Airport dermatophytoses

With over 1 billion air travellers worldwide each year, and numbers rising steadily, most airports are constantly close to capacity. In the UK alone, more than 150 million journeys are recorded annually, with most passengers passing through a modest number of major airports. Airport security arrangements, under constant review due to unprecedented global security concerns, have increased the stringency of passenger screening. In most, but not all, airports, this includes a requirement to remove footwear for separate X-ray screening before passing through a whole-body metal detector. Removal of shoes may be mandatory or more selective and based on the type of shoes worn, overall workload and passenger throughput, in response to specific security threat levels, based on carrier airline or destination, or for other undisclosed security or logistics reasons. Overall, security staff report that removal of shoes for security screening can vary between 15% and 100% of passengers. If removal of shoes is required, passengers will walk over a small area of carpeted or hard flooring from one side of the scanner control point to the other over distances of around 5–10 m, resulting in high rates of footfall from several thousand passengers per day at the scanner pinch points of each airport screening channel.

Fungal infections of the feet and nails are particularly common. Although some communities may record an incidence of around 80%, the global prevalence is approximately 2–10%. The most common cause of athlete’s foot (tinea pedis) and most widely distributed of the dermatophyte fungi is Trichophyton rubrum, although T. mentagrophytes, Epidermophyton floccosum and Candida species may be seen in some patients. Several studies attest to the shedding of dermatophyte fungi from the feet of infected individuals to hard flooring or carpeted surfaces, and the ease of acquisition by others. Tinea pedis is one of the most prevalent human infections. It is difficult to eradicate, despite the availability of improved antifungal agents, as re-infection from contaminated footwear or contaminated communal floor areas results in persistence of infection. Wearing of socks or nylon stockings does not reduce the rate of shedding, or provide significant protection against transmission to previously dermatophyte-free feet.

Transmission of dermatophyte fungi via the contaminated floors of public spaces, such as swimming pools, baths and changing rooms, is not uncommon. Fungal material may be difficult to eliminate from flooring surfaces, and the use of standard detergents for wet mopping of hard surfaces or commercial vacuuming of carpeted floors has little impact on the fungal load. Basic visual hygiene and cleanliness checks may not provide a meaningful assessment of the extent of floor or carpet contamination, and although ‘dry steam’ cleaning of floors or high-efficiency particulate air-filtered (HEPA) vacuuming may offer some advantage, non-HEPA-filtered vacuuming may only serve to redistribute but not remove a proportion of the total fungal load. In carpets, survival times for dermatophyte fungi may be greater than 1 year, although this will vary with humidity and temperature levels, as well as cleaning frequency and the structure, composition and porosity of the floor covering. The regular use of more potent cleaning products having a general inhibitory or specific antifungal action may be effective. However, this is likely to be prohibited to protect those working in the airport security halls, for whom long-term occupational exposure may be unacceptable, and due to the damage they may cause to flooring materials. The impact of the integrity of floor coverings and degree of wear of carpets on the deposition and subsequent pick-up of fungal material by passengers or on the efficacy of standard cleaning regimens is unknown.

In airport security halls, cleaning is generally restricted to a limited number of night-time hours and makes no provision for regular steam cleaning or the use of specific biocides. Although it has not been possible to secure permission to collect samples from the floor surfaces of airport security halls, it is likely that these would reveal heavy and persistent contamination with dermatophyte fungi in the deliberate pinch points of each security channel that are the areas of footwear removal and greatest footfall. Although epidemiological relationships are almost impossible to define among the transient population of a busy airport, it is reasonable to conclude that unexpected exposure to dermatophyte fungi after removal of footwear is both widespread and common during airport security screening. This previously unrecognized infection control hazard may be the unavoidable price for essential airport security. When departing to distant lands, it seems likely that many travellers will take with them an unwelcome travel souvenir from the floor of the airport security hall.
References


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