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Phytopharmacological Investigation,Evaluation Of Plant Aconitum Hetrophyllum

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Abstract:

This study investigates the potential of Aconitum Hetrophyllum ointment as a 1 percent topical formulation for treating dermatophytosis. Aconitum Hetrophyllum exhibits fungicidal action against a broad spectrum of dermatophytes, moulds, and dimorphic fungi. The research aims to develop an effective treatment option for various human skin conditions caused by dermatophytes. The drug release kinetics of the ointment were analyzed using Higuchi and Korsmeyer-Peppas models, with the Higuchi model showing a close fit to the drug release profile. The graphical representation of the drug release further supports the suitability of the Higuchi model. Future investigations will explore formulations with different base compounds and assess their mechanical properties and clinical efficacy. This research highlights the promising role of Aconitum Hetrophyllum ointment as a potential treatment for dermatophytosis, offering a novel therapeutic approach in dermatological care.

Keywords: Aconitum Hetrophyllum, dermatophytosis, topical ointment, drug release kinetics, Higuchi model, Korsmeyer-Peppas model, skin conditions, therapeutic approach.

1. INTRODUCTION

TOPICAL DRUG DELIVERY

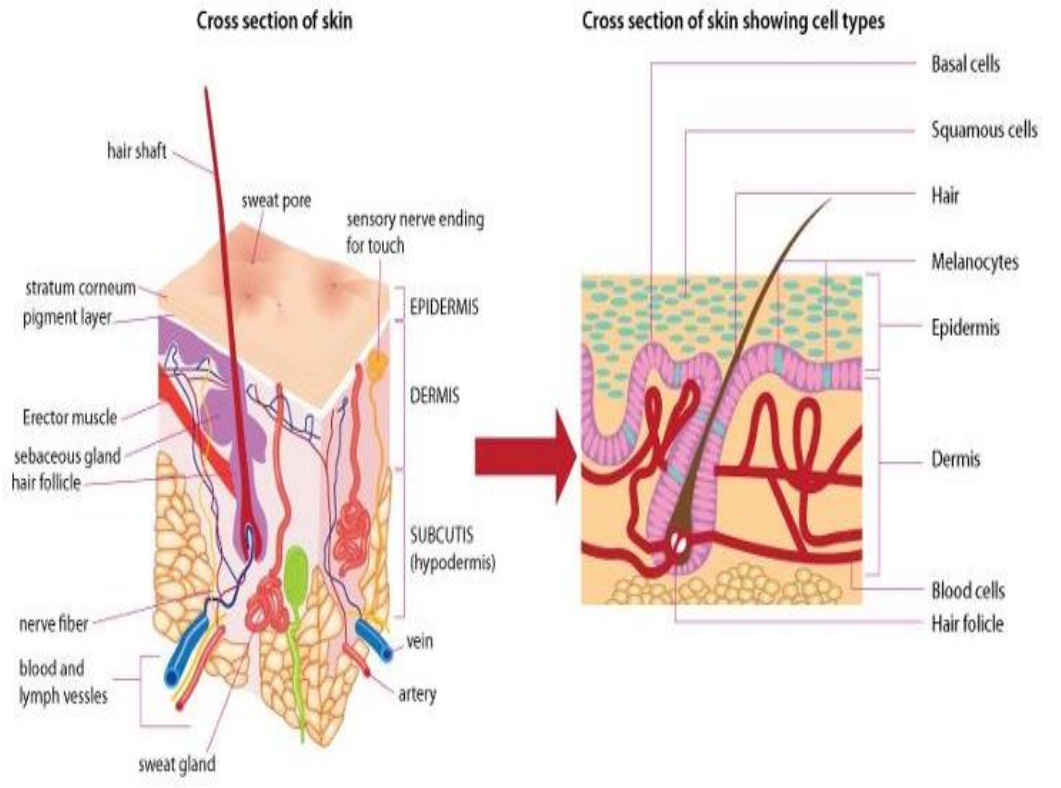
Gels, creams, and ointments are kinds of semi-strong, skin doses. Apply to the skin, put it on the thought or nasal, vaginal, or rectal surface. it's a capable arrangement to use for the region and principal impacts. The going with abilities are massive concerning dermatological applications. A skin dermatology thing is made to treat skin ailments as an objective organ for offering medicine to the skin (Allen et al 2005).. Dermatological things added to the skin have a fluctuating synthesis and consistency among fluids and noteworthy powders, at any rate, the main comprehensively

acknowledged substance is semi-strong nuances. These are consistently non-mitigated, as in with no remedially incredible decorations these could be utilized for supportive purposes (Jain NK 2006).

Skin (Rotstein C.et.al.2008)

The skin is regularly named the body's most noteworthy organ. it's all-inclusive its use as medication the bosses courses, whether or not for close by, provincial or fundamental impacts, since its straightforwardness and its capacity to stay up its applied approach impeccable over very while period. Human skin could be anatomically depicted as a portrayed out organ with three explicit tissue layers: the epidermis, the dermis, and thusly the subcutaneous fat layer. The periphery skin layer of the epidermis wires overlaid epithelial squamous cells. A decently slight region (around ten millimeters thick) known as layer corneum or layer corneum accumulate on the skin region keratinized, affixed stores of those dynamic detaching cuticular cells. The keratinized cells unfurl one another, interconnected by cross-cell relates and stuffed into around fifteen layers inside the layer corneum. Lamellar structures with elective hydrophilic layers and lipotropic bilayers molded all through the natural cycle are essential for the living thing territory of the layer corneum that is prosperous in liquid. The world goes without a doubt as a modest film which is remarkable all things considered flexible. (Remington et al 2004)

The dermis is an undeniable gel-based structure with an unclear colloidal ground substance containing a grid of tacky proteins. Protein, including collagen and elastin strands, is generally relating to the epidermis. The dermis maintained the epidermis and made it less complex to bind to the fundamental muscles and bones. Veins, lymphatics, and nerves can be found in the dermisyet nerve strands can pass past dermal edges or papillae into the germinative area of the epidermis.



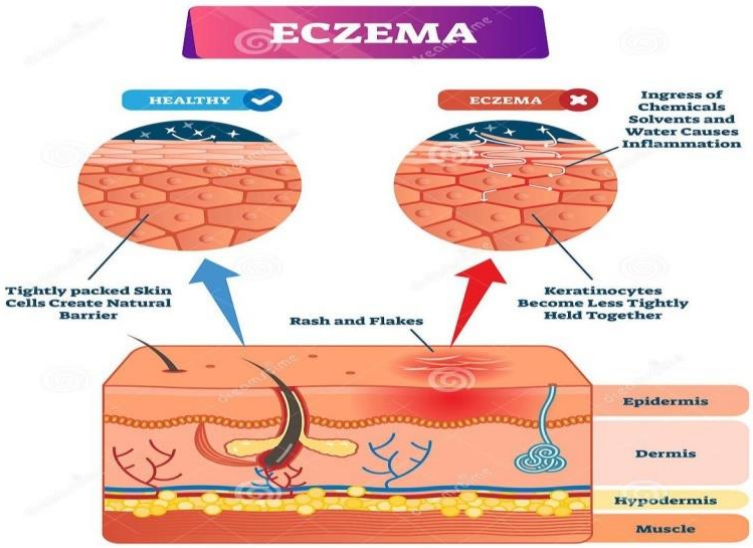


Figure.1 Cross section of skin

The dermis is an apparent gel-based structure with an amorphous colloidal ground substance containing a matrix of fibrous proteins. Protein, including collagen and elastin fibers, is approximately parallel to the epidermis. The dermis supported the epidermis and made it easier to bind to the underlying muscles and bones. Blood vessels, lymphatics, and nerves can be found in the dermis but only nerve fibers can pass beyond dermal ridges or papillae into the germinative area of the epidermis. Glasses of sweat and follicles of hair extending from the dermis through the epidermis give a uniform integument. **(Gennaro et al 2004)**

A dermis and epidermal cushion is the subcutaneous fat layer. Collagenous fibers from the dermis thread between accumulations of fat cells, providing a link between the subcutaneous layer and the superficial layers of the skin.

Dermatophytosis Dermatophytosis

Dermatophytes are identified with parasites arranged for causing skin changes of the sort known as ringworm or dermatophytosis. As such portrayed, the ringworm species are all things considered structures having a spot with three agamic genera Microsporum, Trichophyton and Epidermophyton. In the class Microsporum, the macroconidia are bothersome, regularly thick walled and reach from fusiform to obovate fit as a fiddle with 1-12 or more septa. Those of Trichophyton species are modest walled, smooth and might be tube framed, fusiform or clavate perfectly healthy, with upto 12 traverse septa. In Epidermophyton, the macroconidium is clavate, expanded and adjusted at its distal shaft, thin walled and has up to five septa; the conidia are smooth when at first shaped, yet as the district ages discrete are smooth when from the outset might be viewed.

Clinical kinds of ringworm sicknesses

The clinical highlights of dermatophyte illnesses result from a blend of keratin destruction and a burnable host reaction. The wide combination in clinical introduction relies upon the species and likely the strain of the parasite worried, upon the size of the inoculum, upon the site of the body dirtied and upon the ensured status of the host. **(Sehgal VN. 2004)**

Development diseases

Development or ringworm infection is accomplished by a particular class of living creatures, the dermatophytes. They thrive in the keratin layer of the epidermis, nails and hair. At any rate they don't attack the covering epidermis. **(Thappa**

DM 2005) Dermatophytosis is accomplished by sorts of Trichophyton, Microsporum and Epidermophyton. The typical species experienced in ringworm spoiling are as per the going with.

- Microsporomaudouni,
- Microsporomcanis ,
- Trichophyton rubrum,
- Trichophyton mentagrophytes,
- Trichophyton violaceum,
- Trichophyton tonsurans,
- Trichophyton
- verrucosum,
- Trichophyton schoenleinii
- Epidermophyton floccosum.

2. MATRIAL&METHODS

PHYTOCHEMICAL STUDIES

Crude drugs are obtained from plants, animals, and minerals from natural source. It is essential to identify and characterize them correctly for their physical and chemical features and to enforce their quality.

COLLECTION OF HERB

The leaves of the plant were collected in the month of July 2022 form different parts/district of Uttarakhand State.

IDENTIFICATION AND AUTHENTICATION OF COLLECTED PLANT

Plant parts were identified and authentication from Botanical Survey of India, Shibpur, Howrah, West Bengal.

WASHING AND SHADE DRYING

Plant samples gathered for preparing undergo a washing process to remove contamination from particles that adhere, such as dust and other contaminants.

There are 3 washing methods:-

- "Wash by machine in the bag,"
- "Beaker soak" tap or deionized water by hand washing,
- "Rinse the colander" with tap or deionized water.
- Samples are carried out in soft mode through at least one full wash / rinse / spin cycle. Not more than 15 are processed at one moment.

Some moment after washing plants dried at room temperature [24±5], the temperature rises 50-60. The temperature should not be increased by more than 60 ° C as well as volatile active constituents also evaporate above the 60 ° C enzymes and proteins are denatured. Dried plant material until they were free of moisture and subjected to various parameters of physical assessment.

GRINDING AND SIEVING

Samples of plant tissue were reduced to the particle size of 0.5 to 1.0 mm to ensure homogeneity and facilitate the destruction of organic matter.

Using the suitable Wiley Mill 22 mesh sieve, specimens were passed through a 1.0 mm screen [22 mesh]. However, a 40 mess screen should be used if the sample aliquot to be tested is < 0.5 gm.

Samples are finely ground to achieve homogeneous powder using a stainless steel screen Cyclone Udy Mill to pass through a 22 mess sieve. Large specimens were first grounded by a conventional Beater Cross grinder and then decreased to a manageable size by quartering. The Cyclone Udy Mill or Intermediate Wiley Mill then ground these.

EXTRACTION PROCEDURE

General extraction methods for medicinal plants include maceration, infusion, percolation, digestion, decoction, warm constant extraction (Soxhlet), aqueous-alcoholic fermentation extraction, counter-current extraction, microwave-assisted extraction, ultrasound extraction (sonication), supercritical liquid extraction and distillation methods (water distillation, steam distillation, phyphylaxis). Hydrolytic maceration followed by distillation, expression and effleurage (cold fat extraction) may be used for aromatic crops, hydro-water and steam distillation. Headspace trapping, strong phase micro extraction, protoplast extraction, micro distillation are some of the recent extraction techniques for aromatic plants.

The Basic Parameters Influencing an Extract's Quality are:

- Plant component used as starting material
- Extraction solvent
- Extraction process

Effect of Phytochemical Plant Extracted Depends on:

- Nature of plant material
- Origin
- Processing degree
- Moisture content
- Particle size

Variations in Various Extraction Methods Affecting the Quantity and Secondary Metabolite Composition of an Extract Depending on:

- Extraction type
- Extraction time
- Temperature
- Solvent nature
- Solvent concentration
- Polarity

- Plant Material

Natural components based on plants can be obtained from any portion of the plant, such as bark, leaves, flowers, roots, fruits, seeds, etc.

Choice of Solvents

For the successful determination of biologically active compounds from plant material depends mainly on the type of solvent used in the process of extraction.

A Good Solvent Property in Plant Extractions Includes:

- Low toxicity
- Low heat evaporation facility
- Promoting fast physiological intake of the extract
- Preservative action
- Inability to complex or dissociate the extract.

The Factors Affecting the Choice of Solvent are:

- Quantity of phytochemicals to be extracted
- Extraction rate
- Diversity of distinct compounds extracted
- Diversity of inhibitory compounds extracted
- Ease of successive handling of extracts
- Solvent toxicity in the bioassay process
- Extractant's potential health risk

The selection of solvent depends on what the extract is meant for,Because the end product will contain residual solvent traces, the solvent should be non-toxic and should not interfere with the bioassay. The decision will also rely on the extraction of the targeted compounds.

Variation in Extraction Methods Usually Depends on:

- Duration of processing,
- Solvent used,
- Solvent pH,
- Temperature,
- Particle size of plant tissue,
- Solvent-to-sample ratio.

The fundamental concept is to finer grind the plant material (dry or wet), which raises the extraction surface area and thus improves the extraction rate. Earlier trials recorded the ideal use of solvent to sample ratio of 10:1 (v / w) solvent to dry weight ratio.

Solvents Used for Active Component Extraction are:

Water, Ethanol, Methanol, Chloroform, Ether, and Acetone.

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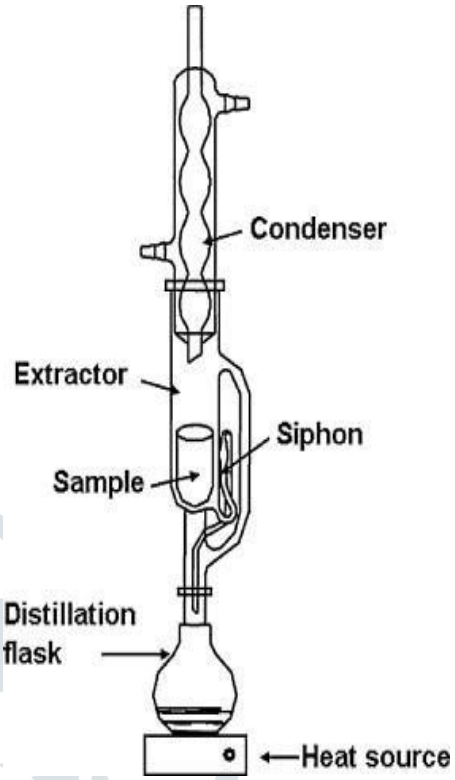

FIG.2 Soxhlet apparatus with A.H **FIG.3Soxhlet Apparatus**

RESULT&DISCUSSION

PHYTOCHEMICAL SCREENING OF ACONITUM HETROPHYLLUM

Extraction of Aconitum Hetrophyllum .

The Aconitum Hetrophyllum plant was washed, shade dried and grinded to coarse powder. Approximately 700 gm of dried powder were extracted successively with decreasing polarity range such as petroleum ether, ethyl acetate, ethanol, and water at temperature ranges between 40-60 ° C using constant heating Soxhlet apparatus. For 15 cycles, the extract was continued. The extract was finally filtered and concentrated to dry weight.

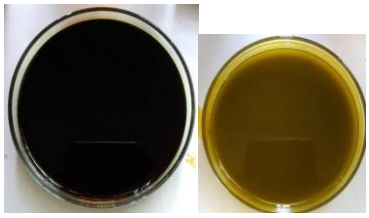

FIG 4 Pet-Ether Extract of A.H **FIG 5 Ethyl Acetate extract of A.H**

FIG 6 Ethanol Extract of A.H

FIG 7 Aquoues Extract of A.H.

In TLC chamber was prepared using mobile phase Chloroform:

Ethyl Acetate: Glacial acetic acid in the ratio of 4.6 : 0.4 : 0.1 ml .

- TLC plate is placed in the closed chamber. It was kept in such a way that sample faces the mobile phase.
- Development of chamber until the solvent reach at sufficient distance.
- The plate was removed from the chamber and solvent font is marked.
- Plate were air dried.
- Plate were paced in the iodine chamber until the spot is visible

Finally determine the Rf value of spot by using formula:

Distance travelled by solute

Rf value = ----------

Distance travelled by solvent

Selection of Solvent for TLC

When you need to determine the finest solvent or solvent combination (a "solvent system") to create a TLC with an unknown blend, multiple test runs differ the solvent's polarity: a test and error process. Observe and record chromatographic outcomes carefully in each solvent scheme. You will find that all the components of the mixture move faster (and vice versa with reducing the polarity) as you increase the solvent system polarity. The optimal solvent system is simply the system which provides the highest possible separation.

- **Very polar solvents:**
- Water > Methanol > Ethanol > Isopropanol
- **Moderately polar solvents:**
- Acetonitrile > Ethyl-acetate > Chloroform > Dichloromethane > Diethyl
- Ether > Toluene
- **Non- polar solvents**:
- Cyclohexane > petroleum ether > Hexane > Pentane.

Common Solvent Combinations

Ethyl Acetate :

- Hexane - 0-30% Most common combination, sometimes difficult to fully remove solvents on rotary evaporator
- Ether : Pentane - 0-40% very popular, easy to remove on the rotary evaporator
- Ethanol : Hexane/Pentane - 5-30% useful for very polar compounds
- Dichloromethane : Hexane/Pentane - 5-30% sometimes useful

Procedure for Column Chromatography

- A small wad of cotton was placed at the bottom of a column (about 1/3 of a cotton ball) using a long glass rod.
- Don't place too much cotton, it difficult to push the solvent through. All the cotton needs to do is keep the solid from getting through the hole.
- Column was placed in the column clamp on a lab banch.
- A steady stream of silica gel was poured through the funnel to pack the column, tap the column with fingers to pack it evenly. Stop when the solid reaches about the 25 ml mark. Column was tapped until the solid doesn't settled properly.
- Sample was prepared by taking little amount of silica gel and Aconitum Hetrophyllum sample was mixed very well and add on the top of the column.
- For starting of elution, the column was filled with chloroform and a beaker is placed underneath the column; stopcock was opened and start forcing the liquid through the column by bulb (shove the pointed part in the top of the column, squeeze, and pull it out without letting go).

Note –Don't let the column run dry – always stop before the top reaches the top of the solid.

- The solvent was added according to the polarity (polar solvent to non – polar solvent).
- Solvent was collected in the test tubes and tested each one by TLC to see what compound it contained.
- Finally collected one compound with single spot, collect it and store in closed container which is used for the further chemical characterization.

Table 1 Percentage Yield of Different Solvent Extracts of Aconitum Hetrophyllum

Plant Name	Extracts	Color and consistency	% Yield (w/w)
Aconitum Hetrophyllum	Pet. Ether	Brownish yellow and sticky	1..85%
	Ethyl Acetate	Brown sticky	3.25%

	Ethanol	Brown and semisolid	7.65%
	Aqueous	Dark Brown	9.65%

The above extracts were undergone to identification of constituents by phytochemical tests.

Table 2 Phytochemical Description of Various Extracts of Aconitum Hetrophyllum

S.No	Phytochemical	Name of Tests	PEAH	EAAH	EAH	AAH
1.	Alkaloids	Mayer's Test	-	-	+	-
		Wagner's Test	-	-	+	-
		Dragon draft's Test	-	-	+	-
		Hager's Test	-	-	+	-
2.	Glycoside	Modified Brontrager's Test	-	+	+	+
		Legal's Test	-	+	+	+
3.	Tannins	Gelatin Test	-	+	+	+
4.	Phenols	Ferric Chloride Test	-	+	+	+
5.	Flavonoids	Alkaline Test	-	+	+	+
		Lead Acetate Test	-	+	+	+
6.	Saponins	Froth's Test	-	-	-	+
		Foam Test	-	-	-	+
7.	Steroids	Salkowaski Test	+	-	-	-
		Libermann Burchard's Test	+	-	-	-

Note:- +:Present, - :Absent

Based on a thorough literature review, Aconitum Hetrophyllum was chosen from distinct districts of Utarakhnad in this current research. The plant material was authenticated by Botanical Survey of India, Shibpur, Howrah (W.B.), gathered plant material (leaves) was dried and grinded in powdered shape, sifted by 40 mess size and further used for consecutive soxhlet extraction in reducing order of solvent polarity, i.e., petroleum ether, ethyl acetate, ethanol, and water. The yield of Aconitum Hetrophyllum extracts of petroleum ether, ethyl acetate, ethanol and aqueous was 1.85, 3.25, 7.65 and 9.65 percent w / w respectively (Table 2).

- Aconitum Hetrophyllum petroleum ether extract showed positive steroid testing.
- Aconitum Hetrophyllum ethyl acetate extract has shown positive testing for flavonoids, glycosides, tannins, and phenolic compounds.
- Aconitum Hetrophyllum ethanol extract has shown positive testing for alkaloid, flavonoids, glycosides, tannins, and phenolic compounds.
- Aconitum Hetrophyllum aqueous extract showed positive testing for flavonoids, glycosides, tannins, phenolic compounds and saponins. (Table 6.2).
- Ethanol extract indicates the largest active phytochemical constituents from the above phytochemical testing of Aconitum Hetrophyllum extracts. For further thorough characterization and study of pharmacological activity, I chosen ethanol extract.

SOLVENT SYSTEM DEVELOPED BY TLC FOR ETHANOL EXTRACT OF ACONITUM HETROPHYLLUM.

By trial and error method, it was founded that the best solvent system for EEAH is

Chloroform : Ethyl Acetate : glacial acetic acid (4.6 : 0.4 : 0.1)

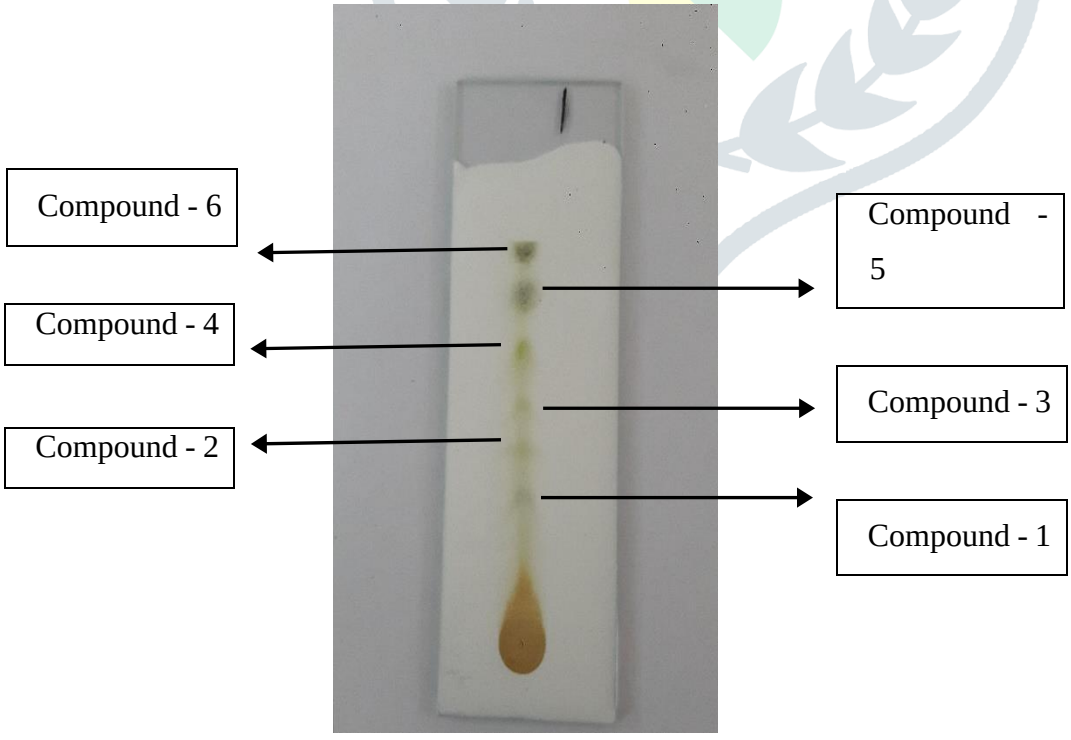

Fig 8 TLC of EAH

From above TLC, 6 spots are found, whose Rf values are given below Rf values

- Compound 1 – 0.200
- Compound 2 – 0.377
- Compound 3 – 0.511
- Compound 4 – 0.688
- Compound 5 – 0.844
- Compound 6 – 0.933

ISOLATION OF COMPOUND BY COLUMN CHROMATOGRAPHY

One compound was isolated by column chromatography

Compound 1 (Compound A [5]) Rf value : 0.844

Table 3.UV Absorbance

S.No	Wavelength (nm)	Absorbance
1.	668	0.6339
2.	610	0.1226
3.	538	0.1502
4.	508	0.1536
5.	414	1.5349
6.	278	0.4824

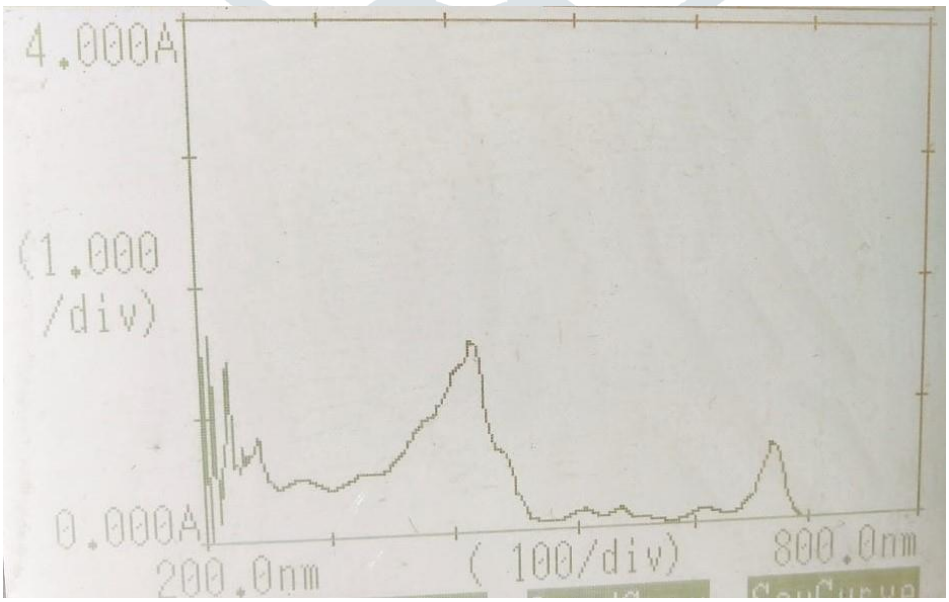

FIG .9 UV Spectral Data of Isolated Compound (λ max : 414nm)

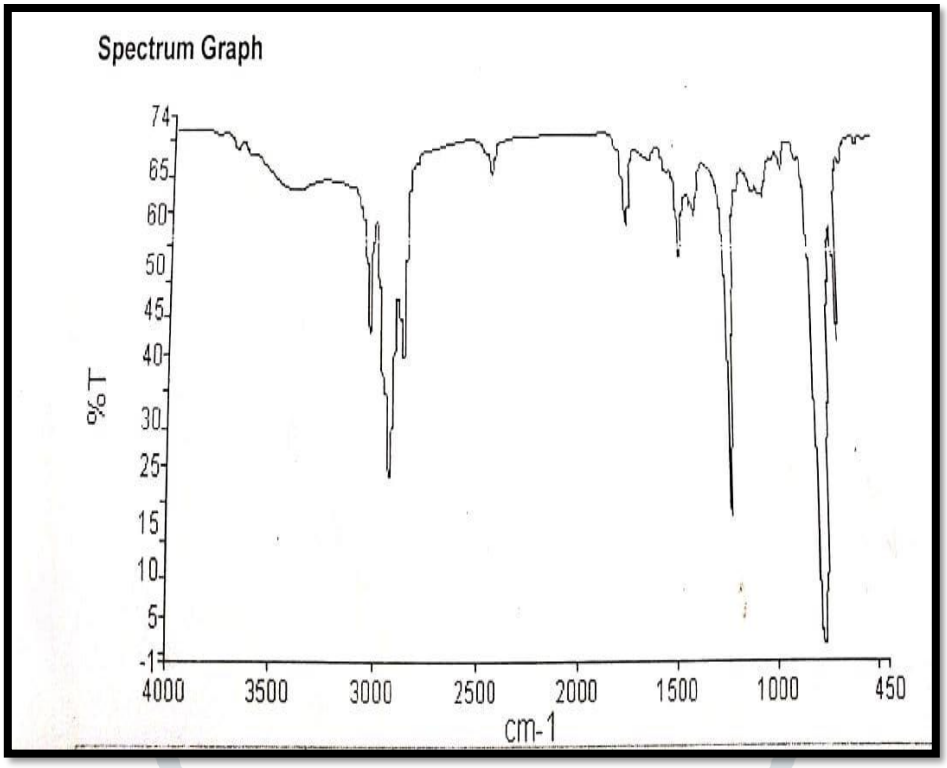

FIG 10 – FT-IR Spectral Data of Isolated Compound

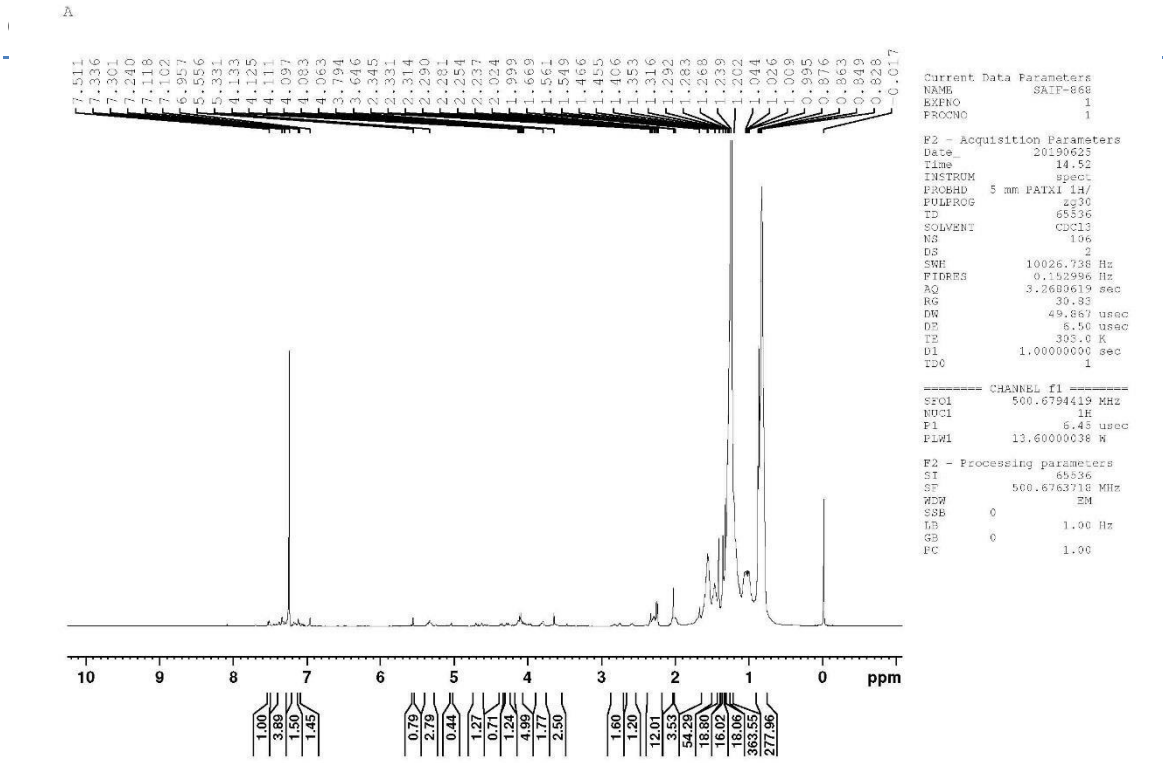

FIG 11 1H NMR Spectral Data of Isolated Compound

CHARACTERISATION OF ISOLATED COMPOUND (COMPOUND A)

One compound A was isolated from the ethanol extract of aerial parts of Aconitum Hetrophyllum by gradient column chromatography technique using chloroform and ethyl acetate as solvent system. Compound A having Rf value 0.844,

λ max value 414nm and IR spectra with 750.53 cm-1, 1462.3 cm-1 (for aromatic group), 1028.85 cm-1, 1215.76 cm-1, 2401.25 cm-1, 3398.3 cm-1 (for COOH group), 1725.96 cm-1 (for CHO group), 1028.85 cm-1, 1215.76 cm-1 (for OH group), suggest the structural similarity with aromatic acid type of compound. NMR spectra of compound A also indicates the same type of compound. Further investigation is required to conform the structure of compound A.

Determination of Physical Characteristics

The physical characteristic studies were conducted for the compound A as per the method described the results are tabulated in table 3.

Table.4 The physical characteristic studies

S.No	Characteristics	Observation
1	Description	White crystalline powder
2	Solubility at 20°C	Soluble in 1 in 16 parts of methanol.(w/w) Soluble in 1 in 160 parts of water.(w/w)
3	Partition coefficient of isolated compound between octanol and water	2.1
4	Melting Point	204-208 °C

Physical Analysis of The Trail Formulations of 1% Isolated Compound (Compound A)

The physical and mechanical properties like appearance, color, pH, viscosity, spreadability, extrudability, firmness, consistency, cohesiveness, hardness and stickiness of the ointment(O1,O2,O3 and RO), trial formulations of Compound A were analyzed as per the procedure described .Out of various formulations analyzed based on the physical and mechanical properties, the best one of the formulation from ointment, cream and gel was taken for further studies.

Table.5 Physical Analysis of The Trail Formulations of 1% Compound A

Properties	O1	O2	O3	RO
Appearance* (Scores)	8	9	8	7
Color	White	White	White	White
pH	5.7	5.8	6.4	6.3
Viscosity (cps) At 12 rpm at 30 c	26900	22200	28796	28240
Spreadability (g.cm/s)	33	34	36	39
Extrudability (g)	532	513	599	586
Firmness (g)	1149.2	1255.32	1363.328	1359.72
Consistency (g)	2755.61	1836.42	2456.64	2632.42
Cohesiveness (g)	-540.67	-514.50	-735.97	-721.20
Hardness (g)	29.4	25.74	31.12	26.14
Stickiness (g)	-17.25	-16.72	-20.34	-19.73

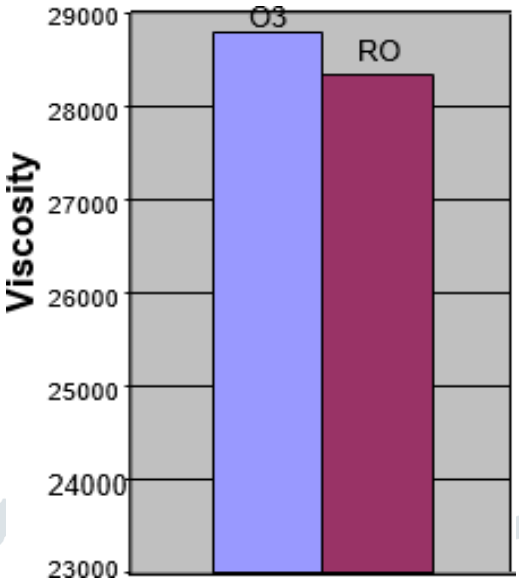

Figure.12 Comparative viscosity profile of formulations

The viscosity profile of the best formulations was compared with reference and marketed products and given in the figure 27

Prearation of 1% Isolated Compound (Compound A) of Aconitum Hetrophyllum Ointments

1%isolated compound (Compound A) ointments pick which one has the correct spreadability and consistency and their formulas are described below.

isolated compound (Compound A) ointment was set up by a combination technique. First hard paraffin (50°C to 57°C) and delicate paraffin (38°C to 56°C) were liquefied together in a china dish over a water shower and the fluid paraffin and propylene glycol containing isolated compound (Compound A) were included and blended well. The liquid blend was detracted from the water shower mixed until cooled, maintaining a strategic distance from air circulation. The substance was mixed successfully to stay away from any crystallization.

Three clusters of isolated compound (Compound A) treatments will plan as referenced above and it will be exposed to physical and substance analysis. Ointment of isolated compound (Compound A) isn't accessible in the market. Subsequently, basic hydrocarbon salve base I shortened as RO was bought and contrasted and three bunches of arranged isolated compound (Compound A) balm for their physical examination. The best plan practically identical with a basic ointment base was picked for additional examination.

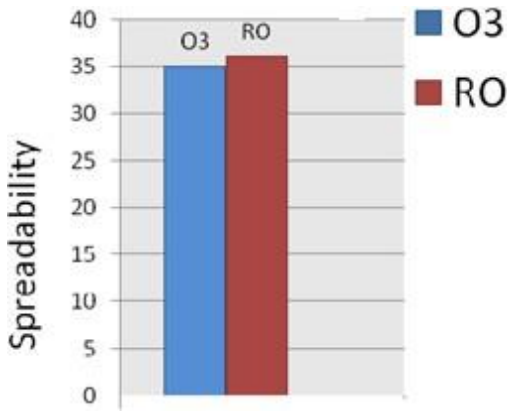

Figure. 13 spredability graph of formulations

Calibration curve for Isolated Compound (Compound A) by UV spectrophotometer

The calibration curve of Isolated Compound (Compound A) was done by UV spectrophotometer according to the method .

Table.6 Standard concentration of Isolated Compound (Compound A) of Aconitum Hetrophyllum by UV spectrophotometer

S.NO	CONCENTRATION (µg/ml)	ABSORBANCE
1	1.0	0.0421
2	1.4	0.0752
3	1.8	0.1062
4	2.2	0.1413
5	2.6	0.1765

The Std. curve of Isolated Compound (Compound A) was examined by UV spectrophotometer and the curve was given in the fig 16.

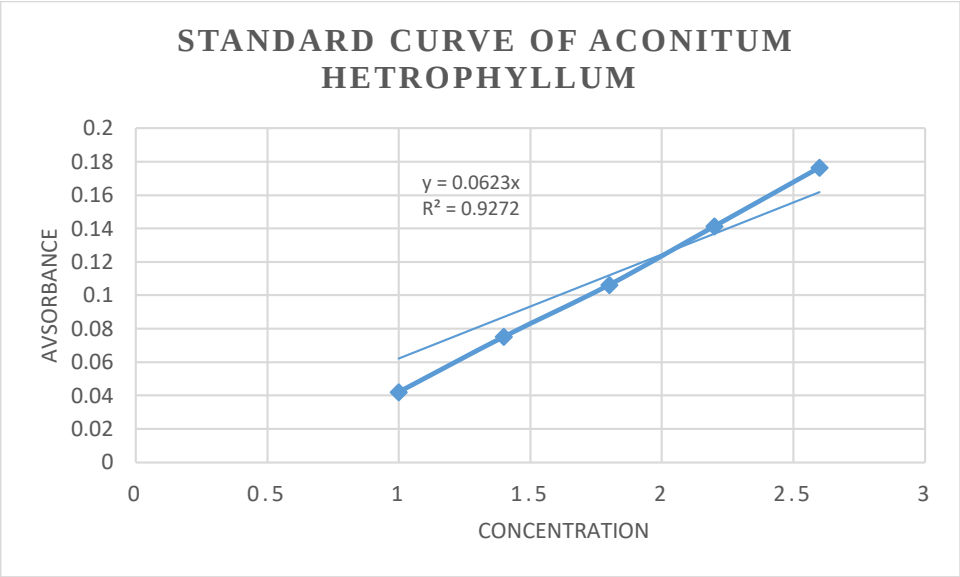

Figure. 14 Standard curve of Isolated Compound (Compound A) by UV spectrophotometer

The data obtained in the in vitro release analysis were analysed using different kinetic models to explain the mechanism of drug release from hydrogels to investigate ,1%Aconitum Hetrophyllum ointment release kinetics ,The following were added to the release data: four models:

- zero order,
- First order,
- Higuchi square root
- Korsmeyer-Peppas semi-empirical model;

1. Zero request condition : Qt = kot

Where Qt represents the level of medication delivered at time t and ko is the delivery rate steady;

2. First request condition Log Q=Log Q0-kt/2.303… (2)

Where,

Q0= is the underlying centralization of medication, k= is the primary request rate consistent,

t = discharge time;

3. Higuchi's condition : Qt= kHt1/2 (3)

Where,kH speaks to the Higuchi discharge rate steady Korsmeyer-Peppas semi observational model was applied Qt/Qe=Ktn(4)

Where Qt/Qe is the fragmentary medication release from the ointment into the receptor media,

K is a steady relating to the auxiliary and mathematical qualities of the gadget and n is the delivery type which is characteristic of the component of the medication discharge.

The (n) estimation of 0.5 that shows Quasi- Fickian dispersion instrument,while in the event that (n>0.5) at that point peculiar or non-Fickian dissemination component exists and on the off chance that it is (=1) at that point the Zero request discharge one exists .

Table No .7 In Vitro % Drug Release Of Prepared Formulations Of 1%Aconitum Hetrophyllum Ointment

SN.NO	FORMULATION	AMOUNT	%DRUG RELEASE IN MINUTES						
			0	30	60	120	180	360	720
1	(O1)	1	0	16.2	32.6	65.4	78.6	85.4	91.8
2	(O2)	1	0	15.4	30.9	62.8	78.1	84.2	89.7
3	(O3)	1	0	15.2	31.8	63.2	77.8	84.9	90.5
4	(O4)	1	0	16.3	33.2	65.7	78.9	86.7	92.1

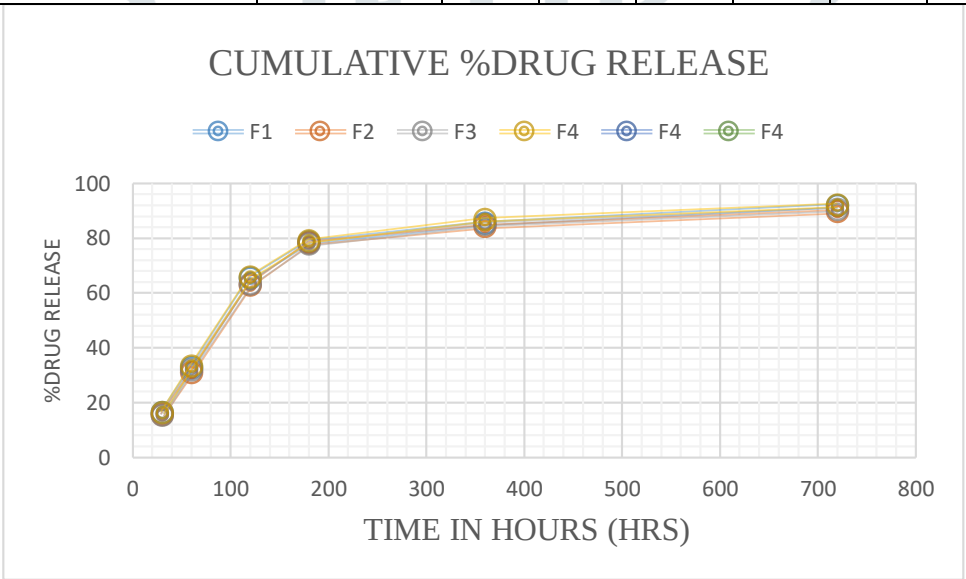

Figure. 15 %cumulative drug release Of Prepared Formulations Of 1% Aconitum Hetrophyllum Ointment Formulations

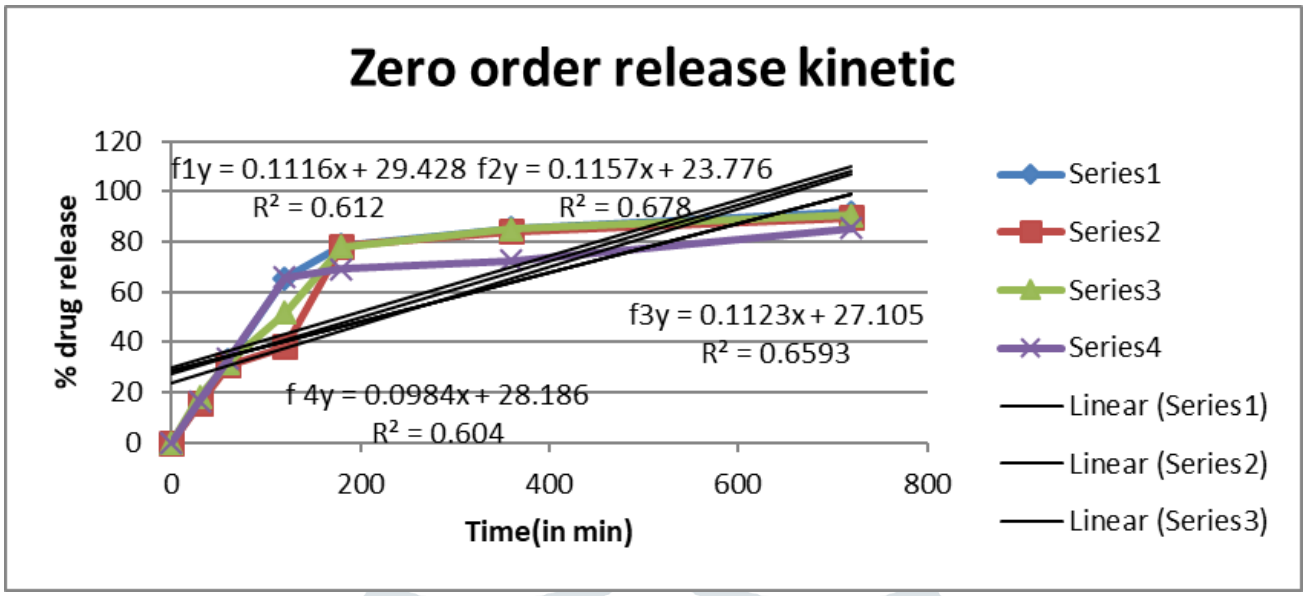

Figure. 16 ZERO ORDER RELEASE KINETICS

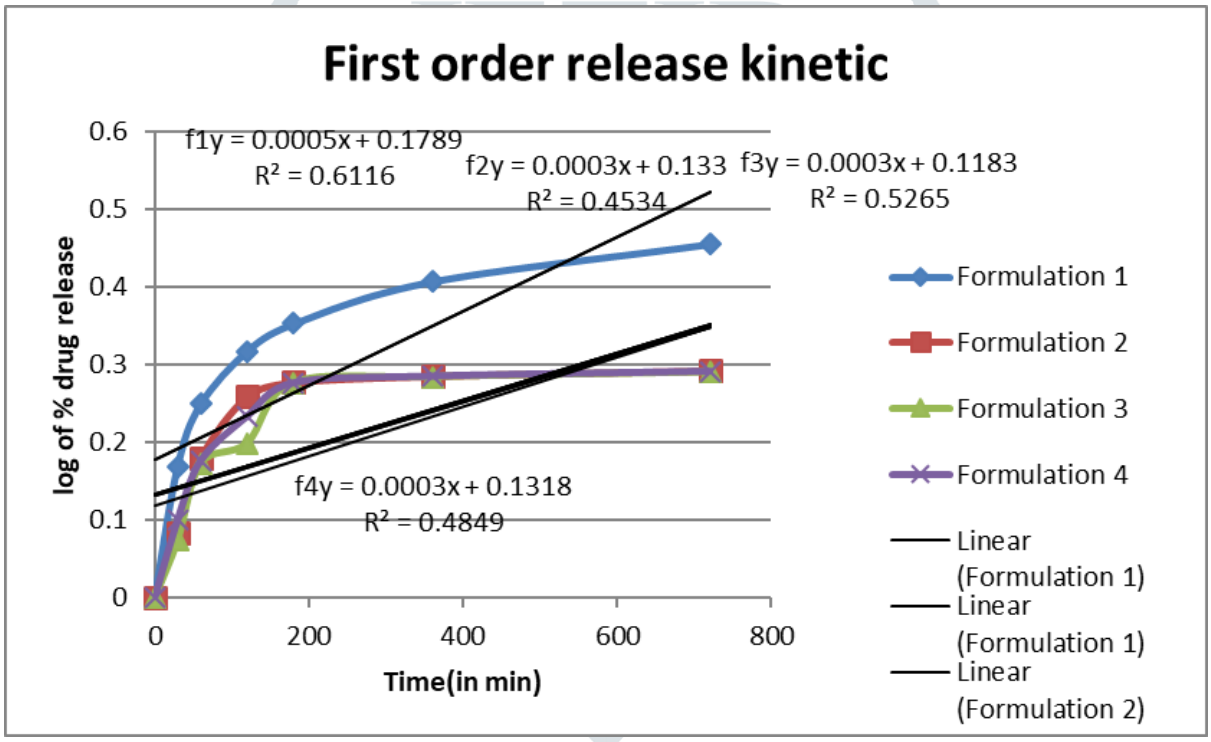

Figure. 17-FIRST ORDER RELEASE KINETICS

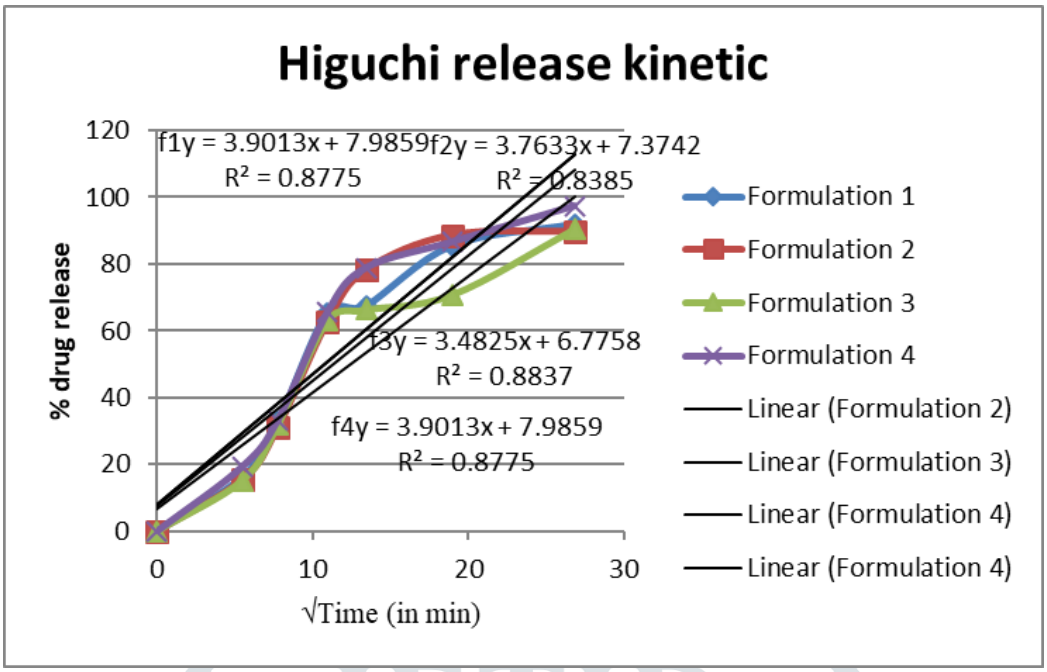

Figure. 18 HIGUCHI RELEASE KINETIC

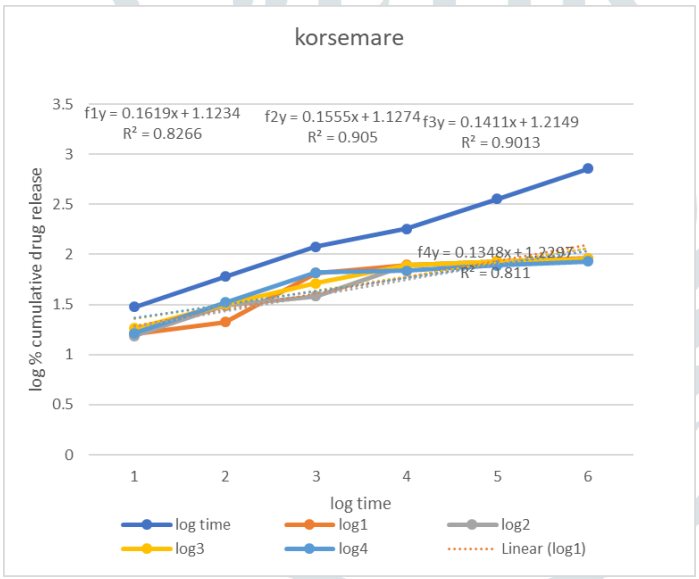

Figure. 19 KORSEMARE PEPPAS MODEL

Fig: 16,17,18 Mathematical models of release profiles of prepared 1% Aconitum Hetrophyllum Ointment using the linearity curve of percent cumulative drug release as a function of time while fig. 19 Korsmeyer-Peppas model represents drug release .

Table.8 In Vitro % Drug Release R^2 Values Of Prepared Formulations Of 1% Aconitum Hetrophyllum Ointment

FORMULATIONS	ZERO ORDER	FIRST ORDER	HIGUCHI	KORSMEYER-PEPPAS
	R^2			
F1	0.1858	--0.248	0.8255	0.8266
F2	0.201	-0.415	0.8248	0.905
F3	0.2065	-0.347	0.8295	0.9013
F4	0.6101	0.4589	0.8439	0.811

Conclusion:

Formulation 4 exhibits the highest R2 value among all the formulations, indicating that it best fits the Higuchi drug release model. This suggests that Formulation 4 has a well-controlled and predictable drug release profile, making it a promising candidate for the treatment of dermatophytosis and other related skin conditions. Further studies and evaluations should be conducted to assess its clinical efficacy, safety, and potential for commercial use.

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