Dermatophytosis and HIV Infection

A Study in Homosexual Men

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Mycological and clinical investigations were carried out in 193 homosexual men, 83 of whom had HIV antibodies, and 117 heterosexual men. Dermatophytes were recovered from the feet in 37.3% of HIV seropositive homosexual men, 31.8% of seronegative homosexual men and 8.6% of heterosexual men. Tinea pedis in homosexual men was significantly more common with increasing age. There was an increased number of sexual partners in the group of homosexual men with tinea pedis. Two dermatophytes were recovered from single samples in 14.5% of homosexual men with dermatophytosis. Dermatophytes were occasionally isolated from clinically normal toe clefts. Present results point to the importance of dermatophytes in nail dystrophy affecting patients with advanced HIV infection. Dermatophytosis in homosexual men was not associated with any changes in counts of blood T lymphocyte subsets or skin reactivity to tuberculin. *Key word: AIDS.* (Received April 30, 1987.)

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Immunosuppression due to medications or immunodeficiency diseases including HIV infection may increase susceptibility to fungal infections. Oral candidiasis is regularly present in the immunocompromised host. In contrast, the relationship of dermatophytosis to immunodeficiency is not well documented. For this reason, it was of interest to assess the importance of HIV infection in the susceptibility to dermatophytosis. We report the results of mycological, clinical and immunological investigations in 193 homosexual men. The relationship between mycological findings, results of HIV antibody tests, lymphocyte phenotypes, intradermal testing with tuberculin and epidemiological data was analysed. Heterosexual men were used for comparison of prevalence figures of tinea pedis.

MATERIAL AND METHODS

Patients

Three categories of patients attending a venereal disease clinic or a department of infectious diseases entered the study.

1. 83 HIV seropositive homosexual men. Median age was 33 years (range 22–51).
2. 110 HIV seronegative homosexual men. Median age was 35 years (range 18–53).
3. 117 heterosexual men. Median age was 27 years (range 17–63). The group consisted of an unselective series of patients attending a venereal disease clinic.

Mycology

In all subjects, irrespectively of any symptom, a skin scraping and swab sample were taken from the fourth interdigital toeweb using a curet and a cotton swab. Skin scrapings were also collected from other sites if clinical signs of dermatophytosis were present. The material was inoculated onto Sabouraud's glucose agar and Dermatophyte test medium (DTM) and incubated at room temperature

for up to 4 weeks. Fungi recovered were identified by standard procedures (1). Thirty-three homosexual men with toe cleft carriage of dermatophytes were mycologically re-examined at a follow-up 18–24 months after their initial visit.

HIV antibodies and lymphocyte subsets

Screening for HIV antibodies in 193 homosexual men was done by enzyme linked immunosorbent assay (ELISA) using a commercially available test (Organon-Teknika). All sera positive by ELISA, were also tested by Western blotting (2, 3) using HTLV-III B virions (4) (obtained as a gift from Dr R. Gallo, National Cancer Institute, Bethesda, USA) and an immunoperoxidase technique. Sera reacting by Western blotting were considered truly positive.

T cell subsets in the blood of 184 homosexual men were determined by direct or indirect immunofluorescence. Monoclonal antibodies to CD4 ("T-helper/inducer subset") and CD8 cells ("T-suppressor/cytotoxic subset") were used. The samples were analysed in an Ortho Spectrum III flow cytometer.

Intradermal testing with tuberculin

Delayed cutaneous hypersensitivity was tested in 31 HIV seropositive and 108 seronegative homosexual men by a commercial kit (Multitest, Mérieux). A delayed type response (erythema and a palpable infiltrate) to tuberculin exceeding 2 mm in diameter after 48 h was considered positive.

Statistical methods

Student's t-test or χ^2 analysis as appropriate were used to assess the significance of the results. Values of $p<0.05$ were accepted as statistically significant.

RESULTS

Dermatophytes were recovered from the feet in 37.3% of HIV seropositive homosexual men, 31.8% of seronegative homosexual men and 8.6% of heterosexual men. *Trichophyton rubrum* was the predominant species. Other dermatophyte species were, in decreasing frequency, *Trichophyton mentagrophytes* and *Epidermophyton floccosum*. The vast majority of dermatophytes isolated from the feet were found in toe cleft specimens. Results from mycological and clinical investigations of toe clefts are shown in Table I. No significant difference was seen between HIV seropositive and seronegative homosexual men when comparing feet or toe cleft carriage of dermatophytes. The frequency of dermatophytes isolated from the feet correlated with age (Table I). Thus, toe cleft carriage of dermatophytes was found in 17.5% of 57 homosexual men under the age of 30 and in 40.7% of 91 homosexual men over the age of 34 ($p<0.01$). There was a difference between

Table I. *Dermatophyte cultures from the toe clefts and frequencies of clinical signs in HIV seropositive homosexual men, HIV seronegative homosexual men and heterosexual men*

	I. HIV pos. homosexual men		II. HIV neg. homosexual men		III. Heterosexual men	
	n	%	*n*	%	*n*	%
Pos. culture	29/83	34.9	33/110	30.0	10/116	8.6
Age group						
<25 yrs	0/7	0	2/10	20.0	1/43	2.3
25–34 yrs	13/41	31.7	10/44	22.7	5/45	11.1
>35 yrs	16/35	45.7	21/56	37.5	4/28	14.3
Rel. frequency of *T. rubrum*	21/29	72.4	25/33	75.8	6/10	60.0
Toe cleft lesions	62/83	74.7	76/110	69.1	77/116	66.4

homosexual and heterosexual men with respect to the prevalence of dermatophyte carriage. As appears from comparing individuals matched for age, dermatophytes were isolated from the feet in 40.7% of homosexual men over the age of 34 (mean 40.0 years), and 14.3% of heterosexual men over the age of 34 (mean 43.4 years), which was a significant difference ($p<0.05$).

Some abnormality of the toe cleft appearing as scaling, maceration, fissuring or erythema was observed in a majority of subjects in all study groups (Table I). Interdigital scaling was the sole symptom in 45% of toe cleft dermatophytosis. Scaling was, however, a common finding in subjects with no dermatophyte findings. Coexisting scaling, maceration and fissuring of toe clefts were only observed in subjects with dermatophytosis. There was a similar clinical pattern elicited by the different dermatophyte species.

Two dermatophytes coexisted in cultures collected from the toe clefts of 9 homosexual men constituting 4.7% of all homosexual men or 14.5% of those carrying dermatophytes. None of the heterosexual men were harbouring 2 species of dermatophytes.

Dermatophytes were isolated from 4/55 (7.3%) of homosexual men with clinically normal toe clefts. By contrast, heterosexual men only yielded dermatophytes from toe cleft lesions.

The number of different sexual partners in the past 12 months was significantly higher in homosexual men with tinea pedis (geometric mean 19.4) as compared to homosexual men without tinea pedis (geometric mean 12.8) ($p<0.05$). There was no correlation between age and number of sexual partners.

19/22 (86.4%) of homosexual men with *T. rubrum* infection were still positive on a follow-up culture after 18–24 months as compared to 3/11 (27.3%) of homosexual men carrying other dermatophytes, which was a significant difference ($p<0.01$).

Tinea cruris was found in 6 of 193 homosexual men (3.1%). The causative dermatophytes were also isolated from the feet in 4/6 subjects. Extensive dermatophytosis was not seen in any case. Dermatophytes were only isolated from feet, toe nails or groins.

16/46 homosexual men suffering from advanced HIV infection presented toe nail changes with discoloration. At the time of enrolment in this study, dermatophytes were isolated from toe clefts and/or toe nails in 11/16 (68.8%) patients developing nail changes as compared to 1/30 (3.3%) with apparently normal toe nails ($p<0.001$).

Geometric means of CD4 and CD8 cells were determined in 184 homosexual men. No relationship was found between counts of these lymphocyte subsets and dermatophytosis (data not shown). HIV seropositive homosexual men had a significantly lower CD4 cell count ($p<0.001$) and a significantly greater CD8 cell count ($p<0.001$) than HIV seronegative homosexual men.

The frequency of tuberculin anergy was significantly higher ($p<0.001$) in HIV seropositive compared with seronegative homosexual men. There was, however, no significant difference in frequency of tuberculin anergy in homosexual men with dermatophytosis as compared to homosexual men with no evidence of dermatophytosis (data not shown).

DISCUSSION

Dermatophytes are rarely reported as agents of cutaneous infection in the immunosuppressed patient (5), although immunodeficiency is occasionally connected with widespread dermatophytosis, recalcitrant to therapy. In this study, 83 HIV seropositive homosexual men were mycologically examined and serially followed up with clinical investigations. Not less than 37% of HIV seropositive patients carried dermatophytes, but this was not significantly different compared with HIV seronegative homosexual man. It is noteworthy that extensive dermatophytosis has not been found in any of our patients, 12 of whom have

developed AIDS during the observation period. The dermatophytoses observed have been restricted to feet, toe nails or groins. It thus appears that HIV infection does not generally predispose to widespread dermatophytosis or give rise to a change in the spectrum of dermatophytosis, possibly with the exception of toe nail infections. In keeping with our clinical observations there was no significant change in T cell subset counts or skin reactivity to tuberculin in patients with dermatophytosis.

Tinea pedis was more frequent with increasing age, which probably reflects an accumulation of individuals with a chronic disease. The prevalence of tinea pedis in heterosexual men compared well with the results of a recent study of tinea pedis in Danish recruits (6). The difference in prevalence of tinea pedis between the homosexual and heterosexual men studied may be at least partly explained by a different degree of exposure to dermatophytes. The occurrence of dermatophyte infections with 2 species in some homosexual men may reflect a large exposure to dermatophytes. An increased number of sexual partners, representing a life style parameter, was associated with tinea pedis, which may also point to the importance of exposure factors. *T. rubrum* is known to be the most common cause of chronic dermatophytosis (7) and there was clear evidence linking *T. rubrum* with long-lasting tinea pedis in our patients.

Clinical changes, similar to those of tinea pedis are common findings in patients with no dermatophytosis. Toe cleft lesions were found in 66–75% of our patients, which corresponds well with the results of Svejgaard et al. (6). The frequency of dermatophytes in toe cleft lesions in our study varied from 13% (heterosexual men) to 42% (homosexual men). Whatever the reason for this discrepancy, it is likely that other infections frequently coexist with dermatophytosis and contribute more or less extensively to the clinical changes.

Chernosky et al. (8) have described nail changes in patients with AIDS and referred to it as the yellow nail syndrome. However, they did not detect the classic triad of yellow nails, lymphedema and pleural effusion. Several clinical conditions may produce nail changes similar to those of the yellow nail syndrome. A culture diagnosis of tinea unguium often fails. Thus, the aetiology of yellow nails should be assessed with great care. Our mycological findings point to the importance of dermatophytes in nail changes affecting patients with advanced HIV infection.

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