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ANTIMYCOTIC POTENTIAL OF SOME HERBAL EXTRACTS AGAINST HUMAN PATHOGENIC FUNGI

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ABSTRACT

Present study was conducted to evaluate the antimycotic potential of some medicinal plants. Organic extracts of parts of eight medicinal plants viz. *Abrus precatorius, Careya arborea, Emblica officinalis, Soymida febrifuga, Syzygium cumini, Woodfordia fruticosa, Terminalia bellirica* and *Terminalia chebula* were prepared by successive extraction with petroleum ether, acetone and 90% methanol. The extracts were tested against human fungal pathogens viz. *Microsporum gypseum, Candida albicans and Cryptococcus neoformans* using disk diffusion method. Extracts of *Plumbago zeylanica* having strong antimycotic potential were also tested for comparative purpose. Extracts of all the plants exhibited strong antifungal activity against *Microsporum gypseum.* Antifungal activity against *Candida albicans* was detected only in *Terminalia bellirica, Terminalia chebula* and *Plumbago zeylanica* extracts. Besides *P.zeylanica*, significant antifungal activity was exhibited by extracts of five plants against *Cryptococcus neoformans.*

KEYWORDS: Antimycotic potential, *Miorosporum gypseum*, Human fungal pathogens, *Woodfordia fruticosa, Abrus precatorious Emblica officinalis.*

INTRODUCTION

Billions of people are suffering from mycoses worldwide.[1] The incidence of opportunistic fungal infections in immune-compromised host is a serious health problem.[2] Antimycotic arsenal currently available for the management of mycoses include amphotericinB, nystatin, fluconazole, ketoconazole, terbinafine, naftifine, flucytosine, caspofungin, micafungin, nikkomycin, griseofulvin etc.[3] Development of resistance to many available antifungal agents in fungal pathogens has become a major concern in medical practice.[4]

Besides the problems of drug resistance, high toxicity of some of the antifungal drugs is a major problem for the treatment of fungal diseases [5]. These problems have necessitated the search for new antifungal agents. As medicinal plants constitute an important source of molecular diversity, they could be exploited for development of safer and cheaper alternatives to currently available antifungal drugs. Recently there have been many developments regarding the therapeutic use of plant derived antifungal agents[6]

Indian traditional medicine *Ayurveda* is a knowledge resource of herbal medicines which possess tremendous potential for modern drug development.[7,8] During past few decades numerous herbal antimicrobial compounds have been isolated that show therapeutic value against microorganisms.[9] Such novel and effective compounds of herbal origin could be employed for combination therapy with other modern drugs to increase their potency or to restrict continuous emergence of antimicrobial resistance.

In the present work eight medicinal plants were selected that have importance in Ayurveda for treatment of various infectious diseases. The plant materials derived from *Abrus precatorius, Careya arborea, Emblica officinalis, Soymida febrifuga, Syzygium cumini, Woodfordia fruticosa, Terminalia bellirica* and *Terminalia chebula* were tested for their antimycotic potential against three common human pathogenic fungi.

MATERIALS AND METHODS

The collected plant parts were chopped (if required) into small pieces, dried in shade and ground to obtain course powders. The powders were successively extracted with petroleum ether acetone and 90% methanol. The extracts were prepared at room temperature using simple extraction method by mixing powders of plant parts with solvent in stoppered reagent bottles and shaking for 16 to 18 hrs. Then the supernatant of each bottle was filtered with ordinary filter paper and each extract was concentrated up to 2ml. by evaporation at 60°C.

For antifungal activity testing disk diffusion method was employed using potato dextrose agar (Titan Biotech TM-

344). Chloramphenicol (0.5mg/ml.) was added to inhibit bacterial growth. Inoculum was prepared by suspending two loopfuls of fungal growth in 5ml. of sterile distilled water. The plates were seeded by swabbing. After placing the disks (6 mm) impregnated with plant extracts, the plates were kept in refrigerator (4°C) for 30 min and then incubated at 30°C for 48 hours for *Candida albicans* and *Cryptococcus neoformans* and for 3 to 5 days for *Microsporum gypseum.* Zones of inhibition were measured after incubation as diameter in mm. The experiments were carried out in duplicate and the average diameter of the zone of inhibition was recorded.

RESULTS AND DISCUSSION

Antimycotic activities of petroleum ether, acetone and methanol extracts of the selected plants were tested against three fungal cultures by disk diffusion method (Table No. 1).

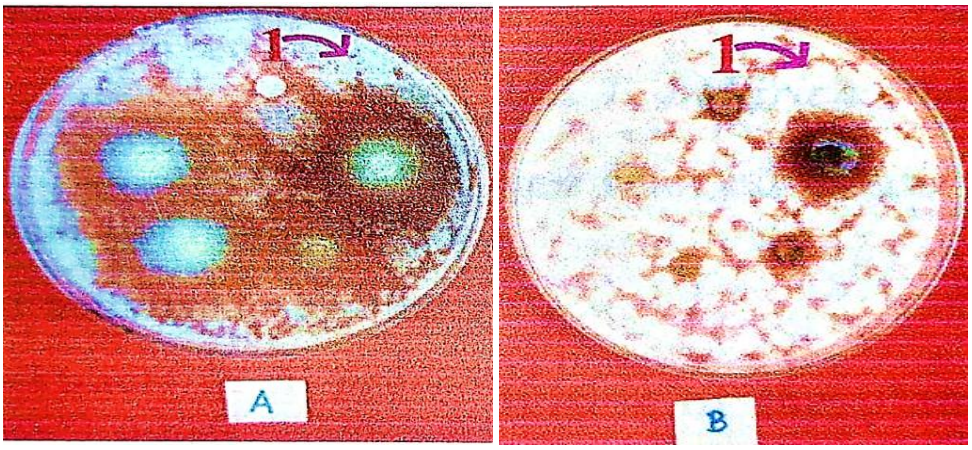
Table No. 1: Antifungal activity of plant extracts by disk diffusion method.

Plant Name	Extracts	Zone of inhibition in mm		
		***M.gypseum* MTCC2829**	***C. albicans* NCIM3100**	***C.neoformans* (Clinical isolate)**
Abrus precatorius (roots)	PE	25	08	08
	A	31	00	00
	M	00	00	00
Careya arborea (bark)	PE	9.5	00	18
	A	20	10(ZS)	08
	M	16	00	00
Emblica officinali s (leaves)	PE	00	00	00
	A	11	00	9.25
	M	09	00	00
Soymida febrifuga (bark)	PE	8.5	00	08
	A	21	00	00
	M	10.5	00	00
Syzygium cumini (leaves)	PE	00	00	00
	A	15.3	00	13.5
	M	00	00	13
Terminalia bellirica (fruits)	PE	7.5	11(ZS)	15(ZS)
	A	28	14	15.6
	M	19	12	15
Terminalia chebula (fruits)	PE	00	00	00
	A	28	15.5	15.75
	M	25.5	12.5	15
Woodfordia fruticosa (flowers)	PE	00	00	00
	A	26	00	11
	M	12	00	12
Plumbago zeylanica (roots)	PE	40	12	40
	A	45	16.5	40
	M	43	11	26

PE = Petroleum ether, A = Acetone M = 90% methanol
Z.S = Zone of Suppression

These studies indicated that strongest antifungal activity was present in the root extracts of *P. zeylanica,* a plant included in the study as positive control for comparative purpose. Earlier Uniyal et al (2014) had reported the antifungal activity of *P.zeylanica* methanol extract against *Trichosporon.*[10] Present investigations indicate very strong activity of extracts of this plant against *M. gypseum*, a dermatophyte.

Significantly strong antifungal activity was also exhibited by the acetone and methanol extracts of fruits of *T. chebula* and *T.bellirica* (Photograph 1 A). Few earlier reports had demonstrated the antifungal activity in the fruit extracts of *T.bellirica*[11,12] and *T.chebula.*[13,14] The present studies are in agreement with these earlier reports. The overall antifungal activities of the other six plants studied were not as strong as the antifungal activity of *P. zeylanica* against the test pathogens. However, significant antifungal activity against *M. gypseum* was recorded in one or more extracts of *Abrus precatorius*, *Woodfordia fruticosa, Carea arborea, Soymida febrifuga* (Photograph 1B) and *Syzygium cunini*. Some of the extracts exhibited activity against *C.neoformans* (Photograph 2).

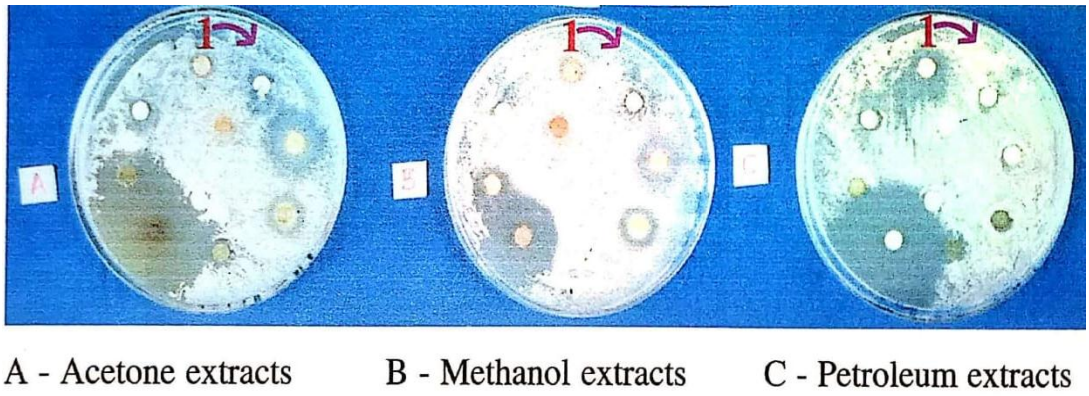


Photograph No. 1 - Antifungal activity of plant extracts against M. gypseum.

1. *T.bellirica (*PE) 2. *T.bellirica* (A)
3. *T.bellirica* (M) 4. *T.chebula (*A)
5. *T chebula (*M)

1. *S. febrifuga* (PE) 2. *S. febrifuga* (A)
3. *S. febrifuga (M)* 4. *Syzygium cunini* (PE)
5. *Syzygium cunini* (M)

Note: PE-Petroleum ether, A- Acetone, M-90%Methanol



Photograph No. 2 - Antifungal activity of plant extracts against *C. neoformans.*

1- *Careya arborea* 2- *Abrus precatorius*.3- *Woodfordia fruticosa*.4- *Terminalia chebula*
5- *Emblica officinalis* 6- *Plumbago zeylanica*,7-*Syzygium cumini*, Central Upper- *Soymida febrifuga* Central lower-. Control

The antifungal activities of the plant extracts were compared with those of the standard antifungal drugs (Table No.2). The activities of *P. zeylanica* extracts for *M.gypseum and C.neoformans* were stronger than standard antifungal drugs. For *M. gypseum* many of the zones, especially of acetone extracts, were in the same range as that of standard antifungal drugs. Acetone & methanol extracts of *Syzygium cumini*, *Woodfordia fruticosa*, *Terminalia bellirica* and *Terminalia chebula* exhibited zone of inhibition in the range of 11 mm to 15.7 mm against *C.neoformans* (Table No. 1). Although these zones of inhibition were relatively smaller than the standard antifungal drugs they seem to be significant considering the crude nature of the extracts.

Table No.2: Sensitivity of test fungi to standard antifungal drugs.

Antifungal Drugs	Zone of inhibition in mm		
	M.gypseum **MTCC2829**	***C. albicans*** **NCIM3100**	***C.neoformans*** **(Clinical isolate)**
Amphotericin B (100 Units/disk)	24	13.75	16.5
Clotramizole (100 Units/disk)	21.5	12.5	13
Nystatin (100 Units/disk)	30	18	21.5

Two earlier reports had shown the antifungal activity in the extracts from fruits of *E.officinalis.*[15-17] In present investigations the antifungal activity of acetone extracts of leaves demonstrated significant inhibitory effect against *Miccosporum gypseum* Antimicrobial activity of *W. fruticosa* was evaluated earlier in two studies.[18-19] In

the present work significant activity against *M. gypseum* was detected in the acetone and methanol extracts *W. fruticosa* flowers. Antimicrobial activity of methanolic extracts of *C.arborea* bark was reported earlier[20,21] against *Candida albicans*, *Aspergillus flavus* & *Aspergillus niger*. Present work indicates its antimycotic potential against *Microsporum gypseum* & *Cryptococcus.neofarmans*.

Many of the extracts exhibited strong activity against *M. gypseum*, a dermatophyte. In Ayurveda,the uses of *A. precatorius* (roots), *W. fruticosa* (flowers), *P. zeylanica* (roots), *T. bellerica* (fruits) and *T. chebula* (fruits) are mentioned for skin diseases. Inhibition of *M. gypseum* by extracts of these plants justify their importance in Ayurveda for skin diseases.

CONCLUSION

Extracts of *Plumbago zeylanica* and *Terminalia chebula* demonstrated strong antifungal activity against all the three test fungi . Acetone and/or methanol extracts of all the tested plants possessed good antimycotic potential against *M. gypseum.* The results are promising regarding their application potential for treatments of fungal skin diseases. However further investigations concerning with their antifungal spectrum against more dermatophytes and characterization of the active compounds would be necessary to confirm their significance for dermatophytoses.

REFERENCE

1. Ghosh PN, C. Fisher M, And Bates KA.: Diagnosing Emerging Fungal Threats: A One Health Perspective. Front Genet, 2018; 9: 376.
2. Badiee P and Zahra H: Opportunistic invasive fungal infection: diagnosis & clinical management. Indian J.Med Res., 2014; 139(2): 195-204.
3. Scorzoni L., Ana CA de Paula e Silva, and Ana M. Fusca-Almeida: Antifungal Therapy: New Advances in the Understanding and Treatment of Mycosis. Front Microbiol, 2017; 8: 36.
4. Kanafani ZA., Perfect JR.: Resistance to Antifungal Agents: Mechanisms and Clinical Impact. Clinical infectious diseases, 2008; 46(1): 120-128.
5. Mourad A, Perfect JR.: Tolerability profile of the current antifungal armoury. Journal of Antimicrobial Chemotherapy, 2018; 73(1): i26-i32.
6. Vidyasagar GM., Plant – Derived Antifungal Agents: Past and Recent Developments, 2016; 123-147. Springer, https//link.springer.com
7. Sukh Dev: Ethnotherapeutics and modern drug developments, the potential of Ayurveda. Current Science, 1997; 73: 909-928.
8. Patwardhan, B., Vaidya, ADB. and Chorghade, M. : Ayurveda and Natural products drug discovery. Current Science, 2004; 86(6): 789-799.
9. Cowan, M.: Plant products as antimicrobial agents. Clinical Micro Rev., 1999; 12(4): 564-582.
10. Uniyal. V., Bhatt. R.P, Saxena S, Negi R,: Phytochemical Screening and Anti-trichosporon activity of Plumbago zeylanica linn. Int. Jour. Pharm Pharm Sci., 6(9): 107-110.
11. Valsaraj R, Pushpangadan P, Wagner SU, Adsersen A, Christensen BS, Sittie Archibald, Nyman Ulf, Nielsen Claus and Olsen Carl Erik: New Anti-HIV-1, Antimalarial, and Antifungal Compounds from Terminalia bellerica. J. Nat. Prod. 1997; 60,7,739-742.
12. Nithya. P Devi, Kaleeswari S., Poonkothai. M: Antimicrobial activity and phytochemical analysis of fruit extracts of Terminalia bellerica. Int. Jour. Pharm Pharm Sci., 2014; 6(5): 639-642.
13. Sakander H, Bhat A, Koteshwara AR : Evaluation of antifungal potential of selected medicinal plants against human pathogenic fungi. International Journal of Green Pharmacy, 2015; 9(2): 110-117.
14. Valli S & Golulshankar. S.: Anticryptococcal activity of Terminalia chebula against clinical and environmental isolates of Cryptococcus neoformans. Journal of Advanced Pharmacy Educational & Research, 2013; 3(2): 76-85
15. Vijayalakshmi.V, Arunkumar.V, Anju. D, Gunasundari. P, Moorthv. P, and Chandrasekharan. AK: Comparative antimicrobial activities of Emblica officinalis and Ocimum sanctum. Ang. Sci. life, 2007; 27(2): 7-6.
16. Hossain MM, Mazumder K, Hossen MM., TanmtTT , and Rashid MJ.: In Vitro Studies On Antibacterial And Antifungal Activities Of Emblica Officinalis ,International Journal of Phamaceutical Science and Research, 2012; 3(4): 1124-1127.
17. Rasika. M, Purameshwari. S, Sivagurunathan. P., Cau. C., Bhuvaneswari. M.: Antifungal activity of Amla extracts against dandruff causing pathogens (Malassezia sp.) Int. Jour. Adv. Res. Biol. Sci., 2016; 3(1): 209-214.
18. Dabur R, Gupta A, Mandal TK, Singh DD. Bajpai V, Gurav AM, Lavekar GS.: Antimicrobial Activity Of Some Indian Medicinal Plants. Afr. J. Trad. CAM, 2007; 4(3): 313-318
19. Kumar D, Sharma M, Sort A, Sareha K, Verma S: Woodfordia fruticosa Kurz: A Review on its Botany.Journal of Pharmacognosy and Phytochemistry, 2016; 5(3): 293-298.
20. Ramnathan S, Sivakumar T, Sundaram RS, Sivakumar PP, Palanavel RS, Nethaji R, Gupta M, Mazumdar UK.: Antimicrobial and Antioxidant Activities of Careya arborea Roxb. Stem Bark. Indian Journal of Pharmacology and Therapeutics, 2006; 5: 35-41.
21. Navya AS and Anitha S: Antimicrobial activities of Careya arborea. Journal of Pharmacognosy and Phytochemistry, 2018; 7(2): 1384-1390.