An Experimental Study: In Vitro Antifungal Activity of Hot Aqueous Extract of *Solanum Torvum* Swartz. Leaves Against *Aspergillus Niger*

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***Abstract*—Background: Medicinal plants are important sources of bioactive compounds with potential antimicrobial properties. *Solanum torvum* Swartz. is investigated for its potential therapeutic application in various conditions, including *Vipadika* (foot cracks). The evaluation of its antifungal activity may provide preliminary evidence regarding its potential role in conditions associated with fungal involvement.**

Objective: To evaluate the in vitro antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger* using the agar well diffusion method. Materials and `Methods: A hot aqueous extract was prepared by boiling 10g of fresh *Solanum torvum* Swartz. leaves in 80mL of water and then reduced to 20mL.

The extract concentration was 2mg/mL. Antifungal activity was evaluated using the agar well diffusion method on Sabouraud dextrose agar inoculated with *Aspergillus niger*. Wells measuring 6 mm in diameter were aseptically prepared and 40µL of the test sample was introduced into the well. Ketoconazole was used as the standard antifungal control. The plates were incubated at 37°C for 24 hours, after which the zones of inhibition were assessed.

Results: The hot aqueous extract of *Solanum torvum* Swartz. leaves exhibited inhibitory activity against *Aspergillus niger* against Ketoconazole as a standard.

Conclusion: The findings indicate preliminary antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger* under the experimental study.

***Index Terms*—*Solanum torvum* Swartz., antifungal activity, *Aspergillus niger*, hot aqueous extract, agar well diffusion, *Vipadika*, medicinal plants.**

I. INTRODUCTION

Medicinal plants have been used traditionally for the management of various health conditions and remain important subjects of pharmacological investigation. Plant derived extracts contain diverse phytoconstituents that may exhibit biological activities, including antioxidant, antimicrobial, anti-inflammatory, and wound - healing effects. Scientific evaluation of these properties is important for understanding the potential therapeutic applications of medicinal plants.

Fungal infections and secondary microbial involvement may lead to certain skin conditions. Fissures and cracks in the skin can create environment for microbial colonization, potentially aggravating discomfort and delaying recovery. Consequently, the investigation of plant extracts for antifungal activity may be relevant to the development of topical preparations for dermatological conditions.

Solanum torvum Swartz. is a medicinal plant whose leaves are being investigated for their potential therapeutic application in *Vipadika*, a condition characterized by fissuring and cracking of the feet. In this study the antifungal activity of its hot aqueous extract of leaves was evaluated against *Aspergillus niger*.

The agar well diffusion method is an in vitro technique used to assess the inhibitory activity of test substances against microorganisms. The appearance of a zone of

inhibition around a sample well provides preliminary evidence of growth inhibition under the conditions of the assay. The observed response may depend on several factors, including the composition and concentration of the extract, its diffusion through the agar medium, and the susceptibility of the test organism.

The present study was undertaken to evaluate the in vitro antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger* using the agar well diffusion method, with ketoconazole as the standard antifungal control. The findings contribute preliminary experimental information to the pharmacological investigation of *Solanum torvum* leaves for potential topical applications.

II. MATERIALS AND METHODS

1. Study design

An in-vitro experimental study was conducted to evaluate the antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger*.

The antifungal activity was assessed using the agar well diffusion method, and ketoconazole was used as the standard antifungal control. The principal outcome was the zone of inhibition measured in millimetres.

2. Preparation of the hot aqueous extract

Fresh leaves of *Solanum torvum* Swartz. were used for the preparation of the aqueous extract.

The preparation procedure was as follows:

1. 10 grams of fresh *Solanum torvum* Swartz. leaves were taken.
2. The leaves were boiled in 80 mL of water.
3. The preparation was concentrated by boiling until the final volume reached 20 mL.
4. The resulting preparation was used as the hot aqueous extract of leaves for the antifungal evaluation.

The concentration was reported as 2 mg/mL in the extract.

3. Test organism

The antifungal activity of the extract was evaluated against *Aspergillus niger*.

The fungal organism was inoculated onto Sabouraud dextrose agar plates, which served as the culture medium for assessing fungal growth inhibition.

4. Antifungal activity by agar well diffusion method

The agar well diffusion method was employed to assess the inhibitory effect of the hot aqueous extract of leaves.

PROCEDURE

1. Sabouraud dextrose agar plates were inoculated with *Aspergillus niger*.
2. Wells of 6 mm diameter were aseptically bored into the agar surface.
3. A volume of 40 µL of the hot aqueous extract of leaves was introduced into the well created.
4. Ketoconazole was used as the standard antifungal control.
5. The inoculated plates were incubated at 37°C for 24 hours.
6. Following incubation, the zones of inhibition were assessed and recorded in millimetres.

The presence of an inhibition zone was used as the indicator of antifungal activity in the experimental assay.

5. Experimental parameters

The principal experimental parameters reported in the document are summarized below.

Parameter	Description
Test material	Hot aqueous leaf extract of *Solanum torvum* Swartz.
Initial plant material	10 g of fresh leaves
Initial volume of water	80 mL
Final extract volume	20 mL
Reported extract concentration	2 mg/mL
Test organism	*Aspergillus niger*
Culture medium	Sabouraud dextrose agar
Method	Agar well diffusion
Well diameter	6 mm
Sample volume	40 µL
Standard antifungal control	Ketoconazole
Incubation temperature	37°C
Incubation duration	24 hours
Outcome measure	Zone of inhibition in millimetres

6. Assessment of antifungal activity

The antifungal response was assessed by observing and measuring the zone of inhibition around the well containing the test extract.

The study document reported a measurable inhibitory response against *Aspergillus niger*.

III. RESULT

1. Antifungal activity against *Aspergillus niger*

The hot aqueous extract of *Solanum torvum* Swartz. leaves demonstrated inhibitory activity against *Aspergillus niger* in the agar well diffusion assay.

The results reported a zone of inhibition of 2.5 mm for a sample volume of 40 µL.

2. Summary of the reported results

Test sample	sample volume	Reported zone of inhibition
Hot aqueous extract of *Solanum torvum* Swartz. leaves	40 µL	2.5 mm
Ketoconazole	30 mg	2.8 mm

3. Photographic documentation

The original document contains a figure depicting the antifungal evaluation of the hot aqueous leaf extract on Sabouraud dextrose agar, with ketoconazole shown as the standard control.

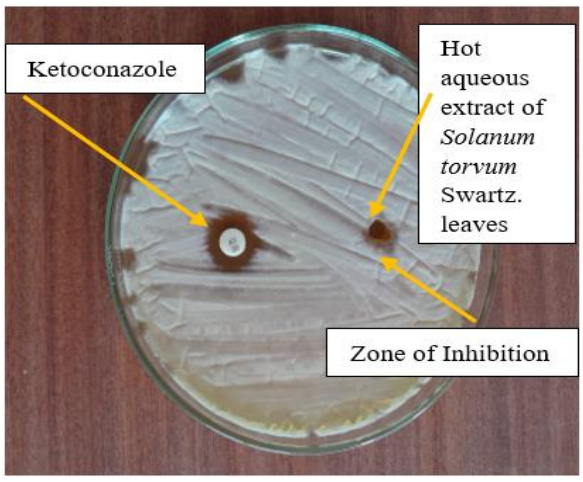

Figure 1. In vitro antifungal evaluation of the hot aqueous extract of Solanum torvum Swartz. leaves against Aspergillus niger using the agar well diffusion method, with ketoconazole as the standard antifungal control.

IV. DISCUSSION

The present study investigated the in vitro antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger* using the agar well diffusion method. The reported observations indicate that the extract exhibited an inhibitory response under the experimental conditions employed.

Interpretation of the antifungal activity

The observation of an inhibition zone suggests that the hot aqueous extract of leaves of Solanum torvum Swartz. may contain constituents capable of inhibiting the growth of the test organism under the conditions of the assay.

The reported inhibition-zone measured was 2.5 mm.

Relevance of the hot aqueous extraction method

The study employed a hot aqueous extraction procedure using fresh leaves of *Solanum torvum* Swartz. Water was used as the extraction medium, and the preparation was concentrated from 80 mL to 20 mL.

The method provides a simple approach to obtaining a water-based plant preparation for preliminary biological testing. The reported concentration was 2 mg/mL

Relevance to *Vipadika*

The study forms part of the broader investigation of *Solanum torvum* Swartz. leaves for potential application in *Vipadika*, characterized by cracking and fissuring of the feet.

However, the present study evaluated the extract against *Aspergillus niger* under in vitro conditions.

Comparison with ketoconazole

Ketoconazole was included as the standard antifungal control in the experimental procedure. Such a control can help contextualize the response observed with the plant extract when the control result is recorded under comparable conditions.

V. CONCLUSION

The present in vitro study reported antifungal activity of the hot aqueous extract of *Solanum torvum* Swartz. leaves against *Aspergillus niger* using the agar well diffusion method. The extract was prepared from 10 g

of fresh leaves by boiling in 80 mL of water and concentrating the preparation to 20 mL. A sample volume of 40 µL was evaluated, with ketoconazole used as the standard antifungal control.

The findings provide preliminary evidence of an inhibitory response against the test organism. However, the reported inhibition-zone value was 2.5 mm.

Further standardized antifungal testing is required to confirm the magnitude and reproducibility of the observed activity. Although the findings may contribute to the pharmacological investigation of *Solanum torvum* Swartz. leaves for potential topical application in *Vipadika*.

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