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# THE ISOLATION OF DERMATOPHYTES AT THE UNIVERSITY HOSPITAL

SOO-HOO TUCK SOON MSc* and BA ADAM MRCP**

*Summary*

A total of 590 samples were collected from patients who attended the skin clinic. The samples were collected over a period of four years, from January 1974 to December 1977. Mycological studies were carried out and 342 or 58.9 per cent of the samples yielded positive culture of dermatophytes. The most common species of dermatophytes isolated were *T mentagrophytes* and *T rubrum. T concentricum* was isolated only from the *Orang Asli*. There was no great difference in the distribution of the species of dermatophytes among the three main ethnic groups. *Microsporum gypseum* was not isolated from any of the clinical specimens though the organism was found to be quite common in the local environment especially in the garden soil.

The superficial mycoses caused by the keratinophilic fungi, the dermatophytes, are a major public health problem in Malaysia. The extent of the infection among the indigenous population is totally unknown due to the paucity of any published works. Though reports of the infections were published by several workers, they were all confined to the British soldiers serving in Malaysia.[1,2,3] The prevalent species of dermatophytes may vary considerably from country to country, and from region to region within a country.[4,5,6] The objective of the present investigation is to establish the prevalence of the types of dermatophytes encountered in local infections and also to obtain information regarding the distribution of the species of dermatophytes among the three principal ethnic groups in Malaysia.

## MATERIALS AND METHODS

A total of 590 samples of skin and nail scraping, and hairs from patients having signs of superficial mycoses seen in the University Hospital were collected over a four year period from January 1974 to December 1977. Materials were collected in small plastic packets or envelopes and were sent directly to the Department of Medical Microbiology for processing. Direct examination of the materials were carried out by mounting the specimen in 40% KOH and examining them microscopically. The remaining materials were then inoculated on to Sabouraud's dextrose agar, 20% malt agar, and potassium tellurite agar. Inoculums were incubated at 30°C and the cultures were examined every third day. Cultures negative after four weeks were discarded. Identification of the isolates was based on the following publications: 1) Dermatophytes, their recognition and identification. Gerbert Rebell & David Taplin, University of Miami Press 1974 and 2) Mycological Diagnosis of Animal Dermatophytes. Jaroslav Dvorak & Milos Otcenasek Dr. W. Junk N.V., The Hague 1969.

## RESULTS

A total of 342 strains of dermatophytes were recovered from 590 clinical specimens examined. Direct microscopic examination showed hyphae and arthrospores in 434 out of the 590 specimens examined, however only 342 of these were culture positive. A total of eight species of dermatophytes were isolated with *Trichophyton mentagrophytes* and *Trichophyton rubrum* being the most common. The other isolates were *Trichophyton violaceum, Trichophyton concentricum, Microsporum canis, Microsporum audouinii* and *Epidermophyton floccosum.*

Table I lists the dermatophytes isolated. Six of the eight species isolated were anthropophilic. Of the anthropophic species, *T rubrum, T mentagrophytes* and *T concentricum* caused the majority of infections. The zoophilic species *M canis* was responsible for the remaining infections. The relationship of the

* Lecturer, Department of Medical Microbiology, Faculty of Medicine, University of Malaya, Kuala Lumpur. (Address for reprint requests)

** Associate Professor, Department of Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur.

isolates to the sites of infections is given in Table I. The most common strain of dermatophytes isolated was *Trichophyton rubrum* followed by *Trichophyton mentagrophytes.* The area most frequently affected by these two species of dermatophytes is the buttock (Table I). *Trichophyton mentagrophytes* was found to affect almost all parts of the body, whereas *Trichophyton rubrum* was limited to a few areas (Table I)

Macroscopic and microscopic study of the 158 strains of *Trichophyton rubrum* locally isolated did not show any unusual form among them. All the strains were of the homogenous type and none of the isolates conformed to the strains as described by Young.[7] *Microsporum canis* was isolated from 15 patients comprising ten Chinese, and five Indians. All patients were male and the prominant areas affected were the body. Only three strains were isolated from the faces of three patients. *Trichophyton concentricum* was found to be confined to the *Orang Asli* (Malaysian aborigines). Scales obtained from the twenty patients, one female and 19 males showed the presence of arthrospores on direct microscopic examination and on culture all the specimens grew *T concentrum* (Table II). One solitary *Trichophyton equinum* was isolated from a male patient who had no history of contact with horses.

Six strains of *Microsporum audouinii* were isolated from the scalps of 6 children and all the isolates exhibited the usual morphological type with no macroconidia but plenty of chlamydospore production. Hair infection in the scalp lesions was of the ectothrix variety. From four cases of inflammatory tinea capitis, 4 strains of *Trichophyton violaceum* were isolated. *Epidermophyton floccosum* was isolated, three strains from the toe nails and one from the groin.

49.2% of all the infections were in Indians (Table II). Fewer females than males were infected (3.8% Chinese, 11.5% Indian, 2.6% Malays and 0.5% Orang Asli). The frequency of *Trichophyton mentagrophytes* infections in males among the three ethnic groups showed only a slight difference. The small number of females infected cases reported was because the majority of the patients were males.

## DISCUSSION

This report represents the first investigation which will provide some preliminary information on the prevalence and distribution of the types of dermatophytes seen in the University Hospital and the kinds of infection caused by them. As most of the patients visiting the University Hospital were urban dwellers, these results may reflect the distribution of the type of dermatophytes and the kind of infections only among the urban population. The results obtained showed that the two most common species of dermatophytes encountered in Malaysia were *Trichophyton mentagrophytes* and *Trichophyton rubrum* which are cosmopolitan dermatophytes.[8,9] This finding concurred with that of Vasu[10] and Kolra et al[11] who found that *Trichophyton mentagrophytes* and *Trichophyton rubrum* were the two organisms responsible for the maximum number of cases of dermatophytoses in India.

*Microsporum gypseum,* the ubiquitous geophilic dermatophyte, which is an established human pathogen was found to be quite common in the soil in Malaysia,[12] and yet the organism was not isolated from any of the patients. The reason could be due to the fact that the people in the urban area were not exposed to the organism because they wear shoes or partly because of the low infectivity of *M gypseum* which is borne out by its minimal clinical manifestations in most parts of the world.[13–23] *Microsporum canis* was not isolated from any of the Malay patients. This could be explained. Since the Malay people are Muslim who are not allowed to keep dogs as pets, the chances of exposure to *M canis* are small. Almost all the 15 species of *M canis* were isolated from people who had either kept dogs as pets or who had come in contact with them. In a few cases, *M canis* was isolated both from the dogs and the owners. The isolation of *Trichophyton concentricum* from the *Orang Asli* who are Polynesian stock, reaffirmed the observations made by Marple[24] and Smith and Marple[25] that *Trichophyton concentricum* infects only people of Polynesian origin. However, it is strange that Malays who are also of Polynesian origin, are not susceptible to the infection. Several attempts to isolate *Trichophyton concentricum* from Malays who work in the *Gombak Orang Asli Hospital,* and who have been constantly in contact with *Orang Asli,* have failed.

The number of infected females was lower

TABLE I

DEMATOPHYTES ISOLATED IN RELATION TO SITES

| Dermatophytes | No. of isolates | Fingernail | Toe nail | Foot | Scalp | Groin | Hand | Buttock | Body | Face |
|---|---|---|---|---|---|---|---|---|---|---|
| *M audouinii* | 6 | – | – | – | 6 | – | – | – | – | – |
| *M canis* | 15 | – | – | – | – | 6 | 4 | 2 | – | 3 |
| *T mentagrophytes* | 132 | 5 | 3 | 2 | – | 3 | 3 | 108 | 7 | 1 |
| *T rubrum* | 158 | – | – | 5 | – | 3 | 6 | 123 | 21 | – |
| *T violaceum* | 6 | – | – | – | 4 | – | – | 2 | – | – |
| *T equinum* | 1 | – | – | – | – | – | – | 1 | – | – |
| *T concentricum* | 20 | – | – | – | – | 5 | – | – | 15 | – |
| *E fluccosum* | – | – | – | – | – | – | – | – | – | – |
| Total: | 342 | 5 | 3 | 7 | 10 | 17 | 13 | 236 | 43 | 4 |

TABLE II

DISTRIBUTION OF DERMATOPHYTES IN RELATION TO ETHNIC GROUPS AND SEX

| | No. of isolates | Chinese | | Indian | | Malay | | Orang Asli | |
|---|---|---|---|---|---|---|---|---|---|
| | | M | F | M | F | M | F | M | F |
| *T mentagrophytes* | 132 | 27 | 5 | 47 | 18 | 27 | 8 | – | – |
| *T rubrum* | 158 | 50 | 8 | 68 | 21 | 10 | 1 | – | – |
| *T violaceum* | 6 | 1 | – | 4 | – | 1 | – | – | – |
| *T equinum* | 1 | 1 | – | – | – | – | – | – | – |
| *T concentricum* | 20 | – | – | – | – | – | – | 18 | 2 |
| *M audouinii* | 6 | 2 | – | 4 | – | – | – | – | – |
| *M canis* | 15 | 10 | 0 | 5 | – | – | – | – | – |
| *E fluccosum* | 4 | – | – | 1 | – | 3 | – | – | – |
| Total: | 342 | 91 | 13 | 129 | 39 | 41 | 9 | 18 | 2 |
| Percentage: | 100% | 26.6% | 3.8% | 37.7% | 11.5% | 12.0% | 2.6% | 5.3% | 0.5% |
| | | 30.4 | | 49.2 | | 14.6 | | 5.8 | |

than that of males regardless of ethnic group. These findings agreed with those of other investigators.[26–31] However, a study of dermatophytoses in Thailand showed a slight preponderance of female patients.[32]

The percentage of positive cultures obtained compared favourably with that of Klokke and Durairaj,[33] Wagle *et al*[6] in India and that of Taylor *et al*[32] in Thailand. The percentage difference in the distribution of the dermatophytes among the three ethnic groups was fairly wide especially between the Malays and the other two races, the Chinese and Indians. However, in evaluating this finding, it should be remembered that a greater proportion of the patients seen were Indians and Chinese. However, among the *Orang Asli* no other dermatophytes other than *Trichophyton concentricum* was isolated. This 'exclusive' susceptibility of the *Orang Asli* to *Trichophyton concentricum* infection may be a reflection of the culture, habits and life style of these people. In Malaysia,

*Trichophyton mentagrophytes* and *Trichophyton rubrum* were found to have almost the same predilection for the three main ethnic groups. This absence of differences was because the three ethnic groups studied are all Asians. On the other hand, the study of Brede[34] and Allen and Taplin[35] showed that *Trichophyton mentagrophytes* infection varied greatly among the Negros, Asians and Caucasians. According to Desai and Bhat[36] and Desai[37], *Trichophyton rubrum* infections were common in Indians especially tinea pedis caused by *T rubrum.* These findings were thought to be due to the custom of wearing open sandals. In this finding, most of the *T rubrum* infections were found in the adults and this agreed with observation of Desai and Bhat[36] that adults had a higher susceptibility to *T rubrum* infections than children. The above reports are consistent with the observations made by many other investigators that *T rubrum* infections have become the most prevalent in many countries.[4,38–40] The susceptibility of the *Orang Asli* to *Trichophyton concentricum* needs to be investigated more thoroughly.

## REFERENCES


1 Sanderson PH and Sloper CJ: Skin disease in British Army in S.E. Asia. Br J Derm 65: 252–264, 1953.

2 Gill, D: Some clinical features of ringworm in Malaya and Hong Kong. J Ray Army Med Corps 105: 120–125, 1959.

3 Harris GF: Fungal infection in an infantry battalion in Malaya. Proc Roy Soc Med 55: 562–563, 1962.

4 Cabrita J: Human mycoses in Portugal (1960–1973). Mycopathol Mycol Appl 54: 347–360, 1974.

5 Gentles JC, LaTouche CJ and Tyagi SC: A strain of Trichophyton rubrum endemic to Nigeria Sabouraudia 3: 321–323, 1964.

6 Smith, JM, Rush-Munro FM: An unusual strain of Trichophyton rubrum from Fiji. Sabouraudia 9: 153–156, 1971.

7 Young, CN: Range of variation among isolates of Trichophyton rubrum. Sabouraudia 10: 164–170, 1972.

8 Ajello, L et al: Laboratory Manual for Medical Mycology, 2nd edition, U S Dept HEW, PHS, C D C, Atlanta. Publication No 994, P D 47, 1963.

9 Wagle, UD, Bhawe, GG and Deodhar, L P: Mycological study of 768 cases of dermatomycosis. J Postgrad Med 21: 107–110, 1975.

10 Vasu, DR: Studies in medical mycology. Indian J Med Res 54: 468–474, 1966.

11 Kalra SL, Mohapatra, LN and Gugnani, HC: Etiology of dermatomycosis in Delhi. Indian J Med Res 52: 553–558, 1964.

12 Soo-Hoo TS: Ph D thesis, in preparation.

13 Rieth H: Nachweis and Einteilung der Deomatophyton unter Answerbung des Krankengutes der Universitats-Hautklinik Hamburg von 1951 bis 1955. Dermatol. Washenshrift 133: 633–637, 1956.

14 Blandin PD: Tinea corporis verusacht durch Micr. gypseum, einem in Deutschland seltenen Dermatophyten. Zeitschrift fur Haut – und Geschlesch Eskrankheiten und deren Grenzgebiete 33: 346–352, 1962.

15 De Montemayor, L and Heredia De Gamero B: Analisis de 6000 especimenes micrologicos sintesis estadistica commentarios. Mycopathol. et Mycol. Appl. 18: 1–83, 1962.

16 Restrepo-Moreno A *et al*: A review of medical mycology in Columbia, South

America. Mycopath. et Mycol. Appl. 17: 93–110, 1962.

17 Kaben, U: Die Haufigkeit der Dermatomykosen im Rostocker Raum. Mykosen 6: 102–106, 1963.

18 Nazare IP, Pereira AM and Goncalves A P: Dermatophytic flora of Rio de Janeiro. Revista brasiliera de medicina 20: 720–722, 1963.

19 Vanbreuseghem, R: Dermatophytes from the Republic of Congo and Ruanda – Burundi. New description of Microsporum rivalieri Sabouraudia 2: 215–224, 1963.

20 Chmel, L: Studia o epidemiologii a experimentalnej terapii dermatomykoz. Sloveska akademia vied Bratislavia, 1964.

21 Carrion, AL: Dermatomykosen in Puerto Rico. Archiv fur Dermatologie und Syphilis 19: 431–438, 1965.

22 Bohme, H, Uber die Dermatophytenflora von Berlin (1955 bis 1964) Dermatologische Washenschrift 152: 873–878, 1966.

23 Prochccki, H: Incidence of dermatomycoses in Poland. Mykosen 10: 221–224, 1967.

24 Marples, MJ: Microbiological studies in Western Samoa II. The isolation of yeast-like organisms from the mouth, with a note of some dermatophytes isolated from lesions of tinea corporis. Trans Roy Soc Trop Med Hyg 54: 166–170, 1960.

25 Smith, JM and Marples, MJ: Ringworm in the Soloman Islands. Trans Roy Soc Trop Med Hyg 58: 63–67, 1964.

26 Legge, RT, Bonar LA and Templeton H J: Incidence of foot ringworm among college students. Its relation to gymnasium hygiene JAMA 93: 170, 1929.

27 Hall, FT: Cultures and findings in 200 cases of dermatophytosis of the feet. Arch Dermatol. 74: 306–307, 1956.

28 Pinkerton ME, Mullins JF and Shapiro E E: The etiology of superficial fungus infections in Galveston, Texas. A five year survey. Texas Dept. on Biol. Med 15: 26–49, 1957.

29 Teroeni, AA: Tinea capitis survey in Charleston. Arch Dermatol 85: 88–91, 1961.

30 Cabrita, J and Figueiredo, MM: Dermatophytes in Portugal. Sabouraudia. 11: 21–29, 1973.

31 Blank, F and Mann SJ: Trichophyton rubrum infections according to age, anatomical distribution and sex. Br J Dermatol 92: 171–174, 1975.

32 Taylor, RL' Kotrajaras R and Jotisankasa, V: Occurrence of dermatophytes in Bangkok, Thailand. Sabouraudia 6: 307–311, 1968.

33 Klokke, AH and Durairaj, P: The causal agents of superficial mycoses isolated in rural areas of South India. Sabouraudia 5: 153–158, 1967.

34 Brede, HD: Dermatophytes in Southern Africa. In essays on Tropical Dermatology. J Marshal ed Excerpta Medica Amsterdam 2: 330–338, 1972.

35 Allen, AM: Epidemic Trichophyton mentagrophytes infections in servicemen. Source of infection, role of environment, host factors and susceptibility. JAMA 226: 864–867, 1973.

36 Desai, SC and Bhat, MC. Dermatomycosis in Bombay. A study on incidence. Clinical features incriminating species of dermatophytes and their epidemicity. Indian J Med Res 49: 662–671, 1961.

37 Desai, SC: Superficial mycoses. In essay on Tropical Dermatology. R O G Ph Simons and J Marshall Eds Excerpta Medica. Amsterdam. 1: 223–230, 1969.

38 Rosman, N: Infection with Trichophyton rubrum. Br J Dermatol. 78: 208–212, 1966.

39 Gugnani, HC, Njoku-obi, AN, Okono, A N: The causal agents of superficial mycoses isolated at the University Teaching Hospital Eungu (Nigeria). West Afr Med J June: 111–115, 1974.

40 Blank, F, Maun, SJ and Reale, RA: Distribution of dermatophytosis according to age, ethnic group and sex. Sabouraudia 12: 352–361, 1974.