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CLINICAL REPORT

The Prevalence of Onychomycosis in Patients with Psoriasis and other Skin Diseases

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Onychomycosis among psoriasis patients is reported with varying prevalence. This prospective, controlled study investigates the occurrence of onychomycosis among inpatients with psoriasis versus inpatients with other skin diseases. The inclusion period was 15 months. Scrapings from clinically abnormal nails (both fingernails and toenails) were examined using microscopy and culture. The prevalence of onychomycosis in patients with psoriasis was 17/79 = 21.5% compared to 18/142 = 12.7% for patients with other skin diseases ($p = 0.13$). In 17 mycologically positive psoriasis patients, dermatophytes, yeasts and moulds were isolated in 8, 10 and 4 cases, respectively, and in 18 mycologically positive patients with other skin diseases in 12, 7 and 5, respectively. Onychomycosis occurred more frequently in men than in women (psoriasis patients ($p = 0.02$), patients with other skin diseases ($p = 0.03$)). Psoriasis patients had a higher frequency of abnormal nails (82.3%) compared to patients with other skin diseases (37.3%) ($p < 0.01$) and more severe affection of their toenails than patients with other skin diseases ($p < 0.01$). It is concluded that the frequency of onychomycosis among inpatients with psoriasis compared to inpatients with other skin diseases is not significantly different. *Key words: dermatophytes; fungal infection; dermatology.*

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Onychomycosis in toenails is the most common nail disorder with a prevalence of 4.1% in patients from Danish general practices (pers. comm., Svejgaard). Prevalences of 2.7% and 8.4% have been observed in England and Finland, respectively (1, 2). The frequency increases with age, and onychomycosis occurs more often in men than in women and more often in toenails than in fingernails. Onychomycosis is mainly caused by dermatophytes, of which *Tricophyton (T.) rubrum* plays the main role, while yeasts are responsible for about 5% and non-dermatophyte moulds for 1–3% (3). Patients with psoriasis often have nail abnormalities. These are due to psoriasis itself, but may also occur in combination with onychomycosis (4, 5). Nail abnormalities in psoriasis may present as pitting, oil spots, subungual hyperkeratosis as well as thickening and change in colour of the nail. Excepting the first two abnormalities mentioned, the clinical manifestations may be confused with onychomycosis, and it is therefore clinically difficult to distinguish between psoriasis and onychomycosis. Psoriasis of the nail may cause a higher susceptibility for infection with dermatophytes. In contrast, an infection with dermatophytes theoretically might induce a local Köbner reaction. It is therefore important to clarify how frequent onychomycosis occurs in psoriasis patients. In the literature there are reports of variable frequencies of onychomycosis in psoriatics. The prevalence has been estimated (i) to be higher than among comparable healthy controls (4), (ii) to occur with almost the same frequency (5, 6), and (iii) to occur with a lower frequency compared to healthy controls (7).

The aim of this study was to examine the prevalence of onychomycosis among inpatients with moderate to severe psoriasis and also among inpatients with other skin diseases.

MATERIALS AND METHODS

Patients

Patients with psoriasis and patients with other skin diseases were included from the in-patient clinic, at the Department of Dermatology, Bispebjerg University Hospital, Copenhagen, during October 1999 – January 2001. The study was approved by the Regional Scientific-Ethical Committee and informed consent was obtained from all participants. The ages of the included patients were ≥ 18 years and ≤ 70 years. Patients were excluded if systemic or topical antimycotic drugs were given within the last four months or within the last month, respectively. For each patient age, sex, and type of skin disease was registered, and for patients with psoriasis also the duration of disease.

Clinical examination

The following parameters were clinically scored: Area of abnormal nails: 0 = no change, 1 = 0–30%, 2 = 30–60%, 3 = > 60% change of the nail area. Hyperkeratosis, onycholysis, paronychial inflammation, colour change of the nail,

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pitting and oil spots were graded separately on a 4-point scale: 0 = no changes, 1 = mild, 2 = moderate and 3 = severe changes of each of the evaluated parameters. A total score was summarized for the parameters, except for pitting and oil spots, which are not specific features in onychomycosis. Three investigators took part in the clinical examinations. Each patient was examined by one doctor.

Mycological examination

Only clinically abnormal nails were examined for onychomycosis. Nail scrapings were obtained from a maximum of four fingernails and/or four toenails from each individual. The material was examined with direct microscopy using Calcofluor white (8) and a fluorescence microscope. Cultures were performed on Sabouraud-glucose-agar + chloramphenicol ± cycloheximid.

Dermatophytes were identified according to their macro- and microscopic morphology. Dermatophytes identified only by microscopy were also considered significant for dermatophyte infection (4). Yeasts were further identified using CHROM-agar Candida (9). Moulds were not further identified, and only those with positive microscopy ± positive culture were registered as moulds.

Statistical methods

Non-parametric statistics was used for data presentation and comparisons between groups. Consequently, medians with 25th and 75th percentiles were used for descriptive statistics and the Mann-Whitney test for 2-group unpaired comparisons. Fisher's exact test was used for frequency analysis. $P \leq 0.05$ was regarded as statistically significant.

RESULTS

Seventy-nine patients with psoriasis and 142 with other skin diseases were included in the study. Patients with psoriasis had a higher frequency of abnormal fingernails and toenails (82.3%) as compared to other dermatological patients (37.3%) ($p < 0.01$) (Table I). The overall median duration of psoriasis was 22 (10 – 31) years. For psoriasis patients with onychomycosis the disease duration was 25 (14 – 30) years and for those without onychomycosis it was 20 (8 – 30) years ($p = 0.30$).

Table II illustrates the frequencies of onychomycosis

Table I. *Demographic data of patients with psoriasis and other skin diseases*

	Psoriasis patients			Patients with other skin diseases[a]		
	Overall	Women	Men	Overall	Women	Men
Age, median (25th – 75th percentiles)	49 (43 – 60)	54 (44 – 63)	47 (40 – 57)	51 (33 – 58)	50 (28 – 57)	51 (38 – 60)
Number (*n*, (%))	79 (100)	34 (43.0)	45 (57.0)	142 (100)	65 (45.8)	77 (54.2)
Patients with:						
Abnormal nails (*n*, (%))	65* (82.3)	26* (32.9)	39* (49.4)	53 (37.3)	20 (14.1)	33 (23.2)
Abnormal toenails only (*n*, (%))	62* (78.5)	25* (31.6)	37* (46.8)	49 (34.5)	17 (12.0)	32 (22.5)
Abnormal finger-nails only (*n*, (%))	35* (44.3)	11** (13.9)	24* (30.4)	11 (7.7)	6 (4.2)	5 (3.5)

[a]Mainly erysipelas, atopic dermatitis, eczema, sclerodermia and bullous skin diseases. Data are compared for subgroups of patients with psoriasis and other skin diseases. *$p < 0.01$, **$p < 0.02$.

Table II. *Mycological results from patients with psoriasis and other skin diseases*

	Psoriasis			Non- psoriasis		
	Total no. of patients $n = 79$	Patients with abn. fn $n = 35$	Patients with abn. tn $n = 62$	Total no. of patients $n = 142$	Patients with abn. fn $n = 11$	Patients with abn. tn $n = 49$
Dermatophytes total	8 (10.1%)	1 (1.3%)	8 (10.1%)	12 (8.5%)	0 (0%)	12 (8.5%)
Trichphyton rubrum	6	0	6	3	0	3
Trichophyton mentagrophytes	1	0	1	5	0	5
Epidermophyton floccosum	0	0	0	1	0	1
Positive microscopy	1	1	1	3	0	3
Yeasts total	10 (12.7%)	5 (6.3%)	7 (8.9%)	7 (4.9%)	2 (1.4%)	5 (3.5%)
Candida albicans	2	0	2	2	1	1
Candida krusei	7	5	4	5	1	4
Trichosporon beigelii	1	0	1	0	0	0
Moulds, non-dermatophytes total	4 (5.1%)	0 (0%)	4 (5.1%)	5 (3.5%)	1 (0.7%)	4 (2.8%)
TOTAL number of patients	17 (21.5%)	6 (7.6%)	19 (24.1%)	18 (12.7%)	3 (2.1%)	21 (14.8%)

Onychomycosis occurred in 17 patients with psoriasis and in 18 non-psoriatics. The occurrence of mixed infections makes the number of positive organisms exceed the number of patients. Furthermore, some patients had onychomycosis in both their fingernails and toenails. Abn. fn = abnormal fingernails. Abn. tn = abnormal toenails.
Data are compared for subgroups of patients with psoriasis and other skin diseases (non-psoriasis).
No significant differences were found.

in patients with psoriasis (17/79 = 21.5%) and in patients with other skin diseases (18/142 = 12.7%) ($p = 0.13$).

Dermatophytes

Dermatophytes were demonstrated in 8 of 79 psoriasis patients (10.1%), (mainly *T. rubrum*), compared to 12 of 142 (8.5%) non-psoriatics (mainly *T. mentagrophytes*) ($p = 0.85$). Dermatophytes were found more frequently in men than in women in both psoriasis and non-psoriasis patients, i.e. 8 versus 0 ($p = 0.02$) and 11 versus 1 ($p = 0.03$), respectively. Dermatophytes in fingernails were found in one person only (Table II).

The median age of psoriasis patients with dermatophytosis (51.5, 40.5 – 64 years) was similar to the median age of psoriasis patients without dermatophytosis (49, 42.5 – 59 years) ($p = 0.75$). For non-psoriatics with dermatophytosis the median age (57.5, 52 – 65 years) was significantly higher than for those without dermatophytosis (50, 30.5 – 57 years) ($p = 0.01$).

Yeast

Yeasts were demonstrated in 10 of 79 psoriasis patients (12.7%), (mainly *Candida (C.) krusei*), and in 7 of 142 non-psoriatics (4.9%), (mainly *C. krusei*) ($p = 0.08$). Furthermore, there was no significant difference between women and men having yeast in their nails, neither among the psoriatics ($p = 0.74$), nor among the non-psoriatics ($p = 0.47$).

Moulds, non-dermatophytes

Moulds were demonstrated from only a few patients; 4 psoriasis patients and 5 patients with other skin diseases.

Severity of nail affection (total score)

The total scores of clinical toenail affection did not differ from those of clinical fingernail affection within psoriasis patients ($p = 0.54$) and within patients with other skin diseases ($p = 0.11$) (Fig. 1). However, the psoriasis patients had a significantly higher total score for their toenails (19.0, 9.0 – 38.0) compared to the non-psoriatics (7.0, 4.0 – 16.0) ($p < 0.01$) (Fig. 1). No differences were seen between the two groups concerning fingernails ($p = 0.83$).

In both patient groups, the severity of nail affection in patients with onychomycosis did not differ from that in patients without onychomycosis (Fig. 2).

DISCUSSION

The present study is a prospective, controlled study, in which the prevalences of dermatophytes and yeasts were not significantly higher in psoriasis patients than in patients with other skin diseases ($p = 0.85$ and $p = 0.08$, respectively) (Table II). A higher number of the psoriatics included might have found a significantly higher frequency of yeasts in this patient group.

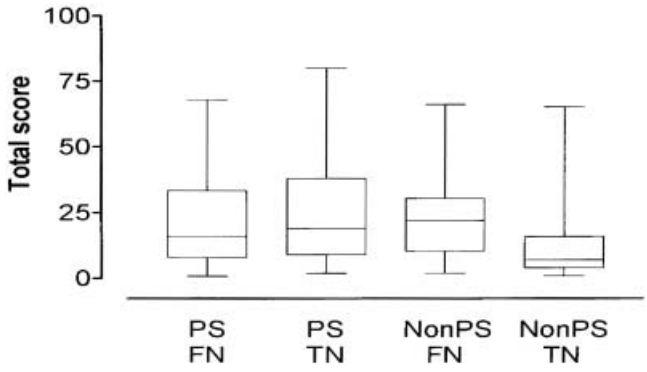

Fig. 1. The total scores of clinically abnormal fingernails (FN) and toenails (TN) are illustrated for patients with psoriasis (PS) and patients with other skin diseases (NonPS). The box extends from the 25th percentile to the 75th percentile with a horizontal line at the median value (50th percentile); whiskers extend from the minimum value to the maximum value.

Several clinical, controlled studies have been published (Table III). As in our study, Staberg et al. (5) and Ständer et al. (6) did not find significant differences between the prevalences of dermatophytes in psoriasis patients compared to non-psoriasis patients (12.3% and 9.8%, respectively). Gupta et al. found a higher prevalence (8.0%) in the psoriasis group (4). However, as can be seen from Table III this prevalence did not differ from Ständer et al. (6). Götz et al. (7) found a lower prevalence in the psoriasis group (14%) compared to the non-psoriasis group (32.7%), but a higher prevalence compared to the psoriasis groups in the studies mentioned above. The very high amount of dermatophytes in the nails of the control group is probably due to a high occurrence of fungal infections in the Ruhr district where the controls came from (7).

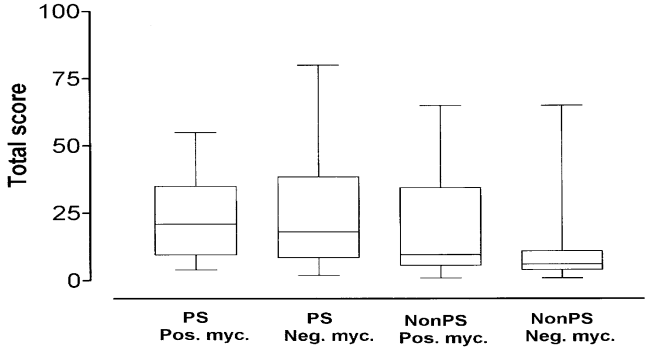

Fig. 2. The total scores of abnormal toenails are illustrated for patients with psoriasis (PS) and for patients with other skin diseases (NonPS) for both positive (Pos. myc.) and negative (Neg. myc.) mycological examinations. The box extends from the 25th percentile to the 75th percentile with a horizontal line at the median value (50th percentile); whiskers extend from the minimum value to the maximum value. Onychomycosis in fingernails was seen in only a few patients and, therefore, is not illustrated.

Table III. *Review of studies on onychomycosis in psoriasis patients*

Author, year	Psoriasis patients			Non-psoriasis		
	n	Dermatophytes (%)	Yeast (%)	*n*	Dermatophytes (%)	Yeast (%)
Zaias (11) 1969	15	0	Some*	n.d.	n.d.	n.d.
Götz (7) 1974	100	14.0	16.0	1000	32.7	n.d.
Feuerman (10) 1976	120	24.2	15.0	n.d.	n.d.	n.d.
Staberg (5) 1983	78	12.3	15.4	41	9.8	9.8
Gupta (4) 1997	561	8.0	0.5	922	4.4	0.3
Ständer (6) 2001	250	9.8	23.9	102	10.8	6.9
Present study 2002	79	10.1	12.7	142	8.5	4.9

Some of the studies included both fingernails and toenails (5, 6, 10, present study), while others only included toenails (4, 7). n.d.= not done. *From subungual debris in 40 psoriatic nails of 15 patients, 22 yeasts were isolated.

Staberg et al. found a tendency towards a higher prevalence of yeasts in the psoriasis group, but it was not significantly different from that of the non-psoriasis patients (5). Ständer et al. found a significantly higher prevalence of yeasts in the psoriasis group with nail changes (23.9%) (6). Gupta et al. found that the occurrence of yeasts in the psoriasis group was almost the same as in the non-psoriasis group (4).

The investigations of Feuerman et al. (10) and Zaias (11) represent uncontrolled studies with very divergent results, i.e. dermatophytes present in 24.2% of abnormal nails versus 0 (Table III).

Nail involvement in psoriasis is common, with reported incidences varying from 10% to 50% (11). In this study, 82.3% had nail abnormalities (Table I). The patients in our study were recruited from the inpatient clinic, and could be assumed to be more severely affected than patients from the outpatient clinic, and this might explain the high occurrence of nail abnormalities. We found that the severity of nail affection could not be used as a marker of onychomycosis (Fig. 2).

In the present study, only clinically abnormal nails were examined for onychomycosis, because onychomycosis is uncommon in normal appearing nails according to Gupta et al., i.e. 0.7% (4).

As in other studies (5–7), the occurrence of yeast was relatively high. The presence of *C. krusei* in most of the cases is noteworthy. Actually, the number of psoriasis patients with yeast infection was higher than for those infected with dermatophytes. This finding differs from the distribution of pathogens in onychomycosis in the general population of otherwise healthy individuals, in which dermatophytes are the dominating cause of infection in more than 90%. Probably, the altered subungual tissue and onycholysis may facilitate the invasion of yeasts. Furthermore, the fast turnover of the nails in psoriasis patients theoretically may constitute an effective defence against dermatophytes. We considered moulds as secondary invaders, as repeated cultures were not within the scope of this investigation.

REFERENCES

1. Roberts DT. Prevalence of dermatophyte onychomycosis in the United Kingdom: results of an omnibus survey. Br J Dermatol 1992; 126 Suppl. 39: 23–27.
2. Heikkilä H, Stubb S. The prevalence of onychomycosis in Finland. Br J Dermatol 1995; 133: 699–703.
3. Summerbell RC, Kane J, Krajden S. Onychomycosis, tinea pedis and tinea manuum caused by non-dermatophytic filamentous fungi. Mycoses 1989; 32: 609–619.
4. Gupta AK, Lynde CW, Jain HC, Sibbald RG, Elewski BE, Daniel CR, et al. A higher prevalence of onychomycosis in psoriatics compared with non-psoriatics: a multicenter study. Br J Dermatol 1997; 136: 786–789.
5. Staberg B, Gammeltoft M, Onsberg P. Onychomycosis in patients with psoriasis. Acta Derm Venereol 1983; 63: 436–438.
6. Ständer H, Ständer M, Nolting S. Frequency of fungal involvement in nail psoriasis. Hautarz 2001; 52: 418–422.
7. Götz H, Patiri C, Hantschke D. Das Wachstum von Dermatophyten auf normalem und psoriatischem Nagelkeratin. Mykosen 1974; 17: 373–377.
8. Haldane DJM, Robart E. A comparison of calcofluor white, potassium hydroxide, and culture for the laboratory diagnosis of superficial fungal infection. Diagn Microbiol Infect Dis 1990; 13: 337–339.
9. Odds FC, Bernaerts R. CHROMagar Candida, a new differential isolation medium for presumptive identification of clinically important *Candida* species. J Clin Microbiol 1994; 32: 1923–1929.
10. Feuerman E, Alteras I, Aryelly J. The incidence of pathogenic fungi in psoriatic nails. Castellania 1976; 4: 195–196.
11. Zaias N. Psoriasis of the nail: a clinical-pathologic study. Arch Dermatol 1969; 99: 567–579.