An outbreak of a mixed infection due to fungal (*Trichophyton mentagrophytes* var. *mentagrophytes*) and parasitic (*Geckobiella donnae*) agents on green iguanas

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Key words: dermal co-infection, *Geckobiella donnae*, green iguana, *Trichophyton mentagrophytes* var. *mentagrophytes*

Abstract:

BACKGROUND: Green iguana (*Iguana iguana*) is one of the newly imported exotic pets which has been observed with increasing regularity in veterinary clinics in Iran. Despite their popularity, information about their diseases is scarce.

OBJECTIVES: The aim of this study was to assess the pathogenic agents in green iguanas with skin disorders.

METHODS: The animals were brought to Small Animal Hospital, Faculty of Veterinary Medicine, Tehran, Iran, with chronic pruritic dermatitis, scabs, loss of spines and deep ulcerative dermatitis located over the body. During physical exam, deposits of dry seborrhea were taken and processed for diagnosis. The clinical specimens were cultured on sabouraud dextrose agar containing chloramphenicol and cycloheximide and mycosel agar.

RESULTS: Microscopic examination revealed fungal elements as *Trichophyton mentagrophytes* var. *mentagrophytes* and psoroptid mites as *Geckobiella donnae*.

CONCLUSIONS: This was the first report of the presence of fungal and parasitic agents as the etiological agents of dermatological disorders in green iguanas.

**Introduction**

Many different mycotic diseases have been reported in captive reptiles. Etiological agents of cutaneous and systemic infections in reptiles are attributed to a wide variety of filamentous fungi and yeasts, although they have often been inadequately identified (Pare et al., 2006). As a rule, fungal infection of reptiles has been regarded as opportunistic, caused by normally saprophytic organisms that invade living tissue strictly under favorable circumstances for the pathogen. Predisposing factors such as suboptimal cage temperatures and inappropriate environmental conditions are often involved (Kostka et al., 1997, Schumacher, 2003).

Dermatophytosis is caused by fungi in the genera *Microsporum*, *Trichophyton* and *Epidermophyton*. There are three ecological groups of dermatophytes: anthropophilic (mostly associated with humans), zoophilic (associated with animals) and geophilic (found in the soil) (Nweze, 2010). Dermatophytes are also reportedly cited among the most frequent cause of dermatological problems in domestic animals (Cabañes, 2000). Human beings are usually infected from animals mostly through direct contact or via fungus-bearing hair and scales from infected animals. In the last few
years, the interest in having animals as pets has increased dramatically in many countries with an increasing number of such pets co-habiting and feeding with their owners and members of their households in the majority of cases (Nweze, 2011).

Parasites, especially mites, are well-known causes of dermatological problems in reptiles. Parasitic mites are chiefly ectoparasites of the skin, mucous membranes, or feathers, but a few are endoparasites. Mites are distributed worldwide on both plants and animals and cause direct injury as well as the spread of disease (Scott et al., 2001). Mite families of importance to lizards include: Trombiculidae, Macronyssidae and Pterygosomatidae (Peterson, 2006).

Skin diseases represent one of the most important reasons for veterinary intervention in reptile medicine. Whereas most skin diseases in commonly kept reptile species are primarily caused by inappropriate husbandry and feeding, few of the infectious agents that primarily cause dermatitis are known. Green iguanas (Iguana iguana) are probably the most popular lizards kept as pets. Readily available, they are also fairly inexpensive, especially when acquired at a small size (50-100 grams). In recent years, although increasing attention has been paid to keeping green iguanas as pet animals in Iran and allowing a close relationship with humans in indoor areas, little is known about the zoonotic hazards of this animal. In this manuscript, we will focus on fungal (Trichophyton mentagrophytes var. mentagrophytes) and parasitic (Geckobiella donnae) agents involved in severe and persistent dermatological problems in a green iguanas.

**Materials and Methods**

Green iguanas (9 months) were presented with a history of skin darkness lesions, thickening, scaling and crusting on the neck, tail and distal aspects of the legs (Fig. 1). Due to the scaling nature of the lesions, it was suspected to have dermatophyte invasion. Clinical specimens were taken from involved cutaneous surface by scraping epidermal scales with sterile surgical blade. Direct microscopic examination was done using 10% potassium hydroxide (KOH) /dimethylsulfoxide (DMSO). The clinical specimens were cultured on saubouraud dextrose agar (Merck Co., Darmstadt, Germany) containing chloramphenicol (0.005%) and cyclohexamide (0.04%), mycosel agar and on dermatophyt test media (Merck Co., Darmstadt, Germany). The cultures were incubated at 30°C for 3 weeks.

**Results**

Direct microscopy showed hyphae and hyaline-septated arthroconidia (Fig. 2a) with lots of red mites in epidermal scales, suggesting mixed dermatophyte-mite co-infection. After 8 days, the colonies of T. mentagrophytes var. mentagrophytes had changed to white to cream in color, granular surface and with central folding or downy areas (Fig. 2b). Reverse pigmentation was usually a yellow to brown color. Microconidia were hyaline, single-celled, and smooth-walled and were predominantly spherical to subspherical in shape. Varying numbers of coil and spiral hyphae along with smooth, thin-walled, clavate shaped, multicelled macroconidia were also observed in lactophenol cotton blue staining. The identification of this dermatophyte was confirmed by studying the macroscopic and microscopic characteristics as well as positive hydrolysis of urea within five days and in vitro hair perforation test within 12 days and development of granular appearance on the 1% peptone agar (Merck Co., Darmstadt, Germany).

Mite identified as Geckobiella donnae had oligotrichous idiosoma. Dorsal idiosomal setae c3 was present. The prodorsal shield resembled an inverted pentagon with anterior sides almost parallel. There were two pairs of
short setae on the shield (Fig. 3a). Coxal group III-IV were considerably apart from the coxal group I-II and stout tarsi I-IV had blunt endings. Base of the capitulum was simple and one pair of ventral, slender and smooth setae was visible behind the palps. Palps were slender and about two times longer than the length of base of gnathosoma (Fig. 3b). Seta d on femur I was branched.

Discussion

Dermatophytosis is a well-recognised zoonotic infection of keratinized structures such as nails, hair shafts, claws and stratum corneum by dermatophytes. Zoophilic dermatophytes, in particular Trichophyton mentagrophytes var. mentagrophytes, are the prominent aetiological agents (Mancianti et al., 2002). The identification of dermatophyte species is essential for appropriate diagnosis and treatment in veterinary dermatology. Routine identification of dermatophytes relies on the use of appropriate culture growth media and the examination of gross colony and microscopic morphology. Results of this study describe the first report of the occurrence of a mixed infection with Trichophyton mentagrophytes var. mentagrophytes and Geckobiella donnae in green iguanas in Tehran, Iran. To our knowledge this is the first report of Trichophyton mentagrophytes var. mentagrophytes being implicated in a disseminated cutaneous infection in iguanas. The isolation of the fungi in pure culture confirmed this fungus as the etiologic agent of the infections in this reptile species. In a previous study by Khosravi et al. (2012), all green iguanas were suffering from T. mentagrophytes var. interdigitale infection. Chung et al. (2014) reported a 1-year-old female green iguana presented with a nodular, darkly discolored skin lesion surrounded by necrosis in the right ventral abdominal region suffering from Microsporum canis. Totally, cutaneous fungal infections in iguanas are attributed to a wide variety of filamentous fungi and yeasts, which often have been inadequately identified (Pare et al., 2006). Although rodents and soil were known to harbour different T. mentagrophytes varieties, it was possible that husbandry was
suboptimal, and this would be a predisposing factor contributing to the onset of infection.

Pterygosomatidae, the only family in the superfamily Pterygosomatoidea, comprises various species of bright red mites found primarily on lizards, tortoises, and arthropods all over the world. The described genera includes Cyclurobia, Geckobia, Geckobiella, Hirstiella, Ixodiderma, Pterygosoma, Scaphothrix, Teqtisistlana and Zonurobia, which are mostly external parasites of lizards. They attach under scales, between the toes, or in areas known as mite pockets and often are confused with chiggers. They feed on body fluids of their host and cause benign to severe pathological disorders such as anemia and intense skin irritation. Apparently, some species are vectors of protozoan diseases of lizards (Krantz and Walter, 2009). Geckobiella spp. (as well as other Pterygosomatids) is scansorial and not usually found in mite-pockets. These mites live under the imbricate scales of their hosts (Delfino et al., 2011). All instars of this genus are parasitic on the Iguanidae (Paredes-León et al., 2012). Parasitism by Geckobiella may cause problems during the molting process of their hosts and some species are potential vectors of Plasmodium and Haemogregarina (Murgas et al., 2013). The mites tend to localize around the eyes, under the chin, in the dewlap, axillary and inguinal areas, on limbs in folds of skin associated with joints, and on the tail. They can cause irritation to the lizards, resulting in a pruritic response (Hoppmann and Barron, 2007). Previous studies in Turkey (Gazyacsi et al., 2011) and Greece (Farmaki et al., 2013) reported a number of red mites, erythema, darkness, and itching on the skin of green iguanas and Hirstiella spp. was diagnosed after microscopic examination. In the iguanas in the present case, mites were generally picked up from periocular, dorsal and tail sites and skin examination showed erythema, darkness, and pruritis. This was the first report of Geckobiella donnae on a green iguanas in Iran and the source of the infestation in the present iguana case was not known. In summary, this case suggests that fungal and parasitic co-infection with multiple organ involvement should be included as a possible etiology in the differential diagnosis of cutaneous infections in reptiles. Moreover, it also demonstrates diagnostic techniques available to aid in identification of fungal and parasitic agents in reptiles.

Acknowledgments

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References

چکیده
زمینه مطالعه: ایکواناهای سبز (یا ایگوانای سبز) از جمله حشرات ایکوانا اسپاکاریا که در کلینیک‌های دامپزشکی ایران مورد توجه اند و از جمله حشرات ایکوانا اسپاکاریا مورد توجه اند. علیرغم محبوبیت شان، اطلاعات ناچیزی در مورد بیماری‌های آنها وجود دارد. هدف این مطالعه تشخیص عوامل بیماری‌زا در ایکواناهای سبز مبتلا به ضایعات پوستی بود.

روش کار: مطالعه تشخیص عوامل بیماری‌زا در ایکواناهای سبز مبتلا به ضایعات پوستی بود.

نتایج: نمونه‌ها در آزمایش‌های تیکوردژی و مایکوسیل آگار کشت شدند. در مطالعه، تحقیق‌های جدید این سرکه نشان داد که ایکواناهای سبز باید در مطالعه‌های تحقیقاتی مورد بررسی قرار گیرند.

گردیدن: نتیجه‌گیری نهایی: این مورد اولین نشان از حضور عوامل قارچی و انگلی بیماری در ایکواناهای سبز بود.

واژه‌های کلیدی: عفونت پوستی ایکوانا، گلوبیلا دونا، ایگوانای سبز، تریکوفایتون منتاگروفایتس

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