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## Research Article

# Characterization And In Vitro Antipsoriatic Evaluation of Moringa Oleifera Extract

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## ABSTRACT

The present study aimed to develop Moringa oleifera extract and evaluate their physicochemical properties and antipsoriatic activity. Moringa extract was characterized by organoleptic examination, UV spectroscopy, and FTIR analysis. Compatibility studies confirmed that there was no chemical interaction between the extract. The prepared pure extract was evaluated using FTIR. The antipsoriatic activity was determined by protein denaturation assay and compared with the standard drug. The developed pure extract showed improved inhibition of protein denaturation crude extract, indicating enhanced biological activity. These findings suggest that Moringa extract may serve as a promising natural topical delivery system for the management of psoriasis and related inflammatory skin disorders.

## INTRODUCTION

Psoriasis is a chronic autoimmune skin disease characterized by excessive growth of skin cells, inflammation, redness, and scaling. It affects nearly 2–3% of the global population and significantly reduces the quality of life of patients. Although several synthetic drugs are available, long-term use often causes adverse effects such as skin irritation, burning sensation, and systemic toxicity. Therefore, there is increasing interest in developing herbal-based topical formulations with

improved safety and efficacy (1). *Moringa oleifera* is known as the "miracle tree" because of its rich content of flavonoids, phenolic compounds, vitamins, and antioxidants. These bioactive constituents exhibit anti-inflammatory, antioxidant, antimicrobial, and wound-healing properties, making Moringa a promising candidate for treating inflammatory skin diseases such as psoriasis (2,3).

Nanofiber-based drug delivery systems have gained attention due to their high surface area,

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porosity, and ability to provide sustained drug release. Chitosan is a biodegradable, biocompatible, and non-toxic polymer widely used in topical drug delivery because it enhances wound healing and provides antimicrobial activity (4). Loading Moringa extract into chitosan nanofibers may improve drug stability, skin adhesion, and therapeutic effectiveness (5).

In the present study, Moringa extract was characterized using UV spectroscopy and FTIR analysis, and compatibility with chitosan was evaluated. The prepared nanofibers were further assessed for antipsoriatic activity. This approach aims to develop an effective herbal nanofiber formulation that may offer improved treatment for psoriasis with fewer side effects (6).

## Material and Methods

Fresh Moringa oleifera extract and chitosan were used. The extract was first evaluated for organoleptic properties, including colour, odour, and physical appearance. UV-visible spectroscopy was performed to determine the maximum absorption wavelength ( $\lambda_{\text{max}}$ ), while a calibration curve was prepared according to Beer–Lambert's law for quantitative analysis (7). FTIR spectroscopy was carried out to identify the

functional groups present in the extract and polymer and to assess possible interactions between them (8).

Compatibility studies were performed by comparing the FTIR spectra of pure Moringa extract, chitosan, and their physical mixture. The absence of significant peak shifts confirmed compatibility between the drug and polymer (9). Moringa extract were prepared and characterized. The antipsoriatic activity was evaluated using the protein denaturation inhibition method, and the percentage inhibition and IC<sub>50</sub> values were calculated. All experiments were performed in triplicate, and the results were expressed as mean values (10).

## Results and Discussion

### Preformulation Study

#### Characterization of pure drug *Moringa extract*

##### a) Organoleptic properties

The procured sample of pure *Moringa extract* was analyzed for its colour, odour, taste and physical appearance. Table 1 shows results of organoleptic properties of Moringa extract.

**Table 1: Properties of *Moringa Extract***

| Test                | Result          |
|---------------------|-----------------|
| Colour              | Yellowish green |
| Odour               | Aromatic        |
| Physical Appearance | Powder          |

## Spectroscopic analysis

### a) Determination of $\lambda_{\text{max}}$

The *Moringa extract* solution in ethanol having concentration 1g/ml was prepared and scanned in the range 400 – 200nm by using UV-spectroscopy. The  $\lambda_{\text{max}}$  of *Moringa extract* was found to be 279 nm.



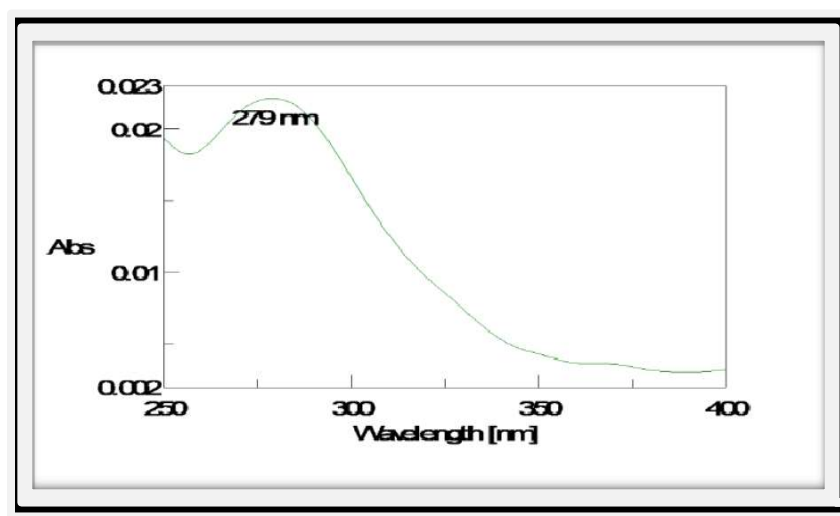


Figure 1:  $\lambda$  max of pure drug *Moringa extract*

#### Calibration curve of *Moringa extract*:

Calibration of curve of *Moringa extract* was carried out as per the standard procedure by preparing the 10  $\mu\text{g}/\text{ml}$  concentration and the absorbance was taken at different concentrations shows straight line which passes from the origin. The ranges found in the calibration were obeyed Beer's lamberts law. Table 2 shows absorbance of *Moringa extract* in ethanol by UV spectroscopy at the irrespective concentration. Calibration curve of *Moringa extract* was shown in Fig 3

The details of calibration curve are as follow-

The regression coefficient of above equation was found to be 0.913.  $y=mx+c$

$y$ =Absorbance

$x$ =(concentration)  $m$  (Slope)=0.437

$c$  (Intercept)=(-0.059)

Table 2: absorbance of *Moringa extract* for Calibration

| Concentration ( $\mu\text{g}/\text{ml}$ ) | Absorbance (nm) |
|-------------------------------------------|-----------------|
| 0.2                                       | 0.072           |
| 0.4                                       | 0.098           |
| 0.6                                       | 0.144           |
| 0.8                                       | 0.284           |
| 1                                         | 0.416           |

Values are taken by triplicates of reading\*

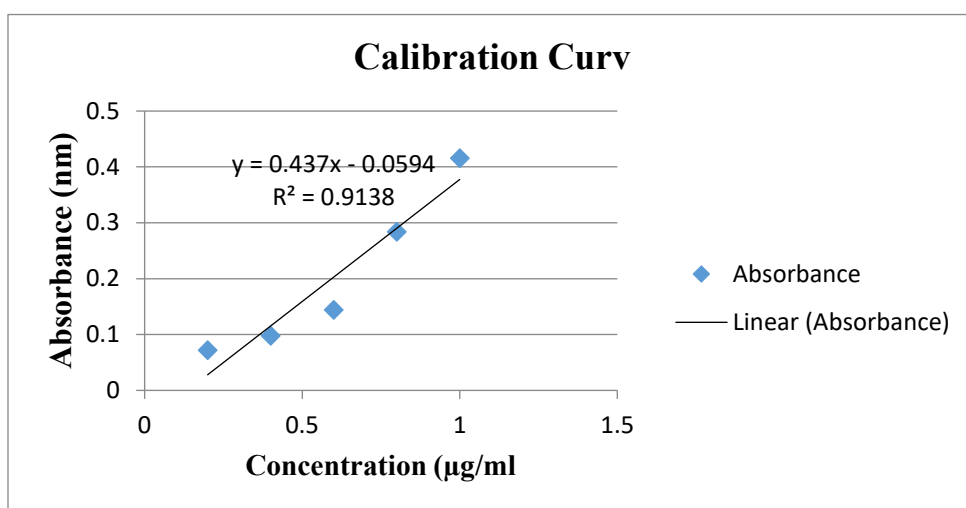


Figure 2: Graphical representation of calibration curve of *Moringa extract*

### FTIR of pure drug *Moringa extract*

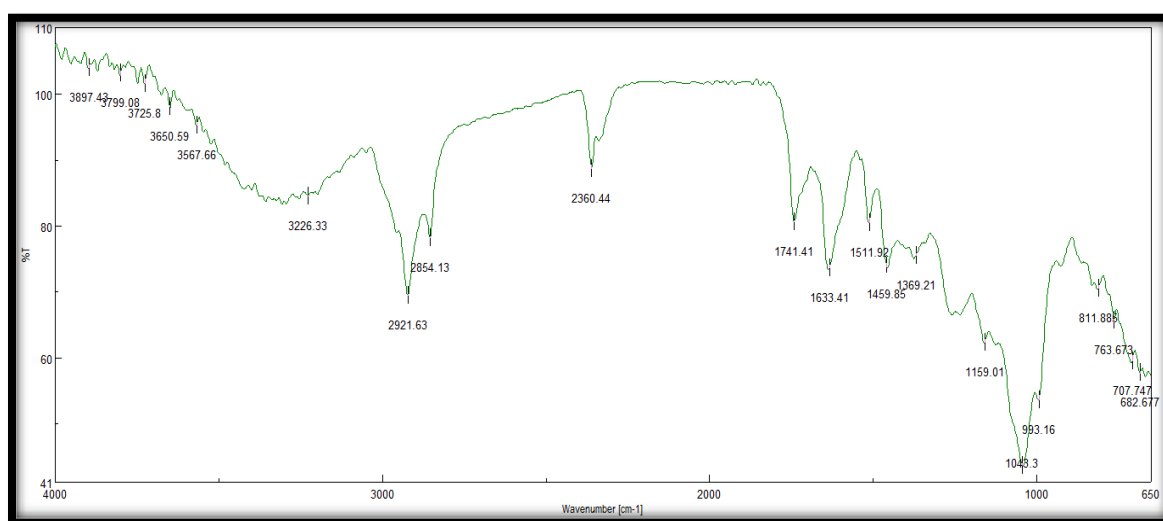


Figure 3: IR Spectra of *Moringa extract*

Table 3: IR Data interpretation of *Moringa extract*

| Sr. No. | Value[cm-1]             | Functional group         |
|---------|-------------------------|--------------------------|
| 1       | 3650.59cm <sup>-1</sup> | -OH Stretch              |
| 2       | 1741.41cm <sup>-1</sup> | C =C Stretch (Aliphatic) |
| 3       | 1369.21cm <sup>-1</sup> | C-C stretch (Aromatic)   |
| 5       | 903.16cm <sup>-1</sup>  | C-C Bend (Aliphatic)     |

**Table No 7: Antipsoriatic Activity**

|        |                 | ANTIPSORIATIC ACTIVITY |                   |       |       |       |              |              |
|--------|-----------------|------------------------|-------------------|-------|-------|-------|--------------|--------------|
| SR. NO | Sample Code     | Concentration (µl/ml)  | Absorbanceat540nm |       |       |       | % Inhibition | IC50 (µl/ml) |
|        |                 |                        | Test1             | Test2 | Test3 | Mean  |              |              |
| 1      | Control         | -                      | 2.153             | 2.153 | 2.153 | 2.153 | -            | -            |
| 2      | Standard        | 1                      | 1.692             | 1.690 | 1.692 | 1.691 | 21.45%       | 525.95       |
|        | Soriatane       | 10                     | 1.220             | 1.222 | 1.220 | 1.220 | 43.33%       |              |
|        |                 | 50                     | 0.997             | 0.998 | 0.997 | 0.997 | 53.69%       |              |
|        |                 | 100                    | 0.856             | 0.855 | 0.856 | 0.855 | 60.28%       |              |
|        |                 | 250                    | 0.730             | 0.732 | 0.730 | 0.730 | 66.09%       |              |
|        |                 | 500                    | 0.510             | 0.512 | 0.510 | 0.510 | 76.31%       |              |
|        |                 | 1000                   | 0.450             | 0.451 | 0.450 | 0.450 | 79.09%       |              |
|        |                 |                        |                   |       |       |       |              |              |
| 3      | Moringa extract | 1                      | 1.720             | 1.721 | 1.720 | 1.720 | 20.11%       | 995.35       |
|        |                 | 10                     | 1.582             | 1.583 | 1.582 | 1.582 | 26.52%       |              |
|        |                 | 50                     | 1.487             | 1.486 | 1.487 | 1.486 | 30.93%       |              |
|        |                 | 100                    | 1.356             | 1.357 | 1.356 | 1.356 | 37.01%       |              |
|        |                 | 250                    | 1.287             | 1.285 | 1.287 | 1.286 | 40.26%       |              |
|        |                 | 500                    | 1.195             | 1.194 | 1.195 | 1.194 | 44.54%       |              |
|        |                 | 1000                   | 1.075             | 1.074 | 1.075 | 1.074 | 50.11%       |              |

## CONCLUSION

The present study successfully developed Moringa oleifera extract for potential antipsoriatic therapy. The preformulation studies confirmed the identity and quality of the Moringa extract through organoleptic examination, UV spectroscopy, and FTIR analysis. Compatibility studies demonstrated that there was no chemical interaction of extract indicating good formulation stability. The prepared extract showed better antipsoriatic activity than the suggesting that the delivery system improved the biological performance of the herbal drug. Further studies

involving in vivo evaluation, stability testing, skin permeation, and clinical investigations are recommended to confirm its safety, effectiveness, and potential for commercial topical pharmaceutical applications.

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