

# Separation and Recognition of Keratinophilic Fungi from Soil of Gwalior section and their manage by Methanolic Plant extorts

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## ABSTRACT

The microorganism is ubiquition in nature. A large number of microbes are current in our atmosphere. The human body occurs in active stability with these microbes .illness occurs when a microbe infiltrates the body surface of tissues. In these, it multiplies and the cumulation effect infects infections damage of disrupt tissues and organs and disease results. In the present study, we found that *A. Fumigatus*, *T. mentagrophyte*, *T. rubrum*. *E. Floccosum* and *chryso sporium sp.*, *A. Niger* were the most prevalent keratinophilic fungi found in the soil of the Gwalior region, which we have secluded. In vitro evaluation was conducted for kindliness testing with 5 different methanolic plant extracts for the reserve of hyphal enlargement and spore formation in *A. Fumigatus*, *T. mentagrophyte*, *T. rubrum*. *E. Floccosum* and *chryso sporium sp.* evaluation antifungal activity were carried out by disc diffusion method and well dispersal method. Plant secondary metabolites have been of attention to man for a long time due to their pharmacological relevance. Higher and aromatic plants have traditionally been used in medicines due to their inhibitory effect on various microbes and they also have antifungal properties .most of their properties are due to essential oil products by their minor metabolite. Our study shows that fungal disease is common in human beings. With the emergence of a new efficient system and topical antifungal therapies. There has been a greater need to search for substitute antifungal agents from microorganisms or plants.

In this paper, it can be accomplished that keratinophilic fungi occur in the Gwalior section and we have used methanolic plant extracts against fungi. These extracts were obtained from plant material. They can also be indulgence against fungi. In this way, we have concluded that fresh methanolic plant extracts can be used as an antifungal agent as they are found to be successful against the test fungi. The ultimate termination of this study supports the conservative medicine use of different plant extracts in treating

different infections caused by pathogenic fungi in Gwalior either by using a single or combined extract.

**Keywords:** separation and recognition of keratinophilic fungi from soil.

## I. INTRODUCTION

Keratinophilic fungi are current in the atmosphere with changeable allocation patterns that depend on dissimilar factors, such as human and or animal presence, which are of essential significance. The potentially pathogenic keratinophilic fungi and allied geophilic dermatophytic species are widespread worldwide. Keratinophilic fungi include a selection of filamentous fungi that mainly embrace hyphomycetes and some other taxonomic groups. Hyphomycetes include dermatophytes and a great variety of nondermatophytic filamentous fungi. Keratinolytic fungi occur in many natural and manmade habitats. These microorganisms exist in communities together with keratinophilic fungi that have weaker similarity to keratin and employ primarily the products of its decomposition *Keratinophilic* fungi are an economically significant group of fungi that crumble one of the most abundant and highly stable animal proteins on earth, keratin, which they use as a nutrient substrate for growth. The distribution of these fungi depends on different factors including the critically significant human and animal attendance. Some of these fungi are well-known dermatophytes and are known to cause superficial cutaneous infections (dermatophytoses) of keratinized tissues of humans and animals. Mycotic infection is reported throughout the world and is extremely contagious. The incidence of dermatophytes in soil was reported for the first time by Vanbreuseghem using the hair bait technique.

## II. ENVIRONMENTAL ROLE

The natural purpose of keratinolytic fungi in the soil is the degradation of keratinized materials such as hides, furs, claws, nails, and horns of dead animals. In the soil, these fungi live in their *teleomorphic* stages in the form of *cleistothecia*, whereas in keratinized



material they live in an *anamorphic* stage in which they enlarge only a very simple morphology. When there is ample keratin substrate available in the soil, these fungi multiply by asexual means by producing enormous numbers of conidia. When the keratin substrate is depleted, however, the fungi reproduce by sexual means and form attribute fruiting bodies called ascomata.

#### **A. COMMON HABITATS OF KERATINOLYTIC FUNGI**

Almost any place in nature where there is a possibility of having keratin

- Farm animals shed.
- Trash
- Animal burrows
- Manure
- Bird's nest
- Barber's hair dumping area
- Public places like parks, schools, the marketplace, etc.
- Poultry sheds
- Herbivore or carnivore dung

With the creation of the technique of isolation of soil fungi, studies on keratinophilic fungi started in **1952** and soil proved to be a natural reservoir of these fungi. Keratinophilic fungi also include Dermatophytes, which cause illness of the skin and its addition.

dermatophytes, Zoophilic dermatophytes, and Geophilic dermatophytes. In the soil, there are also structure associated with contagion, of anthropophilic and zoophilic dermatophytes that may persist for years, in the environment, in hair or skin scales. Since on the skin of animals, there are many saprobic organisms and many fungi may infect the fur, it is important to make an accurate diagnosis.

**B. ETIOLOGY:** Dermatophyte is caused by fungi in the genera *Microsporum* and *Trichophyton*. These organisms called dematophytes are the pathogenic member of the keratinophilic soil fungi. *Microsporum* and *Trichophytona* are human and animal pathogens. The dermatophytes were all formerly classified as members of the phylum *deuteromycota*. Some are now known to replicate sexually and have been reclassified

Keratinophilic fungi have the unique ability to humiliate keratinous substrates, e.g. horsehair, human hair, nail, and peacock feather. The fungi which humiliate this substrate completely are termed as keratinolytic. Numerous keratinolytic dermatophytes endure in the soil, in addition to their clinical habitat. Presently, almost all the habitats of the world have been surveyed for the occurrence of keratinophilic fungi.

Most of these fungi belong to the family *Arthrodermataceae* and *andonygenaceae*, order Onygenales in ascomycetes. Most of the known fungi grow on a senior plant or their remains and survive saprophytically. Keratinophilic fungi are natural to colonize of keratinous substrates. Some are keratinolytic and play a significant environmental role in decomposing a- keratins, the inexplicable fibrous proteins. Because of the tight packing of their polypeptide chain in a- helix structure and their association by disulfide bridges, they are insufficiently degradable. Dermatophytes are the keratinophilic fungi that cause a disease called *Dermatomycosis*.

Dermatomycosis is the mycotic disease of the skin caused by a few mycetes; dermatophytes, and some opportunistic fungi as *Malassezia*, *Candida*, *Trichophyton*, *Rhodotorula*, *Cryptococcus* or *Aspergillus*, *Geotrichum*, *Alternaria*, etc. Dermatophytes are a group of closely related filamentous fungi that assault keratinized tissue of humans and other animals and produce infection called dermatophytosis or ringworm or "Tenia". The etiological agents of dermatophytosis are classified into three genera: *Microsporum*, *Trichophyton*, and *Epidermatophyton* based on their main habitat dermatophytes are alienated in Anthrophilic

in the phylum Ascomycota, family Arthrodermataceae. Each of these fungi now has two species names, one for the stage found in vertebrate hosts, and one for the form that grows in the impression. The dermatophytes have been classified into three environmental groups based on their habitat preference – Geophilic, Zoophilic, and anthropophilic.

#### **C. TRANSMISSION**

Infection occurs by contact with arthrospore or conidia. Disease typically begins in a growing hair or a stratum corneum of the skin. Dermatophytes do not generally invade resting hairs, since the essential nutrients they need for growth are absent or limited. Hyphae spread in the hairs and keratinized skin, ultimately developing infectious arthrospores.

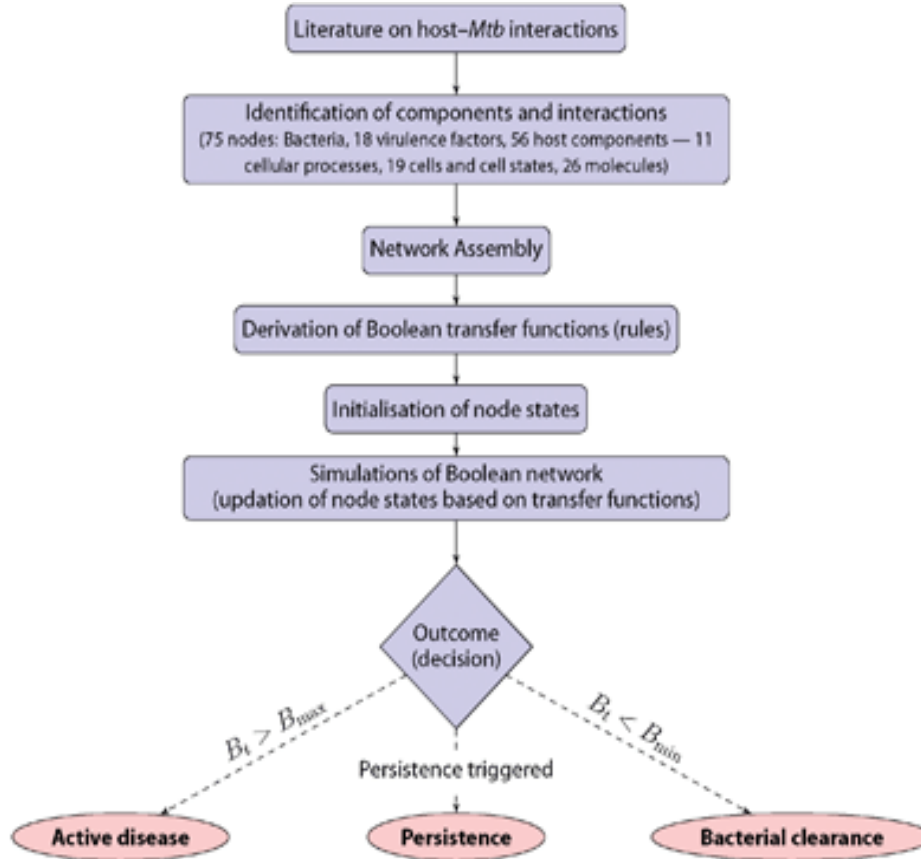


Fig 1: The Schematic Route of Entry of Dermatophytes Into The Host System.

### III. PATHOGENESIS AND CLINICAL PRESENTATION

The probable direction of entry for the dermatophytes into the host body is injured skin, scars, and burns. Infectivity is caused by arthrospores or conidia. Resting hairs lack the important nutrient compulsory for the development of the creature. Hence these hairs are not invaded during the process of infection. The pathogen invades the uppermost, non-living, keratinized layer of the skin namely the stratum corneum, produces exo-enzyme keratinase, and induces inflammatory reaction at the site of infection. The habitual signs of provocative reactions such as redness, swelling, heat, and alopecia are seen at the infection site.

Soreness causes the pathogen to move away from the site of infection and take residence at a new site. This association of the creature away from the infection site produces the classical ringed lesion. The infections caused by dermatophytes are generally referred to as “*tinea*” or “ring-worm” infections due to

the characteristic ringed lesions. Based on the site of infection the tinea infections are referred to as tinea capitis (scalp), tinea corporis or tinea circinata, tinea pedis, tinea unguium, tinea manuum (hands), tinea barbae, tinea incognito (steroid modified), tinea imbricata, tinea gladiatorum, and tinea cruris.

### IV. TYPES OF DERMATOPHYTOSIS

On the basis of site of infection dermatophytosis is characterized as:

**A. *TINEA CAPITUS*:** Tinea capitis, most often seen in children, is a dermatophyte infection of the hair and scalp. Tinea capitis begins with a small papule, which spread to form scaly, irregular, or well-demarcated areas of alopecia.

**B. *TINEA CORPORIS*:** *Tinea corporis*, or ringworm, occurs on the trunk, extremities, and face. It is characterized by single or multiple scaly annular lesions with a slightly elevated, scaly, and erythematous edge.



**Fig. 2: Types of tinea unguium**

**C. TINEA BARBAE:** Tinea barbae is an infection of the hairs and skin in the beard and mustache area, and is usually seen in men. The lesions may include scaling, follicular pustules, and erythema.

**D. TINEA FACIEI:** Tinea faciei is seen on the nonbearded parts of the face. The lesions are regularly pruritic; itching and burning may become worse after introduction to sunlight.

**E. TINEA CRURIS**

Tinea cruris is an infection of the groin, usually caused by anthropophilic dermatophytes. The symptoms include burning and pruritus.

**F. TINEA PEDIS & TINEA MANNUM:** Tinea pedis is an infection of the foot, characterized by fissures, scales, and maceration in the toe web, or scaling of the soles and lateral surface of the feet. Erythema, vesicles, pustules, and bullae may also be present.

**G. TINEA UNGUIUM:**

Tinea unguium is a dermatophyte infection of the nail. It is differentiated by coagulate, discolored, broken, and dystrophic nails. The nail plate may be alienated from the nail bed.

**V. CONCLUSION**

Many investigations were carried out to discover plant products that inhibit the fungi like *Trichophyton rubrum* and *Microsporum canis*. These two species cause common infections in humans which are difficult to control successfully. Hence, plant products that inhibit their growth without harming the host represent potential therapeutic agents. Keratinophilic fungi are the fungi that utilize keratin which mainly grow on skin, nails, hairs etc. they may be Dermatophytes like *Trichophyton* and *Epidermatophyton* which cause skin infection, etc and maybe non- dermatophytes like *Aspergillus niger*, *trichophyton sp.*, etc. Dermatophytes cause dermatophytosis which is a chronic infection of the nails, hair, and skin. Now a day's considered a serious problem for public health, In view of its high occurrence in the worldwide population. Although this disorder is not serious in terms of mortality or physical or psychological sequelae, It has significant clinical consequences given its infection nature esthetic importance, chronicity, and therapeutic difficulties. The occurrence is probably higher than is currently thought as the difficulty in clinical mycological diagnosis, unsuitable collection of material for study as well as ineffective treatment make it hard to establish the true profile such as dermatomycosis. In recent years, there

has been an increasing search for new antifungal mutual due to lack of efficiency, side effects, and or confrontation associate with some of the existing drugs. To fight against keratinophilic dermatophytic fungi in our present study we have tested a combination of some essential oils and some methanolic plant extracts against them which are proved to be proficient as plant necessary oils area potentially useful source of antimicrobial compounds. Essential oils and their constituents have a long history of application as antimicrobial agents. Essential oils are often fungistatic rather than fungicidal this means that they stop the enlargement of the fungi while it is exposed to the oils.

## REFERENCE

- [1] Ajello L, Gets M E (1954). "Recovery of dermatophytes from shoes and a showstall". J Invest. //Dermat. 22 (1): 17- 22. Doi: 10.1038/Jid. 1954
- [2] Aly R. "Ecology and epidemiology of dermatophyte infection" J Am Acad Dermatol. 1994;31:S25
- [3] Ali-Shtayeh MS, Khaleel TKh, Jamous RM. "Ecology of dermatophytes and other keratinophilic fungi in swimming pools and polluted and unpolluted streams". Mycopathologia 2002;156:193-205.
- [4] Abdulmoniem MA, Saadab AMA, 2006. "Antifungal activity of some Saudi plants used in traditional medicine". Asian J. Plant Sci., 5: 907-909.
- [5] Ali AA, 1999. "Studies on some medicinal plants as a source of antifungal substances in North Africa". M.Sc. Thesis, Inst. of African Res. and Studies, Cairo Univ.
- [6] Amer S, Aly MM, Sabbagh S, 2006. "Biocontrol of dermatophytes using some plant extracts and actinomycetes filtrates". Egyptian J. Biotechnol., 330-315.
- [7] Aho R, Saprophytic fungi isolated from the hair of domestic and laboratory animals with suspected dermatophytoses. Mycopathologia, 83: 65-73, (1983).
- [8] Barker KS, Rogers PD, Recent insights into the mechanisms of antifungal resistance. Curr Infect Dis Rep, 8: 449-56.
- [9] BENEDEK, T. (1962). Fragmenta mycologica. I. Some historical remarks on the development of 'hair baiting' of Tom-Karling Vanbreuseghem (The To Ka Va hair baiting method). Mycopath. Mycol. Appl. 16: 104-106.
- [10] Caceres A, Lopez B, Juarez X, Aguila J, Garcia S, and Del Aguila J (1993). "Plants used in Guatemala for the treatment of dermatophytic infections". 2. Evaluation of the antifungal activity of seven American plants. *Journal of Ethnopharmacology* 40 207-213.
- [11] Charchari S, Dahoun A, Bachi F, and Benslimani A (1996). "In vitro antimicrobial activity of essential oils of *Artemisia herba-alba* and *Artemisia judaica* from Algeria". *Rivista Italiana EPPOS* 18 3-6.
- [12] DESHMUKH, S. K. (1985). "Isolation of dermatophytes and other keratinophilic fungi from the soil of Mussoorie (India)". - *Mykosen* 28: 98-101.
- [13] DESHMUKH, S. K. & S. C. AGRAWAL (1983). "Prevalence of dermatophytes and other keratinophilic fungi in soils of Madhya Pradesh (India)". — *Mykosen* 26: 574-577.
- [14] El-Said AHM, Abdel-Hafez SII, Keratinophilic fungi associated with human hair in Yemen. *Cryptogamie Mycol*, 16: 129-133, (1995).
- [15] Evans G, White NH, 1967. "Effect of the antibiotics *Radicicolin* and *Griseofulvin* on the fine structure of fungi". *J. Exp. Bot.*, 18: 465-470.
- [16] Gupta MP, Kapur I, Bala I, Khuller GK, 1991. "Studies on the mode of action of tolnaftate in *Microsporum gypseum*.J". *Med. Veter. Mycol.*, 29: 45-52.
- [17] GAIK; A. K. (1966). "Isolation of dermatophytes and other keratinophilic fungi from the soil of India". - *Sabouraudia* 4: 259-264
- [18] Hasegawa A, 2000. "Dermatophytes in animals". *Nippon Ishinkin Gakkia Zasshi*, 41:1-4.
- [19] Holder IA, Boyce ST, 1994. "Agar well diffusion assay testing of bacterial susceptibility to various antimicrobials in concentrations non-toxic for human cells in culture". *Burns.*,20: 426-9. <http://bioline.utsc.utoronto.ca/archive/00001220>.
- [20] Jain, N, Sharma M, Kumar P, 2004. "Regulatory effect of some plant extracts on the growth of dermatophytic fungi". *Indian J. Microbiol.*, 44: 59-62.
- [21] JAIN, P. C. & S. C. AUKAWAL (1977). Keratinophilic fungi from the soils of Mount Abu (India). - *Geobios* 4: 136-138.
- [22] JAIN, M., P. K. SHUKLA & O. P. SHKIVASTAVA (1985). "Keratinophilic fungi and dermatophytes in Lucknow soils and their global distribution". - *Mykosen* 28: 148- 153.
- [23] KUSHWAHA, R. K. S. & S. C. AGRAWAL (1976). Some keratinophilic fungi and related dermatophytes from the soil. - *Proc. Ind. Natl. Sei. Acad.* 42: 102-110.
- [24] KOZAK, P. R., Jr., J. GALLUP, L. H. COMMINS & S. A. GILMAN (1980). "Currently available methods for some mold surveys. II. Examples of problem homes surveyed". — *Annals Allergy* 45: 167-176.
- [25] Kumari GR, Mahrora S, Rao PS. "Prevalence of non-keratinophilic fungi in the soil". *Indian J Med Microbiol* 2005; 23:144-5.