FORMULATION AND EVALUATION OF *SPHAERANTHUS INDICUS* LINN. EMULGEL FOR ANTIMICROBIAL ACTIVITY

Nikita Gupta[1]*, Sagar Bansal[1], Dr. Manoj Kumar Mishra[1], AnayPratap Singh[1], Shashank Gupta[1], Dheeraj Dubey[2]
[1]Shambhunath Institute of Pharmacy Jhalwa, Prayagraj – 211012 (U.P.) India.
[2]Ashoka Institute of Technology and Management,Varanasi – 22100 7(U.P.), India.

***Corresponding Author**
Nikita Gupta*,
[1]Shambhunath Institute of Pharmacy,
Jhalwa, Prayagraj – 211012 (U.P.) India.
Email-ng7769317@gmail.com,**Contact-** 8874136075

Abstract

The main aim of the thesis is Formulation and Evaluation of *SphaeranthusIndicus* Linn. Of Emulgel for Antimicrobial Activity. *Sphaeranthusindicus*are collected from different place of Rajasthan. Fresh leaves are collected and keep it for drying. By using leave extracts pharmacognostic studies, phytochemical studies and *in-vitro* antioxidant property are studied. Emulgel have emerged as a extensively used drug delivery system. The topical emulgel formulation is made. The present study shows that the emulgel formulation of *sphaeranthus indicus* was formulated by various gelling agents and oily phase. The physiochemical study of emulgel formulation was subjected with pH, spreadability and *in vitro* drug release. F4 formulation show good results in spreadability and rheological characteristics. It was concluded that the *sphaeranthusindicus*can be formulated as emulgel for antimicrobial activity.

Keywords:-*SphaeranthusIndicus*, emulgel, evaluated, antimicrobial activity
DOI Number: 10.48047/NQ.2022.20.15.NQ88789 **Neuroquantology 2022; 20(15):7953-7968**

1. INTRODUCTION

From time immemorial plants are coexisting with human being. The aesthetic sense in man with a love for the colourful world of plants hasdrawn the attention of many for the plant kingdom.[1,2,3] Ever since the advent of man onearth, he became dependant on nature. Plants form an integral part of nature and aprimary source of man's food, medicine and other basic needs. The primitive manexposed to various parasitic, infectiveresulting high rate of morbidity andmortality. This forced man to search for remedies to control the various ailments usingdifferent parts of various plant species. We cannot say how exactly ancient peoplediscovered the medicinal properties of herbs. Probably it started with ancient belief,myths and lores got involved with astrology and other occult practices, developed intofolk-medicine and herbalism.[4,5,6]On diseases skin the products are applied. This was use for the treatment of general disorder the pharmacological confining the effects of another drug. The mucosal surface are produces local effect and

form their application. It shows effect on systemic effect.[7,8]

The skin is the largest and readily accessible organs spread extensively all over the body of living beings. Approximately 2m^2 surface area is covered by an adult human skin whichis receiving one third of theblood circulation with a potential to provide medication through skin. The skin separates the vital organs of body from the external environment, provides protection against UV light, physical, chemical,microbial andradiological attack, helps in maintaining body temperature.[9,10]

Emulgel contains oil and aqueous phase. In this the drug is entrapped into gel. At first the oil and aqueous phase is formed with suitable composition after that the emulsion is incorporated into gel phase. It contains emulsion which help in dissolving drug. Emulgel is most use as ointment, cream and various preparation of dermatitis.[11,12,13]Topical formulation has lesser spreading coefficient and it was applied on skin by rubbing. It was use in cosmetic preparations. It was wet and has semisolid liquid rigid. This was immobilized the surface tension and has macromolecular fibres. The gel formulation has better advantages in topical formulation. Hydrophobic drug is carried into gel and it is been used.[14,15,16]

2. MATERIAL AND METHODS

2.1 PHARMACOGNOSTIC STUDY

2.1.1 Plant material

*Sphaeranthusindicus*are collected from different place of Rajasthan. Fresh leaves are collected and keep it for drying. By using mechanical grinder dried leaves are powdered. It was passed through 60 mesh sleve for desired coarseness. In air tight container these coarse powdered are stored and use for further experiment.

Plant (*Sphaeranthusindicus)* is an aromatic smell. It is belonging to the family *Asteraceae*.

2.1.1.1 Leaf microscopy: -

Simple microscope is use for the study of morphology of*Sphaeranthusindicus*leave. This test is done for the determination of shape, size, tase and odour of leave. Leaves are simple, oblong, spatulate, spinousdecurrents base at the wings of steam, acute hairy and narrowed by microscopically. Fresh leaves are dark green and dried leaves show greenish black colour. When leaves are fresh it has pleasant odour and bitter in taste. The aromatic smell was diminishing on storage and drying.

2.2 MICROSCOPICAL STUDY

2.2.1 Material and Methods

For microscopical studies fresh leave was used. Formalin, acetic acid and ethanol is use for the fixing the cut position of leave. Tertiary butyl alcohol is used after 24 hours of fixing of leave and it was dehydrated. After that paraffin wax is use for the filtration process(58-60^{0}C). it was casted in a paraffin block. Microtome is use for section of paraffin embedded leave.

2.3 EVALUATION OF PHYSIOCHEMICAL PARAMETERS

The physiochemical parameters were done by calculation of total ash, water soluble ash and acid insoluble ash. For the determination of extractive value of the extracted leave by treated it with different solvents. As per standard procedure fluorescence study was done on powder and extract.

2.3.1 Ash Value Determination

3gm of powder was weigh and it was tared into silica crucible. Heat is increased gradually and the sample is free from carbon. It was cooled and desiccated. The ash value is obtained and percentage was calculated by dried air sample.

2.3.1.1 Acid insoluble ash value

This was done for the earthy matter which is present on leaves. The total ash which was obtained from above in 30ml of HCl for 5 to 6min. after the completion of this filtration was done and collect the insoluble matter on ashless paper. By using hot water wash the paper ignited it in tared crucible, cooled and desiccated. After that it was weigh and calculated the insoluble ash value.

2.3.1.2 water soluble ash value

This represents the ash amount dissolved in water. It indicates the presence of extraction in water and soluble salts drug or preparation of incorrect amount of inorganic matter.

2.3.2 Loss on drying

Weigh the sample and tared the dish and it was completely dried by the use of heating at

105^{0}C. the loss of amount of sample is calculated by the weight loss of sample.

2.3.3 Foreign matter

On a paper maximum amount of drug is spreaded for the calculation of foreign matter. 10X lens are used for the determination of this sample. After that the separation of foreign matter was done and percentage was calculated.

2.3.4 Swelling Index

Swelling index is known as the absorbing capacity of water by drug. 1gm of sample was transfer into 25ml of cylinder. After the cylinder was fill up to 20ml with water and agitated gently for 24h. at last measured the volume.

2.3.5 Extractive Value

5gm of dried extract was macerated with 100ml of solvent. It was transfer into a flask for 24hours. In initial 6h the sample was shaken and allowed it for 18h. It was filtered rapidly and the 25ml of filtrate was evaporated to dryness and tared to the bottomed of the cylinder.

2.3.6 Foaming index

Plants contains saponins on shaking the sample it forms foam. Foaming index is used to measure the plant material foaming ability. 1gm of sample was mixed in water in a beaker and shaken it well. After that it was stand for some time and observed the height of the measured.

2.3.7 pH determination

10gm of sample was weigh and pour it into 100ml of water. It was stirred for 1h and then filtered. pH meter is use for the determination of pH of the filtrate.

2.4 Powder Analysis

Powder analysis of *Sphaeranthusindicus*was done by microscopically by the using of different chemicals.

2.5 Extraction of plant materials by Soxhlet extractor

For the extraction of plant material Soxhlet extractor is use with different solvents (Petroleum ether, benzene, chloroform and ethanol) for increasing polarity. With each solvents the powder drug is extracted for 72hour. Whatman filter paper is use for filtration of filtrate and rotary flash evaporator is use for evaporation of remaining materials. After the completion of process, the extract was dried and by using maceration process triple distillation is done by distilled water. For 48h maceration was continued as well as filtration and concentration also.

2.6PHYTOCHEMICAL SCREENING

Extract phytochemical screening was carried out using normal methods. Extracts have been preliminarily phytochemically tested to classify different plant substances.

2.6.1 Tests for carbohydrates

A. Molisch test: To 1ml of test + 2-3 drops of α- naphthol + Conc. sulphuric acid, appearance of purple ring.

B. Fehling's test: To 1 ml of test sample+ Fehling 's solution A and B + heat, brick red precipitate.

C. Benedict's test: To 1 ml of test sample, equal quantity of Benedict 's reagent was added and boiled. Red colour precipitate confirmed the presence of carbohydrates.

2.6.2 Test for alkaloids

All the extracts were first treated with dil. hydrochloric acid separately and then filtered. The filtrate of all the extracts was subjected to following tests:

A. Mayer's test: 1 ml of the filtrate + 1ml of Mayer`s reagent, cream precipitate

B. Hager's test: 1 ml of the filtrate + 1mL of Hager`s reagent, yellow precipitate

C. Wagner's test: 1ml of the filtrate + 1ml of Wagner 's reagent, reddish brown precipitate

2.6.3 Tests for terpenoids

A. Salkowski test: Chloroform solution of test sample was treated with equal amount of conc. sulphuric acid. The presence of steroid components in the test sample was observed by the appearance of red color in chloroform layer and green fluorescence in acid layer.

B. Libermann - burchard test: To 2ml of test sample, chloroform was added before the addition of 2-3 drops of acetic anhydride and conc. sulphuric acid. The test solution was observed for colour change from red to blue and then finally to bluish green which confirmed the presence of steroids in the test extracts.

2.6.4 Tests for flavonoids

A. Lead acetate test: Lead acetate solution

was added to the extract. Flavonoid was confirmed on the basis of formation of yellow precipitate.

B. Alkaline reagent test: 1mL of test sample was dissolved in dilute sodium hydroxide solution that resulted in formation of yellow colour precipitate.

2.6.5 Tests for tannins and phenolic compounds

A. 5% FeCl3 solution: Few drops of 5% FeCl3 solution was added to the small amount of extract that leads to the formation of deep blue-black colour complex.

B. 10% lead acetate solution: To 2 ml of extract, few drops of 10% lead acetate solution were added, white precipitate was formed.

C. Gelatin test: After dissolving some quantity of extract in distilled water, 2 ml of 1% gelatin solution containing 10% NaCl was added which lead to the formation of white precipitate indicating the presence of phenolic compounds.

2.6.6 Tests for saponins

A. Froth test*:* 1 ml of test sample + 20 ml of distilled water + shacked for 15min, Formation of persistent foam.

2.6.7 Test for proteins and amino acids

A. Ninhydrin test: 3 ml of the test solution + 3 drops of 5% ninhydrin + heat for 10 min + observe colour change

B. Biuret test: Test sample was treated with same volume of 1% copper sulphate and 4% sodium hydroxide solution and appearance of violet or pink colour was observed.

C. Million's test: 3 ml of extract was mixed with 5 ml of Million 's reagent. White precipitate formed which on heating turned to brick red, indicated the presence of proteins.

2.6.8 Tests for glycosides:

A. Borntrager's test: Dil. H_2SO_4 was added to 3 ml of extract solution and boiled for 5 min. The solution was filtered and cooled. Same amount of chloroform was added while shaking the mixture. Ammonia was added to the organic solvent layer. Change in color of ammonical layer to pinkish red colour confirmed the presence of anthraquinone type glycosides.

B. Legal test: 1 ml of sodium nitroprusside was added in 1 ml of pyridine solution containing test sample and colour change was observed.

C. Keller killani test: To 2 ml of extract, 3 ml of glacial acetic acid and 1 drop of 5% ferric chloride were added. This solution was carefully transferred to the surface of 2 ml concentrated H_2SO_4 and the observation was noted down.

2.6.9 Tests for fats and oils

A. Spot test: One drop of extract was placed on filter paper and solvent was allowed to evaporate. An oily stain on filter paper indicated the presence of fixed oil.

2.7 IN-VITRO ANTIOXIDANT PROPERTY OF SPHAERANTHUS INDICUS

2.7.1 *ABTS* radical cation decolorization assay–

The ABTS solution was prepared by ABTS radical cation. It contains 2.45mM ammonium persulfate and it was stand for 12 to 16 hours at room temperature. It was use before the experiment. Different concentration (2 to 1000 µg/ml) of extract was added into 0.4ml of ABTS solution and the volume was made up to level. The absorbance was calculated at 745nm.

2.7.2 DPPH radical scavenging activity-

Take 1ml of extract and 1ml of DPPH solution and mix it. Fresh Methanol and DPPH is use as a control. Then it was put it into 20min dark place. After that absorbance is done at 517nm.

2.7.3 Scavenging of superoxide radical –

The superoxide radical is used for the measurement of scavenging activity for the inhibition of generation of O_2. DMSO method is use for the determination of this experiment. Potassium superoxide and dry DMSO wereallowed to stand in contact for 24 hr and the solution was filtered immediately before use. The aqueous solution contains NBT, EDTA and potassium phosphate buffer was added into the filtrate. Various concentration of test compounds is added and the absorbance is recorded at 560nm in which pure DMSO is added in alkaline DMSO.

2.7.4 Scavenging of nitric oxide radical

From sodium nitroprusside, nitric oxide is evaluated and it was measured by Griess reaction. Different concentration of extract was incubated in in sodium nitroprusside and in phosphate buffer. Tubes are incubated into 25^{0}C temperature for 5hr. In identical manner the test control was conducted in identical manner. After completion of 5h 0.5ml of incubation solution is removed and Griess solution is use for dilution. At diazotization of nitrite, the chromophore of absorbance with sulphanilamide with coupling of napthyl ethylene diamine at 546nm.

2.7.5 Iron chelating activity–

Reaction mixture contains O-phenathroline (0.05%), ferric chloride (2ml) and different concentration of test compound were incubated for 10to 15min. after that absorbance was taken at 510nm.

2.7.6 Total antioxidant capacity

Spectrophometric method is use for the determination of antioxidant property. In water 0.1ml of extract was dissolved into it and add reagent solution (1ml). In a thermal block these tubes are incubated and capped for 95min at 95^{0}C. at room temperature sample was cool and absorbance was taken 695nm. Standard ascorbic acid is use and the total antioxidant capacity is expressed as equivalents of ascorbic acid.

2.8 Preparation of Emulgel:

For the formation of emulgel various formula used. First all, gel preparation by using gelling agents. In hot purification water, Carbopol 90 and Carbopol 934 is dispersed and cooled and stay for overnight. Emulsion was prepared by dissolving the span80 and tween 80 in aqueous phase. In propylene glycol, the methyl and propyl paraben are dissolved. In aqueous phase, drug and solution was dissolved in water. At 70-80^{0}C temperature both oil and aqueous phase were separated. It was done until the solution was cool to the room temperature. In 1:1 ratio the emulsion was mixed with gel. It was done until the emulgel is formed. By using Triethanolamine the pH of emulgel is adjust.

2.8.1 Evaluation of Emulgels:

1. Physical Examination:

Visually inspected theprepared emulgel. The formulation was observed for their colour, appearance, homogeneity, consistency and grittiness.

2. pH:

Formed emulgel is use for the determination by pH meter. In 100ml of water, 1gm of gel is dissolved in water. It was kept for around 2 to 4 hrs.

3. Viscosity:

Brookfield viscometer is use for the dertermination of prepared emulgel. It was done 25^{0}C.

4. Spreadability:

After the preparation of emulgel, the determination of spreadability is done for 48h. Around 350mg of emulgel is weighed and put it between two glass plate the circle is formed. It was measured by measuring the diameter of the circle.

5. Extrudability:

The formulated emulgels were extrudability. It was measured on the quantity in percentage of the gel from aluminium collapsible tube. It was weight in gm which is required to extrude at 0.5cm ribbon of gel in 10s. The extruded the quantity the product show good extrudability. The extrudability was measured in triplicate and the average were calculated by using formula: -

Extrudability=

$$\frac{\text{applied weight to extrude gel from tube (g)}}{\text{area (cm2)}}$$

6. Drug content determination:

The drug was determined by prepared emulgel. About 40gm of formulation was dissolved in 500ml of flask. It was shaken and diluted with water to dissolved the extract. After that the Whatman filter paper is use for the filtration of the filtrate. The drug was estimated by spectrophotometrically at 215nm.

7. In-vitro Release/ Permeation Studies:

Franz diffusion cell was use for the study of *in-vitro* release of formulate emulgel. It was done by dialysis membrane. Phosphate buffer with pH 6.8 is use for the soaking of dialysis membrane. It was done for 9 to 12 hours. 10ml of pH 6.8 phosphate buffer in receptor compartment is filled by using magnetic

stirrer at temperature 37^{0}C. Around 1ml of sample were collected at suitable interval and then it was filled with fresh buffer. The prepared sample was analysed by UV-Spectrophotometer at 215nm and measured the drug release amount.

2.8.2. Pharmacological Studies [Antimicrobial activity]

*Sphaeranthusindicus*is use all over the world for the treatment of skin infection, bronchitis jaundice and nervous depression. Leaves is also use for the treatment of indigestion, asthma, leukoderma. The leaf of *Sphaeranthusindicus*is added with milk and sugar candy and is use for cough.

2.8.2.1 Test concentration: -

The crude extract of*Sphaeranthusindicus*is dissolved in DMSO. After that this extract was loaded on dia sterile disc(6mm). it has concentration of 1.25,2.5 and 5mg**/**disc.

2.8.2.2 Antimicrobial assay: -

NCCLS (National committee for clinical laboratory standard) has recommended some bacteria (*Staphylococcus aureus, Streptococcusfaecalis. Escheriachia coli*) which are use for antimicrobial activity.

Muller hinton broth is use for inoculation for bacterial culture. It was incubated at 37^{0}C for 18h at 160RPM. This was standardised at 660nm. It was further use for disc diffusion method.

2.8.2.3 Filter paper disc method: -

In small amount of cold-water starch is dissolved into beef infusion then add casein hydrolysate and agar. By using distilled water volume was makeup 1litre. At 100^{0}C temperature the constituents were dissolved, agitated and filtrated. pH was adjusted at 7.4. At last bottles were capped and sterilized by autoclaving at 121^{0}C for 20min.

2.8.2.4 Inoculation of microbe

On water bath the mullerhinton were heated for melt the media. Media is poured into petri dish and stay for solidify. After that the organism (*Staphylococcus aureus, Streptococcusfaecalis. Escheriachia coli)* inoculated separately and poured into the sterile petri dishes.

2.8.2.5 Preparation of sterile disc

For filtration process are Whiteman's filter paper is use. The sterile disc was incorporated in 20 to 60L extract. From the disc, the solvent extract was prevented. On disc the condensed extract was applied in small quantities. It was allowed for dry in air. After few minutes another dose of extracts were applied on disc. It was stored at 4^{0}C.

2.8.2.6 Assay of antimicrobial activity using Disc diffusion method

In a sterile Petri dish(20ml) mullerhinton is poured. After solidification the culture was put on this plate. The discs which are prepared kept on this petri dish. It will have various concentrations (20, 30, 40, 50,60µl). on the surface of the media the discs were impregnated contains methanol, extract and volatile oil. After that it was put on an incubator for 20 to 24h at 37^{0}C. The inhibition zone is measured and the results were tabulated.

2.8.3 Skin irritation test:

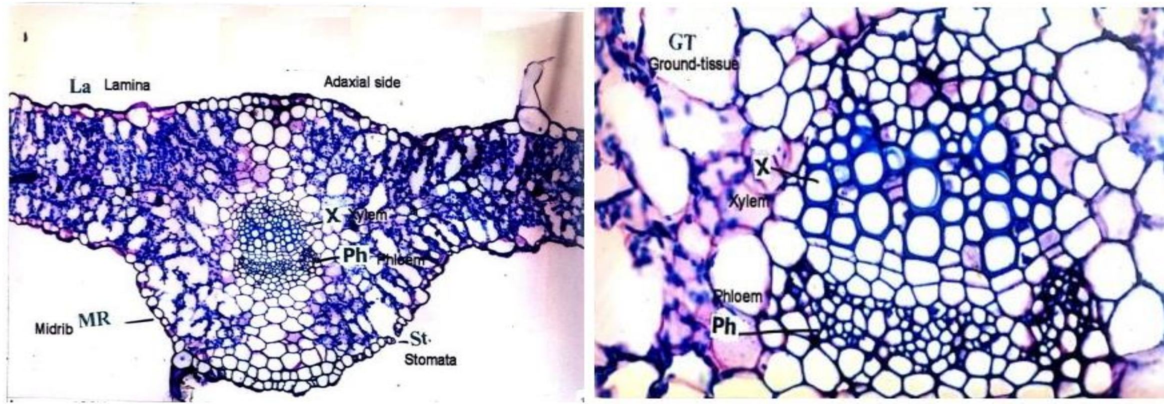
Rabbit is use for the study of skin irritant test. On standard animal feed, the animal was feed the and it has free access to water intake. Rabbit was shaved from back. The aera of around 3 to 4cm is properly cleaned and one side is served as control and other is prepared for test. The prepared emulgel is applied on the skin for twice a day. It was applied for 7 days regular. The site was observed for any sensitivity happen in that aera.

2.8.4 Stability Studies:

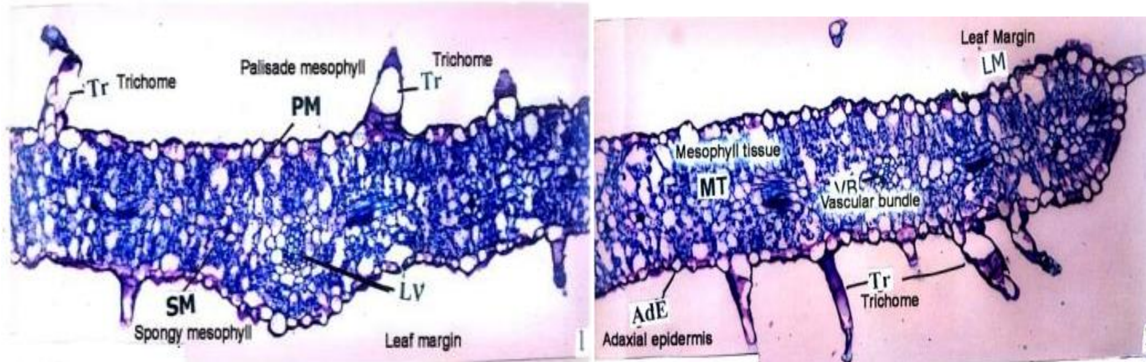
For the optimization of emulgel formulation a stability study was performed. It was done according to ICH guidelines. This was done for the period of 3months. This sample were stored at (4-8ºC) in room temperature (25±2ºC). oven is maintained at a temperature (45ºC±2ºC). After weekly interval of time the sample were withdrawn and the sample were analysed.

3. RESULT AND DISCUSSION

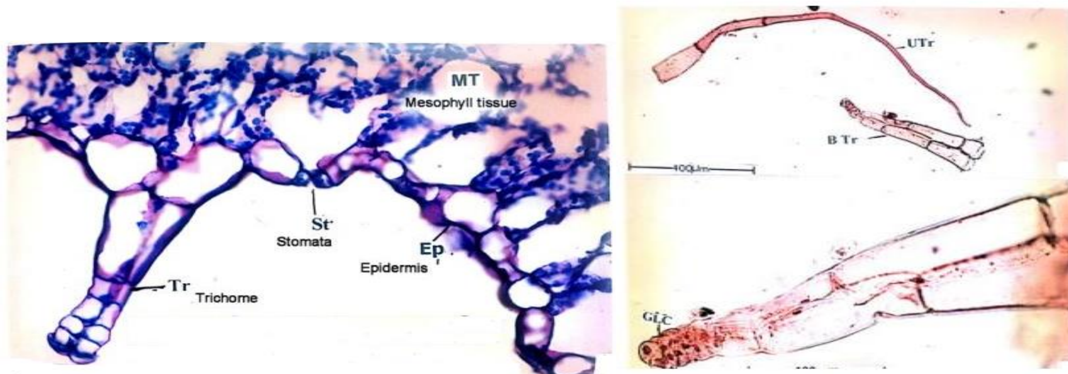
3.1 Pharmacognostic study



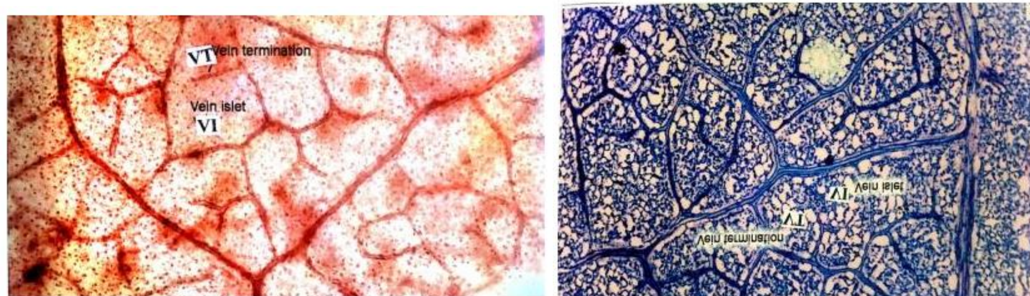
T.S of midribT.SVascular bundles



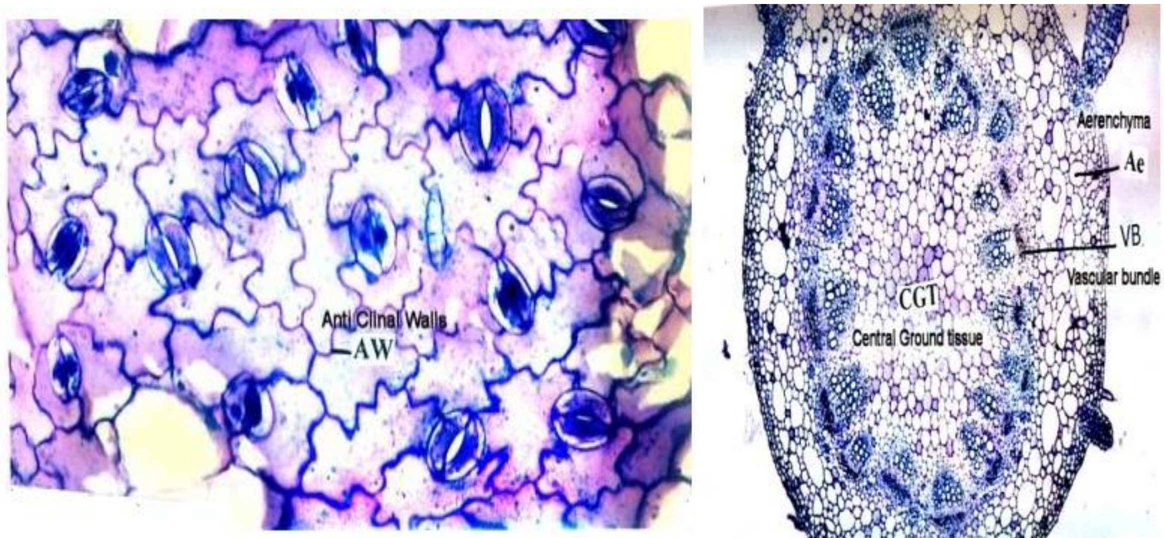
T.S of laminaT.S of trichome



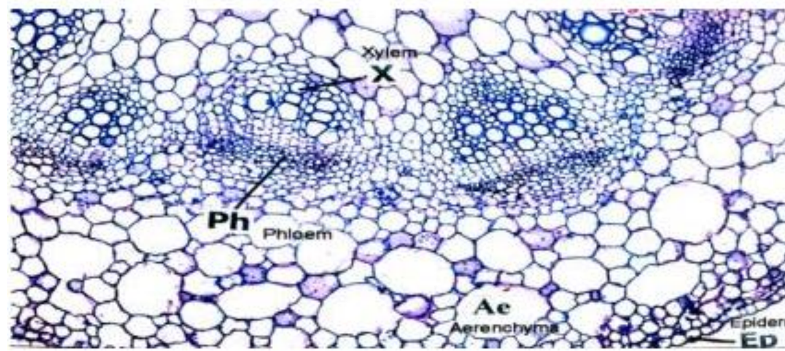
Glandular trichome enlargedTrichome morphology



VenationParadermal section



StomataT.S of Petiole



T.S. of petiole enlarged

3.2 Powder Microscopy

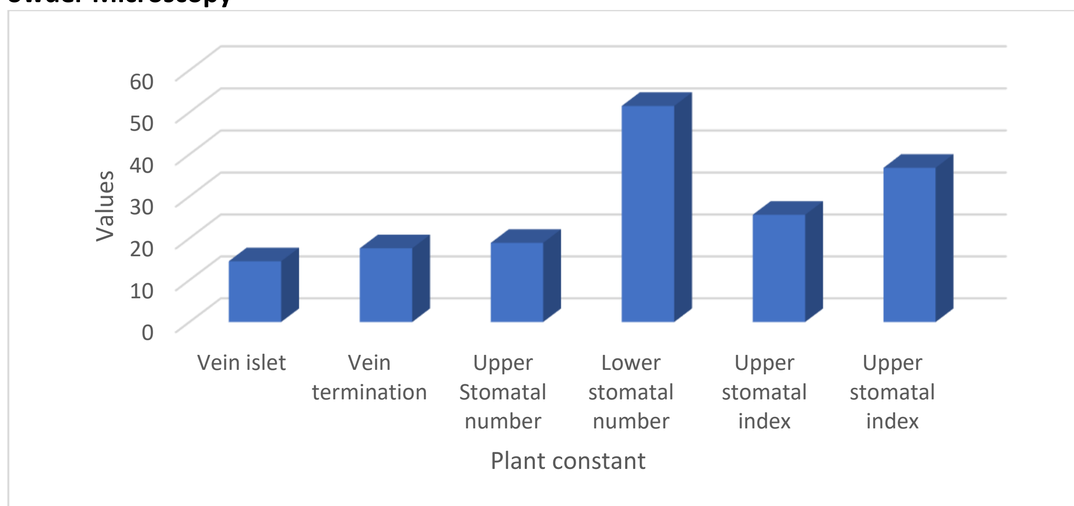


Figure 1.Quantitative evaluation of *Sphaeranthusindicus*

3.3 Physicochemical features

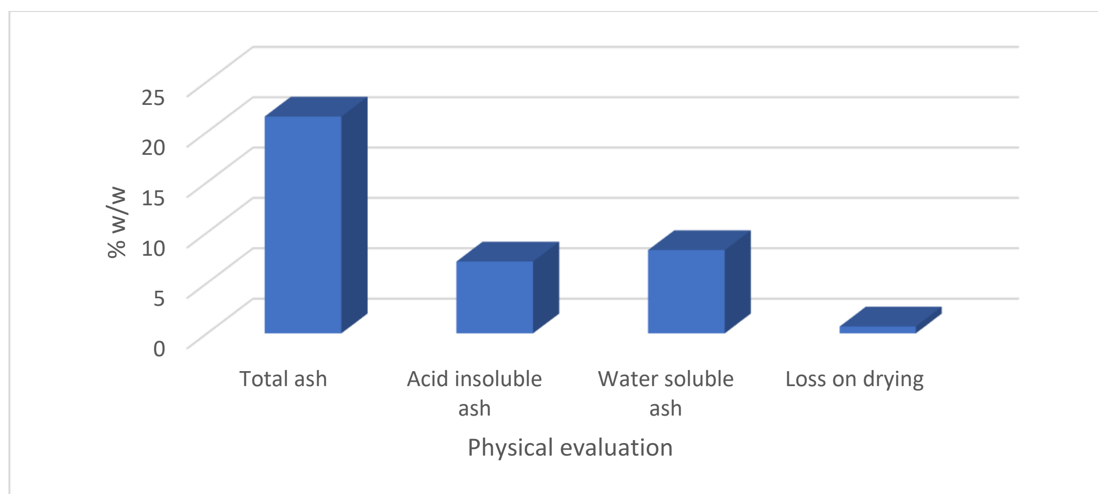


Figure 1.Physicochemical evaluation of *Sphaeranthusindicus*

3.4 Extractive values

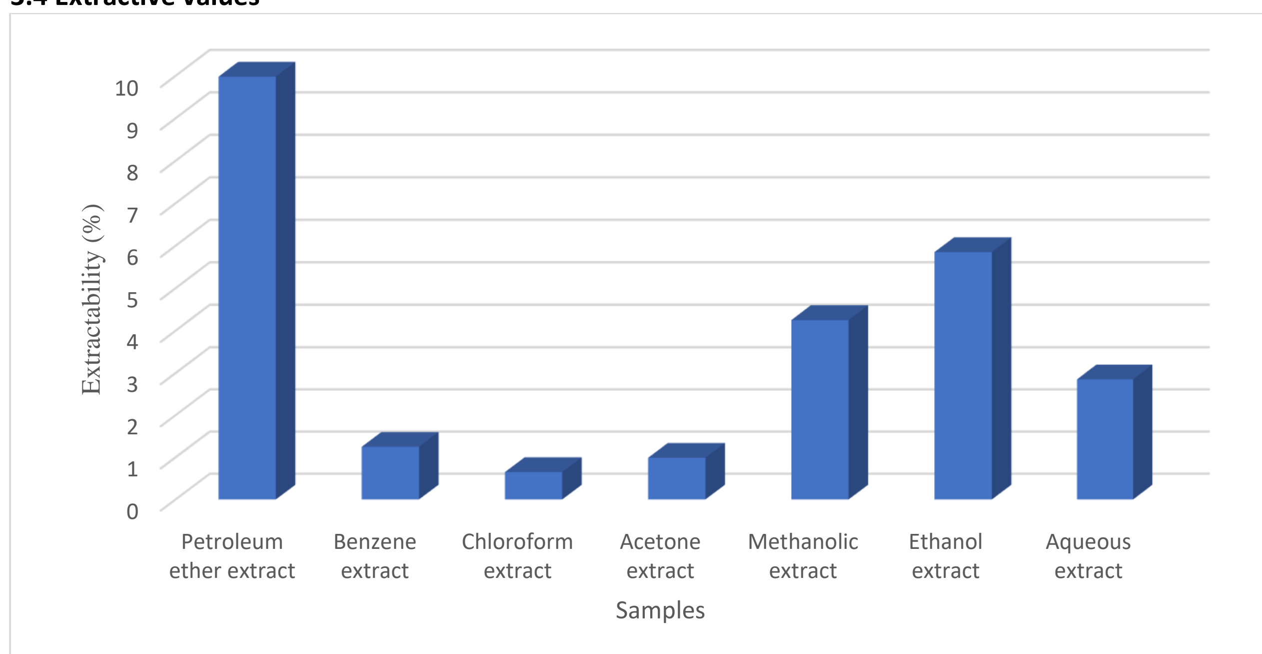


Figure 3.Extractive values of leaf of *Sphaeranthusindicus* in different solvents

3.5 Foaming Index

S.no	**Volumetric flask number (10ml)**	**Height of foam (in cm) for *Sphaeranthus indicus***
1.	1	0.1
2.	2	0.2
3.	3	0.4
4.	4	0.5
5.	5	0.5
6.	6	0.6
7.	7	0.7
8.	8	0.8
9.	9	0.8
10.	10	0.9
		Average =0.58

Table 1. Foaming Index of *Sphaeranthusindicus*

3.6 Extraction of Sphaeranthusindicus

Extracts	Percentage yield (w/w)	Colour	Consistency	Colour at 254nm
Petroleum ether	5.2	Brownish green	Greasy	Green
Benzene	3.67	Dark green	Greasy	Green
Chloroform	3.14	Green	Greasy	green
Ethanol	4.97	Greenish brown	Sticky	Yellowish brown
Aqueous	12.3	Brown	Slight sticky	Yellowish brown

Table 2. Yield, colour and consistency of *Sphaeranthusindicus*

3.7 Phytochemical Tests

S.no	Chemical test	Observation for *Sphaeranthusindicus*
1.	Test for Glycosides	
	Keller-killiani test	+
	Borntrager test	+
	Legal test	-
2.	Test for proteins and amino acid	
	Biuret test	-
	Million's test	+
	Ninhydrin test	-
3.	Test for flavonoids	
	Alkaline test	+
	Lead acetate test	+
4.	Test for alkaloids	
	Mayer's test	+
	Hager's test	+
	Wagner's test	+
5.	Test for carbohydrate	
	Molisch test	+
	Fehling's test	-
	Benedict's test	-
6.	Test for tannins and phenolic compounds	
	5% FeCl3 solution	+
	10% lead acetate solution	+
	Gelatin test	-
7.	Tests for saponins	
	Froth test	+
8.	Tests for terpenoids	
	Salkowski test	+
	Libermann - burchard test	-
9.	Tests for fats and oils	
	Spot test	+

Table 3. Phytochemical Screening

3.8IN-VITRO ANTIOXIDANT PROPERTY OF SPHAERANTHUS INDICUS

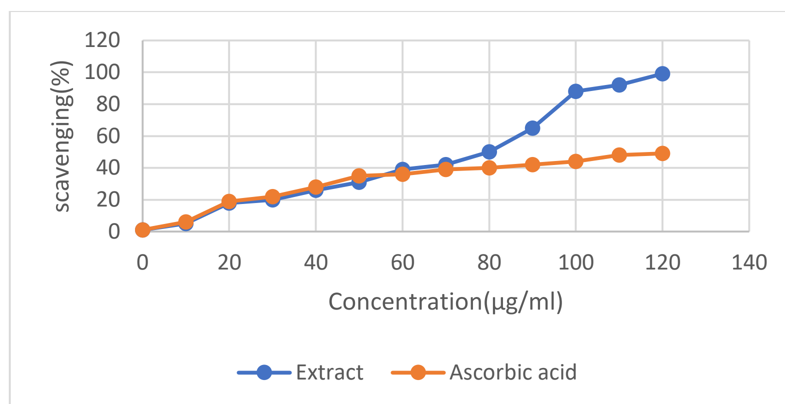


Figure 4. ethanolic extract and ascorbic acid in ABTS

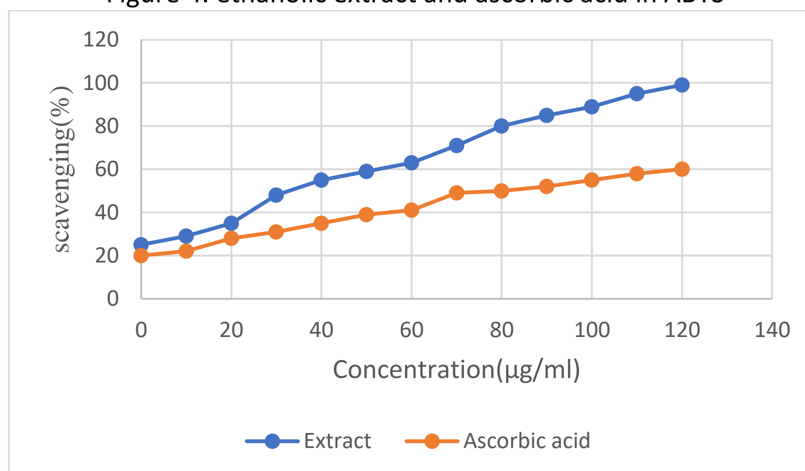


Figure 5. ethanolic extract and ascorbic acid in DPPH

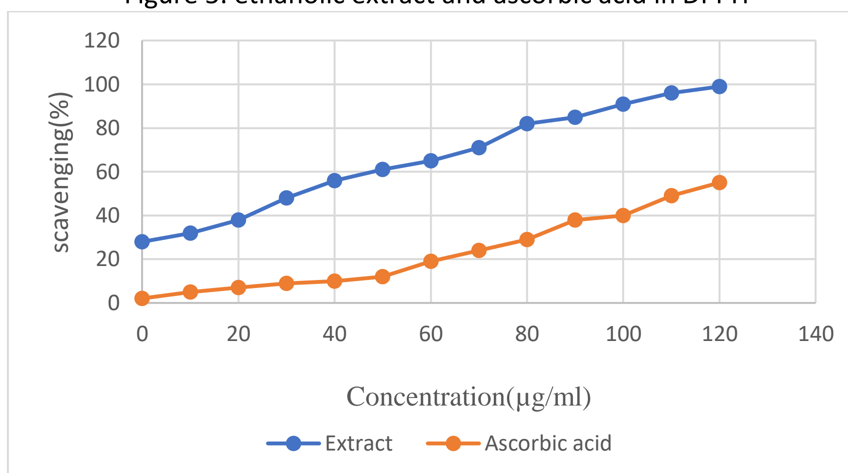


Figure 6. ethanolic extract and ascorbic acid in nitric oxide

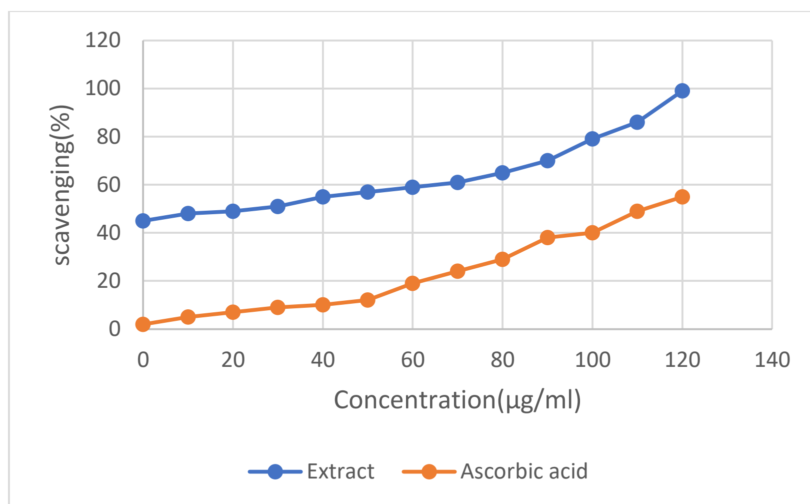


Figure 7. ethanolic extract and ascorbic acid in iron chelating radical

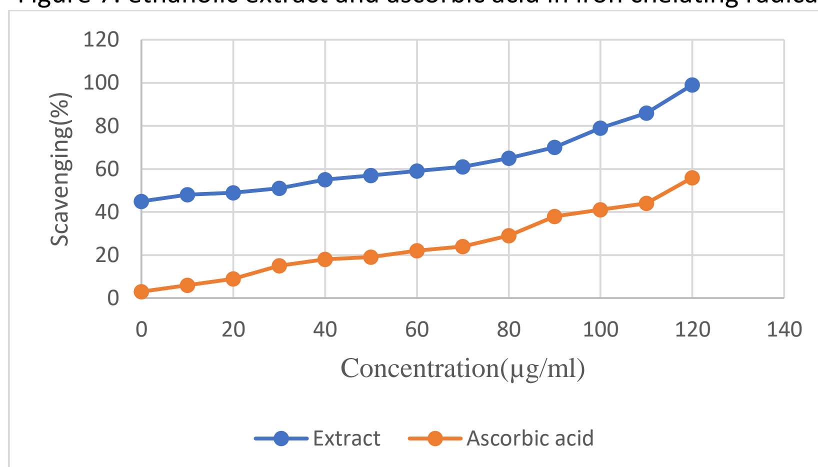


Figure 8. NBTmethod is for Superoxide anion radical scavenging activity

3.9EMULGEL FORMULATION

3.9.1 Physicochemical parameter of emulgel formulations

S.no	Formulation	Colour	Homogeneity	Consistency	pH
1.	F1	Brownish	Excellent	Excellent	7.4±0.02
2.	F2	Brownish	Excellent	Excellent	7.3±0.02
3.	F3	Brownish	Excellent	Excellent	6.69±0.02
4.	F4	Brownish	Excellent	Excellent	7.25±0.08
5.	F5	Brownish	Excellent	Excellent	7.25±0.15
6.	F6	Brownish	Excellent	Excellent	7.52±0.5
7.	F7	Brownish	Excellent	Excellent	7.24±0.5

Table 4. Physicochemical observation

3.9.2 Physical evaluation of Emulgel formulations

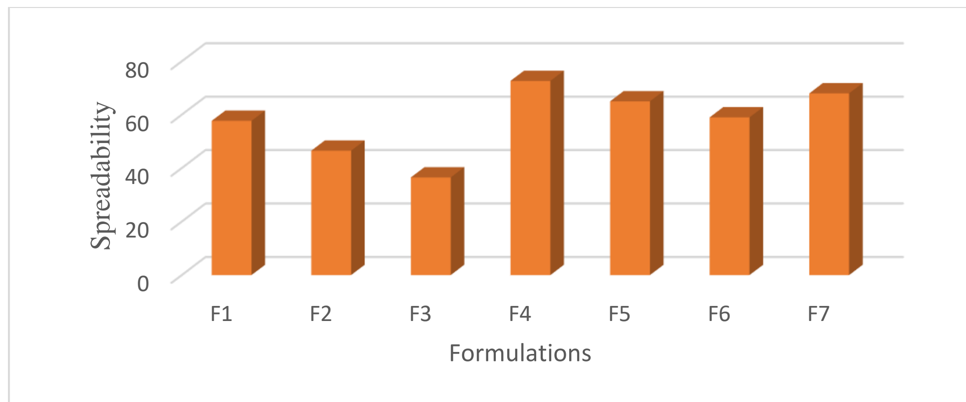


Figure 9. Physical evaluation data of Spreadability of Emulgel formulations

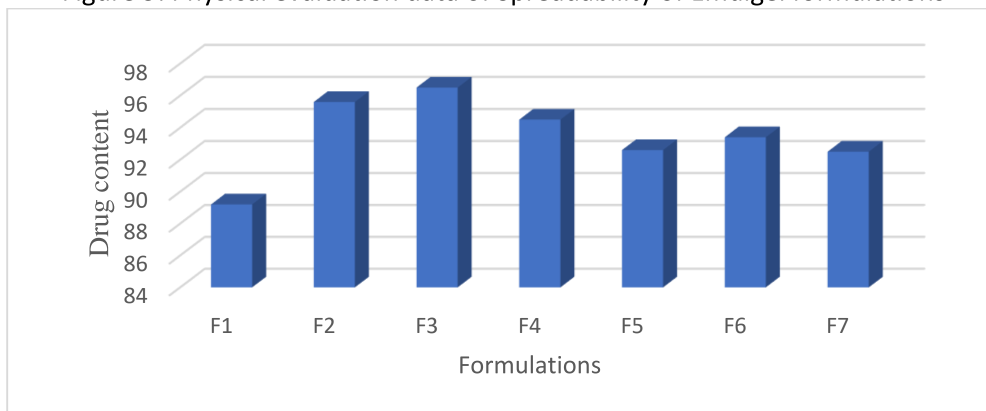


Figure 10. Physical evaluation data of Drug content inEmulgel formulations

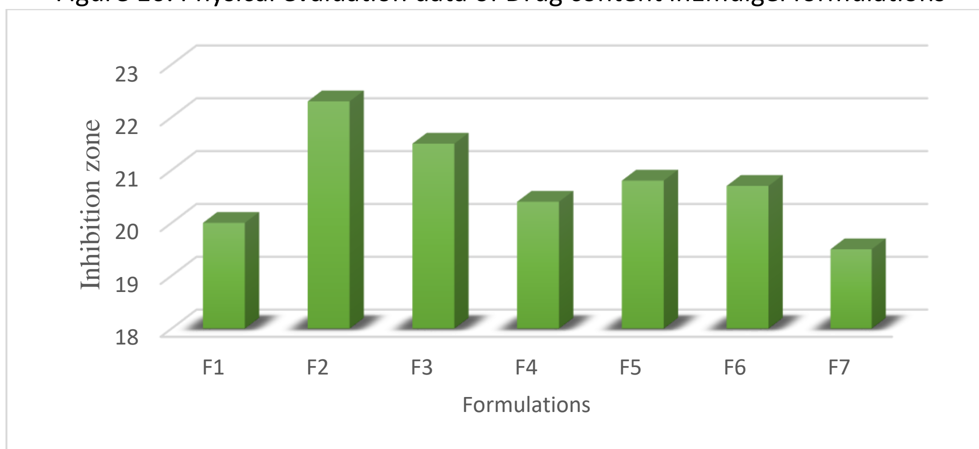


Figure 11. Physical evaluation data of inhibition zone in Emulgel formulations

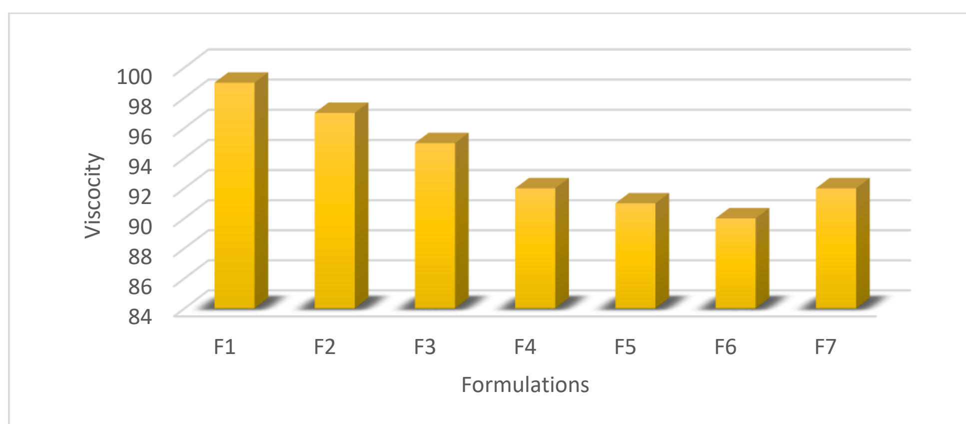


Figure 12. Physical evaluation data of viscosity in Emulgel formulations

3.9.3 Skin irritation study data of emulgel

Formulation	Skin irritation test
F1	A
F2	A
F3	A
F4	A
F5	A
F6	A
F7	A

Table 5. Skin irritation study data of emulgel

3.10 Kinetics data of emulgel formulations

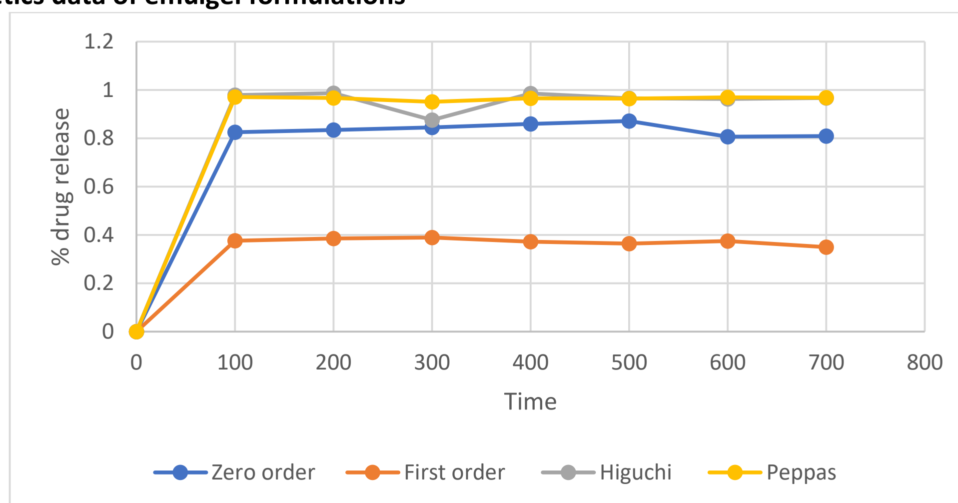


Figure 13. *In vitro* drug release ofemulgel formulations

3.11 ANTIMICROBIAL ACTIVITY

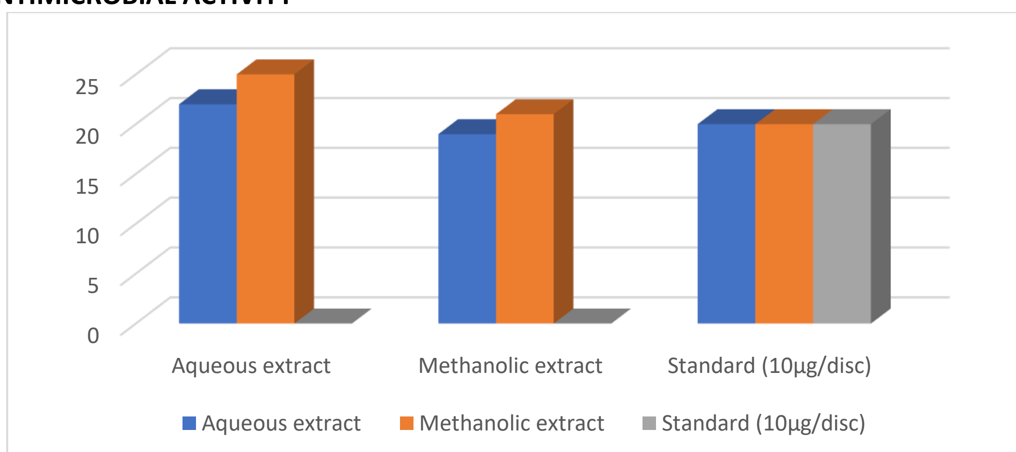


Figure 14. Antibacterial Activity of Aqueous, Methanolic Extracts and Essential Oil comparison

3.12 STABILITY STUDY

Formulation	Days	Appearance	pH	% Drug Content
F1	3months	Brownish	7.2±0.01	90.1±0.03
F2	3months	Brownish	7.2±0.01	95.4±0.55
F3	3months	Brownish	6.50±0.01	96.3±0.01

F4	3months	Brownish	7.25±0.005	97.6±0.07
F5	3months	Brownish	7.10±0.13	98.9±0.03
F6	3months	Brownish	7.30±0.4	94.1±0.01
F7	3 months	Brownish	7.29±0.5	94.6±0.05

Table 6. Stability Study of emulgel formulation

4. SUMMARY & CONCLUSION

The current research describes the "Formulation and evaluation of *sphaeranthusindicus*linn. ofemulgel for antimicrobial activity". *sphaeranthusindicus*show the detail profile with the source, distribution and botanical description of the leaf. The simplest and cheapest methods is microscopic method. Form the leaves, the Pharmacognostic, Phytochemicalstudies include with phytochemical tests. The pharmacognostic parameter were use for the determination of leaf. In drugs organoleptic characters are most important for the detection of adulteration of drug. The leaves are dark in colour. When it was bruised it show aromatic minty flavour. In physiochemical parameter the moisture content and the ash value are determined. The moisture content was 0.68±0.1 it was below the 10%. The ash value is determinate the 20.22±0.04. The extractive value in water, petroleum ether, ethanol, methanol, benzene, acetone and chloroform are found to be 12.85%,9.96%,5.83%,4.20%,1.20% and 0.98% and 0.65%. different test was conducted for the presence of phytoconstituents present in the drugs. It shows that sterols, terpenoid flavonoid and tannins are present in drug. The phytochemical study shows that the carbohydrate, proteins and amino acids, fixed oils, fats, flavonoids and alkaloids and tannins. The antioxidant capacity was calculated and it was found that flavonoids have various biological properties. From the thesis it was concluded that study show the compounds was formulate and show that the drug is more potent for antimicrobial drugs. For patients compliances topical drug delivery system play a most important role. The topical emulgel formulation is made. The present study shows that the emulgel formulation of *sphaeranthus indicus* was formulated by various gelling agents and oily phase. The physiochemical study of emulgel formulation was subjected with pH, spreadability and *in vitro* drug release. F4 formulation show good results in spreadability and rheological characteristics.

From the thesis it was concluded that the *sphaeranthusindicus*can be formulated as emulgel for antimicrobial activity.

5. REFERENCES

1) Peltola, S., Saarinen-Savolainen, P.,Kiesvaara, J., Suhonen, T.M., &Urtti, A.
Microemulsions for topical delivery ofestradiol. Int. J. Pharm., **254**: 99–107 (2003).
2) Huabing Chen et al. Microemulsion-basedhydrogel formulation of ibuprofen for topicaldelivery. International Journal ofPharmaceutics. **315**: 52-58 (2006).
3) Delgado-Charro, M. B., Iglesias-Vilas, G.,Blanco-Mendez, J., Lopez-Quintela, M. A.,Marty, J. P., & Guy, R. H., Delivery of ahydrophilic solute through the skin from novel microemulsion system. Eur. J. Pharm.Biopharm. **43**: 37–42 (1997).
4) Djordjevic, L., Primorac, M., Stupar, M., &Krajisnik, D., Characterization ofcaprylocaproylmacrogolglycerides basedmicroemulsion drug delivery vehicles for an amphiphilic drug. Int. J. Pharm., **271**: 11-19(2004).
5) Gondaliya, D.P., &Pundarikakshudu, K.,Studies on preparation, characterization and transdermal permeation of nimesulide fromaqueous and emulgel. Indian Drugs., **39**(9): 465-73 (2002).

6) Kreilgaard, M., Influence of microemulsionson cutaneous drug delivery. Adv. Drug Deliv.Rev., **54**(1): 77-98 (2002).

7) KashappaGoud, Desai H. Enhanced skinpermeation of rofecoxib using topical microemulsion gel. Drug DevelopmentResearch. **63**(1): 33-40 (2004).

8) Kirtikar KR, Basu BD, ICS. Indian medicinal plants. In: Blatter E,Caius JF, Mhaskar KS, editors. 2nd ed. Vol-2. Allahabad, India:Lalit Mohan Basu; 1981. p. 1346-8.

9) Chatterjee A, Pakrashi SC. The treatise on Indian medicinalplants. 1st ed. Vol-5. New Delhi: National Institute of Sciencecommunication and information resources; 2003. p. 177.

10) Vikani KV, Dangar RD, Kapadia NS, Shah MB. A pharmacognosticstudy on *Sphaeranthus indicus*. J Nat Remed 2008;8:61-7.

11) Sohoni JS, Rojatkar SR, Kulkarni MM, Dhaneshwar NN,Tavale SS, Gururow TN, *et al*. A new eudesmenolide and2-hydroxycostic acid from *SpharanthusindicusLinn.* Xraymolecular structure of 4-alpha, 5-alpha-epoxy-7-alphahydroxyeudesmanolide. J Chem Soc Perkin 1 1988;2:157-60.

12) Rojatkar SR, Nagasampagi BA. 7-hydroxyeudesmanolides from*Spharanthusindicus*. Phytochem 1992; 31:3270-1.

13) Pujar PP, Sawaikar DD, Rojatkar SR, Nagasampagi BA.Eudesmanoids from*Sphaeranthusindicus*. Fitoterapia2000; 71:264-8.

14) SinghSK, Saroj KM, Tripathi VJ, SinghAK, Singh RH. AnAntimicrobial Principle from *Sphaeranthusindicus*L. (FamilyCompositae). Int J Crude Drug Res 1988;26:235-9.

15) Gogte MG, Ananthasubramanian L, Nargund KS, BhattacharyyaSC. Some interesting sesquiterpenoids from *Spharanthusindicus*Linn. (compositae). Indian J Chem 1986;25B:233-8.

16) Singh SK, Tripathi VJ, Singh RH. β-D-glucoside of (24S)-24-ethylcholesta-4, 22-dien-3- β-ol from *Sphaeranthusindicus*L.Indian drugs 1989;26:317-8.