material and the Extrudability of the definition was checked.

Table 10: Extrudability of gel formulations

S. No.	Formulation	Extrudability
1.	F1	+
2.	F2	++
3.	F3	+
4.	F4	++
5.	F5	+++

Excellent (+++), Good (++), Average (+), Poor (-)

Determination of viscosity:

The viscosity was determined by using Brookfield viscometer. Spindle no.: 7 at 100 rpm Temperature: 25°C

Table no. 11: Viscosity of gel (F1-F5)

S. NO.	Formulation	Viscosity (cps)± std. dev. (n=3)
1.	F1	8635.33±2.51
2.	F2	8675.33±8.73
3.	F3	8882.33±2.51
4.	F4	8522.33±2.51
5.	F5	8696.66±8.73

Drug content:

To guarantee uniform plan of the gel, it was tested from the various areas in the blender and examined for the medication content. Drug content of the gels was determined gel formulation were prepared and shown below: (F1-F5)

Table no.12: Percentage Drug content (F1-F5)

S.NO.	Formulation	Percentage Drug content (Mean ± SD) (n=3)
1.	F1	80.02±0.558
2.	F2	82.71±0.101
3.	F3	79.75±0.036
4.	F4	82.24±0.402
5.	F5	84.71±0.401

Percentage drug release:

In-vitro drug release studies are carried out by using a Franz diffusion cell was determined of gel formulation shown and below: (F1-F5)

Table no.13: Percentage drug release data of (F1-F5) formulation of gel:

Time (in min)	% Drug Release (Mean±SD)				
	F1	F2	F3	F4	F5
0	0	0	0	0	0
30	21.66 ±1.7	13.46 ±0.70	15.93± 0.40	21.11 ±0.67	26.20 ±0.5
60	37.01 ±3.36	31.34 ±1.26	30.93± 0.4	42.22 ±1.95	49.83 ±0.56
90	53.46 ±0.9	50.52 ±1.31	49.8±0 .65	51.13 ±0.66	61.05± 0.65
120	65.96 ±4.09	69.68 ±1.32	64.5±0 .81	68.41 ±0.95	74.53 ±0.5

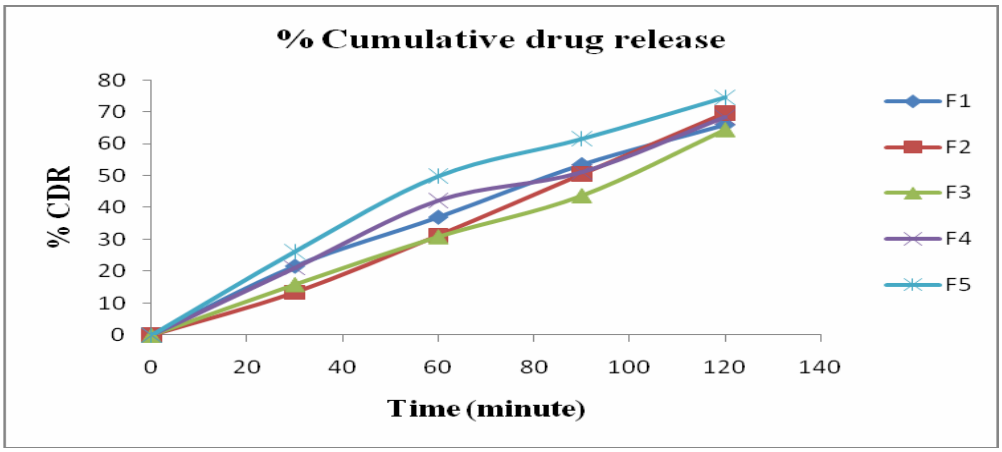


Figure 4 Percentage drug release graph from formulation F1-F5

5. Summary and Conclusion:

The gel formulation can provide better absorption characteristics and hence increase the bioavailability of the drug. Regular cures are more satisfactory in the conviction that they are more secure with less result than the engineered ones. Natural plans have developing interest on the planet market. It is a very good attempt to establish the herbal gel containing ethanolic extract of Argemone Mexicana. Argemone Mexicana gel formulations prepared with different concentrations of carbopol as gelling agent and propylene glycol as permeability enhancer showed acceptable physical properties and drug release study. All prepared gel showed acceptable physical properties concerning color, odor, and taste, pH measurement viscosity, and drug content spreadability, Extrudability, Accelerated stability test. Among all gel formulations it is concluded that increasing the Propylene glycol concentration decrease the drug release because polymer concentration increases, viscosity increases. This study revealed that the developed herbal gel formulation F5 was comparatively better than other formulation.

The clinical evidence shows that topical gel is a safe and effective treatment choice for use in the management of skin related diseases.

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