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**Research**

# Advancing skin cancer therapy: innovations in curcumin ointment development

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**Abstract**

Skin cancer, primarily driven by excessive ultraviolet (UV) radiation exposure, represents a significant health challenge globally. This article explores the potential of herbal therapies in skin cancer treatment, focusing on the development of a curcumin based ointment. Traditional treatments such as chemotherapy and radiation have limitations, including severe side effects and drug resistance. Herbal remedies offer a promising alternative due to their natural anti-inflammatory, antioxidant, and anti-carcinogenic properties. In this research two herbal compounds like turmeric, neem highlighting their pharmacological actions and potential in skin cancer therapy. A detailed formulation process for a curcumin and azadirectin ointment is provided, along with evaluation reagent' s to ensure its efficacy and safety. The findings suggest that incorporating herbal treatments could enhance current skin cancer therapies, offering a more holistic approach with fewer side effects.

**Keywords:** Curcumin, Neem extract, Skin cancer, Herbal ointment

## INTRODUCTION

Skin cancer posses a significant and growing global health concern, particularly among Caucasians. Increased exposure to ultraviolet (UV) radiation is a major culprit, leading to a steady rise in its prevalence. This disease disrupts the delicate balance in the epidermis, either promoting excessive cell survival and proliferation or hindering programmed cell death (apoptosis). While UV radiation is the primary culprit, other factors contribute to skin cancer development. These include viruses, dietary and chemical mutagens, and even hereditary predisposition. Fortunately, by mitigating these risk factors, we can significantly reduce the risk of developing skin cancer [1]. One successful treatment approach involves anti-angiogenesis therapy. This strategy disrupts the tumor's blood supply, hindering its growth and improving patient outcomes. Additionally, many cancer cells have flawed apoptotic pathways, allowing them to evade death and proliferate unchecked. This is where chemotherapy comes in, specifically targeting the process of apoptosis to eliminate cancer cells. The current treatment landscape for skin cancer encompasses various approaches, including radiation therapy, chemotherapy, cryosurgery, and surgical excision. Topical chemotherapies like imiquimod and 5fluorouracil offer targeted treatment options for specific types of skin cancer. However, selecting the optimal treatment path is a complex decision. Factors like

the patient's health, cancer location, and individual preferences all influence this choice. Despite their effectiveness, conventional chemotherapeutic drugs come with significant drawbacks [2]. The potential for severe side effects and interactions between multiple medications poses a challenge. Additionally, cancer cells can develop resistance to these drugs through various mechanisms like amplification of drug targets, altered drug kinetics, and efflux systems [3]. Thankfully, researchers are exploring ways to overcome this resistance, with promising approaches involving liposomes, micellar drug delivery, and nanoparticles. The limitations of traditional chemotherapy and the perceived benefits of natural therapies have fueled a surge in interest in complementary and alternative medicine (CAM)[3,4]. Plant extracts rich in phytochemicals offer promising possibilities as potential anticancer drugs or lead compounds for novel pharmaceutical development. Traditionally, these have been used in homemade remedies like tinctures, teas, or crude extracts. However, natural products and traditional medicines have their limitations. Variations in manufacturing techniques can affect the chemical composition and dosage, making it difficult to determine and standardize appropriate doses [5,6]. Additionally, the optimal delivery routes for these natural remedies need further investigation. While research on natural compounds holds immense potential for developing new therapeutic agents, optimizing doses and creating efficient dosage forms specifically tailored for the intended route of administration is crucial [7].

## MATERIALS

**Chemicals and Reagent**

- **Ethanol**: 99% purity, supplied by [Thakur Enterprises INDIA].
- **Methanol**: 99% purity, supplied by [Thakur Enterprises INDIA].
- 0.25 M sodium hydroxide (NaOH), 2% sodium nitroprusside solution, 20% NaOH solution, sulfuric acid (H2SO4), 10% ammonia (NH4) solution, diluted HCl, alcoholic FeCl3 solution, 1% alcoholic KOH solution, ethyl acetate, n-hexane, ethyl acetate, methanol, and distilled water [NICE CHEMICAL Pvt.Ltd., P.B.No. 2217, Manimal Road, Edappally, Kochi- 682024, Kerla, India].
- **Ointment Base Components**: Hard paraffin, Cetostearyl alcohol, Wool fat (lanolin), White soft paraffin [NICE CHEMICAL Pvt.Ltd., P.B.No. 2217, Manimal Road, Edappally, Kochi- 682024, Kerla, India].
- **Reagents**: Mayer's Reagent, Wagner's Reagent, Dragendorff's Reagent, Keller-Killiani Reagent, Borntraeger's Reagent, Legal's Reagent, Ferric Chloride Reagent, Lead Acetate Reagent, Gelatin Reagent, Shinoda Reagent, Lead Acetate Reagent, Alkaline Reagent, Reagent, Salkowski Reagent, Libermann-Burchard Reagent, Zimmermann Reagent [NICE CHEMICAL Pvt.Ltd., P.B.No. 2217, Manimal Road, Edappally,Kochi- 682024, Kerla, India ].

**Plant Material**

- **Turmeric Rhizomes:** Collected from the herbal garden of Ganpati Institute of Pharmacy, Bilaspur, Authenticated by the director of the college's department.
- **Neem Leaves:** Collected from the herbal garden of Ganpati Institute of Pharmacy, Bilaspur, Authenticated by the director of the college's department.

**Equipment**

- **Extraction Apparatus**: Soxhlet apparatus, rotary evaporator, Reflux assembly.
- **Ointment Preparation Equipment**: Homogenizer, mixing equipment.
- **Storage Containers**: Amber glass bottles, refrigeration.

**Analytical Instruments**

- **Thin Layer Chromatography (TLC)**: For preliminary analysis of extracts.
- **UV Visible Spectrophotometer**: For absorbance spectra recording

## METHODOLOGY

**Medicinal plant selected for the study** Curcuma longa (Turmeric) and Azadirachta indica (Neem) are two potent medicinal plants selected for this study due to their well-documented therapeutic properties. Curcuma longa, commonly known as turmeric, is renowned for its active compound curcumin, which exhibits significant anti-inflammatory, antioxidant, and anticancer activities. Curcumin has been extensively studied for its ability to induce apoptosis and inhibit the proliferation of cancer cells, making it a promising candidate for skin cancer treatment. Azadirachta indica, known as neem, has been used in traditional medicine for centuries. Neem extract contains a plethora of bioactive compounds, including nimbin and azadirachtin, which possess potent antimicrobial, anti-inflammatory, and anticancer properties. The combination of these extracts in a topical ointment aims to harness their synergistic effects to provide a natural and effective treatment for skin cancer.

**Collection and Authentication of Turmeric and Neem** The Ganpati Institute of Pharmacy campus in Bilaspur was the source of the neem (Azadirachta indica) leaves and turmeric (Curcuma longa) rhizomes. The department

director of the college confirmed the legitimacy of these plant materials, guaranteeing appropriate and high-quality control. This verification procedure provides a strong basis for the research by ensuring the validity of the neem and turmeric used in the study.

**Extraction of plant material**

**Turmeric** Curcumin extraction from turmeric involves a number of crucial steps. The turmeric rhizomes are first grind into a fine powder in order to increase surface area and extraction efficiency. The powder is then mixed at a typical ratio of 1:10 (w/v), or one gram of powdered turmeric for every ten ml of ethanol, with a 70% ethanol solution in a round-bottom flask. The flask has a reflux condenser attached to it, which ensures a tight seal at all points. The mixture is heated to a gentle boil using a hot plate or heating mantle to maximize extraction efficiency. The ethanol vapors can condense and return to the flask as a result. This reflux process lasts for two to four hours. After cooling, the mixture is filtered using a funnel and filter paper to separate the liquid extract from the turmeric residue. Alternatively, Buchner filtration can be used for faster results. If necessary, the ethanol can be removed in order to concentrate the extract. This can be accomplished by rotary evaporation at low pressure and temperature, or by oven drying at 40–50°C. The final product is a concentrated extract of curcumin, which can be made by rotary evaporation or oven drying, where the residue is semi-solid or paste [8].

**Neem** Grind 50 grams of dried neem leaves into a fine powder. Pack the powder loosely in a cellulose thimble and place it in the Soxhlet apparatus. Add 200 ml of food-grade ethanol to the flask and heat it using a heating mantle. The ethanol vapor will rise, condense, and drip through the thimble, extracting the desired compounds from the neem powder. The process will continue until the extract in the flask turns colorless, signifying complete extraction. Finally, evaporate the solvent using a rotary evaporator or a hot plate in a fume hood to obtain the concentrated neem extract. Store the extract in an airtight container in a cool, dark place [9].

**Fig 1: Turmeric extraction**

**Fig 2 Neem extraction**

**UV Spectroscopy of curcumin**

**Preparation of Dilutions:** weigh 1mg of curcumin extract and dissolve it in 10ml of ethanol to create a stock solution with a concentration of 100µg/ml. To prepare the final concentrations of 1, 2, 3, 4, and 5µg/ml, use 10 ml volumetric flasks. For the 1 µg/ml solution, precisely pipette 0.1 ml of the stock solution into a volumetric flask and dilute it with ethanol up to the 10 ml mark. For the 2 µg/ml solution, pipette 0.2 ml of the stock solution into another volumetric flask and then add ethanol to reach a total volume of 10 ml. Similarly, for the 3µg/ml solution, pipette 0.3 ml of the stock solution into a volumetric flask and dilute it with ethanol up to 10 ml. To achieve a 4 µg/ml concentration, pipette 0.4 ml of the stock solution into a volumetric flask and fill it with ethanol to the 10 ml mark. Finally, for the 5 µg/ml solution, pipette 0.5 ml of the stock solution into a volumetric flask and add ethanol to make the total volume 10ml [10].

**Procedure**: Turn on the UV-Vis spectrophotometer and let it warm up for at least 15 minutes before starting UV-Visible spectroscopy procedure. Set the wavelength range for scanning between 200 and 600nm. To prepare the blank, insert a quartz cuvette into the spectrophotometer to zero it out and fill it with pure ethanol. To proceed with the sample measurements, transfer the 1µg/ml curcumin dilution into a quartz cuvette and record the absorbance spectrum. Proceed with the 2, 3, 4, and 5µg/ml dilutions in the same manner, noting the absorbance spectra at every concentration [10].

**UV Spectroscopy of Neem Ethanolic Extract**

**Preparation of Dilutions** A stock solution with a concentration of 100µg/ml is created by weighing and dissolving 1ml of neem ethanolic extract in 10ml of ethanol. Prepare the following concentrations in 10ml volumetric flasks for the serial dilutions: 1, 2, 4, 6, 8, and 10µg/ml. Fill a 10ml volumetric flask with 0.2ml of the stock solution. Next, fill the flask with ethanol until it reaches the 10ml mark to obtain a 2µg/ml solution. Once 0.4ml of the stock solution have been measured out, transfer it to a second volumetric flask (10 ml) and top it up with ethanol to obtain a 4µg/ml solution. Similarly, take 0.6ml of the stock solution and dilute it with ethanol in a 10ml volumetric flask to get a 6µg/ml solution. Pipette 0.8 ml of the stock solution into a volumetric flask and top it off with 10ml of ethanol to create an 8 µg/ml solution. Measure out 1ml of the stock solution, then dilute it with ethanol in a 10ml volumetric flask to produce a 10µg/ml solution. [11].

**Procedure** Turn on the UV-Vis spectrophotometer and let it warm up for at least 15 minutes before starting UV-Visible spectroscopy procedure. Set the wavelength range for scanning between 200 and 600nm. To prepare the blank, insert a quartz cuvette into the spectrophotometer to zero it out and fill it with pure ethanol. To proceed with the sample measurements, transfer the 2µg/ml neem dilution into a quartz cuvette and record the absorbance spectrum. Proceed with the 4, 6, 8, and 10µg/ml dilutions in the same manner, noting the absorbance spectra at every concentration [11].

**Fig 3: Curcumin serial dilution**

**Fig 4: Neem extract serial dilution**

**TLC (Thin Layer Chromatography)**

**Curcumin** Thin layer chromatography (TLC) was used to separate the curcumin using a 3:7 ethyl acetate and n-hexane mixture. The plate is sprayed with 1% alcoholic potassium hydroxide (KOH) solution. The Rf values of the pure curcumin and the separated spots are compared [12].

**Neem** Thin Layer Chromatography (TLC) of neem ethanolic extract is a multi-step process. The solvent mixture is made up of ethyl acetate, methanol, and distilled water in an 8:1:1 ratio. With a pencil, mark the origin of a silica gel TLC plate by drawing a horizontal line that starts 1 cm from the bottom. Place 1-2µL of the neem extract in a capillary tube and apply it to this line; allow it to dry between applications. Pour the solvent mixture down to 0.5cm below the surface of the developing chamber to ensure complete vapor saturation. Next, place a piece of filter paper inside. Place the spotted TLC plate inside the chamber and shut it, being careful that the spots don't come into contact with the solvent. Allow the solvent to ascend until it nearly reaches the plate's top. Examine the areas under a UV lamp after removing the plate and letting it air dry. Measure the distances traveled and draw a pencil circle around the visible spots to find the Rf values [13].


**Fig 5: TLC of curcumin**


**Fig 6: TLC of neem extract**

**Phytochemistry**
**Curcumin and Neem**
**Alkaloid**
**Dragendorff's Test**: Add 2 drops of Dragendorff's reagent to 1ml of the ethanolic extract filtrate. The presence of alkaloids is identified by the formation of a creamy precipitate.
**Wagner's test**: Wagner's reagent should be combined with 1 ml of the filtrate. The presence of precipitate indicates the presence of alkaloids.
**Saponins:** In a boiling tube, mix 5ml of the ethanolic extract with 20 ml of sterile distilled water. Give the mixture a good shake, then leave it alone. When frothing persists for more than 15 minutes, saponins are present.
**Tannin**: To 3ml of the plant extract, add an equivalent volume of freshly made ferric chloride (FeCl3) solution. The emergence of a green color signifies the existence of tannins.
**Coumarins:** Combine 1.5 ml of a 0.25 M sodium hydroxide (NaOH) solution with 2ml of turmeric extract. Coumarins are identifiedfied to be present by a yellow color.
**Flavonoids**: Use a 0.25 M NaOH solution to treat the turmeric ethanolic extract. A bright yellow coloration appears, indicating the presence of flavonoids.
**Diterpenes:** 2ml of extract and the same volume of water, add 10 drops of copper acetate solution. Diterpenes are indicated by the formation of a deep green coloration.
**Cardiac Glycoside**: To conduct Legal' s test, combine 1ml of pyridine with 3ml of ethanolic turmeric extract. Five drops of a recently made 2% sodium nitroprusside solution and five drops of a 20% NaOH solution should be added. Heart glycosides are indicated by the first pinkish - red coloration that turns brownish-yellow.
**Phenol:** To 1ml of the extract, add four drops of recently made alcoholic FeCl3 solution. The presence of phenols is indicated by a bluish-black coloring.
**Steroids**: In a test tube, combine 1ml of the extract with 10ml of chloroform. Without stirring, gradually pour concentrated sulfuric acid (H2SO4) through the tube's walls. A red interface and yellow-greenish fluorescence in the sulfuric acid layer are signs of the presence of steroids.
**Anthraquinone:** Mix 0.5g of turmeric extract with 10ml of benzene to perform Borntrager's test. Mixture should be filtered, and the filtrate should contain 5 ml of 10% ammonia (NH4) solution. There are free hydroxyl - anthraquinones present when the lower (ammonia) phase has a pinkish-red coloration.

**Reducing Sugar Detection**
**Fehling test**: Use diluted HCl to hydrolyze 2ml of the filtrate, neutralize with an alkali, and heat Fehling's solutions A and B. Sugars are reducing when a reddish precipitate forms.
**Benedict's test**: Gently heat 2ml of Benedict's reagent and 2ml of the extract filtrate combined. Reducing sugars are confirmed by an orange-red precipitate.
**Anthocyanins:** In a corresponding volume, combine 1ml of turmeric extract with 2ml of HCl and ammonia. Anthocyanins are indicated by the original pink hue turning blue or violet.
**Terpenoid:** Combine 5ml of the extract and 2ml of chloroform for Salkowski's test. Pour 3 ml of concentrated sulfuric acid (H2SO4) through the test tube's walls. Terpenoids may be present at the interface because of its reddish-brown coloring.

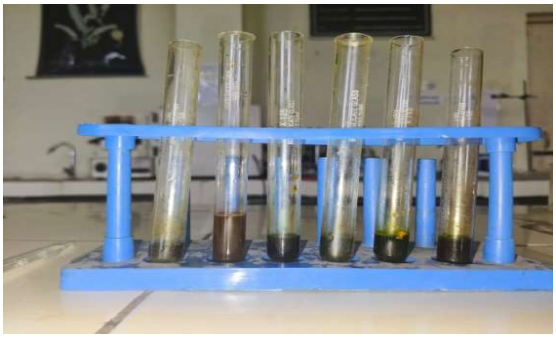

**Fig 7: chemical tests of curcumin**

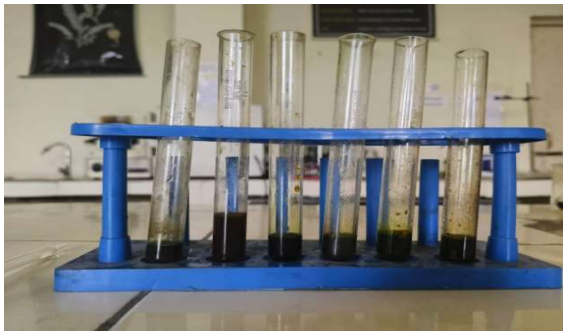

**Fig 8: chemical tests of neem extract**

**Preparation of herbal ointment**

To prepare a 10g ointment containing curcumin and neem extract, start by melting 2g of hard paraffin, 1g of cetostearyl alcohol, and 1 g of wool fat (lanolin) together in a water bath until fully liquefied. Then, add 6g of white soft paraffin to the mixture and stir until homogeneous. Remove from heat and allow the mixture to cool slightly. Incorporate 0.1g of curcumin and 0.1g of neem extract into the base mixture, ensuring even distribution.

Continue stirring until the mixture reaches a uniform consistency. Transfer the prepared ointment into a suitable container and allow it to solidify at room temperature. Store in a cool, dry place until use.

**Fig 9: herbal ointments of F1, F2, F3 concentration**

**Table 1: Formulation ingredients**

| Sr. no. | Ingredients | quantity | uses |
|---|---|---|---|
| 1 | Hard paraffin | 2.0 gm | Provides consistency and stability |
| 2 | Cetostearyl alcohol | 1.0 gm | Emulsifying agent |
| 3 | Wool fat (lanolin) | 1.0 gm | Emollient and softening agent |
| 4 | White soft paraffin | 6.0 gm | Provides a soft texture |
| 5 | Ointment base | (Q.S. up to 10 gm) | Base |

**Table 2: Formulation of Ointment**

| Name of ingredients | Quantity of ingredients | | |
|---|---|---|---|
| | **F1** | **F2** | **F3** |
| **Curcumin** | 0.06gm | 0.12gm | 0.18gm |
| **Azadirectin** | 0.06gm | 0.12gm | 0.18gm |
| **Ointment base** | (Q.S. up to 10 gm) | (Q.S. up to 10 gm) | (Q.S. up to 10 gm) |

**Evaluation of Herbal ointment**

i. **Appearance and Color:** This evaluates the ointment's homogeneity, color (which should match the greenish color of curcumin and azadirectin), and lack of lumps or separation visibly.

ii. **pH**: Indicates how acidic or alkaline the ointment is. A slightly acidic pH of 5 to 6 is ideal to reduce skin irritation.

iii. **Viscosity**: Assesses how easily the ointment may be applied and distributed. It shouldn't be too thick or thin.

iv. **Spreadability**: Determines the force required to spread the ointment evenly across a surface. This has an effect on patient compliance and ease of use. Better spreadability is the outcome of taking less time to separate two slides. Spreadability was determined using the formula below[14].
S = MHL/T
In this case, S= spreadability
M= weight tide uphill on the slide
L= Glass slide length
T= Duration of slide separation

v. **Extrudability:** The force needed to extrude a material from a collapsible tube after applying a predetermined weight-based force is measured by the extrudability test. The percentage of ointment that extruded from the tube after a specific load was applied was calculated in the current study. Using the following formula, the extrudability of prepared ointments containing neem and turmeric was determined: Extrudability is determinedas follows: ointment amount extruded from the tube x 100 / ointment total inside the tube

vi. **LOD**: The formulation was dried to 105 degrees Celsius in a Petri dish placed over a water bath to ascertain LOD.

vii. **Solubility**: Miscible in ether, alcohol, and chloroform; soluble in hot water.

viii. **Washability**: The ease with which the formulation could be cleaned off with water was evaluated after the skin had been applied..

ix. **Non irritancy test:** A prepared herbal ointment was applied to a human's skin, and the result was witnessed. In order to check for effects like redness, erythema, inflammation, etc., a small amount of sample is applied to the hand and the hand is observed for 24 hours. It is therefore non-irritating to the skin, and no such effect was noticed [15].

## RESULTS AND DISCUSSION

To prepare and assess the herbal ointment, the current investigation was conducted. To do this, a straightforward maceration procedure was used to create the plant extracts. Excellent extract yield and no negative effects on the chemical components activity are observed. In order to create an ointment that would remain stable throughout storage, the levigation procedure was employed to ensure that the herbal extract and ointment base are uniformly mixed. The physicochemical characteristics are determined, and the findings for spreadability, extrudability, washability, solubility, loss on drying and other factors are satisfactory.

**Determination of absorption maxima [16]**
The neem extract's maximum absorbance at 542 nm was determined to be 0.188. The turmeric extract's maximum absorbance was determined to be 425 nm.

**Curcumin**
**Stock Solution Preparation**: Weigh 1 mg of curcumin extract and dissolve it in 10 ml of ethanol to prepare a stock solution of 100 µg/ml.
**Preparation of standard calibration curve:** The absorbance of the reference solutions in ethyl acetate was measured at 418 nm, within the range of 1-4µg/ml. To test if the standard calibration curve was linear, a regression equation was used to plot the average (n=3) maximum absorbance (λmax) against concentration.

**Table 3: Absorption maxima of curcumin**

| Concentration | Absorbance (nm) |
|---|---|
| 1 | 0.055 |
| 2 | 0.099 |
| 3 | 0.145 |
| 4 | 0.192 |
| 5 | 0.238 |

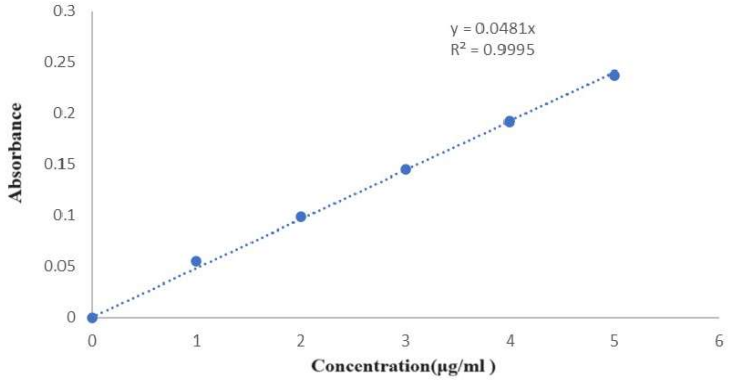


**Fig 9: Calibration curve of curcumin**

**Neem extract: Stock Solution Preparation**: Weigh 1 mg of neem ethanolic extract and dissolve it in 10 ml of ethanol to prepare a stock solution of 100 µg/ml.
**Preparation of working standard solution:** Mixing 1 ml of the above stock solution with 100 ml of distilled water yields a working standard with 100µg/ml.

**Table 4: Absorption maxima of neem extract**

| Concentration | Absorbance (nm) |
|---|---|
| 2 | 0.239 |
| 4 | 0.498 |
| 6 | 0.751 |
| 8 | 1.016 |
| 10 | 1.264 |

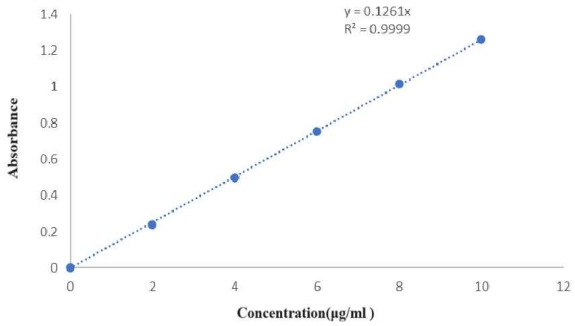


**Fig 10: Calibration curve of neem extract**

**Chemical Tests of Curcumin and Neem Extract**

Confirming the existence of active compounds and their possible efficacy requires conducting chemical tests on curcumin and neem extract. Table 1 provides an overview of the test results.

**Table 5**: **Turmeric's phytochemical components in an ethanolic extract**

| Sr. no. | Secondary Metabolites | Turmeric Extract |
|---|---|---|
| 1 | Alkaloids | Present in High concentration |
| 2 | Coumarins | Present in High concentration |
| 3 | Phenol | Present in Moderate concentration |
| 4 | Saponins | Present |
| 5 | Flavonoids | Present in Moderate concentration |
| 6 | Cardiac Glycosides | Present |
| 7 | Phlobatannins | Present |
| 8 | Diterpenes | Present |
| 9 | Tannins | Present |
| 10 | Steroids | Present in Moderate concentration |
| 11 | Anthocyanins | Present |
| 12 | Reducing Sugars | Present in High concentration |
| 13 | Anthraquinones | Present |
| 14 | Terpenoids | Present in Moderate concentration |

**Table 6: Phytochemical Screening Ethanolic Leaf Extracts of *Azadirachta indica***

| Chemical Component | Ethanolic Extract |
|---|---|
| Alkaloids | Present |
| Cardiac glycosides | Present |
| Flavonoids | Present |
| Phenols | Present |
| Resins | Present |
| Saponins | Present |

**Table 7: Chemical Tests Results for Curcumin and Neem Extract**

| Test | Curcumin Result | Neem Extract Result | Interpretation |
|---|---|---|---|
| Color | Yellow | Green | Positive for curcuminoids and neem compounds |
| Solubility | Soluble in ethanol | Soluble in ethanol | Confirms compatibility with ethanol solvent |
| pH Test | 6.2 | 8.6 | Suitable for topical application |
| TLC Profile | 0.46 Rf values observed | 0.32 Rf values observed | Identifies distinct active components |
| UV-Vis Spectroscopy | Peak at 425nm | Peak at 542nm | Confirms presence of curcuminoids and neem compounds |

**Physical properties of herbal ointment**

The ointment's physical attributes, such as color, smell, and condition, are assessed. The formulated ointment has a distinct smell and is semisolid in nature. transpired and had a greenish hue. The ointment has a silky feel. It is confirmed by touch and appearance that every formulation results in an even dispersion of extract in the ointment.

**Table 8: Physical properties of herbal ointment**

| Sr. no. | Physical Property | Specification |
|---|---|---|
| 1. | Colour | greenish |
| 2. | Odour | Characteristic |
| 3. | State | Semi solid |
| 4. | Texture | Smooth |

**pH Determination**

The ointment's pH discovered to be between 5 and 6.5, which is a healthy range for the pH of skin. Every herbal ointment composition had a pH that was close to what was needed for skin. For example, F1- 5.4, F2-6, and F3-6.2 show pH values that are close to skin pH.

**Table 9: pH results**

| Sr. no. | Formulation | pH |
|---|---|---|
| 1. | F1 | 5.4 |
| 2. | F2 | 6 |
| 3. | F3 | 6.2 |

**Spreadability Determination**

Spreadability guarantees consistent ointment application over a broad area of skin and is a significant factor in patient compliance. The low spreadability value The ointment's adequate coefficient indicated ease of spreading. The spreadability number that is lower signifies that applying the ointment to the skin requires less effort. which indicates that a modest amount of shear might be applied to disperse the formulation with ease. The formulation has good spreadable properties, according to the spreadability test[14].

**Table 10: Spreadability results**

| Sr. no. | Formulation | Spreadability |
|---|---|---|
| 1. | F1 | 28.2 sec |
| 2. | F2 | 29.6 sec |
| 3. | F3 | 30 sec |

**Table 11: Physical and chemical inspection of the prepared ointment**

| Sr. no. | Physicochemical parameters | Observation |
|---|---|---|
| 1 | Colour | Greenish |
| 2 | Odour | Characteristic |
| 3 | Solubility | Soluble in boiling water, miscible with alcohol, ether, chloroform |
| 4 | Consistency | Smooth |

| | | |
|---|---|---|
| 5 | pH | 5.4 |
| 6 | Extrudability[19] | 0.4 gm |
| 7 | Spreadability[14,19] | 26.5sec |
| 8 | Loss on drying | 30% |
| 9 | Diffusion study (after 60 min)[17] | 0.7 cm |
| 10 | Washability | Good |
| 11 | Non irritancy[15] | Non irritant |
| 12 | Stability study (20ºC, 25ºC, 37ºC)[18] | Stable |

## CONCLUSION

Neem and turmeric have long been known for their many therapeutic benefits, which include antimicrobial, antifungal, anti-inflammatory and anticancer qualities. This ointment makes good use of these qualities and offers a convenient dosage form. This formulation can be applied topically to shield skin from harm, according to test results. F1 outperformed F2 and F3 in terms of activity among the tested formulations, suggesting that it could be a useful treatment.

Herbal treatments for skin cancer offer a promising alternative to traditional therapies, with the potential to lessen the side effects of radiation and chemotherapy. Herbs with pharmacological qualities, such as licorice, cloves, fennel, and turmeric, as well as green tea, show great promise in the prevention and treatment of skin cancer. The creation of an ointment based on neem and curcumin extract highlights the usefulness of these herbal treatments and highlights the need for careful analysis and standardization. Clinical trials to confirm the effectiveness of these herbal remedies and investigate their incorporation into conventional medical practice should be the main focus of future research. Herbal therapies' all-encompassing advantages have the potential to transform the treatment of skin cancer by providing patients with safer and more natural options.

## REFERENCES


1. D'Orazio J, Jarrett S, Amaro-Ortiz A, Scott T. UV radiation and the skin. Int J Mol Sci. 2013 Jun 7;14(6):12222-48. doi: 10.3390/ijms140612222. PMID: 23749111; PMCID: PMC3709783.
2. Samant RS, Shevde LA. Recent advances in anti-angiogenic therapy of cancer. Oncotarget. 2011 Mar;2(3):122-34. doi: 10.18632/oncotarget.234. PMID: 21399234; PMCID: PMC3260813.
3. Talib WH, Alsayed AR, Barakat M, Abu-Taha MI, Mahmod AI. Targeting Drug Chemo-Resistance in Cancer Using Natural Products. Biomedicines. 2021 Sep 29;9(10):1353. doi: 10.3390/biomedicines9101353. PMID: 34680470; PMCID: PMC8533186.
4. Kufe DW, Pollock RE, Weichselbaum RR, et al., editors.Hamilton (ON): BC Decker; 2003. https://www.ncbi.nlm.nih.gov/books/NBK12354/
5. Shrihastini V, Muthuramalingam P, Adarshan S, Sujitha M, Chen JT, Shin H, Ramesh M. Plant Derived Bioactive Compounds, Their Anti-Cancer Effects and *In Silico* Approaches as an Alternative Target Treatment Strategy for Breast Cancer: An Updated Overview. Cancers (Basel). 2021 Dec 10;13(24):6222. doi: 10.3390/cancers13246222. PMID: 34944840; PMCID: PMC8699774.
6. Hao F, Kumar S, Yadav N, Chandra D. Neem components as potential agents for cancer prevention and treatment. Biochim Biophys Acta. 2014 Aug;1846(1):247-57. doi: 10.1016/j.bbcan.2014.07.002. Epub 2014 Jul 10. PMID: 25016141; PMCID: PMC4734358.
7. Chaachouay, N., & Zidane, L. (2024). Plant-derived natural products: A source for drug discovery and development. *Drugs and Drug Candidates*, *3*(1), 184–207. https://doi.org/10.3390/ddc3010011
8. Ciuca MD, Racovita RC. Curcumin: Overview of Extraction Methods, Health Benefits, and Encapsulation and Delivery Using Microemulsions and Nanoemulsions. Int J Mol Sci. 2023 May 17;24(10):8874. doi: 10.3390/ijms24108874. PMID: 37240220; PMCID: PMC10219365.
9. Hashim, N., Abdullah, S., Hassan, L. S., Ghazali, S. R., & Jalil, R. (2021). A study of neem leaves: Identification of method and solvent in extraction. *Materials Today: Proceedings*, *42*, 217–221. https://doi.org/10.1016/j.matpr.2020.11.726
10. Subhan, M. A., Alam, K., Rahaman, M. S., Rahman, M. A., & Awal, R. (2013). Synthesis and characterization of metal complexes containing curcumin ($C_{21}H_{20}O_6$) and study of their anti-microbial activities and DNA-binding properties. *Journal of Scientific Research*, *6*(1), 97–109. https://doi.org/10.3329/jsr.v6i1.15381
11. Caboni P, Cabras M, Angioni A, Russo M, Cabras P. Persistence of azadirachtin residues on olives after field treatment. J Agric Food Chem. 2002 Jun 5;50(12):3491-4. doi: 10.1021/jf020076+. PMID: 12033816.

12. Nurjanah, N., & Saepudin, E. (2019). Curcumin isolation, synthesis and characterization of curcumin isoxazole derivative compound. *PROCEEDINGS OF THE 4TH INTERNATIONAL SYMPOSIUM ON CURRENT PROGRESS IN MATHEMATICS AND SCIENCES (ISCPMS2018)*.
13. Wandscheer CB, Duque JE, da Silva MA, Fukuyama Y, Wohlke JL, Adelmann J, Fontana JD. Larvicidal action of ethanolic extracts from fruit endocarps of Melia azedarach and Azadirachta indica against the dengue mosquito Aedes aegypti. Toxicon. 2004 Dec 15;44(8):829-35. doi: 10.1016/j.toxicon.2004.07.009. PMID: 15530964.
14. Shubhangi E. Sawant, Monali D. Tajane, Formulation and evaluation of herbal ointment containing Neem and Turmeric extract, Journal of Scientifics and Innovative Research 2016; 5(4): 149-151.
15. Ms.Maryam Mulla. Sana Attar, Ms. Nazneen Nithore, Ms. Reeba Parkar. Formulation and evaluation of herbal ointment containing Neem and Karanj oil, International journal of creative research thoughts (IJCRT); 2022;10(5):200-205.
16. Dr. Tribhuvan Singh, Syed Imran U1 Haq, Shaik Mohammed Salman, Afifa Namreen, Anas Rasheed, International Journal of Applied Pharmaceutical Sciences and Research 2017;2(4):99-106.
17. Zheutlin, H. E. C., & Fox, C. L., Jr. (1948). Use of diffusion rates in evaluating ointment vehicles for antibacterial Therapy11From the department of dermatology and the department of bacteriology, college of physicians and surgeons, Columbia university. *The Journal of Investigative Dermatology*, *11*(3), 161–165. https://doi.org/10.1038/jid.1948.82
18. Zdoryk OA, Khokhlova KO, Georgiyants VA, Vyshnevska LI. Investigation of physical and chemical stability of ointment with herbals. Int J Pharm Compd. 2014 May-Jun;18(3):248-52. PMID: 25306773.