

## Diversity of fungi causing human subcutaneous mycoses in West Bengal

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The diversity of fungi causing human subcutaneous mycoses in West Bengal was studied. The study was confined with the patient registered in the Calcutta School of Tropical Medicine during the period of 1991 to 2000. It was found that of all the subcutaneous mycoses mycetoma was the commonest which was followed by sporotrichosis, entomophthoromycosis, rhinosporidiosis and chromomycoses.

**Key words :** Human subcutaneous mycoses, mycetoma, sporotrichosis, entomophthoromycoses, rhinosporidiosis, chromomycoses, West Bengal

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### INTRODUCTION

Subcutaneous mycoses are localized spreading chronic granulomatous infections which initially start at subcutaneous tissues, following traumatic implantation of wide variety of saprophytic fungi or actinomycetes. These exclusively occur in tropical and sub-tropical countries. The geoecological conditions of the locality are determinants of species prevalence. Incidental or occupational traumas are important predisposing factors for occurrence of such lesions.

Subcutaneous mycoses do not rank as major public health problems due to extreme rarity and high prevalence among poorer people of tropical countries and also for their slowly progressive less eventful noninfectious clinical course. For the same reasons cases are usually wrongly treated for a long time, as one of chronic bacterial infections or neoplastic growths. Due to the lack of proper mycological diagnostic facilities and lack of comprehensive surveys, their true prevalence is not known. As these are not reportable diseases and commonly occur in rural areas and often misdiagnosed, no adequate panoramas of the problem at the state or country level could be constructed. If we consider the damage that any of

these mycoses inflict on the individual in terms of discomfort, disability, days of hospitalization, hazards of delayed diagnosis and drug abuse or consequences of sequelae, their significance is very great.

Many investigational reports on subcutaneous mycoses by general microbiologists are deficient or faulty in terms of description of species, yet existing data from the Mycology Department of Calcutta School of Tropical Medicine point to the prevalence of almost all diverse group of subcutaneous mycotic agents in the locality. Present study on such a disease occurring in the last decade of 20th century, refers specifically the present prevalence of subcutaneous mycoses in the state.

### MATERIALS AND METHODS

With high degree of clinical suspicion, collection of appropriate clinical specimen like discharged material, exudate or biopsy tissues and their thorough microscopical examination with culture in appropriate media in multiple sets is the key to successful diagnosis of subcutaneous mycoses. Due to paucity of fungal elements in lesions and their uneven distribution in the clinical materials, repeated attempts of isolation and identification of

causal agents are often required, even by an experienced mycologist.

Mycologically confirmed cases of subcutaneous mycoses which attended the Mycology Department, Calcutta School of Tropical Medicine during 1991 to 2000, are included into the study. Post-scraping discharged materials or biopsy tissues were aseptically collected and a portion was inoculated into Sabouraud's Dextrose Agar (SDA) with or without chloramphenicol and cycloheximide (Vroey, 1989), and were incubated at room temperature and 37°C for 2-6 weeks. Colony characteristics of primary culture were noted. Fungal morphology and conidiogenesis were studied from slide-culture on potato-dextrose agar block (Riddel, 1950) and mounted in lactophenol cotton blue. Actinomycetes were identified by decomposition study of casein, xanthine, tyrosine and urea (Mishra *et al.*, 1980). Direct microscopical examination of minced biopsy tissue or discharged material in potassium hydroxide (KOH) smears were done thoroughly to note any pathognomonic fungal elements. Sometimes histopathological study of biopsy tissues also helped diagnosis.

## RESULTS AND DISCUSSION

Records of present study indicated that, of all subcutaneous mycoses, mycetoma was the commonest clinical condition followed by sporotrichosis, entomophthoromycosis, rhinosporidiosis and chromomycosis respectively. From etiological point of view, mycetoma, entomophthoromycosis and chromomycosis were caused by a variety of fungi. Of total 170 mycetomas detected during the study period, 121 were actinomycetomas caused by different species of three genera e.g. *Nocardia*, *Streptomyces* and *Actinomadura*. Rest 49 were eumycetomas caused by different genera of true fungi.

According to the causal agents, the distribution of mycetomas detected during 9th. and 10th. decade of 20th Century are shown in Table 1. A significant increase in isolation of *Actinomadura* sp. ( $P < 0.01$ ) and decreased isolation of *Nocardia caviae* ( $P < 0.01$ ) were noted during last decade.

About 23 species of fungi and 10 species of actinomycetes are attributed to be causal agents of mycetomas (Rippon, 1998) and their number is increasing. According to geo-ecological conditions, the predominant organisms vary from country to country and within different parts of country (Magna, 1984). The shifting of prevalence of *Actinomadura* sp. and *N. caviae* during last two decades may be attributed to quick geo-ecological changes of the locality following "green revolution". Some new pathogens like *Actinomadura vinacea* (Maiti *et al.*, 2000a), *Streptomyces viridis*, *Phialemonium* sp. (Maiti *et al.*, 2000b) had emerged from this locality as new entrant in the list of causal agents of mycetomas. Mycetomas are not contagious as they do not spread from one person to another or from animal to man. Also concomitant bilateral involvement of subcutaneous mycoses is considered as exception rather than rule (Maiti *et al.*, 2000b). This may be due to noninfective nature of their tissue form of fungus which does not contain infective spores as are present their saprophytic forms.

Human sporotrichosis is caused by a dimorphic fungus, *Sporothrix schenckii*. Here also cross infection is restricted because only the spores of saprophytic form of the fungus are infective while non-infective yeast form is pathognomonic. During the study period of 10 years, 59 lymphocutaneous sporotrichosis were detected while in the previous decade the number was 32. The growth of *Sp. schenckii* in nature depends upon optimum temperature of the locality and annual rainfall. Probably for that reason the disease is endemic in Eastern and Northern parts of India (Barua *et al.*, 1975; Chakrabarty *et al.*, 1994), but rare in Southern parts of the country.

Subcutaneous phycomycosis is the disease caused by Entomophthoraceae family of fungus in immunocompetent host. It characteristically presents as localised painless hard granulomatous swelling, and it is of two types : chronic subcutaneous phycomycosis caused by *Basidiobolus ranarum* usually occurs in below 20 years age group and chronic rhinofacial phycomycosis caused by *Conidiobolus coronatus*, occurs in above 20 years

age group. Both types are prevalent in this locality (Roy *et al.*, 2000; Mukhopadhyay *et al.*, 1995). During 10 years of study period 7 basidiobolomycosis and 8 conidiobolomycosis were detected. Histopathologically two conditions are alike with presence of broad non-septate hyphae and eosinophilic immune deposit around fungi. Infective spores are never formed within the tissue.

Rhinosporidiosis is considered as sub-cutaneous mycoses caused by a non-cultivable fungus, *Rhinosporidium seeberi* and usually presents as polypus growth on nasal mucosa. Cases are detected by histopathological examination or demonstration of sporangium in tissues. In the present study 4 rhinosporidiosis were detected of which one was at atypical site on ankle region (Mitra and Mitra, 1996). Obviously the number is the tip of the iceberg because most of the cases are detected by pathologists without help of mycologists.

**Table 1** : Mycetoma agents detected during 9th and 10th decade of 20th century.

Organisms	Cases in 9th decade		Cases in 10th decade		Total
<i>Nocardia brasiliensis</i>	27	(28.7%)	48	(28.2%)	75 (28.4%)
<i>N. caviae</i>	25	(26.6%)	13	(7.7%)	38 (14.4%)
<i>N. asteroides</i>	19	20.2%	33	(19.%)	52(19.7%)
<i>Streptomyces somaliensis</i>	3	(03.2%)	05	(02.9%)	08 (03.0%)
<i>Str. viridis</i>	-	-	01		
<i>Actinomadura madurae</i>	02	(02.2%)	19	(11.2%)	21 (8.0%)
<i>Actinomadura pelletieri</i>	-	-	01		01
<i>Actinomadura vinacea</i>	-	-	01		01
<b>Actinomycetoma agents</b>	<b>76</b>	<b>(80.8%)</b>	<b>121</b>	<b>(70.2%)</b>	<b>197 (74.6%)</b>
<i>Madurella grisea</i>	12	(12.8%)	29	(17.0%)	41 (15.5%)
<i>Madurella mycetomatis</i>	03		05		08
<i>Pseudallescheria boydii</i>	02		03		05
<i>Pyrenochaeta romeroi</i>	01		05		06
<i>Acremonium sp.</i>	00		05		05
<i>Phialemonium sp.</i>	00		01		01
<i>Exophiala jeanselmei</i>	00		01		01
<b>Eumycetoma agents</b>	<b>18</b>	<b>(19.2%)</b>	<b>49</b>	<b>(28.8%)</b>	<b>67 (25.4%)</b>

Chromomycosis is another rare type of subcutaneous mycoses in this locality and are caused by one of several dark pigmented exogenous hyphomycetes belonging to dematiaceous genera of *Cladosporium*, *Exophiala*, *Fonsecaea* and *Phialophora*. Their tissue form is indistinguishable and is observed as brown sclerotic bodies which is different from their saprophytic forms. Three chromomycosis cases were detected from this

locality with isolation of *Phialophora*, *Cladosporium* and *Fonsecaea* sp. The same group of fungi or manp. other dematiaceous fungi can cause subcutaneous cystic abscess or granulomas in immunocompromised host, which is known as "phaeohyphomycosis". When such lesions are caused by non-dematiaceous fungi, the clinical condition now a days called as "hyalohyphomycosis". These are not included in this study, as these conditions applied for unusual hosts only. Similarly subcutaneous extensions of some systemic mycoses are not taken into account. Lobomycosis is caused by one non-cultivable fungus, *Loboa loboii*. This is only type of subcutaneous mycosis yet to report from this locality, which is known to occur in the Amazonian region.

## REFERENCES

- Barua, B. D.; Saikia, T.C., and Bhuyan, R. N. (1975): Sporotrichosis in Assam. *Indian J. Med. Sci.* **29** : 251-256.
- Chakrabarti, A.; Roy, S. K.; Dhar, S. and Kumar, B. (1994). Sporotrichosis in north-west India. *Indian J. Med. Res.* **100** : 62-65.
- Magna, M.(1984). Mycetoma. *Int. J. Dermatol.* **25**, 221-236.
- Maiti, P. K.; Ray, A.; Halder, P. K. and Bandyopadhyay, S. (2000a). Red-grain actinomycotic mycetoma due to unusual organism. *Indian J. Med. Microbiol.* **18** : 191-192.
- Maiti, P. K.; Ray, A.; Banerjee, S. (2000b). Bilateral eumycetoma : a rare presentation. *Indian J. Med. Microbiol.* **18**(3) : 135 -136.
- Mishra, S. K.; Gerden, R. E. and Bearnett, D. A. (1980). Identification of Nocardiae and Streptomycetes of medical importance. *J. Clin. Microbiol.* **11** : 728-736.
- Mitra, K. and Maiti, P. K. (1996). Cutaneous rhinosporidiosis, *J. Indian Med. Assoc.* **94**(2) : 84.
- Mukhopadhyay, D.; Ghosh, L. M.; Thammayya, A. and Sanyal, M. (1995). Entomophthoromycosis caused by *Conidiobolous coronatus* : Clinicomycological study of a case. *Auris. Nasus. Larynx (Tokyo).* **22** : 139-142.
- Riddel, R. W. (1950). Permanent stained mycological preparations obtained by slide culture. *Mycologia.* **42** : 265-270.
- Rippon, J. E. (1988). *Medical Mycology*, 3rd. Edn., W. B. Saunders Company, London, p. 81-84.
- Roy, A. K.; Sarkar, J. N. and Maiti, P. K. (2000). Subcutaneous zygomycosis treated with ketoconazole. *Ind. J. Dermatol.* **45**(1), 22-23.
- Vroey, C. D (1989). Identification of agents of subcutaneous mycoses. In : Evans, E.G.V., Richardson, M.D. (Ed.) *Medical Mycology : a practical approach*. 1st Edn. IRL Press, London. p. 111-140.

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