

Antifungal Activity of Alcoholic Leaf Extracts of *Terminalia* *Catappa* and *Terminalia Arjuna* on Some Pathogenic and Allergenic Fungi

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Abstract

Ethanol and methanol leaf extracts of *Terminalia catappa* and *Terminalia arjuna* were investigated for *in-vitro* antifungal activity. Four fungi tested were *Aspergillus niger*, *Alternaria alternata*, *Curvularia lunata* and *Trychophyton tonsurans*. The *in-vitro* antifungal activity was evaluated by food poison technique. Both the plants showed antifungal activity on comparison with *T. arjuna* better antifungal efficacy was shown by methanol extract of *T. catappa*. Methanol extract showed significant antifungal activity against most susceptible mould was *Curvularia lunata*. The results were compared with standard antifungals.

Key words: *Terminalia* species, medicinal plants, antifungal activity, *Aspergillus niger*, *Alternaria alternata*, *Curvularia lunata*, *Trychophyton tonsurans*, pathogenic, allergenic in-vivo.

1. INTRODUCTION

In designing a search for novel prototype antifungals, higher plants are a logical choice, because secondary metabolites are widely distributed among higher plants,¹ but only a few have been evaluated for their activity against human, animal and plant pathogenic fungi.

The majority of clinically used antifungals have various drawbacks in terms of toxicity, efficacy as well as cost. Their frequent use has also led to the emergence of resistant strains. Concerns have been raised about both the environmental impact and the potential risk related to the use of synthetic fungicides.⁴ Therefore there is a need to search for plants of medicinal value. The species of *Terminalia* are very well known for their therapeutic values and are useful as anticancer, antigenotoxic, anti-inflammatory, anti HIV, antidiabetic and hepatoprotective activities. The plants used in present study are *Terminalia catappa* and *Terminalia arjuna* (Combretaceae). The main objective of this study is to examine the antifungal property of ethanolic and methanolic leaf extracts of *Terminalia catappa* and *Terminalia arjuna*.

2. MATERIAL & METHODS

2.1.1 COLLECTION OF PLANT MATERIALS:

Twigs of *T. catappa* and *T. arjuna* were collected from Bhopal. Both the plants were identified from Govt. M.V.M. college with the help of the project report of Dr.Madhuri Modak who has confirmed the identification from Botanical Survey of India, Allahabad. The leaves were separated and dried at room temperature. The dried leaves were powdered in a mixer blender and stored at room temperature in close containers in the dark until used. A herbarium of the same was deposited at Sarojni Naidu Girls college, Bhopal (M.P.).

2.1.2 SOURCE OF MICRO-ORGANISMS:-

Fungi, *Aspergillus niger*, *Alternaria alternata*, *Curvularia lunata* and *Trychophyton tonsurans* were selected from isolated aeromycoflora of Bhopal. This selection is based on their allergenic and pathogenic nature.

2.1.3 EXTRACT PREPERATION

The powdered leaves(25g) of both plants were extracted separately to exhaustion in a soxhlet apparatus using ethanol and methanol solvent system. The extracts were filtered through a Whatman filter paper no.1 and then concentrated by using a hot air oven at low temperature 40⁰-50⁰c. A yield of 11.6% from ethanol, 12.2% from methanol³ extract of *Terminalia catappa* and 0.096% and 0.104% from *Terminalia arjuna* was obtained.

2.1.4 ANTIFUNGAL ACTIVITY STUDY

The antimicrobial activities of all the extracts were determined by food poison technique.¹⁰

2.1.5 SCREENING OF EFFECTIVE EXTRACT

One gram of each of the dried evaporated solvent extract, was dissolved in 10ml of solvent. 500µl of each solvent extract was amended with 15-20 ml of PDA medium before solidification. The medium without any treatment served as control. Test fungi were inoculated and percent inhibition of mycelia growth was determined. After two days colony diameter was measured in millimeter. For each treatment three replicates were maintained. The fungitoxicity of the extracts in terms of percentage inhibition of mycelial growth was calculated by using formula

$$\% \text{ of inhibition at } +25 = \frac{dc-dt}{dc} \times 100$$

Where:

dc = Average increase in mycelial growth in control.

dt = Average increase in mycelial growth in treatment.

2.1.6 STATISTICAL ANALYSIS: The results were statically analysed by Tukeys method using ANOVA software.

3. RESULT AND DISCUSSION:-

To evaluate the antifungal activity of *T. catappa* and *T. arjuna* they were tested against four allergenic and pathogenic moulds. An initial screening of effectivity of ethanol and methanol fraction on fungi was done by food poison technique. It has been noticed that both the fractions are effective against all the organisms in varying levels of sensitivity. *Curvularia lunata* was found to be the most susceptible to ethanol fractions of *T. catappa*. An inhibition of 74% growth was observed. Next to this *A.niger* was 57.33% inhibited. *A. alternata* was least susceptible. However, methanol extract of both plants tested against all four fungi showed significant antifungal activity. The percent of inhibition of methanol extract was more than 50% against *Curvularia lunata*, *Aspergillus niger* and *Trychophyton tonsurans*. Results of these studies have shown that methanol extract of *T. catappa* has good antifungal activity. Out of four fungi tested *Curvularia* is most sensitive and *Alternaria* is least sensitive. Results of antifungal analysis are shown in table 1 and 2.

Table1 Showing results of screening of effective leaf extract of *terminalia catappa* in two solvents.

S. No.	Leaf extracts in various solvents	% inhibition of mycelial growth			
		Aspergillus niger	Alternaria alternata	Curvularia lunata	Trychophyton tonsurans on
1	Ethanol Extract	57.33 ± 0.33	24.66 ± 0.33	74.7 ± 0.88	43.7±0.31
2	Methanol extract	68.7 ± .33	35.3 ± 1.45	60 ± .57	61±0.57
3	Ketoconazole (10 mg/ ml)	63 ± 0.33	ND	ND	71±0.33
4	Carbendazim (10 mg/ ml)	ND	75 ± .18	39 ± 0.33	ND

Table 2 Showing results of screening of effective leaf extract of *Terminallia arjuna* in two solvents.

Sr.no .	Leaf extract in various solvents	% inhibition of mycelial growth			
		Aspergillus niger	Alternaria alternata	Curvularia lunata	Trychophyton tonsurans on
1	Ethanol extract	47±0.1	20.33 ±.33	50±0.1	42±0.11
2	Methanol extract	49 ±.01	30±.12	53±0.31	49±0.14
3	ketoconazole	63±.01	ND	ND	70±0.15
4	carbendazim	ND	75±.01	60±0.01	ND

Replicates = three

Result were expressed as mean ± SEM

all the results were found to be significant at $p < 0.01$ and $p < 0.05$.

The presence of secondary metabolites in plants, produce some biological activity in man and animals and it is

responsible for use as herbs.¹² Hence the antifungal activity of *T.catappa* tends to agree with the earlier reports.^{6,8} The presence of antifungal activity in alcoholic fraction of *Terminalia* leaf extracts finds agreement with the work of other scientists.^{2,5,7, 11} Hydroalcoholic extracts of *T.catappa* and *T. mantaly* have been reported to inhibit the *in vitro* gr. of *Aspergillus fumigatus*.¹³ Several studies have reported the presence of Phytochemical content & medicinal properties in the plant for the treatment of different ailments. However, work continues on ethanolic and methanolic leave extracts. It may bring more information on its phytochemical components and their possible use against plant pathogens, human allergenic and pathogenic fungi.

4. FUTURE SCOPE AND CONCLUSION:-

The plant material used in the present investigation is commonly available not only in forest area but can easily be witnessed in urban and sub urban areas. Antimicrobial screening of *T. catappa* has revealed its medicinal potential and represents it as an important medicinal plant. Hence, development of modern antifungal drug from this plant can be emphasized for control of *Curvularia lunata*. This would lead to development of cost effective herbal drugs. It is concluded that antifungal activity of methanolic leaves extract of *T. catappa* and its active constituents would be helpful in interacting various kinds of plant and human diseases.

5. REFERENCES

1. Caceres, A., E. Jauregui, D. Herrera and H. Logemann, (1991). Plants used in Guatemala for the treatment of dermatomucosal infections: Screening of 38 plants extracts for anticandidal activity. *J. Ethnopharmacol.*, 33: 277-283.
2. Elizabeth K.M. (2005) Antimicrobial activity of *terminalia bellerica*. *India journal of clinical biochemistry*: 20(2): 150-153.
3. Elumali E K, N. Chandrasekaran, T. Thirumalai, C. Sivakumar, S. Vivian, Therasa, E. David (2009). *Achyranthes aspera* leaf extracts inhibited fungal growth. *International journal of Pharmtech Research* Vol. No.4pp 1576-1579.
4. Khulbe K. and S.C. Sati, (2009). Antibacterial activity of *Boenninghausenia albiflora* Reichb. (Rutaceae). *Afr. J. Biotechnol.* 8:6346-6348.
5. Lee SH, Chang KS, Sums, Huang YS and Jang HD (2006). Effects of some Chinese medicinal plant extracts on five different fungi. *Food control*: 18:1547-1554.
6. Manzur Abul, A. Raju and S. Rahman (2011). Antimicrobial activity of *Terminalia catappa* extracts against some pathogenic microbial strains. *Pharmacology and pharmacy*, 2; 299-305
7. Parekh J and Chanda S (2006). Screening of aqueous and alcoholic extracts of some Indian medicinal plants for antibacterial activity. *Indian journal of pharmaceutical science* 68 (6): 835-838.
8. Parekh J and Chanda S (2008). In vitro antifungal activity of methanol extracts of some Indian medicinal plants against pathogenic yeast and moulds. *African journal of Biotechnology* vol 7(23), pp 4349-4353;
9. Sati, S.C. and P. Arya, (2010). Antagonism of some aquatic hypomycetes against plant pathogenic fungi. *Sci. world j.*, 10: 760-765.
10. Satish, S., D.C. Mohana, M.P. Raghvendra and K.a. Raveesha. (2007). antifungal activity of some plant extracts against important seed borne pathogens of *Aspergillus* spp. *Jr. of agriculture technology* p.109-119.
11. Shinde, S.L., S.M. More, S.B. Junne and S.S. Wadje (2011). The antifungal activity of *Terminalia* species checked by paper disc method. *IJPRD* .3(2) pp 36-39.
12. Sofowora A (1986) Medicinal plant and traditional medicine in Africa II, John Wiley chichester P. 178.
13. Zirihi, N. Guessan K, Kassy N dja J, Coulibaly K. and Djaman A.J. (2012). Evaluation and comparison of antifungal activities of *Terminalia mantaly* (combretaceae) on the *in vitro* growth of *Aspergillus fumigatus*. *Jr. of medicinal plants Res.* Vol.6(12), pp 2299-2308.

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