

***Geomyces pannorum* as a Possible Causative Agent of Dermatomycosis and Onychomycosis in Two Patients**

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SUMMARY *Chrysosporium pannorum* (Link) Hughes is a soil keratinophilic fungus present in organic residues, on human skin surface and in the general environment of human beings. Clear evidence for the pathogenicity of this fungus for human beings was lacking. In 1999, a case of fungal infection in a chow-chow dog and its owner was published, where *Chrysosporium pannorum* (Link) Hughes was determined as the only possible infection trigger. The State Hygiene Institute in Bratislava repeatedly confirmed the cultivation results. *Chrysosporium pannorum* (Link) Hughes was detected in the material provided by a ZOO: camel, tiger and antelope hair, whereby the same finding as in the dog mentioned above was described, i.e. extensive alopecic foci of various size. Since 2000 the cultivations have been monitored with due care. Eight positive cultivations of *Chrysosporium pannorum* (Link) Hughes have been detected until now, two of them in patients with a flair for horticulture. In a male patient, fingernail onychomycosis with affected skin on forearms, hands and fingers was determined. In a female patient only nail plates were affected. *Chrysosporium pannorum* was confirmed to be the only possible pathogen. Therapy with itraconazole produced excellent results in both patients and no relapses were recorded. Based on our repeated findings it is concluded that the evidence for non-pathogenicity of *Chrysosporium pannorum* should be revised.

KEY WORDS: *Geomyces pannorum*, dermatomycosis, onychomycosis

INTRODUCTION

Geomyces pannorum (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) is a ubiquitous saprophytic fungus occurring in organic residues, on human skin surface, and in the general environment of human beings. The original description of this fungus dates back to 1914 and was given by Traen (1). The next description containing four more species of this pathogen was published by Robak (2) in 1932. In a monograph, Carmichael (1962) described the strains of *Geomyces* Traen as synonyms for *Chrysosporium pannorum* (Link) Hughes fungus (3). The finding of a typical kera-

tinophilic fungus *Chrysosporium keratinophilum* (Frey) extracted from the soil was documented in 1962 by Otčenášek and Dvořák (4). In 1965, Fassatiova (5) published a work on the variability of *Chrysosporium pannorum* (Link). Apart from that, she also drew attention to the fact that the nomenclature was inconsistent (3) and that there was minimum solid knowledge about this species (3,6-8). Between 1961 and 1963, she isolated a whole range of *Chrysosporium pannorum* (Link) Hughes strains from the soil in Český Kras and Žďárský les in Moravia as well as on Pouzdřanská step. In 1965, she detected another two

species of *Chrysosporium pannorum* (Link) Hughes isolated from the wall in a flat in a new building and from the surface of human skin. Clear evidence for the pathogenicity of *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) for human beings or animals was lacking or was not published.

Present taxonomy: *Geomyces pannorum* (Link) Sigler & Carmichael var. *pannorum*, Synonyms: *Botrytis terrestris*, *Chrysosporium pannorum*, *Chrysosporium verrucosum*, *Geomyces auratus*, *Sporotrichum carnis*.

In the years 1999 and 2000, a case of fungal infection in a chow-chow dog and his owner was presented (World Congress of Mycology, Buenos Aires, ISHAM 2000), in which *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) (9,10) was determined as the sole possible causative agent of the disease. In the dog, two extensive alopecic foci on the back were observed. The owner developed rare skin lesions on his forearms and fingers. Targeted examination presuming the possible fungal infection in the dog and its owner verified that *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) (9,10) was the only possible causative agent. Other reports dealing with *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) as a possible pathogen were published in the years 2002 and 2003 (11,12).

Since 1999, the cultivations of *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) have been monitored as the possible causative agents of fungal infection in human beings. Following the case of the chow-chow dog and its owner mentioned above, we also recorded another two cases of positive fungal cultivation in 2001 and 2002, with manifestations of fungal infection in two patients (12).

CASE REPORTS

Case 1

I.J, a male patient aged 58: family history, personal history, allergy history unremarkable. Social history: retired, working in his garden on a regular basis. The patient sought help six months after the first manifestation of the disease had occurred. The first manifestations were noticed in 2001, such as discrete changes on the skin of his forearms, dorsal aspects of his hands, and gradually

progressing changes on 4 finger nails. Later, all nail plates were affected. Apart from regular activities in his garden and working with wood, he was not aware of anything that could have traumatized his skin. The attending dermatologist had treated the manifestations of the disease diagnosed as eczema with corticosteroids for 5 weeks. The changes in nail plates were not considered important.

On the skin of both forearms, dorsal aspects of his hands and fingers the skin was erythematous, slightly edematous and infiltrated, dry and with lots of small dandruff. The foci present on the dorsa of his hands and fingers were outlined and accentuated by edges. All finger nail plates were deformed, with loss of shine, subungual hyperkeratosis and white-yellowish discoloration. The patient reported subjective severe pruritus (see Fig. 1).



Figure 1. Patient No. 1: pretherapeutic finding

Microscopic mycologic examination: skin scale with ramified hyphae and isolated fragments of septate mycelium. A similar finding was detected on the nail.

Cultivation mycologic examination: *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) (Laboratory of Mycology, University Department of Dermatology, Ružinov, Bratislava) Medium: Sabouraud glucose agar – SGA (9;1) with antibacterial antibiotics and cycloheximide. Temperature: 25° C, agar soil and Petri dishes were used.

Therapy: itraconazole (Sporanox®, Janssen Cilag) pulse therapy consisting of 4 pulses accompanied by topical treatment with cyclopiroxolamine (Batrafen® solution, cream), and disinfection soap containing Ichthamol 5% were applied. Later the patient was instructed to use a preparation containing 1% Ichthamol Pale suitable for skin regeneration.

Epicrisis: in 3 weeks the skin lesion improved dramatically with no visible pathologic changes

and with marked improvement of the nail finding. General regeneration including negative microscopic and cultivation findings was accomplished by the end of the fourth month of therapy initiation (Fig. 2).



Figure 2. Patient No. 1: post-therapeutic finding.

The patient was instructed to apply prophylactic measures and was advised to wear protective gloves while working in the household as well as in the garden. On the last examination in August 2003 the patient was without signs of any pathologic manifestations either on the skin of the hands or the nails.

Case 2

L.A., a female patient aged 38: family history, personal history, allergy history unremarkable. Social history: housewife, working occasionally as a cook, takes care of a little garden.

Disease description: changes in the nail of the fourth right hand finger present since 2002; until then, the patient had not paid attention to those changes. The patient reported a possible injury as she had run a splinter into the fingertip and under the edge of the nail. For three weeks she was trying to heal the lesion with slices of onion she would apply to its surface. The patient had not received systemic treatment.

The nail on the fourth finger of the right hand was deformed, coarse, without shine and off-white yellowish color, especially in distal parts, in some parts with indications of sand wave deformities. The skin surrounding the nail was slightly infiltrated and erythematous with partially missing eponychium (Fig. 3). The patient reported moderate anemia.

Microscopic mycologic examination: subungual debris with ramified hyphae, isolated fragments of septate mycelium.

Mycologic cultivation examination: *Geomyces pannorum* (LINK) Sigler & Carmichael var. pan-



Figure 3. Patient No. 2: pretherapeutic finding.

norum (*Chrysosporium pannorum* (Link) Hughes) (Laboratory of Mycology, University Department of Dermatology, Ružinov, Bratislava). Sabouraud glucose agar – SGA (9;1) with antibacterial antibiotics and cycloheximide. Temperature: 25°C, agar soil and Petri dishes were used.

Therapy: itraconazole (Sporanox®, Janssen Cilag) pulse therapy consisting of 4 pulses accompanied by topical treatment with cyclopiroxolamine (Batrafen® solution, cream) and disinfection soap containing 5% and 8% Ichthamol. For regeneration an emulgel preparation containing 1% Ichthamol Pale was recommended.

Epicrisis: there was gradual improvement of the finding on the nail plate during the first 3 weeks and the nail grew fully without any deformities. General rehabilitation including negative microscopic and cultivation findings was achieved by the end of the fourth month of therapy initiation (Fig. 4). The patient was instructed on the need to employ prophylactic measures and was advised to wear



Figure 4. Patient No. 2: post-therapeutic finding.

protective gloves while working in the household as well as in the garden. On the last examination in September 2003 the patient was without signs of any pathologic manifestations either on the skin of the hands or on the nails.

DISCUSSION

Geomyces pannorum (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) is an imperfect species with many synonyms (2-4,13,14). The possible pathogenicity of this species has been awarded minimum attention in contrast to for example *Chrysosporium parvum*, var. *crescens* (Syn. *Emmonsia crescens*) EMMONS et JELLISSON 1960. This species, *Chrysosporium parvum*, is considered to be the causative agent of adiaspiromycosis as the cause of chronic lung disease in small rodents and later as the causative agent of severe chronic disease in humans (15). The activity of a specific antiserum influencing the course of experimentally induced adiaspiromycosis was studied in laboratory mice (14).

Based on repeated findings we have come to a conclusion that the evidence for non-pathogenicity of *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) should be revised. This conclusion is based on our observations such as the positive cultivation of *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) and consultation with the expert staff of the Laboratory of Mycology of the State Hygiene Institute in Bratislava (16). Before 2000, *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) isolates were repeatedly detected by the Institute from the material provided by the ZOO: camel, tiger and antelope hair, with the same findings as those recorded in the dog mentioned above, i.e. extensive alopecic foci. Until the year 2000, the finding of the pathogen was not brought into connection with the disease. *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) was considered to be a keratinophilic non-pathogenic fungus. After the recommended disinfection of the environment and change of lair the symptoms in the animals subsided spontaneously (17).

In the past three years, eight positive cultivations of the pathogen *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) were recorded at the State Health Institute in Bratislava in dog

and cat skin. In 2002, a graduation thesis entitled Dermatophytes and Other Micromycetes in Dogs with Skin Changes – Infection of a Female Pug Dog Triggered by *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) was defended at the University of Veterinary Medicine (11). *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) was confirmed as the only possible pathogen.

Concomitant works and taxonomy: Hoog GS, Guarro J, Figueras MJ, Gené J. Atlas of clinical fungi, 2nd ed., Centraalbureau voor Schimmeltcultures/Universitat Rovira i Virgili, Baarn/Reus, The Netherlands, 2000; 1126 pp.; van Oorschot CAN. A revision of *Chrysosporium* and allied genera. Stud Mycol 1980;153:634-7.

CONCLUSION

Based on our repeated findings (9-12,16), it is concluded that the pathogenicity of *Geomyces pannorum* (LINK) Sigler & Carmichael var. *pannorum* (*Chrysosporium pannorum* (Link) Hughes) is more than possible. The clinical features of the affected skin, if differentially diagnosed fungal infection is not considered, may easily be mistaken for other dermatoses and wrongly interpreted and treated for quite a long period of time. The affected nail plates may also proceed unnoticed or might be mistaken for fungal infection caused by some other pathogen. In case of any doubt and differential diagnoses it is necessary to think of this possibility, especially if the patients come into contact with animals or work in their gardens (as was the case in the patients presented in this paper). The therapeutic effect of itraconazole proved to be an excellent choice during our repeat examinations.

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