

The Achilles Project

Prevalence of Tinea Pedis and Onychomycosis in Malta

The Maltese Dermatological Association

Keywords: Achilles project, onychomycosis, Tinea pedis, fungal foot infections.

Tinea pedis (athlete's foot) is a common fungal infection of the feet with the major causative organisms being *Trichophyton rubrum*, *Trichophyton mentagrophytes* and *Epidermophyton floccosum*¹. It occurs worldwide, with a greater frequency and severity during the warmer months of the year. The condition is most prevalent in adult men, especially in the presence of excessive perspiration and occlusive footwear². Transmission may be direct, from person to person, or indirect via infected skin scales on towels, shoes, socks, and floors, particularly in communal showers². These conditions tend to favour recurrence of the infection.

The symptoms generally commence in the fourth toe cleft and may include itching between the toes and the development of small blisters that may rupture and ooze a thin fluid. The horny skin layers eventually become macerated and peel, resulting in cracks which are prone to secondary bacterial infection. Chronic fungal infection leads to a scaly and cracked skin appearance, and, if the condition persists further, may involve the rest of the foot including the nails, where onychomycosis (also known as Tinea unguium) can develop. When this happens, the nail may become discoloured, thickened, or even distorted^{1,2}.

The Achilles project was set up because of the general poor awareness of foot disease, especially of fungal foot infections. Foot diseases are often not viewed as a real problem and there

is limited knowledge of them. Most previous studies have involved small and specific population groups, such as school children, subjects visiting swimming baths, populations with specific occupations, or patients with underlying diseases like diabetes. Moreover, patients often had to diagnose the condition themselves. The results of these self-assessments was an underestimation of the prevalence of foot infections^{3,4}.

The Achilles project is the largest epidemiological study ever to be carried out on foot health in Europe. Started in 1998, the aim of the project is to gain a better understanding and awareness of the medical problems of diseases affecting the feet or related to the part of the body below the Achilles heel (e.g. foot, toes, toenails) and of their prevalence amongst different patient groups. The project will also

allow an insight to be gained into the predisposing factors and quality of life in a large population. In the longer term, a key objective is to improve the diagnosis and treatment of foot conditions and to generate clinical data from a sample of the population. The data will serve as the basis for epidemiological studies, allowing both medical professionals and patients to benefit from this knowledge. The ultimate goal is therefore to increase the chance for timely diagnosis and treatment of foot disorders.

Several European countries, including Austria, Belgium, the Czech Republic, Germany, Greece, Hungary, Italy, Luxembourg, the Netherlands, Portugal, Poland, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom (UK), have thus far participated in this foot-screening project, which was endorsed by the European Academy of Dermatology and Venerology (EADV) and the European Nail Society. Following the example of these countries, in the fall of 1999 many efforts were deployed to implement the Achilles project in Malta, Jordan and Cyprus.

Design and Methodology

The study was designed to give patients visiting the dermatologist, a clinical evaluation of the feet. The patients had initially presented with a condition other than fungal infection. Patients were included in the study irrespective of their age, sex, or medical complaints. Participating dermatologists examined patients' feet for seven working days during the last week of October 1999. Assessments were also carried out for demography, predisposing factors, diagnosis of foot disease, skin and nail examination, and quality of life measurements. The project investigated the effect of gender, age and several clinical factors, including diabetes, obesity, antibiotics, corticosteroids, immunodepression, vascular disease, trauma, osteoarticular pathology, and sports activity, on the prevalence of foot disease.

Four patient age groups were defined as follows: child, 0-17 years; adult, 18-39 years; medium aged, 40-64 years; elderly, 65 years and older. In

Table 1: Comparison of Achilles project results
(adapted from Haneke, 1999)

	Patients	Fungal foot infections	Tinea pedis	Onychomycosis
Europe	13,695	35.0%	22.0%	23.0%
Malta	186	23.7%	16.1%	19.1%
Cyprus	1506	41.2%	28.2%	21.7%
Jordan	1287	27.3%	20.5%	11.5%

assessing the nature of the foot disease, Tinea pedis was defined as a fungal infection involving the plantar and/or interdigital side of the foot while onychomycosis was defined as a fungal infection of the nail. The prevalence was calculated as the number of cases divided by the number of subjects in the corresponding population. The results were subjected to statistical analysis using logistic regression, a *p* value of 0.05 being chosen as the delimiting statistic between statistical significance and nonsignificance.

Results

Fungal foot infections

186 patients were screened, and 60% of the dermatologists practising in Malta took part in this project. The percentage incidence of fungal foot infection was 23.7%, with an expected higher prevalence in males (28.4%) than females (18.7%). The risk increased by 1.65 times for males relative to females, and with each additional year of age by 1.28 times for both males and females. Practising sports was observed to be a predisposing factor for foot diseases, mainly in children and adults.

Tinea Pedis

Tinea pedis was reported for 16.1% of individuals, with prevalence being higher in males (20.0%) than females (12.1%). In all groups with predisposing factors, except antibiotics and immunodepressants, the prevalence of Tinea pedis was higher, although not statistically significant. Tinea pedis incidence increased with age up to the age of 56.

Onychomycosis

Onychomycosis was reported in 19.1% of individuals, with the

prevalence being approximately the same for males (10.5%) and females (7.7%). The risk of onychomycosis for males was approximately 1.30 times higher than the risk for females, and increased with each additional year of age by 1.02 times for both sexes. The prevalence of onychomycosis was higher among persons with diabetes, obesity, vascular disease, trauma, and those practicing sports, and lower among those using antibiotics or corticosteroids, and with immunodepression or osteoarticular pathology. However, apart from the increase in the risk of onychomycosis associated with trauma, the effects of all other factors on the risk of onychomycosis were not statistically significant.

Discussion

Table 1 compares the results for fungal foot infections, Tinea pedis and onychomycosis in Europe (1998 survey) and in Malta, Cyprus and Jordan (1999 survey). In Europe, 13,695 patients were included in the survey. In Malta 186 patients were screened (population 376,000), compared to 1506 in Cyprus (population 751,500) and 1287 in Jordan (population 936,300). Cyprus screened the largest percentage of their population, while Europe screened the least. However, it can be seen from the table that the incidence of all fungal foot infections, Tinea pedis, and onychomycosis is comparable for all regions⁵. However, compared to other epidemiological studies^{3,4} the prevalence of fungal foot infections as found in the Achilles project is much higher⁵. The sex dependency of onychomycosis remains a topic of discussion. The Achilles project data for Europe parallels the results obtained in Malta and firmly establishes the higher prevalence of clinically

diagnosed fungal foot infections in the males of the total screened population⁵.

Based on the above results, it would appear that physicians have to take a more active approach to foot health, since many foot conditions are never diagnosed, and hence treated. Furthermore, because of their ignorance of foot problems, patients do not seek treatment in time and the condition often becomes very serious, affecting quality of life (itching, pain, discomfort in walking, embarrassment, limitations in work and other activities). This makes the disease more difficult to treat, and longer treatment duration is needed. People should be educated that foot problems are not due to poor personal hygiene, but that underlying causes may be related to a variety of predisposing factors which mean that some people are more likely to contract a foot problem like a fungal infection. Moreover, both physicians and patients should be aware of effective systemic therapy⁵.

Acknowledgements

In Malta, this research has been made possible by an unrestricted educational grant from Janssen-Cilag, under the auspices of the Maltese Dermatological Association.

The participating dermatologists were Dr. M.J. Boffa, Dr. E. Borg, Dr. E. Mifsud, Dr. J. Pace, Dr. L. Scerri, and Dr. D. Vella Briffa. ★

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