

=Abstract=

## Comparison the Growth Rate between the Affected and the Unaffected Great Toenail in the Same Patients with Onychomycosis

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**Background:** Onychomycosis is a common manifestation of fungal disease, accounting for 50% of all nail problems and a recent rise in the prevalence of onychomycosis has been noted. Despite enormous advances in the treatment of onychomycosis in recent years, treatment frequently fails and recurrences of infection following successful therapy are not uncommon. In order to understand the pathogenesis of onychomycosis, it is crucial to know the factors affecting the nail growth (individual health, age, sex, familial tendency and seasonal factor, etc) and the growth rate of nails.

**Objective:** The purpose of this study was to find any difference of growth rate between affected and unaffected toe nails in the same individual.

**Methods:** During a 2-year-period from February, 1998 to February, 2000, 49 patients who had attended our department with distal subungual onychomycosis affecting only one sided toe nail were recruited. A reference mark (lunula or 3 mm from the border of the proximal nail fold) by CO<sub>2</sub> laser was etched on the nail plate of their both great toe nail. Patients were seen at intervals of 1-2 weeks. At each visit the vertical distance was measured between the lunula or the proximal nail fold and the mark on the nail plate. The growth rate of affected and unaffected toe nails in the same patients was measured. All data are reported as mean  $\pm$ SD and statistical analysis was performed using the paired t-test.

**Results:** The growth rate of the affected great toe nails showed a decrease against that of the unaffected. The affected toe nails were divided to above 50% and under 50% according to the size of invasion of the nail plate by fungi and compared with unaffected toe nails respectively. In under 50% we did not find any statistically significant difference of the growth rate.

**Conclusion:** our study did not support slow linear nail growth as a predisposing factor for onychomycosis. Other factors such as local abnormality of nails which are more common in older patients may be responsible for the increased incidence of onychomycosis in this group.

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**Key Words:** Onychomycosis, Growth rate

49 ( 16 , 33 ) ,  
 (distal subungal onycho-  
 mycosis) 5 65  
 30  
 41.6 ± 14.2 가  
 가 20 ,  
 가 29 ,  
 가 23 , 50% 가 26  
 가 1. 가 3,4 (Table 1). 87.1 ±  
 68.3  
 2.  
 Hillman  
 (distal subungal onychomycosis) 5  
 (lunula)  
 CO<sub>2</sub> laser  
 , 1~2 vernier calipers  
 0.1 mm  
 가  
 (proximal nail fold) 3 mm  
 1.  
 (nail cuticle)  
 1998 2 2000 2 2  
 가  
 49  
 (mm/day) =  
 (Y-X)/ No. of days between observations

**Table 1.** Age, sex, the affected site, and the degree of involvement of the patients with onychomycosis

| Age (yr) | No. of Patient |        |       | Affected Site |      | % of Nail Involvement |     |
|----------|----------------|--------|-------|---------------|------|-----------------------|-----|
|          | male           | female | Total | Total         | Left | <50%                  | 50% |
| 1-9      | 1              | 0      | 1     | 0             | 1    | 1                     | 0   |
| 10-19    | 2              | 0      | 2     | 0             | 2    | 0                     | 2   |
| 20-29    | 3              | 3      | 6     | 2             | 4    | 6                     | 0   |
| 30-39    | 4              | 10     | 14    | 5             | 9    | 9                     | 5   |
| 40-49    | 2              | 9      | 11    | 6             | 5    | 5                     | 6   |
| 50-59    | 2              | 6      | 8     | 2             | 6    | 3                     | 5   |
| 60-69    | 2              | 5      | 7     | 5             | 2    | 2                     | 5   |
| Total    | 16             | 33     | 49    | 20            | 29   | 26                    | 23  |

X: ( 3 mm ) day 가  
 Y: X (p<0.05).  
 2. (Table 2)  
 , , , 가 (p<0.05),  
 paired 가  
 t-test 가 (p<0.05),  
 p-value 0.05 (p>0.05).

1.

(Fig. 1)

0.080 ±0.025 mm/day,  
 0.068 ±0.025mm/day

**Table 2.** The growth rate of the affected and the unaffected great toe nails according to the sex of the patients with onychomycosis

| Sex      | Nail Growth Rate* (mm/day) |              | p-value† |
|----------|----------------------------|--------------|----------|
|          | Affected                   | Unaffected   |          |
| Male     | 0.068 ±0.024               | 0.095 ±0.050 | p<0.05   |
| Female   | 0.069 ±0.026               | 0.073 ±0.024 | p> 0.05  |
| p-value§ | p>0.05                     | p<0.05       |          |

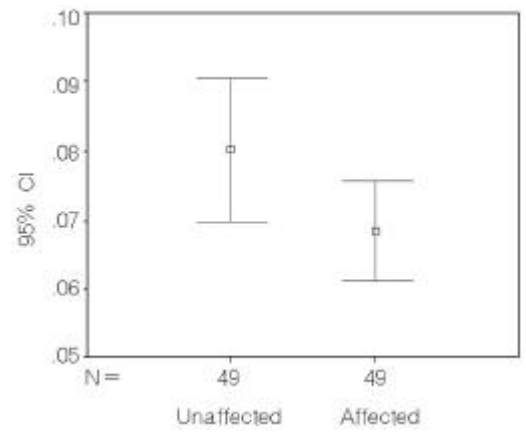
\*Mean ±SD  
 †By paired t-test between the affected and the unaffected nail  
 §By paired t-test between male and female

day 가  
 (p<0.05).  
 2. (Table 2)

가 (p<0.05),  
 paired 가  
 가 (p<0.05),  
 (p>0.05).

3. (Table 3)

19 , 20~39 , 40~59 , 60



**Fig. 1.** Comparison of the growth rate between the affected and the unaffected great toe nail (CI: confidence interval, Mean ±SD, p<0.05).

**Table 3.** The growth rate of the affected and the unaffected great toe nails according to the age group of the patients with onychomycosis

| Age (yr) | No. of Patient |        |       | Nail Growth Rate* (mm/day) |              |
|----------|----------------|--------|-------|----------------------------|--------------|
|          | Male           | Female | Total | Affected                   | Unaffected   |
| 1-19     | 3              | 0      | 3     | 0.080 ±0.026               | 0.099 ±0.038 |
| 20-39    | 7              | 13     | 20    | 0.073 ±0.026               | 0.077 ±0.024 |
| 40-59    | 4              | 15     | 19    | 0.063 ±0.025†              | 0.082 ±0.047 |
| 60-      | 2              | 5      | 7     | 0.065 ±0.021†              | 0.075 ±0.031 |
| Total    | 16             | 33     | 49    | 0.068 ±0.025†              | 0.080 ±0.025 |

\*Mean ±SD, †p<0.05, by paired t-test

**Table 4.** The growth rate of the affected and the unaffected great toe nails according to the degree of nail involvement

| % of Involvement | Nail Growth Rate* (mm/day) |              | p-value† |
|------------------|----------------------------|--------------|----------|
|                  | Affected                   | Unaffected   |          |
| < 50%            | 0.076 ±0.025               | 0.076 ±0.022 | p>0.05   |
| 50%              | 0.061 ±0.026               | 0.080 ±0.025 | p<0.05   |
| Total            | 0.068 ±0.025               | 0.080 ±0.025 | p<0.05   |

\*Mean ±SD

†By paired t-test

가 40 (p<0.05).  
 , 19  
 60  
 4.  
 50%  
 ,  
 가 (p<0.05).  
 Hillman<sup>5</sup>  
 0.07~0.17 mm/day  
 35  
 , Bean<sup>6</sup>  
 0.1~0.123 mm/day  
 1/2~1/3  
 7,  
 (turnover rate)  
 ,  
 ,  
 가 .

9-13 . Runne 14 , , , 가 , , 가 0.080 ±0.025 mm/day , 3 , 50% 가 , 가 가 2. 가 , 15. , 16. , 가 , 1. , 25 . Orentreich 17 가 0.5% , 17-19, 가 가 1, 가 가 가 20 4 , 19 60 18 가 .

가 40 (16/23)가 40 (10/26)

18 가 가 가 가

3 가 가

가 Goulden 20

1998 2 2000 2

가 가 49

1. 가

가

2. 가

50% 50%

, 50%

50% 가

가 가

가 가

가 가

가 가

40 가 가

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