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Incidence Of *Microsporum* Species From Different Soil And Water Samples From South Tamilnadu

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ABSTRACT: Fungi found in soil,water and the variation and prevalence in each area depends on
environmental and nutritional conditions. It constitutes humus and organic material. The wastewater is rich in pathogenic and non-pathogenic keratinophilic fungi including dermatophytes. Most of the fungal isolates from the waste water have already been reported as dermatophytes causing infections of skin, scalps or hair. More than 100 species of fungi are generally recognized as a pathogen for man found in soil. The majority of dermatophytes can live as saprophytically and considered as potential pathogen. These fungi can cause different types of tinea in humans. The fungal flora was analyzed in different samples for the presence of dermatophytes and keratinophilic fungi by hair baiting technique**.** Considering the importance of transmission of diseases, this study aims at assessing the frequency of dermatophyte ie., *microsporum* Species, in various soil and water samples collected from house, hospitals, swimming pools, sewage water, bathing water, slum, park, and the rest room water. In our present study we isolated *microsporum* Species from selected soils and water.They were isolated by using spread plate technique and microscopically by Lactophenol cotton blue technique. The samples were cultured on Sabouraud's dextrose agar, containing Chloramphenicol and Cyclohexamide, and incubated at 25- 30^{o}C for 3- 4 weeks aerobically. Isolates were identified by colony morphology. Five Species of *microsporum* were identified it includes *M.gypseum, M.canis, M.cookei, M.nanum, M.distortum*. The results demonstrated that dermatophytes *microsporum* sp is somewhat different from that in other parts. This may be due to the different climatic conditions and unhygienic status prevailing. Considering, the fact that most of the potential pathogenic fungi were isolated from the public areas.

Keywords: Dermatophytes, water, soil, *Microsporum*, Spread plate technique.

INTRODUCTION:

Dermatophytes are the group of filamentous fungi that are the most common cause of cutaneous mycoses. The diseases caused by these organisms are generally named after the part of the body that is infected rather than the infecting organism. For example, tinea pedis refers to athlete's foot and tinea unguium refers to a nail infection. Dermatophyte infections are generally superficial, but immunocompromised patients can experience severe, disseminated disease (Rodwell 2008). Although dermatophyte infections are treatable, there is a high rate of reinfection; it remains to be determined whether this is due to relapse (the fungus not being completely eradicated during treatment) or a new infection. (K. Gupta and E. A. Cooper 2008). The dermatophytes include three genera of molds in the class Euascomycetes: *Trichophyton, Microsporum,* and *Epidermophyton*. Dermatophytes are grouped according to their habitat as being either anthropophilic (human associated), zoophilic (animal associated), or geophilic (soil dwelling). Anthropophilic species are responsible for the majority of human infections; however, species from all three groups of dermatophytes have been associated with clinical disease. Human infections caused by anthropophiles tend to be chronic, with little inflammation, whereas infections caused by geophiles and zoophiles are often associated with acute inflammation and are self-healing . (I. Weitzman and R. C. Summerbell,1997)

Keratinophilic fungi have been receiving considerable attention in recent days as these include dermatophytes and are able to degrade various types of keratinous substrates. Several opportunistic keratinophilic fungi with pathogenic potential are emerging rapidly. The hair-baiting technique of isolation of these fungi from soil added new keratinophilic fungi. The teleomorph

development of many of these fungi on soil hair is an additional outbreak. Soil-inhabiting keratinophilic fungi are now reported from almost all the habitats of the world. Several scattered reports of occurrence of these fungi in India are appearing. Taxonomic account of human pathogenic fungi (Kushwaha 2004) and keratinophilic fungal flora of India (Tripathi N, Kushwaha 2000) are reviewed. In addition to the pathogenic potential of keratinophilic fungi, their other relevance like enzyme keratinase to degrade prion, use in feather meal production and dehairing of hides etc. are recently reported.

In recent days, human exposure to the potentially pathogenic fungi is a matter of health risk. Several non-pathogenic fungi are now being reported as opportunistic pathogen and their occurrence in various environments where they are naturally occurring is not directly investigated. Identifying both environments and fungi where people are exposed to them is of major health concern. (Madisen AM, 2007) The hospitals and houses are continuously inhabited by human beings. Their floor dusts become heavily contaminated from different sources, particularly shoes, barefoot and or domestic animals and indoor air flora, which settle down during the night.

Polluted water is a dynamic medium in which a large number of keratinophilic and non-keratinophilic fungus live in close association. Some keratinophilic fungi are pathogenic to animals including human beings. The biodiversity of keratinophilic fungal communities occurs both in soils and wastewater habitat *(Hoog,* 1996*).* The first discovery of keratinophilic fungi from soil was hair baiting technique, the most common method used for a qualitative and quantitative isolation of these fungi from soil (Kunert *et al.,* 2000).

Keratinophilic Fungi are the finest Keratin degraders, prevalent in Keratin rich environments. The waste water and sewage are rich in organic matter, are habitat for many *(*Kacprzak M and Adewoye 2005) and domestic sewage is a rich source of Keratin, Cellulose and Lignin etc. where the occurrence of Keratinophilic fungi can be easily expected. The objectives of this study to identify the presence of dermatophytes i.e. *Microsporum sp* from soil and water from south Tamilnadu ,which causes infection to human beings and animals.

MATERIALS AND METHODS:

Sample collection:

Total of 100 samples were collected from different places from south Tamilnadu. 50 soil samples were collected from hospitals, homes, slum, and park.Soil samples were collected from different sites in sterile polyethene bags by scooping up to a depth of 2-5cms with the help of sterile disposable spoon. Each bag was tightly packed and labeled .These samples were brought to the laboratory and processed immediately and stored at 40^0C for further studies. The study was conducted by collecting soil samples to screen for dermatophytic fungi.

50 polluted water samples were collected in sterile screw vial tubes from different habitats i.e. (bathing water, swimming pool, water from rest room sewage water, and pond water) and brought to laboratories for further microbiological analysis.

Isolation of fungi:

Plating Techique:

Dilution:

The fungi were isolated by spread plate method on sabourad's dextrose agar (SDA) media. The soil sample and the water samples were serially diluted. Soil dilution plate method. 1gm of soil sample and 1ml of water sample was suspended in 10ml of double distilled water to make microbial suspensions (10^{-1} to 10^{-5}). Dilution of 10^{-3}, $^{10-4}$ and 10^{-5} were used to isolate fungi.

Spread plate:

SDA media was prepared with chloramphenicol and cycloheximide. 0.1 ml of soil sample and Water sample were plated on to the corresponding plate, and uniformly spreaded with the help of L-rod. The Petri dishes were then incubated at 28 ± 2 ^{0} C for two to three weeks.Plates were examined regularly.

Cultivation of fungi:

Cultivation on Sabouraud's dextrose agar - SDA

SDA medium contains chloramphenicol (50 mg⁄L) and cycloheximide (500 mg⁄L). The cultures were inoculated on to the medium labeled with the date of inoculation. Then incubated at 25-30 ˚C for three weeks, it was preferable not to discard the negative culture before one month.

Identification of fungi:

These fungi were examined microscopically, identified according to their Macro and Micromorphological characteristics, following the manuals proposed by (Cano and Gurrao 1990).

1.Macromorphology

The colonies were examined for slow or for rapid growth, topography (flat, heaped, regularly or irregularly folded), texture (yeast like, glabrous, powdery, granular, velvety or cottony), surface pigmentation and reverse pigmentation.

2. Micromorphology

A drop of Lacto phenol cotton blue stain was added on to the clean glass slide. The Fungal culture was placed on the slide and teased with the sterile straight wire and cover slip was placed without the air bubble. The slide was examined by low and high power to demonstrate the presence of hyphae, macroconidia, microconidia, chlamydospores and other special fungal structure.

RESULT:

TABLE : 1 Represents the isolates of *microsporum* Species from different places

S.No	Isolates	Soil samples					Water samples					
		Hospital	Slum	Park	Home	Garden soil	Sewage water	Bath water	Swimming water	Rest room water	Pond water	*Total Positive samples*
												%
1.	*M.gypseum*	8	7	9	4	7	8	3	6	9	9	60.7
2.	*M.canis*	5	6	5	3	4	6	2	4	1	5	40
3.	*M.nanum*	2	6	3	3	3	3	2	2	7	2	30.5
4.	*M.cookei*	1	2	1	1	-	2	-	2	-	1	10
5.	*M.distortum*	3	-	2	-	-	1	-	-	3	-	10

Table -1 About100 samples were collected and examined for dermatophytes from different places of south Tamilnadu, which includes 50 soil and 50 water samples - *Microsporum* species. Five Species of *microsporum* were identified it includes *Microsporum gypseum M.canis M.nanum, M.cookei, M.distortum. M.gypseum* was found to be 60% and followed by *M.canis 40%* and is followed by *M.audouinii 30%.* The very least isolates are *M.cookei* and *M.distortum*.

TABLE: 2 Represents the Total number of isolates (*Microsporum sp)*

S.No	Places	Number of Isolates
1	Slum	21
2	Hospital	19
3	Park	20
4	Home	11
5	Garden soil	14
5	Sewage water	20
6	Rest room water	20
7	Swimming water	09
8	Bath water	07
9	Pond water	17

Table - 2 shows that the isolates of *Microsporum* species, isolates were found to be highest in soil from slum area and isolates from sewage water were found to be highest from water sample respectively.

DISCUSSION:

The geophilic species of *M.gypseum* was isolated from water sample this work coincides with the zarei 1997 who isolated *M.gypseum* from the soil of Ahvaz. The geophilic *M. gypseum* was only isolated from soil sample. Other researchers previously reported few cases of tinea due to *M. gypseum* in Ahvaz.

In our present study we have isolated Microsporum sp it includes *M.gypseum,M.canis,M.nanum,M.distortum and M.cookei* in parks, slum and hospitals . Al-Musallam A, and Al-Zarban1997 reported that *M. gypseum* has a universal distribution, and it is the etiological agent of *tinea capitis* and *tinea corporis* in humans and animals, where dogs, horses and rodents are common reservoirs of keratin. In this investigation, it was found in soils of empty lots, slums, schools, squares, homes and rural areas.

Microsporium gypseum is a geophilic dermatophyte relatively frequently isolated from skin lesions. Therefore, this species is of special epidemiological importance. The waste water favored the growth of *Microsporum gypseum* on Keratinous substrata in a wide temperature range. It can be expected, therefore, that the waste water on waste water treatment plant area or applied to land poses an elevated health risk to immune compromised individuals (Ulfig . k 2003). In our present study we have isolated 8 isolates of *M.gypseum*, 6 isolates of *M.canis*,3 isolates of *M.nanum* , 2 isolates of *M.cookei* and 1 isolate of *M.distortum* from sewage water.

In our present study we isolated 19 isolates from hospitals. Hoog de GS and Guarro j 2000 *reported that Microsporum gypseum* , a common geophilic fungus, 13 isolates hospital dusts, causes tinea corporis and tinea capitis in humans and is also reported from cats, dogs and rodents.

Detandt . M and kamihma 1997 reported that Polluted water habitats can be sources of environmental contamination and disease. Swimming pools have also been established to be sources of tinea pedis. People walking bare-footed on contaminated places with dermatophytes, which come from shed infected skin scales, may acquire infections. In our study we isolated 09 isolates from swimming pool.

In our present study were found that maximum number of isolates reported from rural area (slum). In this investigation, it was found in soils of empty lots, slums, schools, squares, homes and rural areas. Hayashi & Toshitani 2000 reported, in Japan, 271 cases of human infection by this fungal species. A case of *tinea capitis* due to infection by this species, has been diagnosed in João Pessoa-PB.

Lopez Martínez 1986 reported that *M. nanum* (3%) was isolated for the first time from soil of schools, parks and empty lots in Paraiba State. In a study carried out on soil of a swimming resort, in Mexico, its isolation rate was 5%. In our study we also isolated *M.nanum* (30%) both in soil and in sample.

In our present study we have isolated *M.gypseum* shows higher isolates from both soil and water samples *Microsporum gypseum* is a dermatophyte that has been isolated from various environments, such as soil, sewage and swimming pools (*Ali-Shtayeh M.S, Jamous Rana M.F,*1999). In the present study, it was isolated only from the unpolluted stream site. This species has been reported to cause increasingly frequent human and animal skin infections all over the world (Cannol 1990).

CONCLUSION:

Our study confirm the presence of dermatophyte –Microsporum in soil and water samples from different places in south Tamilnadu.The risk of fungi infections from the water is increasing in the environment day by day. From these results we found that different species of keratinophilic fungi are present in sewage, bathing water , swimming pool which causes superficial cutaneous infections in human beings and animals. According to these results it can be concluded that the water from these places does not seemed to be ideal water for the human beings and the animals because they contain lots of keratinophilic and non keratinophilic fungi which causes dermatophytosis or superficial cutaneous infections in human beings and animals. The soils of areas within schools, slums, hospital, park were found to be the most suitable reservoirs for almost all dermatophytes. Its growth may have been influenced by environmental factors such as residues of human and/or animal keratin and alkaline pH. So hygienic measures should taken to control the diseases. It is hoped that this study would stimulate further work in this area to understand the ecology of human infections caused by dermatophytes and related keratinophilic fungi .

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