

Dermatophytosis caused by *Trichophyton benhamiae* in a dog

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Trichophyton benhamiae was diagnosed in a 9-year-old female dog by histopathological evaluation, fungal culture and confirmation by sequencing of the internal transcribed spacer region of ribosomal DNA. Successful therapy was achieved with itraconazole, bathing with miconazole and chlorhexidine shampoo, and topical application of sodium hypochlorite as a rinse.

Introduction

Dermatophytoses are superficial mycoses that affect the skin and other keratinised structures (nails or hair) and are caused by dermatophytic fungi.¹ Guinea pigs are considered the primary host of *Trichophyton benhamiae*, yet this species also has been isolated from rabbits and other rodents, which can be carriers.² The present study is a case report of dermatophytosis caused by *T. benhamiae* in a dog.

Case description

A 9-year-old spayed female cross-bred dog from Buenos Aires, Argentina, was presented with progressive alopecia, erythema and erosions with sero-haemorrhagic crusts, affecting the limbs, axillae and chest (Figure 1a). Skin impression smear cytological examination revealed pyogranulomatous inflammation and intracellular coccoid bacteria within neutrophils. A skin biopsy was acquired for histopathological examination, and hairs and scale from lesions on the ventral thoracic area were collected for fungal culture. Histopathological evaluation revealed folliculitis and severe, diffuse, pyogranulomatous furunculosis and intralesional endothrix arthrospores. Periodic acid Schiff staining highlighted the presence of fungal hyphae around the hair follicle (Figure 2). Mycological culture in Lactrimel Borelli agar and potato dextrose agar produced fungal colony growth after seven days of incubation. Microscopic examination of the colonies showed a septate, hyaline mycelial fungus with cigar-shaped macroconidia containing eight to 12 transverse

septa and globose-to-pyriform microconidia grouped in clusters. This morphology is characteristic of the *T. mentagrophytes* complex. DNA was extracted from the mycelium for PCR and sequencing of the internal transcribed spacer (ITS) fragment (ITS1-5.8S-ITS2) of the rDNA. The sequence showed 99.70% similarity with *T. benhamiae*



Figure 1. Lateral view of a dog with *Trichophyton benhamiae* dermatophytosis.

(a) Clinical presentation showing alopecia, erythema and erosions with crusts. (b) Hair regrowth with resolution of most lesions post-treatment. Residual erythema and a self-induced erosive lesion (arrow) were thought to be due to persistent atopic dermatitis.

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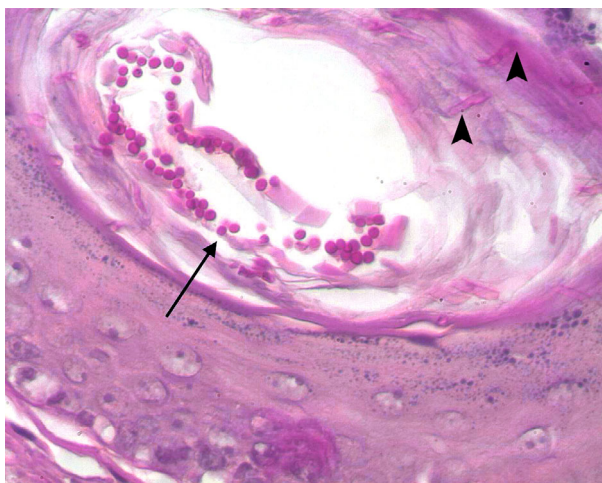


Figure 2. Histopathological findings in a skin biopsy of a dog with *Trichophyton benhamiae* dermatophytosis. Fungal hyphae and arthrospores (arrows) are observed colonizing a hair follicle. Periodic acid Schiff stain, x40.

(accession no. KP132805.1), using the BLAST algorithm from NCBI GenBank (MV292805). Treatment included itraconazole 10 mg/kg/day (Sporanox, CIMA; Latina, Italy), bathing every five days with a 2% miconazole/2% chlorhexidine shampoo (MacDonald Gel Shampoo; Buenos Aires, Argentina) and daily topical spray application of 0.025% sodium hypochlorite solution for 120 days until complete remission of the lesions was achieved (Figure 1b).

Discussion

Dermatophytes are important pathogens given their contagious nature and zoonotic potential. A rapid and accurate diagnosis, accompanied by adequate treatment, limits the contagion potential to other animals and people.¹ Contagion was not documented in this case. Skin infections by *T. benhamiae* have been associated with inflammation in immunosuppressed children and adults, where it can lead to severe clinical signs with secondary bacterial infections, scarring and kerion celsi.³ Carriage studies conducted in Denmark on guinea pigs, hamsters and rabbits in pet stores have shown a 38% positive rate

in guinea pigs, 6% in hamsters and 0% in rabbits.⁴ In the case presented here, although the dog had no contact with guinea pigs, it did frequently hunt caviés (*Microcavia australis*), a wild rodent related to guinea pigs, which may have been the source of the contagion. The fungal species presents two phenotypes: one produces white colonies and the other yellow colonies.⁵ In France, all yellow phenotype strains were isolated from human patients with inflammatory dermatophytosis who had had previous contact with guinea pigs.² In the case reported here, the isolated strain manifested a white phenotype. Although *T. benhamiae* colonies may exhibit some variation in colour between strains, their micromorphology is indistinguishable from the *T. mentagrophytes* complex. However, in the typing and identification of dermatophyte species, the sequence and length of the ITS region in dermatophyte rDNA has shown good interspecific specificity and intraspecific conservation.⁶

Conclusion

Trichophyton benhamiae must be considered as one of the aetiological agents of canine dermatophytosis. It is important to reach an early and definitive diagnosis in order to identify the ecological niche of infectious source, in order to minimise contagion and zoonosis.

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Résumé – *Trichophyton benhamiae* a été diagnostiqué chez une chienne de 9 ans par examen histopathologique, culture fongique et confirmation par séquençage de la région ITS (internal transcribed spacer) de l'ADN ribosomique. Une guérison thérapeutique a été obtenue par de l'itraconazole, des shampooings de miconazole et chlorhexidine et application topique d'hypochlorite de sodium en rinçage.

Resumen – Se diagnosticó infección por *Trichophyton benhamiae* en una perra de 9 años mediante evaluación histopatológica, cultivo de hongos y confirmación mediante secuenciación de la región espaciadora transcrita interna del DNA ribosómico. Se logró un tratamiento exitoso con itraconazol, baños con champú de miconazol y clorhexidina y aplicación tópica de hipoclorito de sodio como enjuague.

Zusammenfassung – *Trichophyton benhamiae* wurde bei einer 9-Jahre alten Hündin mittels histopathologischer Evaluierung, Pilzkultur und der Bestätigung durch Sequenzierung der internen transkribierten Spacer Region der ribosomalen DNA diagnostiziert. Eine erfolgreiche Behandlung wurde mittels Itrakonazol, Shampooebehandlung mit Miconazol und Clorhexidin, und der topischen Verabreichung von Natriumhypochloritinktur erzielt.

要約 – 9歳雌犬において、*Trichophyton benhamiae*を病理組織学的評価、真菌培養、リボソームDNA内部転写スペーサー領域のシークエンシングによる確認により診断した。治療はイトラコナゾール、ミコナゾールおよびクロルヘキシジン含有シャンプーによる入浴、すすぎとして次亜塩素酸ナトリウムの外用適用により成功した。

摘要 – 通过组织病理学评价、真菌培养和核糖体DNA内转录间隔区测序，确诊了1只9岁雌性犬感染了本哈米毛癣菌。使用伊曲康唑、咪康唑和氯己定香波洗澡，并外涂稀释的次氯酸钠，得到成功治愈。

Resumo – *Trichophyton benhamiae* foi diagnosticado em uma cadela de 9 anos através de avaliação histopatológica, cultura de fungos e confirmação por sequenciamento da região espaçadora transcrita interna do DNA ribossomal. Sucesso terapêutico foi obtido com o uso de itraconazol, banho com shampoo à base de miconazol e clorexidina e aplicação tópica de hipoclorito de sódio.