Article/Artigo

Sporothrix schenckii associated with armadillo hunting in Southern Brazil: epidemiological and antifungal susceptibility profiles

Sporothrix schenckii relacionado à caça ao tatu no Sul do Brasil: aspectos epidemiológicos e suscetibilidade dos isolados aos antifúngicos

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ABSTRACT

Introduction: Sporotrichosis is the most common subcutaneous mycosis observed in Brazil and it is generally consequent to a little trauma caused by vegetal particles or spines which inoculate the fungi in the subcutaneous area. Although sporotrichosis had been frequently mentioned with armadillo hunting this form has not been widely reported in Brazil until now. In this study we report ten cases of sporotrichosis evolving the armadillo's hunting diagnosed in some towns located in the central and west regions of Rio Grande do Sul State. **Methods**: The cases were established based on clinical and classic mycological laboratorial techniques. The susceptibility tests were conducted by microdilution technique according to M38-A2 CLSI documents. **Results**: Ten cases of sporotrichosis associated with armadillo hunting detected in the State of Rio Grande do Sul were diagnosed by mycological methods. The susceptibility tests of *Sporothrix schenckii* isolates to antifungal agents itraconazole, ketoconazole and terbinafine showed that all the isolates were susceptible. **Conclusions**: The paper discusses some cultural aspects related to hunting of this wild animal as well as possible causes of this unexpected occurrence in southern Brazil.

Key-words: Armadillos. Brazil. Sporotrichosis. *Sporothrix schenckii.*

RESUMO

Introdução: A esporotricose constitui-se na micose subcutânea mais frequentemente observada e, na maioria dos casos, a infecção é decorrente de pequenos traumas envolvendo fragmentos vegetais ou espinhos que inoculam o fungo no tecido subcutâneo. Embora frequentemente relacionada a caça a tatus, esta ocorrência tem sido raramente relatada no Brasil. Neste estudo relatamos dez casos envolvendo esta prática, observados em várias cidades das regiões centro e oeste do Estado do Rio Grande do Sul. **Métodos:** o diagnóstico clínico foi confirmado pelos métodos clássicos de cultura em ágar Mycobiotic, identificação micromorfológica seguida de reversão a fase leveduriforme em ágar BHI. Os testes de suscetibilidade foram realizados pela técnica de microdiluição em caldo, de acordo com as normas estabelecidas pelo documento CLSI M38-A2 (2008). **Resultados**: A esporotricose, decorrente de lesões causadas pela caça ao tatu foi confirmada pelo métodos microbiológicos. Os testes de suscetibilidade indicaram que todos os isolados eram sensíveis ao itraconazol, cetoconazol e terbinafina. **Conclusões**: O artigo discute aspectos ambientais e culturais relacionados a caça a este animal silvestre bem como àqueles relacionados a esta inesperada ocorrência.

Palavras-chaves: Tatu. Brasil. Esporotricose. *Sporothrix schenckii.*

INTRODUCTION

Sporotrichosis is a subcutaneous fungal infection that affects humans and other mammals and is caused by the thermally dimorphic fungus, *Sporothrix schenckii*[1]. Sporotrichosis has a worldwide distribution, especially in tropical and subtropical areas. The mycosis is endemic to Latin America and hyperendemic in areas including the rural highlands of Peru[2], Guatemala[3] and Rio de Janeiro in Brazil[4-7].

Lymphocutaneous and fixed cutaneous are the most common forms of sporotrichosis and result from traumatic skin inoculation of *Sporothrix schenckii* through thorns and splinters, as well as through skin injuries sustained during leisure and occupational activities, such as floriculture, horticulture, gardening, fishing, farming, cattle-raising, mining and wood exploration. On rare occasions, sporotrichosis has been associated with animal scratches or bites during the wild animal hunts[4-7]. Here, ten cases of sporotrichosis are report associated with armadillo hunting in the hinterland of the State of Rio Grande do Sul (Brazil) from 2005 to 2009. The susceptibility of the isolates to antifungal treatment was tested using itraconazole, ketoconazole and terbinafine.

METHODS

All cases were reported to the Public Health Service (4th Coordenadoria Regional de Saude do Rio Grande do Sul, City of Santa Maria, RS), which encompasses the central, west and northwest part of the State of Rio Grande do Sul. The cases occurred in the rural areas of the following towns: Capão do Cipó (4), Santiago (2), São Sepé (2), Nova Esperança do Sul (1) and Augusto Pestana (1). All patients were male, with ages varying from 18 to 59 years-old,

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Received in 19/05/2010

Accepted in 13/07/2010

whose primary occupation was in farming and/or agriculture. Tests of fungal susceptibility to itraconazole (Biofarma), ketoconazole (Teuto) and terbinafine (Cristalia) were performed using the M38-A2 technique, according to the CLSI protocol[8]**.** Following isolation and identification, the strains were maintained at -70°C in the Mycological Research Laboratory (*Laboratório de Pesquisas Micológicas*) of the Federal University of Santa Maria.

RESULTS

The clinical symptoms observed in each of the patients were associated with trauma caused by armadillo scratches during the hunt. During the hunting, the armadillos normally hide in burrows, such that the hunter must pull them by their tail. Thus, it is not unusual for the hunter to be scratched or suffer other accidents that could cause skin trauma. The clinical presentation was the lymphocutaneous form in six cases and the fixed cutaneous form in the remaining cases. Regarding anatomic location, two patients showed fixed lesions on the hand and one patient had a fixed lesion on the arm; six patients presented with the classical nodular lymphangitis on the hand and arm and one patient showed the lymphocutaneous disease progressing from the foot to the thigh. At the date of diagnosis, the duration of symptoms was from 1 to 16 months, with an average of 4 months. Based on these clinical features of sporotrichosis, the patients were referred to the Santa Maria University Hospital (Santa Maria, RS) to confirm the mycological diagnosis. A KOH-direct mycological examination and culture on Mycobiotic agar (Difco) of pus, exudates and scrapings from the lesions were conducted as part of routine laboratory testing. The direct examination was negative. The cultures were incubated at 25°C and after 5 to 8 days, cultures showed a creamy, wrinkled surface colony with a brownish colour in the centre. Slide cultures with corn meal agar revealed numerous oval-shaped spores with sympodial growth, which were suggestive of *Sporothrix schenckii*. Positive identification of *Sporothrix schenckii* was confirmed by the microscopic appearance of the fungus after conversion to the yeast form at 37°C. All patients were treated with itraconazole for between 4 weeks and 4 months, depending on the clinical resolution of the lesions. Nonadherence to the treatment regimen or therapeutic failure was not registered.

Itraconazole is currently considered the treatment of choice to treat diverse clinical manifestations of sporotrichosis[9]. The minimum inhibitory concentrations (MICs) for itraconazole varied between 0.06 and 1.0μg/ml (MIC50 = 0.25μg/ml; MIC90 = 0.5μg/ml); the MICs for ketoconazole were between 0.125 and 1.0μg/ml (MIC50 = 0.25μg/ml; MIC90 = 0.5μg/ml), and for terbinafine, the MICs were between 0.03 and 0.25μg/ml (MIC50 = 0.125μg/ml; MIC90 = 0.25μg/ml).

DISCUSSION

In the hinterland of the State of Rio Grande do Sul in Brazil, the incidence of sporotrichosis has been studied since 1957, with more than 342 cases reported in the Santa Maria University Hospital, where injuries sustained by contact with decaying vegetation has been the main cause[5,10].

Although less common than other causes, the zoonotic transmission of sporotrichosis is well-known and domestic animals, mainly cats, have been identified as the major vectors in the transmission of the mycosis to humans[6].

Sporotrichosis has also been attributed to wounds caused by other animals, such as dogs, cattle, mice, horses, boars, gophers, camels, chimpanzees, dolphins, donkeys, fowl, foxes, mules and rats; however, the association of sporotrichosis with armadillos is remarkable[11]. In 1969, Mackinnon et al[12] established that *S. schenckii* can be identified in vegetation lining the burrows of armadillos. Conti-Diaz[7] in Uruguay reported 138 cases of sporotrichosis over a span of 16 years in which 81% were attributed to contact with armadillos. Vidal & Rodríguez[13] have also reported cases associated with armadillo hunting in the province of Santa Fé in Argentina and in 2005, Gezuele & Rosa[14] reported new cases in Uruguay.

Rio Grande do Sul is the southernmost Brazilian state that borders Uruguay and Argentina. These regions thus share many geographic, cultural, economic (farming) and ethnic characteristics. In these regions armadillo (*mulita*) hunting may be considered a subsistence or leisure activity because its meat is quite appreciated. Here, all the patients attended were males, since, in general, men are the ones involved in the armadillo hunting activities. The species, *Dasypus hybridus* (*mulita*), *D. septemcinctus* and *D. novemcinctus* are commonly found in Rio Grande do Sul and it is against Brazilian law to hunt these animals.

The incidence of sporotrichosis varies according to geographic area and climate, but it mainly varies according to human activities. Lopes et al[5] have showed that in the hinterland of Rio Grande do Sul, sporotrichosis in females decreased from 43 cases in a decade (1958-1967) to 4 cases in the years from 1988-1997. This change was coincident with rural migration to urban areas and the growing number of people living in apartments. In Rio de Janeiro, disease transmission from cats increased from 2 cases in the years from 1987-1998 to 66 cases in the years from 1998-2000, thus showing an unprecedented epidemic involving cats; however, the reason for this epidemic remains unknown[4,6,11]. In this dynamic scenario, 10 cases of sporotrichosis arising from association with armadillo hunting in the last 4 years were surprising. One hypothesis might be that the shift from a primarily cattle-raising livelihood to a soy-based culture in Rio Grande do Sul negatively impacted the natural habitat of armadillos, diminishing the spaces available for burrows in the savannah and thus making armadillos more vulnerable to hunting. This hypothesis is reinforced by Lavalle[15], who observed that sporotrichosis is not only an occupational hazard, but also a disease associated with sport. Our studies complement this work and further suggest that the ecological imbalance also impacts the epidemiology of sporotrichosis, which is the most common subcutaneous mycosis in Brazil. Regarding susceptibility, the MICs classified the isolates as susceptible to itraconazole, ketoconazole and terbinafine, with similar results reported by Alvarado-Ramirez & Torres-Rodrigues[16] and Marimon et al[17]. Specific studies focusing on the susceptibility of *S. schenckii* isolated from lesions caused by armadillos were not found, but the tests herein did not show antifungal resistance and were in agreement with the evolution of patient treatment.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FINANCIAL SUPPORT

Conselho Nacional de Desenvolvimento Científico e Tecnológico.

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