Trends in Pediatric Laboratory-Diagnosed Onychomycosis Between 2006 and 2014 in the Southwest of England

Abstract: This is the largest study of laboratory-diagnosed onychomycosis in England for children younger than 17 years. The most common (91.5%) cultured organism in this population was *Trichophyton rubrum*. *Candida* species were isolated only from fingernails, and the majority were from children younger than 5 years. Continued analysis of fungal pathogens is vital to identify changing trends.

There are few reports on onychomycosis in children, which has a reported prevalence of 0.2% to 2.6% (1).

AIM

The aim of the current study was to analyze epidemiological trends of laboratory-diagnosed onychomycosis from the pediatric population in the southwest of England between March 2006 and October 2014.

METHODS

Data were collected from computerized records at the Public Health England Mycology Reference Laboratory and included information on nail specimens received from the Bristol and Bath catchment area from patients younger than 17 years. We recorded patient age and sex, microscopy and culture results, and site of the specimen. Statistical analysis was performed using Stata version 13 (StataCorp, College Station, TX).

RESULTS

A total of 1434 specimens were received. The mean age of patients was 9.6 years (95% confidence interval 9.3–9.8) (Table 1).

There were significant differences in the proportion of positive results according to age; microscopy was positive in 34% and culture in 24% of children younger than 6 years, microscopy was positive in 64% and culture in 47% in those 6 to 10 years of age, and microscopy was positive in 50% and culture in 35% of those 11 to 16 years of age (p < 0.001).

There were statistically more culture-positive results from boys (38%) than girls (33%) (p = 0.04). There was some evidence of this for the microscopy-positive results (boys 56%, girls 44%; p = 0.05). Thirty-five percent (501/1,434) of samples were both microscopy and culture positive.

Eighty-nine percent (948/1,070) of specimens were from toenails. There were significantly more fingernail specimens received from children younger than 6 years (16%) than from older children (9.5%) (p = 0.03).

Eight different organisms were cultured. The most common was *Trichophyton rubrum* (91.5%) (Table 2). The percentage of *Candida* species grown from children 0 to 5 years of age (13%) was significantly higher than from older children (3%) (p < 0.001); 9 of 15 were from unspecified sites and the remaining 6 from fingernails. *Fusarium* was cultured only in those 12 years of age and older.

DISCUSSION

This is the largest study to examine trends in pediatric laboratory-diagnosed onychomycosis in England. Smaller European studies and one from Korea found *T. rubrum* to be the most prevalent organism in their pediatric population (1–4). Although *Candida* was the most commonly isolated organism from fingernail specimens in our population, it cannot be determined

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**TABLE 1. Patient Characteristics**

| Variable         | Value |
|------------------|-------|
| Sex, n (%)       |       |
| Male             | 768 (54) |
| Female           | 664 (46) |
| Unknown          | 2 (0.1) |
| Age, median (interquartile range) | 10.4 (5.9–13.7) |
| Season, n (%)    |       |
| Winter           | 739 (52) |
| Summer           | 695 (48) |
| Site, n (%)      |       |
| Finger           | 122 (9) |
| Toe              | 948 (66) |
| Unspecified      | 364 (25) |
| Microscopy, n (%)|       |
| No fungus seen   | 721 (50) |
| Fungal elements seen | 711 (50) |
| Yeast seen       | 2 (0.1) |
| Culture, n (%)   |       |
| No fungus isolated | 919 (64) |
| Culture positive | 515 (36) |
whether it represents true nail plate infection or colonization of onycholysis. Candida was nevertheless exclusively isolated from fingernails and the majority was from children younger than 6 years. This finding has been reported in Poland (5). We postulate that thumb sucking is a contributory factor.

Onychomycosis is more common with older age because of slower nail growth, larger contact surface increasing the risk of trauma and fungal colonization, more frequent exposure to fungi in public spaces, and a higher prevalence of tinea pedis (1). It is therefore surprising that onychomycosis was most prevalent in children 6 to 10 years of age, which is different from results of other studies (1,2).

Although this is the first U.K. study of its type, it is limited by its retrospective nature and lack of clinical case information. Performing such studies is important for the continued analysis of fungal pathogens. The British Association of Dermatologists’ guidelines (6) recognize that the dominant etiological agents are T. rubrum, Trichophyton mentagrophytes, and Candida and as such recommend the use of terbinafine, itraconazole, and fluconazole. Griseofulvin is still the only licensed systemic antifungal drug for children, although it is no longer first-line treatment because of long treatment duration and low efficacy. The azoles are advocated in onychomycosis caused by Candida species. This study therefore reinforces the recommendations set out in the U.K. guidelines.

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Christina Wlodek, B.Sc. (Hons)*
Adam Trickey, M.Sc.†
David de Berker, MRCP* Elizabeth Johnson, Ph.D.‡

*Bristol Royal Infirmary, Bristol, UK, †School of Social and Community Medicine, University of Bristol, Bristol, UK, ‡Public Health England Mycology Reference Laboratory, Bristol, UK

Address correspondence to Christina Wlodek, B.Sc. (Hons), Bristol Royal Infirmary, Upper Maudlin Street, Bristol BS2 8HW, UK, or e-mail: christina.wlodek@gmail.com.