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STUDY OF DERMATOMYCOSIS, CAUSAL AGENTS AND THEIR CONTROL

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ABSTRACT

Dermatophytes are parasitic fungi that infect the skin and cause infections of the skin, hair and nails because of their ability to obtain nutrients from keratinized material. These organisms colonize the keratin tissues and in response to their metabolic by products, host experiences inflammatory reactions. During the study identification & isolation of micro-organism that causes mycoses was carried out. The present study was purposed to investigate the presence of unreported skin lesions in infected patients. Wet mount method was used for the identification of fungal isolates. Topical therapies were successful in less than 20% of patients. In antifungal sensitivity test, antifungal agents (Ketoconazole, Nystain, Itraconazole, Amphotericin –B, Fluconazole) & herbs like garlic, eucalyptus, neem, tulsi turmeric were used. This method was done by disc diffusion method (Kirby Bauer method).

KEYWORDS: Dermatitis, Antifungal, Antibiotics. Itraconazole, Flueonazole, Ketoconazole.

INTRODUCTION

Fungi are the group of eukaryotic, heterotropic organisms that are of great practical and scientific interest. Filamentous mould and yeast like fungi are ubiquitous organisms found worldwide and are a part of the normal human microbial flora. Several species of fungi are significant pathogens of human and other animals. Fungal infections are a major cause of morbidity and mortality in human especially in debilitated patients. The common fungal infections are cutaneous (including nails), disseminated fungemia, pneumonia, osteomyelitis and endocarditis. In nature, fungi generally grow by secreting enzymes that digest tissues but some are actually predacious.[6]

Skin infections are common diseases in developing countries, of which dermatophytosis is of particular concern in the tropics. A fungal skin infection is usually the result of the presence of some types of foreign fungus on the skin, These fungi grow best on those areas of the skin that are warm, dark and moist.

Fungi produce exoenzymes in nature. These have a role in their saprophytic capability on non living material, may it living or dead plant or animal tissues. Microbial pathogens use a number of genetic strategies to invade the host and cause infection.[2]

Superficial infection or mycoses are limited to the stratum corneum and essentially elicit no inflammation. Superficial fungal infections of the skin are some of the most common dermatologic condition seen in clinical practice. So recognition is important for physicians. Superficial fungal infections can be divided into 3 broad categories-

- Dermatophytic infections.
- Tiniea versicolor.

Cutaneous candidiasis- Skin infection caused by *C.albicans* and other species. Fungal infections are quite widespread and have affected a growing number of people in recent years. Most fungal infections are located on the skins outermost layer (epidermis). Fungal infections in the lower layers of skin, internal organs and blood are rarely seen. Cutaneous infection involves the integument and its appendages including hair and nails. Infections may involve the stratum corneum or deeper layers of the epidermis. Cutaneous mycoses may be classified as dermatophytoses or dermatomycoses. Sub-cutaneous mycoses include a range of different infections characterized by infection of the sub-cutaneous tissues usually at the point of traumatic inoculation. Deep mycoses involve the lungs, abdominal viscera bone & central nervous system. The most common portals of entry are the respiratory tract & blood vessels. The spread of drug resistance pathogens is one of the most serious threats to successful of microbial diseases. The mortality rate of acute mycotic infection is also very high even in non-immuno-compromised patients.

Dermatophyte infections are one of the earliest known fungal infections of mankind and are very common throughout the world. Dermatophytosis constitutes a group of superficial fungal infections of the epidermis, hair and nails. Dermatophytosis has been reported to be encouraged by hot and humid conditions and poor hygiene and occur throughout tropical and temperate regions of the world. Dermatophytes are pathogenic fungi that have a high affinity

for keratinized structures like nails, skin or hair, causing superficial infections known as *Tinea versicolor* and are common in adult. It is found in region of the body that has sebaceous glands. such as the upper trunk, neck and arms. the characteristics finding is skin depigmentation. Systemic therapy often is needed in treatment of moccasin-type *Tinea pedis*.[10][9] reported Dermatophytes as prevalent cause of cutaneous mycoses and unlike many other fungal pathogens are able to cause disease in immunocopetent individuals.

MATERIAL AND METHODS

- The collection of the sample for the study of mycotic infection were done from patients at the dermatological wards at Jabalpur (Fig: 1). A total of 15 samples were collected.
- Infected nails, hair & skin samples were treated with 10% KOH to destroy tissue elements & were examined microscopically.
- Fungal pathogens were isolated on Sabouraud's dextrose agar (SDA) at 26^0C - 28^0C for 3 -5 days. Antibacterial was added in SDA media for inhibiting bacterial growth.
- These fungal isolates were screened for various enzymatic activity tests like amylase activity, protease activity, phospholipase activity etc. and thermotolerance tests.
- The clinical fungal isolates are also subjected to antifungal susceptibility test by Disc diffusion method (Kirby Bauer Method) against available antifungal discs.

Fig: 1 - Patients from whom clinical samples are collected for present study.

RESULTS AND DISCUSSION

Direct microscopic observations revealed presence of hyphae and unidentified fungal elements. From the 15 clinical samples a total fungal species were isolated and identified. They were *Aspergillus sps., Fusarium sps, Cladosporium sps, Aureobasadium sps* and *Alternaria sps*. All fungal isolates were subjected to different tests. The screening test for enzymatic study was performed for amylase, protease & phospholipase. The results are expressed in Table no. 1. All the isolated species were positive for amylase activity. *Cladosporium sp.* did not show protease activity while all other showed positive protease activity. *Aspergillus sps* showed high protease activity, *Fusarium sps, Aureobasadium sps*

and Alternaria *sps* showed moderate protease activity. *Aspergillus sps.* and *Alternaria sps* were found to be highly active for the production of phospholipase. *Fusarium sps* showed moderate phospholipase activity while *Cladosporium sps.* was found to be weak for phospolipase activity. *Aureobasadium sps* did not show phospholipase activity at all.

Table no. 1: Enzymatic activity of isolated fungi from clinical samples.

Fungal Isolate	Amylase	Protease	Phospholipase
Fusarium sps.	+++	++	++
Aspergillus sps.	+++	+++	+++
Cladosporium sps.	+++	-	+
Aureobasadium sps.	+++	++	-
Atlternaria sps.	+++	++	+++

Thermo tolerance test were performed on all fungal isolates. *Aspergillus sps. Cladosporium sp.* were able to grow at all the temperature whereas *Fusarium sps.* didn't grow at 37^{o}C and 50^{o}C indicating that it might not be pathogenic in nature. The species of *Aspergillus* and *Cladosporium may* be pathogenic in nature as they were able to grow at 50^{0}C.

The results of in vitro antifungal susceptibility are expressed in Table no.2 and Fig. 2, 3, 4 and 5. From the table it is clear that all the clinical isolates are highly susceptible to Voriconazole. Although *Fusarium sps* and *Cladosporium sps* were more susceptible to Itraconazole. *Aspergillus sps* was susceptible to all the antifungals used. The results so obtained are in accordance with results obtained by Anupan et. al 2005, Dorman et. al. 2000, Erdogan et. al. 2004, Hammer et al. 1999, Rai 2014 and Rai et al. 2013, which are coherent with the results obtained in the present investigation.

Table no. 2: Results of in vitro susceptibilities of fungi isolated from clinical samples.

Fungal Isolate	Voriconazole	Itraconazole	Ketoconazole	Miconazole
Fusarium sps.	4.33cm	5.5cm	-	-
Aspergillus sps.	4.5cm	1.46cm	1.36cm	3.5cm
Cladosporium sps.	4cm	5.5cm	-	-
Aureobasadium sps.	3.5cm	-	-	-
Atlternaria sps.	4.5cm	-	-	2.5cm

Fig. no. 2: Results of in vitro susceptibilities of fungi isolated from clinical samples (*Cladosporium*, *Aureobasidium*, *Aspergillus and Alternaria*).

With increase in immunocompromised conditions, the incidence of dermatophytosis has increased. Current drug therapy used for these infections is often toxic, long-term and expensive and has limited effectiveness; therefore, the discovery of new anti dermatophytic compounds is a necessity. Natural products have been the most productive source for new drug development.

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