

Prevalence of etiological agents in superficial mycoses with reference to dermatophytoses and pityriasis versicolor.

N Sivakumar, A Karthikeyan, A Vivek, M Santhamani

Citation

N Sivakumar, A Karthikeyan, A Vivek, M Santhamani. *Prevalence of etiological agents in superficial mycoses with reference to dermatophytoses and pityriasis versicolor.*. The Internet Journal of Microbiology. 2008 Volume 7 Number 2.

Abstract

The present study sets out to highlight the prevalence of etiological agents in superficial mycoses such as dermatophytoses and pityriasis versicolor with different age groups, sex and socioeconomic classes. Samples taken from 91 clinically suspected cases were examined for *Tinea rubrum*, *T. mentogrophytes*, *T. violaceum*, *Malassezia* sp, *Epidermophyton floccosum*, *Microsporum nanum*, *Candida* sp. and non-dermatophytes. Among the cases analyzed for superficial mycoses the maximum number of patients found to be in the age groups of 20-30 years and the male to female ratio being 1:1.8. In cases of pityriasis versicolor, the commonest site of involvement was neck. *Tinea corporis* was the most common clinical presentation of dermatophytosis. A significant difference was found in the detection of causative fungi by microscopic and culture studies. The most frequently isolated fungus was *T. rubrum*.

INTRODUCTION

Superficial fungal infections are among the most common infections in the world. The incidence rates of some fungal infections have increased significantly over the last 15 to 20 years (Brown and Chin, 2000). Throughout the world, the prevalence of fungal infections varies widely (Pierard, 2001). Generally, these infections of skin and mucous membranes do not account for a significant degree of morbidity in the elderly; however some can cause severe discomfort and disability, thereby potentially impacting quality of life. It is important to note that those elderly persons institutionalized the longest have the greatest problem with their skin overall (Balin et al., 1990). So the present study was aimed to determine the prevalence of etiological agents in superficial mycoses such as dermatophytoses and pityriasis versicolor with different age groups, sex and socioeconomic classes.

MATERIALS AND METHODS

The present study of dermatophytoses was carried out in Department of Microbiology, M. E. S. Medical college, Perinthalmanna, Malappuram District, Kerala, India, over a period of six months, from March to August 2008. A total of 91 clinically diagnosed cases of tinea infection of all age groups of both sexes, attending as out patients I the Department of Skin and Venerology of M.E.S. Medical

college were taken for the study. A detailed history of selected cases was taken in relation to name, age, sex, address, occupation, duration of illness and involvement of more than one site. Patients were also enquired regarding the treatment taken for ringworm infection, whether topical or systemic and its duration. After the detailed history, a detailed clinical examination of patient was done.

Collection of samples: Fungal scrapings were taken from the active peripheral edge of the lesions, after cleaning the affected area with 70 % ethanol. In case of nail infections, clippings and scrapings were taken from friable or discolored areas of hypokeratic nails. Scrapings were taken in sterile petridishes with the help of a sterile scalpel and brought to the lab, processed for direct microscopy and culture techniques.

Laboratory studies: All the scrapings were placed in few drops of 10 % KOH solution on a clear glass slide. Then cover slip was placed over the preparation and heat fixed for 15-20 min. The slides were observed under microscope immediately for the presence of fungal elements. After the direct microscopic examination, the scrapings were inoculated on to modified Saubourauds agar slants containing chloramphenicol and cyclohexamide. Then the slants were incubated at 25 + 2°C for 2- 5 days. After five days of incubation the fungal species were identified on the

Prevalence of etiological agents in superficial mycoses with reference to dermatophytoses and pityriasis versicolor.

basis of cultural characteristics, pigment production, lacto phenol cotton blue staining and biochemical tests and slide culture technique (Evans and Richardson, 1989; Guarro and Stehigel, 1999; Moore and Jacicow, 1979; Sutton et al., 1998).

RESULTS

Out of the 91 cases 16 were clinically suspected for pityriasis versicolor and 75 for superficial fungal infections including dermatophytic and non-dermatophytic molds. The maximum number of patients was found in the age groups of 20 – 30 years, followed by 11 - 20 years (Table - 1).

Figure 1

Table 1: Distribution of age groups and isolated fungal pathogens

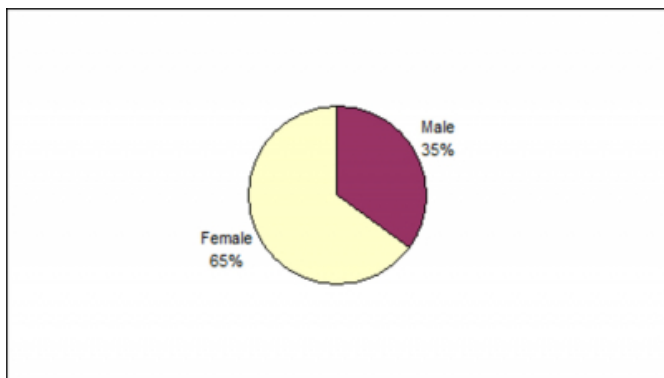
S.No	Age group (years)	No. of patients	<i>Malassezia</i> sp.	<i>T. rubrum</i>	T.mentography tes	<i>T. violaceum</i>	<i>E. floccosum</i>	<i>M. nanum</i>	Non - Dermatophytes	<i>Candida</i> sp.
1.	1-10	13	-	4	4	-	2	-	-	-
2.	11-20	19	2	4	-	-	1	-	5	-
3.	21-30	28	3	6	6	-	-	-	-	1
4.	31-40	14	-	6	3	1	-	1	-	1
5.	41-50	4	-	1	2	-	-	-	-	-
6.	51-60	5	3	1	3	-	-	-	1	-
7.	61-70	7	3	-	-	-	-	-	-	-
8.	71-80	1	-	-	-	-	-	-	-	-

(-) Negative

The male (32) and female (59) ratio was found 1:1.8, shows the prevalence of superficial fungal infections according to the sex of patients (Fig.1).

Figure 2

Fig. 1. The percentage of prevalence of superficial fungal infections in Males and Females



Dermatological examination revealed hypo pigmented macules in 35 cases and hyper-pigmented macules in 26 cases, among them 75% of patients had itching and

irritation. Mild to moderate scaling was observed in 61 cases. Chronic dermatophytosis was seen in 7 patients (Fig. 2, 3 & 4)

Figure 3

Fig. 2: Percentage of Clinical representation of the patients

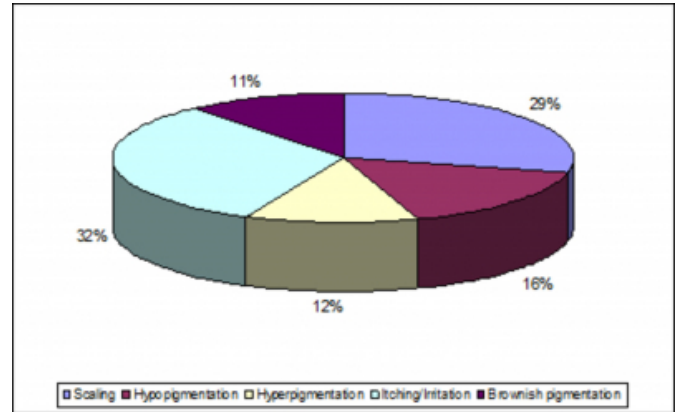


Figure 4

Fig. 3: Photograph of superficial fungal lesion



Figure 5

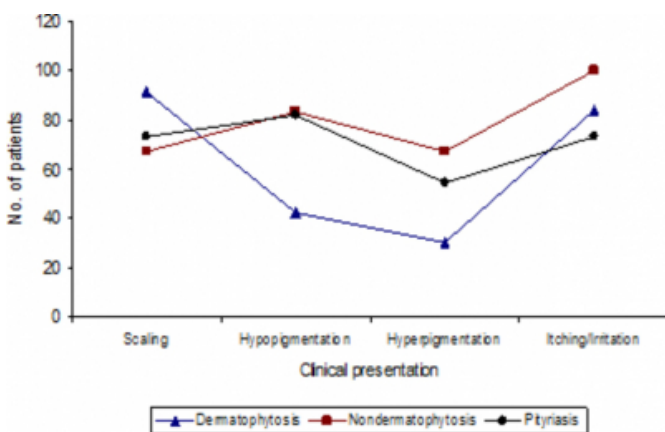
Fig. 4: Pityriasis versicolor- hypopigmented lesions over back



But the dermatophytic and non- dermatophytic infection does not showed any difference in clinical presentation. There was overlapping of the symptoms caused by different fungal pathogens (Fig.5), so it will not be possible to identify the aetiological agent by looking the clinical presentation of infection alone. This makes laboratory procedures essential for definitive diagnosis of superficial fungal infections.

Figure 6

Fig. 5: Clinical presentations in patients with different superficial fungal infections



The duration of the diseases varied from one week to ten years. Most of the patients had the disease for less than one year. Recurrent episodes of mycotic infections of the skin were recorded in 4 patients. But the microscopic observation and culture techniques produce a significant difference that is out of the 91 cases 42 were positive for direct microscopy

and 64 by culture. Out of the 16 cases of pityriasis versicolor, only 9 cases were positive for direct microscopic examination and 11 were positive for culture. Out of the 11 positive culture cases 3 does not showed the evidence of fungal elements by direct microscopy while one out of 5 culture negative cases was positive for direct microscopy.. The commonest site of involvement was neck, back, followed by chest, arms and face.

In case of other (75) superficial fungal infections only 33 cases were positive for direct microscopic examination and 53 cases were positive for culture. Out of this 75, four of them were nail scrapings and only one was positive for direct microscopy among the four. Where as, all the four cases were positive for culture technique. When the results of direct microscopy and culture techniques were compared, it was found that there was a significant difference in the detection of causative fungi in the sample. Thus it is interpreted that the direct microscopy alone will lead to false negative results more than culture method. T. corporis was the most common clinical type of dermatophytosis observed in the present study followed by T. pedis, T. cruris, T. unguium, T. manuum and T. capitis (Table 2). The frequently isolated fungi was T. rubrum (in 22 cases), followed by T. mentogrophytes (in 18 cases), E. floccosum (in 3 cases), Microsporum nanum (in one case),and T. violaceum(in one case).

Similarly, non dermatophytic molds were isolated from 6 patients and vigorous growth of C. albicans was seen in 2 cases. The non-dermatophytic molds were Scopulariopsis sp, Cladosporium sp, Curvularia sp, Aspergillus nidulans and Chrysosporium sp. The calculated total prevalence rate of superficial mycosis at Malappuram district of Kerala was 0.0177. In males it was found as 0.0125 and in females 0.0224. Categorization of cases by socio - economic status also carried out (Fig. 6).

Figure 7

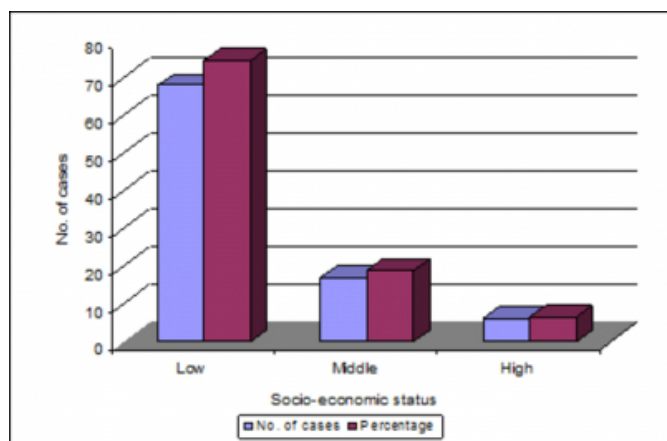
Table 2: Isolation of Dermatophytes from different clinical types

Clinical Types	<i>T.rubrum</i>	<i>T.mentagrophytes</i>	<i>T.violaceum</i>	<i>E.floccosum</i>	<i>M.nanum</i>
T.corporis	10	4	1	-	-
T.pedis	2	5	-	-	-
T.cruis	5	1	-	-	-
T.unguium	1	2	-	-	1
T.manuum	1	3	-	-	-
T.faciei	3	1	-	3	-
T.capitis	-	2	-	-	-
Total no. Of cases	22	18	1	3	1

(-) Negative

Figure 8

Fig. – 6. Categorization of cases by socio-economic status



It revealed that the highest prevalence of superficial mycoses was seen in low socio economic status with 68 cases (74.72%) followed by middle socio economic status with 17 cases (18.68 %) and least incidence in high socio economic status with 6 cases (6.6%).

DISCUSSION

The present study is an attempt to find the species prevalence and the epidemiological characteristics of various etiological agents with superficial fungal infections at Malappuram district, Kerala, India. The high humid climatic conditions prevailing at Kerala is a stimulant for various superficial fungal infections (Ranganathan et al., 2001; Sharma and Gupta, 1983). In the present investigation the maximum number of patients was in the age group of 20 – 30 (30.7%). Several workers also reported this in their study on pityriasis versicolor (Peerapur et al., 2004; Vijaya et al., 2004). This increased incidence of fungal infections may be due to the hormonal change and /or increase in sebum

secretion (Chander, 2002). The study on dermatophytosis at Tirupati reported male preponderance with female ratio was 2:1. Similarly Gupta et al., (2001) have reported male preponderance with female ratio of 2.3:1. In the present study among 91 cases the male preponderance with female ratio was almost 1:1.8 and the age ranges from 1 to 77 years, for both the sexes. The increased female population in this study may be due to the fact that more female patients came for treatment because of cosmetic application problems. But in most of the other studies there was a predominance of male population than females. This was due to more vulnerable infections such as higher exposure to army, school activities, increased sweating and types of shoes and socks they use (Peerapur, 2004; Philpot, 1997).

Morphologically most of the fungal infections were hypo pigmented. Hyper pigmentation was comparatively less. This was similar to the previous reports (Gatha, 2002). Chronic dermatophytosis observed patients were correlated with overcrowding and poor economic status (Prasad, 2005). *T.corporis* was the most common type of dermatophytosis followed by *T. pedis*, *T. faciei*, *T. unguium*, *T. mannum* and *T. capitis* which concurs with reports from other parts on India (Sen and Rahul, 2006). In the present study the incidence of *T. capitis* was very less; this finding had been noticed in many of the previous studies also and was attributed to the use of hair oils, which were customarily used by Indians, to have an inhibitory effect on dermatophytes in vitro. This is very much true with Kerala population in India who regularly applied coconut oil or other types of oil on their hairs (Hajini et al., 1970). In the cases of pityriasis versicolor, it was found to be distributed predominantly over the neck, chest, back, arms, and face as in the case of other studies (Vijaya et al., 2004). Out of the 16 cases, which were presented as pityriasis versicolor, 9 were positive by direct microscopy and 11 were positive by culture. One case which was positive by direct microscopy but not grow in culture. This states that culture is often negative because it is quite difficult to persuade to grow on lab media. The role of *Malassezia* sp has been surrounded by controversy because of their fastidious nature, relative difficulty of isolation, cultivation and identification.

In cases of other superficial fungal infections including deramtophytosis and non-dermatophytosis, dermatophytes were the most commonly isolated fungi in each types of superficial fungal diseases studied. This was also agreed with earlier reports (Maggi, 1996). The non dermatophytic

molds isolated were *Scopulariopsis* sp, *A.nidulans*, *Curvularia* sp, and *Chrysosporium* sp. It was proved that *Scopulariopsis* sp are known to degrade keratin (Malviya et al., 1991). But these non-dermatophytes and *C.albicans* play a minor role in causing superficial fungal infections (Maggi et al., 1996).

In conclusion, the epidemiological characteristic of dermatophytes indicates no significant difference in the distribution of various species of dermatophytes in Kerala as compared to other parts of India. Definitely there is a need to find out changing epidemiological pattern of these infections. Further, the detection of pathogen in clinical samples by culture methods was found to be more sensitive than detection rate of pathogen by direct microscopy in untreated samples. So the present data indicates the necessity of considering the treatment status of the patients when reporting the results of microbiological analysis of superficial fungal infections.

ACKNOWLEDGEMENT

The authors are grateful to Dr.Santhamani, Faculty of Medicine, MES Medical College, Perinthalmanna, Malappuram Dt, Kerala, India for her technical assistance.

References

- r-0. Balin AK. Aging of Human Skin. In: Hazzard.WR., Andres.R., Bierman.EL. Principles of Geriatric medicine and Gerontology 2 nd ed.New York McGraw- Hill, (1990).
- r-1. Brown TE., Chin TW. Superficial fungal infections. In:Dipiro, JJ., Talbert,RL., Yee, GC. Pharmacotherapy: A pathophysiologic approach 5th ed. New York McGraw- Hill, (2000).
- r-2. Chander JC. A text book of medical mycology. Mehta Publishers, New Delhi.(2002) 67-79.
- r-3. Evans EGV, Richardson, MD. General guidelines on laboratory diagnosis.In: Evans,EGV and Richardson,MD. Medical mycology: A practical approach(1st ed). New York. IRL press, (1989).
- r-4. Gatha R, Kuruvilla,Kumar P. Clinico epidemiological studies on *Tinea Versicolor*. *Ind.J. Dermatol. Venereal. Leprol.* (2002) 208-209.
- r-5. Guarro J, Stchigel AM. Development in fungal taxonomy. *Clinic.Microbiol. Rev.* (1999) 454-500.
- r-6. Gupta AK., Kohli Y, Faergemann,J., Sumerbell, RC. Epidemiology of *Malassezia* yeast associated with Pityriasis Versicolor on Ontario. *Can.Med. Mycol.* (2001) 199- 206.
- r-7. Hajini GH, Kandhari KC, Mohapatra LN. Effect of hair oils and fatty acids on the growth of dermatophytes and their in vitro penetration of human scalp hair. *Sabouradia.* (1970) 174.
- r-8. Maggi E, Kema MT, Boni E, Elewski MD. A US epidemiologic survey of superficial fungal diseases. *J.Ameri.Acad.Dermatol.* (1996) 539-542.
- r-9. Malviya HK, Hasija SK, Raja RL. Keratin degradation by *Scopularopsis brevicaulis*. *J.Ind. Bot. Sci.*(1991) 123-126.
- r-10. Moore G S, Jacicow DW. Mycology for the clinical laboratory. Reston publishing company, Virginia.(1979) 113-142.
- r-11. Peerapur BV, Pushpa PV, Stamm P. Clinicomycological study of dermatophytosis in Bijapur.*Ind.J. Microbiol.* (2004) 272- 274.
- r-12. Philpot,CM. Some aspects of the epidemiology of *Tinea.Mycopathologia*, (1997) 62.
- r-13. Pierard G. Onychomycosis and other superficial fungal; infections of the foot in the elderly: A pan European survey. *Eur.J. Epidemiol.*(2001) 220-224.
- r-14. Prasad PVS, Priya K, Kaniarasan PK. A study of chronic dermatophytoses infection in a rural hospital. *Ind. J. Dermatol. Venereal.Leprol.* (2005) 129-130.
- r-15. Ranganathan S, Gokul Sankar, Ranjith MS. Fungal diseases of the skin." The Hindu online edition of Indian national news paper" (2001).
- r-16. Sen SS, Rahul ES. Dermatophytosis in Assam. *Ind. J. Med. Microbiol.* (2006) 77- 78.
- r-17. Sharma LN, Gupta LM. Superficial mycoses in Simla. *Ind. J. Dermatol. Venereal. Leprol.* (1983) 266- 269.
- r-18. Sutton DA, Fother Gill A, Rinaldi MG. Guide to clinically significant fungi. New York. Williams and Wilkins Publishers, (1998).
- r-19. Vijaya D, Kumar A, Leelavathy BH. Mycological study of Pityriasis versicolor. *Jacad Clinic. Microbial.* (2004), 51-54.

Author Information

N. Sivakumar, Ph.D

Department of Microbiology, Faculty of Medicine, 7th April University

A. Karthikeyan, M.Sc., M.Phil.

Department of Microbiology, J.J. College of Arts and Science

A. Vivek, M.Sc., M.Phil.

Department of Microbiology, J.J. College of Arts and Science

M.D. Santhamani

Department of Microbiology, MES Medical College