Journal of Chemical Health Risks

www.jchr.org

JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

Formulation And Development Of Antifungal Herbal Ointment With Melia Azardichta And Curcuma Longa Containing Plant Extract

Preeti Mangala[1], Shaikh Amir Afzal[2], Stuti Pandey[3]* , Jyoti Gorakh Wagh[4], Prasanthi Pakalapati[5], Ankur patel[6], Samriti Vohra[7], Amit Chandna[8]

[1]Associate Professor and Head, Department of Chemistry, Jyoti Nivas College Autonomous, Koramangala, Hosur Road, Bangalore, Karnataka . 560 095
[2]Associate Professor, Department of Pharmaceutics, SCES's Indira College of Pharmacy, Pune, Maharashtra. 411033
[3]*Associate Professor, Cross Belly College Of Pharmacy, Kukripur, Sathiaon, Azamgarh, Uttar Pradesh. 276406
[4]Associate Professor, MES College of Pharmacy, Sonai, Ahmednagar, Maharashtr a, Savitribai Phule Pune University. 414105
[5]Associate Professor, Aditya College of Pharmacy, Surampalem, Kakinada, Andhra Pradesh. 533437
[6]Assistant Professor, Sardar patel college of pharmacy, Vidyanagar-Vadtal Road, Bakrol, Gujarat. 388315
[7]Department of Pharmacology, Gandhi College of Pharmacy, Karnal. 132001
[8]Department of Pharmaceutics ,R .P. Educational Trust Group of Institutions. Bastara , Karnal. 132114

***Corresponding Author:** Stuti Pandey
* Associate Professor, Cross Belly College Of Pharmacy, Kukripur, Sathiaon, Azamgarh, Uttar Pradesh. 276406

(Received: 25 December 2023 Revised: 10 January 2024 Accepted: 23 January 2024)

KEYWORDS
Physiochemical parameters, antifungal activity, plant illnesses, spread ability, extrudability ect.

ABSTRACT:
Even in places where modern treatment is readily available, the utilization of herbal remedies has witnessed a significant surge in fascination over the past few years. A lot of people are interested in phytochemicals and herbal medicines lately because these substances are derived from medicinal plants, which are a source of bioactive compounds utilized in both conventional and alternative medicine. The purpose of this study is to create and test an ointment containing Azadirachta indica and Curcuma long a plant extracts. The extract was blended with the base using the levigation procedure to generate the ointment after the ointment base was prepared. When it was finished, the formulation's physicochemical properties—such as color, fragrance, pH, spread ability, extrudability, consistency, solubility, and washability—were evaluated. After it was ready, the formulation was assessed for physicochemical characteristics such color, smell, pH, spread ability, extrudability, consistency, solubility, and washability. Further stability testing of the formulation at various temperatures indicated no alteration in irritancy, spread ability, or diffusion. As a result, it might become a medium for efficiently and readily utilizing the therapeutic properties of Melia azardichta and Curcuma longa in a simple dose form.

1. Introduction

Medicinal or pharmaceutical chemistry is a branch of chemistry and pharmacology concerned with the design, synthesis, and development of pharmaceutical medications. The identification, production, and development of novel chemical entities appropriate for therapeutic use is the focus of medicinal chemistry [1-2]. It also involves the investigation of already available pharmaceuticals, their biological features, and their Structure-activity correlations in quantitative terms (QSAR). Pharmaceutical chemistry focuses on the effectiveness of medications and the suitability of medical equipment for the uses for which it is intended [3].

The role of medicinal plants in the pharmaceutical industry

synthetic chemistry, combinatorial chemistry, molecular modeling, and separation from plants and other natural sources of novel chemical entities have all been used to obtain molecules for drug development [4]. About a quarter of top-selling medications globally in 2001 and 2002 were either natural ingredients themselves or were derived from them. [5].For lead development, lead optimization, and clinical studies, the quantities of

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

isolated natural compounds are frequently insufficient. To assess if synthesis or semi-synthesis would be feasible, cooperation with medicinal and synthetic chemists is required.[6-7].

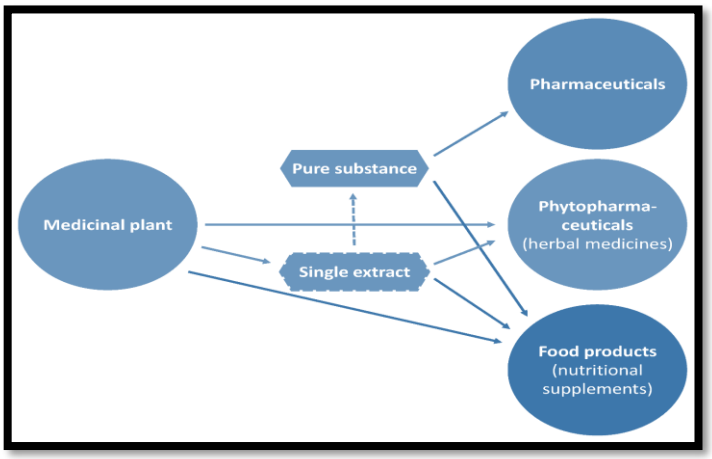

Fig.1 Comprehensive presentation of medicinal plant discoveries [8]

Medical plants have positive effects on human health [9]

(I) Many contemporary medications, like aspirin, are made inadvertently from therapeutic plants.
(II) Many cultures around the world, including Chinese medicine and Indian medicine, directly use plants as remedies.
(III) Many food crops, like garlic, have therapeutic properties. New medications can be derived from medicinal plants. More than 250 000 different species of flowering plants are thought to exist.
(IV) Studying therapeutic plants enables one to comprehend plant toxicity and safeguard both people and animals against natural toxins.
(V) The cultivation and preservation of therapeutic plants, for instance, protects plant metabolic engineering.

2.Fundamentals of phytochemistry

In the strictest sense, phytochemistry is the study of phytochemicals. These substances are made from plants. The phrases are frequently used in a more restricted sense to refer to the numerous secondary metabolic products that are present in plants. Numerous of them are well known for offering defense against insect assaults and plant illnesses [10]. For human consumers, they also provide a number of protective activities. The separation, identification, and determination of the structure of physiologically active chemicals have

become simpler thanks to the ongoing creation of spectroscopic and chromatographic analytical

techniques[11].Research in structural elucidation, biotechnology, pharmacology, ethnobotany and traditional use, genetics, and analytical evaluation of herbal treatments are all promoted by the periodical Phytochemistry Letters, which focuses on natural products. Research medicinal herbs and plants, provide training in phytochemical examination, and advise on sample recognition, processing, and production of excellent herbal products. [12-13].

Important to the collection of plants of interest to HMRC is the Phytochemistry Unit, which possesses knowledge in the following areas [14]:

- Sampling and preparing plants for analysis.
- Plant sample preparation for screening and bioassay research on plant compounds.
- Utilizing methods like Flash Chromatography, Preparative TLC, Preparative HPLC, GC-MS, HPLC-UV, HPLC-Diode Array, and LC-MS analysis, bioactive chemicals can be fractionated and isolated.
- Preparing and using HPLC to analyze standardized extracts.

Herbal medicine has been used for millennia and is being studied in some European and Asian nations. A great deal of effort has been made that is beyond the comprehension and ability of the average person [15]. The best thing about using herbal medication is that it can be used by people of any age group and has no side effects or ineffective cures. Polyherbal formulations are defined as those that contain two or more herbs. Numerous studies using turmeric rhizomes (Curcuma longa Family-Zingiberaceae) and neem leaves (Azadirachta indica Family-Meliaceae) extracts as well as several other herbal medicines have been carried out [16-17].Ointments, a semisolid preparation used topically for a variety of reasons, including protectants,

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

antiseptics, emollients, antipruritics, keratolytics, and astringents, are also available as dosage forms for herbal medications. Neem is made up of Azadirachta indica (Melicaceae) leaves and other aerial elements. Neem leaves and neem oil are being tested for their effectiveness in treating AIDS and have several qualities, including antiseptics, insecticides, antifertility, and antiviral effects [18-19]. Turmeric is made from the dried and fresh rhizomes of the Zingiberaceae plant species, Curcuma longa [20]. It is employed as an antibacterial, expectorant, seasoning, or condiment. Due to its high antioxidant content, studies have shown that turmeric can be used to treat conditions like arthritis, liver disease, Alzheimer and depression [21].

3. A Method and Material of plant extract

Phytoplanet library Neem leaves were gathered from the neighborhood around the city, while dried turmeric rhizomes were bought at a nearby market.

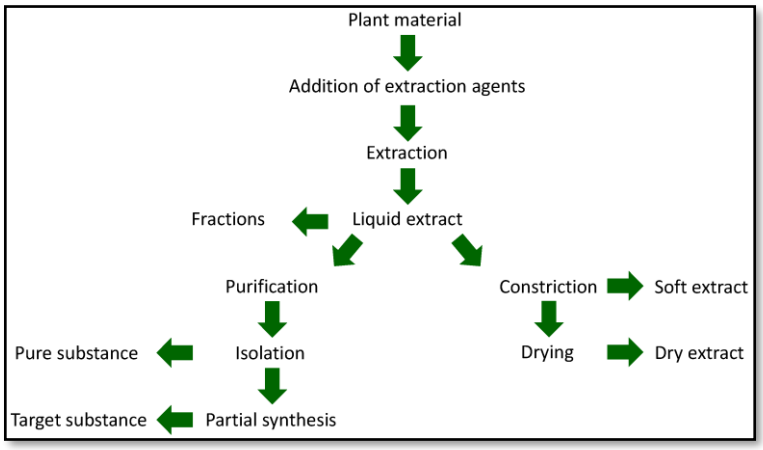

Fig.2 Flow diagram represent the extraction process

Preparation of Melia azardichta extract [22]

After being carefully washed with distilled water, the plant leaves were picked and allowed to dry for 10 days in the shade. The powdered dry leaves were created. After being ingested for three hours with 350 ml of 90% ethanol, 100 g of powder was transferred to a percolator, and 150 ml of 90% ethanol was added. The powder was macerated for seven days while being stirred occasionally. After collecting and concentrating the ethanolic extract, a blackish-green residue was obtained. The extract was kept in a cool, dry location in an airtight container.

Curcuma longa extraction and processing [23]

Dried rhizomes of Curcuma longa was ground into a powder, and the extraction procedure was the same as it was for neem leaf extract. plant extract with a ruby red hue was achieve and kept in an airtight container in a cool, dark location.

Fig.3 Process of extraction by soxhlet apparatus in laboratory

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

4. Developing herbal ointment [24]

Table1:manufacturing the ointment base

S.No.	Content of ointment base	Take quantity
01	Olestra from wool	0.52gm
02	alcohol cetostearyl	0.52gm
03	Hard paraffin	0.52gm
04	Yellow soft paraffin	8.44gm

Table2: manufacturing of herbal ointment

S.No.	Name of plant extract	Quantity required
01	Concentrated Melia azardichta	0.06gm
02	Concentrated Curcuma longa	0.06gm
03	Ointmentbaseq.s.	10gm

The steps involve in formation of herbal ointment [25]

Bases for topical ointments: aqueous cream, emulsifying ointment, and simple ointment. BP-with varied degrees of aqueous or anhydrous character were made using the fusion process. Initial preparation of the ointment foundation involved carefully grated hard paraffin weight, which was then placed in an evaporating dish. Both plant extracts were accurately measured and added to the herbal ointment foundation using the Using a levigation method, a smooth paste that was two or three times as heavy as the base was produced. The ointment was subsequently placed into a suitable container after adding additional base gradually until it was homogeneous.

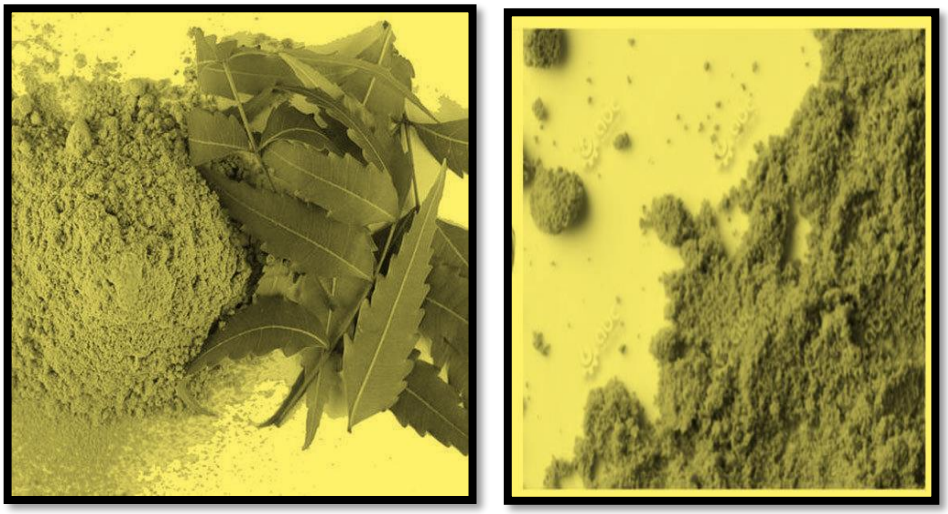

Fig.4 Dried powder of melia azardichta and Curcuma long a to evaluate Physicochemical studies

6. Standards of evaluation for herbal ointments [26]

A visual examination was used to check physical characteristics, including color and smell.

Consistency

Smooth consistency and no indications of greed are present.

Solubility

Ether, alcohol, and chloroform are all soluble in and miscible with boiling water.

Washability

After the combination had been applied to the skin, the ease of water washing was evaluated.

pH

A digital pH metre was used to determine the herbal ointment's pH. One hundred milliliters of distilled water was used to make the ointment solution, which was then left to settle for two hours. The solution's pH was measured three times, and the average value was determined.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

Table 3 The pH of each sample was measured using a digital pH tester.

Formulation	pH (Mean ±SD) *	Average pH
Ointment FA1	6.9±0.1	6.93
OintmentFA2	6.8±0.0	
OintmentFA3	7.1±0.3	

(n=3)

Spread ability

To test the spread ability, we sandwiched extra sample between two slides that had been uniformly crushed using a predetermined weight for a specific amount of time. To determine spread ability, the time needed to separate the two slides was utilised. Improved spread ability is the end consequence of speedier slide separation. Spread ability was determined using the formula below.

S=M×L/T
Where,
S = Spread ability
M denotes the weight of the upper slide. L = Glass slide length
T is the duration needed to separate the slides.

Extrudability

A tube-shaped container was used to store the mixture. Extrudability was calculated as the weight of cream needed to extrude 0.5 cm of cream ribbon in 10 seconds.

Diffusion analysis

The diffusion research was carried out using the agar nutritional medium. A board with a hole in the middle was filled with ointment. It was apparent how long the ointment took to diffuse. (After 60 seconds)

Stability study

A four-week physical stability test on the herbal cream was conducted at different temperatures, including 2°C, 25°C, and 37°C. It was found that the herbal ointment was physical steadiness across a range of temperatures, including 2°C, 25°C, and 37°C, four weeks soon.

Table 4 Stability studies data of formulated herbal ointment

No. of days	Physical Appearance	pH evaluation	% drug content (Mean cm ±SD)*
Initial	++	6.8	96.18±0.02
30	++	6.8	96.18±0.03
60	+	6.5	94.25±0.16
90	+	6.4	93.56±0.24

*** Average of three trails**

(Table No.8 Data of stability study of herbal ointment formulation)

++ No change in color
+ Slight change in color

Table5: Analysing a herbal ointment's physical-chemical composition [27]

S.No.	Physicochemical parameters	Observation
01	Intensity of Colour	Yellow
02	Odouristic	Characteristic
03	Be consistent	Smooth
04	PH	5.4
05	Spread ability(seconds)	7
06	Extrudability	0.4gm
07	Diffusion study(after60min)	0.7cm
08	Losson drying	30%
09	Solubility	Soluble in boiling water, miscible with alcohol, ether, chloroform
10	Washability	Good
11	Nonirritancy	Nonirritant
12	Stability study (20^{o}C,25^{O}c,37^{o}C)	Stable

7. The antifungal characteristics of the herbal ointment [28-30]

The herbal ointment's antifungal effectiveness was examined during the current investigation. The antifungal experiment included C. albicans, M. audouinii, A. niger, and T. mentagrophytes are four typical bacteria was obtained antifungal activity of the compounds was assessed using the disc-diffusion method.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

Materials Used
- sterile Petri dishes
- Clean graduated pipettes
- Sterilised beakers, glass rods, conical flasks, and watch glasses.
- A 6mm cork borer that has been sterilised.
- A growing culture that is 18–24 hours old and is in nutrient broth.
- Forceps with fine, sterilised points.
- Syringes used to treat tuberculosis.
- Sterile cotton swabs and cotton wool.

Building nutrition agar media
The following items were used to make the nutritional agar media.

Peptone	: 20 g.
Beef extract	: 05 g.
Sodium chloride	: 05 g.
Agar	: 20 g.
Distilled water up to	: 1000 ml.

Peptone and beef extract were weighed out in portions that were gently warmed in distilled water before being heated on a boiling water bath to dissolve the necessary amount of agar. Sodium chloride is then used to adjust the PH of the aforementioned solution, and the resulting product is then diluted with distilled water to make a volume of 1000 ml. The healthy agar medium is next sterilized by autoclaving it at 120 ℃ under 15 lbs/in 2 pressure for 20 minutes.

The creation of test solution
10 ml of DMSO and 10 mg of the plant extract were used to dissolve it. The 10 ml of solution was then diluted with DMSO to create 100 ml. Currently, the test substance's concentration is 100 gm per ml. These test-tube preparations for sample solutions were labelled and sanitized.

The creation of standard solutionThe usual drug utilised throughout testing is flucanazole. The dosage of this drug is altered to contain 100 g per ml because it is water soluble.

Approach to testing
The previously created nutritious agar media is cooled to 45oC while being gently agitated to guarantee consistent cooling. This was aseptically supplemented with a culture that was 18 to 24 hours old, properly mixed, and gently shaken.This was put in the large petridishes (20 to 25 ml each) and let to sit for an hour..The circumference of each cup is 48 mm. These cups received 100 cc of the plant extract that had been prepared in DMSO.The drug solution was next added, and it was allowed to diffuse for about 45 minutes at room temperature. The plates were then kept at 37 °C for the following 24 hours in an incubator. After 24 hours, the inhibition's diameter or area in millimeters were measured.

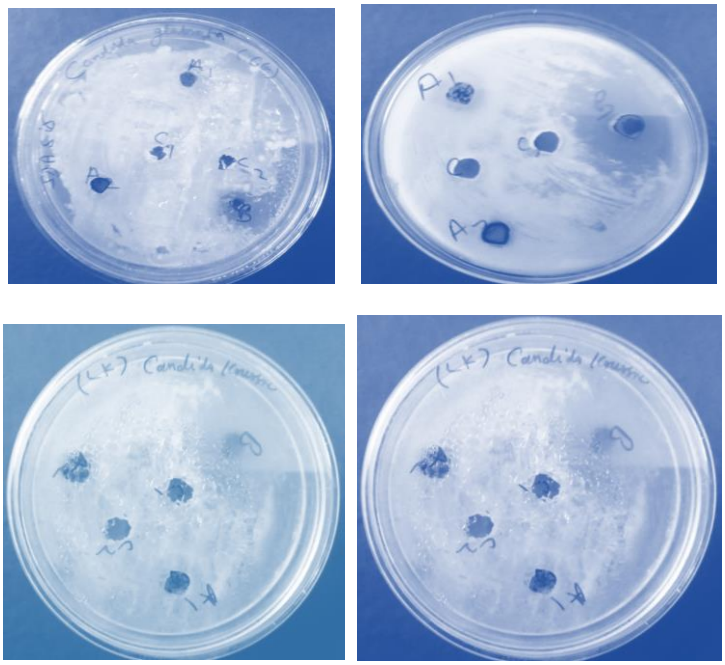

Fig.5 Diagrammatic presentation of inhibition zone area showing antifungal activity

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

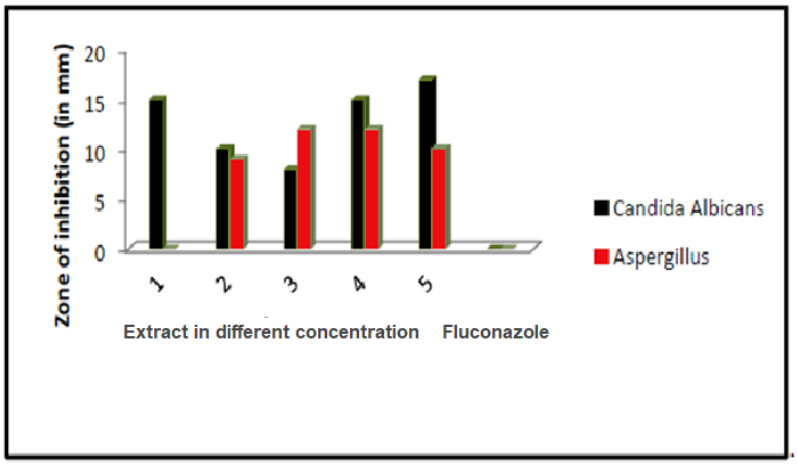

Fig.6-Antifungal activity of herbal ointment

8. Result and Discussion

The current investigation's objectives were to create and assess herbal ointment. To acquire a decent extract yield for this without damaging the chemical components or their action, Basic maceration was the technique employed to create the botanical extracts. The levigation technique was employed to create the ointment, which guaranteed an equal blend of herbal extract and ointment base and maintained stability throughout storage. Investigations on the physicochemical properties produced positive results for spread ability, extrudability, washability, solubility, loss on drying, and other factors.ThepHofthecreamwasfoundtobeinrangeof6.8to 7.1 which is good for skin pH. The ointment has shown pH nearer to skin required i.e pH of average formulation was found to be6.93.

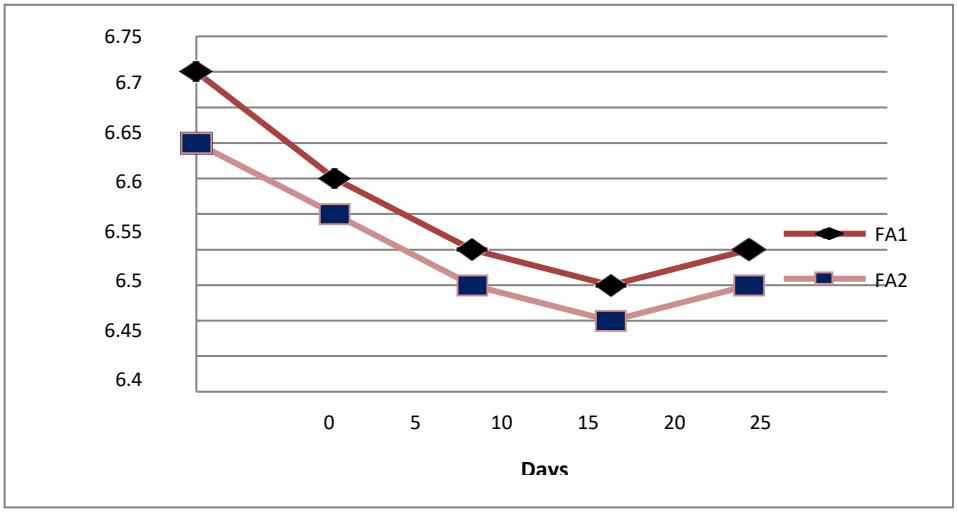

Fig.7 Bar graph represent the pH of the herbal ointment formulation

Spread ability denotes the extent of area to which the formulation readily spreads on application to skin Or hair. The bioavailability efficiency of a formulation also depends on its spreading value.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

S.No.	Formulation FA1	Formulation FA2
1	14.9	9.9
2	7.5	8

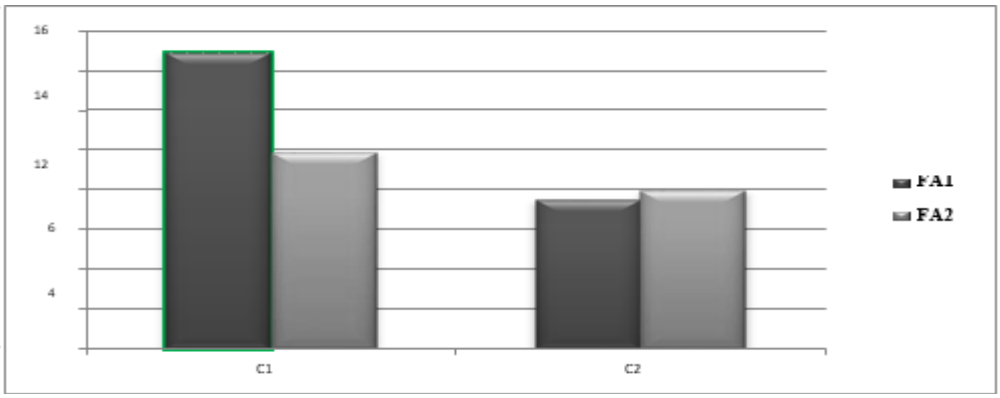

Fig.8 Bar graph represent the spread ability of herbal ointment formulation

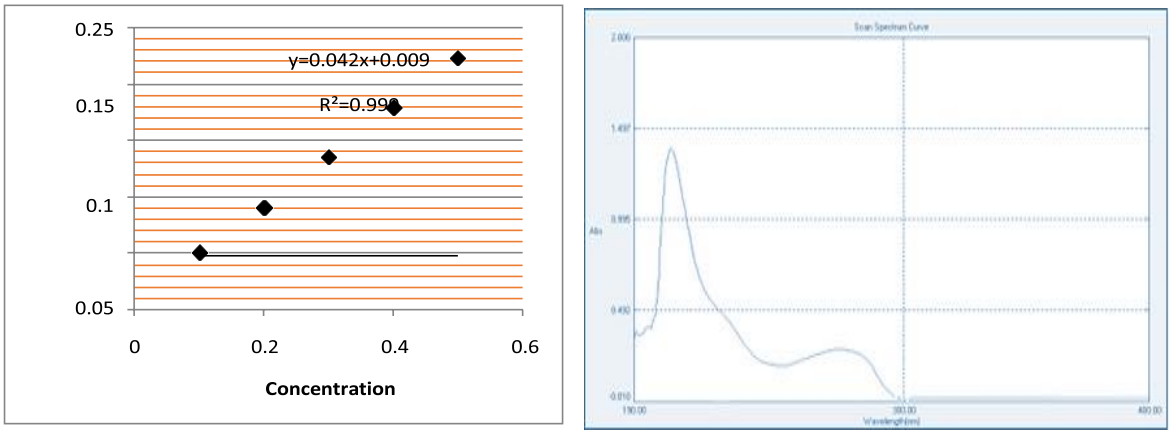

Fig.9 Spectrometric analysis of herbal ointment formulation

In addition, the formulation was exposed to a variety of temperatures over the course of four weeks, including 2°C, 25°C, and 37°C, to investigate its stability. There were no changes discovered in terms of spreading potential, diffusion analysis, or annoying effect. The ethanolic extract and fractions of Neem and Turmeric were potential antifungal agents because both had MIC values of less than 1000 g/mL. With MIC values of 50–100 g/mL, the ethylacetate fraction of Melia azardichta and Curcuma longa showed mild to moderate antifungal activity, against C. albicans and A. niger species, having the maximum antifungal activity (MIC 12.5 g/mL)

Reference

1. X. Chen, H. Zhu, X. liu, Q. Li and M. Dong, Design and synthesis of novel GluN2A NMDAR positive allosteric modulators via scaffold hopping strategy as anti-stroke therapeutic agents, *Bioorganic & Medicinal Chemistry* 83 (2023) 117236.
2. H. Sato, A. Chandela and Y. Ueno, Synthesis and characterization of novel (S)-5′-C-aminopropyl-2′-fluorouridine modified oligonucleotides as therapeutic siRNAs, *Bioorganic & Medicinal Chemistry* 87 (2023) 117317.
3. H. N. B. Nguyen and M. Y. Patuwo, Quantitative Structure-Activity Relationship (QSAR) modelling of the activity of anti-colorectal cancer agents featuring quantum chemical predictors and interaction terms, *Results in Chemistry* 5 (2023) 100888.
4. J. Almaliti and W. H. Gerwick, Methods in marine natural product drug discovery: what's new?, *Expert Opinion on Drug Discovery* 18 (2023) 687–691.
5. 1.W.-J. Tian and X.-J. Wang, Broad-Spectrum Antivirals Derived from Natural Products, *Viruses* 15 (2023) 1100.
6. R. Lu, H. Akasaka and K.-H. Ruan, Design, synthesis and characterization of lead compounds as anti-inflammatory drugs targeting mPGES-1 via enzymelink screening, *Future Medicinal Chemistry* 15 (2023) 757–767.
7. M. P. Badart and B. C. Hawkins, Synthetic Strategies to Access Heteroatomic Spirocentres Embedded in Natural Products, *Synthesis* 53 (2021) 1683–1705.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024)14 (1), 3216-3224| ISSN:2251-6727

8. M. Feher and J. M. Schmidt, Property Distributions: Differences Between Drugs, Natural Products, and Molecules from Combinatorial Chemistry., *ChemInform* 34 (2003).
9. A. K. Mandal, A. Pandey, P. Pant, S. Sapkota, P. Yadav and D. P. Bhandari, Formulation of Herbal Tea from Nepalese Medicinal Plants: Phenolic Assay, Proximate Composition and In-vivo Toxicity Profiling of Medicinal Plants with Nutritive Benefits, *Journal of Plant Resources* 20 (2022) 139–149.
10. 1.S. Jethi, S. K. Mishra and K. B. Satapathy, Study on Ethnomedicinal Plants used against diabetes by the tribes of Gajapati district of Odisha: Ethnomedicinal plants used against diabetes, *Plant Science Today* (2023).
11. A. A. Grigoriev and I. A. Avdeenko, Regenerative ability of grafted cuttings in the callusing room by using solutions of physiologically active substances, *Agrarian science* (2023) 125–129.
12. 1.Perception and use of Medicinal Plants and Chemical Products in the Traditional Treatment of Cutaneous Leishmaniasis in Morocco, *Tropical Journal of Natural Product Research* 7 (2023) 2946–2951.
13. N. Cicero, S. Gangemi and A. Allegra, Natural products and oxidative stress: potential agents against multiple myeloma, *Natural Product Research* 37 (2022) 687–690.
14. F. Barbier, F. Fichtner and C. Beveridge, The strigolactone pathway plays a crucial role in integrating metabolic and nutritional signals in plants, *Nature Plants* (2023).
15. This abstract has been withdrawn, *Heart, Lung and Circulation* 32 (2023) S228.
16. Assessment of Neem (Azadirachta Indica) and Lemongrass (Cymbopogon citratus) Extracts on Meloidogyne incognita, *Indian Journal of Ecology* (2023).
17. .Z. El Ouafi, S. Pirro, N. Al Idrissi and H. Ghazal, The Complete Genome Sequence of Curcuma longa (Zingiberaceae, Zingiberales), Turmeric, *Biodiversity Genomes* (2023).
18. R. A. Chachar, Individual and Combined Effects of Moringa and Neem Leaves on Immune Response and Gut Microflora in Japanese Quails, *Pakistan Journal of Zoology* (2023).
19. K. Thangamani and Shiwani, Effect of magnetic water and neem leaves ash on strength properties, *Materials Today: Proceedings* 79 (2023) 406–410.
20. I. Gałązka-Czarnecka, Modification of color in turmeric rhizomes (Curcuma longa L.) with pulsed electric field, *PRZEGLĄD ELEKTROTECHNICZNY* 1 (2023) 125–127.
21. T. Asselah, What is the Path Forward to Treat Hepatitis Delta Virus?, *Clinics in Liver Disease* (2023).
22. Dr. M. Sakthivel, Dr. S. M. Halith, R. Karthikeyan, M. Kaviya, M. Kiruthika, S. Kowsalya and R. Krishnapriya, Formulation and Evaluation of Herbal Ointment Containing Neem and Turmeric Extract, *International Journal of Pharmaceutical Sciences Review and Research* 78 (2023).
23. O. Bayraktar, M. E. Uslu and G. Öder, Preparation of Encapsulated Turmeric Extract for Food Fortification, *Current Nutraceuticals* 04 (2023).
24. Dr. M. Sakthivel, Dr. S. M. Halith, R. Karthikeyan, M. Kaviya, M. Kiruthika, S. Kowsalya and R. Krishnapriya, Formulation and Evaluation of Herbal Ointment Containing Neem and Turmeric Extract, *International Journal of Pharmaceutical Sciences Review and Research* 78 (2023).
25. S. Biswas, D. Dasar, K. Khandare and A. Wanjari, Efficacy of Novel Herbal Formulation in Efficacy of Novel Herbal Formulation in Conservative Management of Mutrashmari (Urolithiasis) - A Case Report, *International Journal of Ayurvedic Medicine* 13 (2023) 1078–1082.
26. Miss. Shivani Prakash Kale, Miss. Snehal P. Patil, Sakshi T. Kale, Mr. Sachin S. Navale and Dr. Amol A. Patil, Formation and Evaluation of Herbal Ointment by using Curcuma Longa (Turmeric), *International Journal of Advanced Research in Science, Communication and Technology* (2023) 721–725.
27. M. Shelke, P. Sonawane, G. Bharskar and S. D. Mankar, Formulation and Evaluation of Antimicrobial Herbal Ointment containing Colocasia esculenta, *Research Journal of Pharmacognosy and Phytochemistry* (2022) 277–280.
28. F. A. da S. Sá, T. C. Silva, W. M. Andrade, R. I. de Ávila, M. C. Valadares, C. R. Costa, A. S. Santos, V. A. Q. Feitas, J. R. de Paula and M. do R. R. Silva, Antifungal activity of the ethanolic extract and flavonoid avicularin from Myrcia tomentosa (Aubl.) DC. on virulence factors of Candida species, *Journal of Herbal Medicine* 38 (2023) 100643.
29. Dr. M. Sakthivel, Dr. S. M. Halith, R. Karthikeyan, M. Kaviya, M. Kiruthika, S. Kowsalya and R. Krishnapriya, Formulation and Evaluation of Herbal Ointment Containing Neem and Turmeric Extract, *International Journal of Pharmaceutical Sciences Review and Research* 78 (2023).
30. A.Shah, Development and characterization of herbal ointment by using psoralia corylifolia and aloevera for the treatment of vitiligo, *International Journal of Biology, Pharmacy and Allied Sciences* 12 (2023).