

Dermatophilosis in ruminants and horses in the southern region of Rio Grande do Sul between 2009-2019

Dermatofilose em ruminantes e equinos na região sul do Rio Grande do Sul entre 2009-2019

Dermatofilosis en rumiantes y caballos en la región sur de Rio Grande do Sul entre 2009-2019

Received: 03/29/2022 | Reviewed: 04/07/2022 | Accept: 04/11/2022 | Published: 04/16/2022

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Abstract

This study has the objective of describing the epidemiology of dermatophilosis in cattle, horse, and sheep in the southern of Rio Grande do Sul during a period of 10 years. Data was gathered of all cases/outbreaks of dermatophilosis in ruminants and equines. There were 44 (49,4%) diagnoses of dermatophilosis out of 89 cases presenting non-proliferative cutaneous lesions. Of these, 13 were in cattle, 29 in horses, and two were in sheep. It was made a consultation to the Hospital de Clínicas of Porto Alegre/RS and DATASUS database to determine the occurrence of dermatophilosis in humans due to its zoonotic characteristic. It was observed that both in public hospitals and in the SUS database, dermatopathies are recorded in a non-specific way, and with dermatophilosis being a dermatopathy with nonspecific lesions, the definitive diagnosis with the characterization of the agent is not made. The results of this study allowed to conclude that dermatophilosis has a relative importance in domestic species since mortality not occurs in cattle and horses. Still, one must consider the lower dairy production in cattle. In sheep, there was mortality and losses due to the fall in wool quality, and the disease should be considered in diagnosing skin lesions in this species. In humans, the disease is underreported and the possibility of its occurrence in rural areas is alerted; however, cases rarely reach the laboratory.

Keywords: Production animals; *Dermatophilus congolensis*; Dermatopathy; Zoonosis.

Resumo

Este trabalho teve como objetivo descrever a epidemiologia da dermatofilose em bovinos equinos e ovinos na região sul do Rio Grande do Sul, em um período de 10 anos. Para isso realizou-se uma pesquisa nos protocolos de necropsia/biopsia do laboratório identificando-se os casos de dermatofilose diagnosticados nestas espécies. Foram feitos 44 diagnósticos (49,4%) de um total de 89 casos de lesões cutâneas não proliferativas recebidas. Destes, 13 foram em bovinos, 29 foram em equinos e dois foram em ovinos. Foi realizada, também, uma consulta no Hospital de Clínicas de Porto Alegre/RS e, também, no DATASUS sobre a ocorrência de dermatofilose no homem para determinar a frequência do diagnóstico desta enfermidade por tratar-se de uma zoonose. Foi observado que tanto em Hospitais públicos como no Banco de dados do SUS as dermatopatias são registradas de forma inespecífica, sendo a dermatofilose uma dermatopatia com lesões inespecíficas o diagnóstico definitivo com caracterização do agente, de modo geral, não é feito. Os resultados deste trabalho permitiram concluir que a dermatofilose tem importância relativa

nas espécies domésticas de produção, uma vez que a mortalidade em bovinos e equinos é nula, porém deve-se levar em conta a queda na produção leiteira em bovinos. Em ovinos houve mortalidade e prejuízos pela queda na qualidade da lã, devendo ser considerada no diagnóstico de lesões de pele nesta espécie. No homem o fato de a doença ser subnotificada, alerta para a possibilidade de sua ocorrência no meio rural, entretanto dificilmente os casos chegam ao conhecimento no laboratório.

Palavras-chave: Animais de produção; *Dermatophilus congolensis*; Dermatopatia; Zoonose.

Resumen

Este estudio tuvo como objetivo describir la epidemiología de la dermatofilia en bovinos, equinos y ovinos en la región sur de Rio Grande do Sul, durante un período de 10 años. Para ello se investigó en los protocolos de necropsia/biopsia del laboratorio, identificando los casos de dermatofilia diagnosticados en estas especies. Se realizaron 44 diagnósticos (49,4%) de un total de 89 casos de lesiones cutáneas no proliferativas recibidas. De estos, 13 fueron en bovinos, 29 en equinos y dos en ovinos. También se realizó una consulta en el Hospital de Clínicas de Porto Alegre/RS y también en DATASUS sobre la ocurrencia de dermatofilia en humanos para determinar la frecuencia de diagnóstico de esta enfermedad por ser una zoonosis. Se observó que tanto en los hospitales públicos como en la base de datos del SUS, las dermatopatías son registradas de forma inespecífica, y siendo la dermatofilia una dermatopatía con lesiones inespecíficas, generalmente no se realiza el diagnóstico definitivo con la caracterización del agente. Los resultados de este estudio permitieron concluir que la dermatofilia tiene una importancia relativa en las especies de producción doméstica ya que la mortalidad en bovinos y equinos es nula. Aún así, hay que considerar la menor producción lechera en el ganado bovino. En ovinos hubo mortalidad y pérdidas por la caída en la calidad de la lana, lo que debe ser considerado en el diagnóstico de lesiones cutáneas en esta especie. En humanos, el subregistro de la enfermedad advierte sobre la posibilidad de su ocurrencia en áreas rurales; sin embargo, los casos rara vez llegan al laboratorio.

Palabras clave: Animales de producción; *Dermatophilus congolensis*; Dermatología; Zoonosis.

1. Introduction

Dermatophilosis, also known as cutaneous streptotrichosis or wood wool in sheep, is an infectious disease caused by the bacterium *Dermatophilus congolensis*, which affects several species of mammals (Pereira & Meirelles, 2007), including humans (Burd et al., 2007). Transmission occurs by direct contact with zoospores on the skin of contaminated animals, fomites, and vectors such as ticks and flies. Sheep, cattle, and horses develop the disease more frequently (Pereira & Meirelles, 2007; Vieira et al., 2017), but it can also occur in dogs, cats, wild animals (Carreira et al., 2011), swine (Birgel et al., 2006) and humans (Burd et al., 2007).

Dermatophilosis has a global distribution, being particularly frequent after heavy periods of rain in tropical and subtropical areas of South America (Pereira & Meirelles, 2007; Castelo Branco et al., 2012; Mauldin & Peters-Kennedy, 2016). *D. congolensis* is considered an opportunistic agent, being present in the skin of clinically normal animals (Vieira et al., 2017). The development of the disease is strongly associated with hot and humid climates and after periods of heavy rain (Ojong et al., 2016). The condition occurs when there is an imbalance of superficial barriers of immunological and nonspecific defense (pH, fatty acids, and normal flora), breaking the integrity of the skin and allowing the invasion of the tegument by mobile zoospores (Pereira & Meirelles, 2007). When there is skin invasion by the zoospore, there is an acute inflammatory response by neutrophils in the dermis and epidermis, creating intraepidermal microabscesses that prevent the penetration of bacteria into the dermis. However, residual microorganisms invade the regenerated epidermis causing cycles of bacterial growth and epidermal regeneration (Hargis & Mayers, 2018).

The clinical presentation of the disease is characterized by agglutination of hair, alopecia, formation of papules, pustules, and rashes with thick crusts. The distribution of lesions can be focal or diffuse and occurs predominantly in the head, neck, loin, and ribs. Histologically, there is parakeratosis, hyperkeratosis, acanthosis, and infiltration by neutrophils (Pereira & Meirelles, 2007; Hargis & Mayers, 2018). The crusts are composed of alternating stratified layers of hyperkeratotic stratum corneum, proteinaceous fluid, and degenerated neutrophils (Hargis & Mayers, 2018).

The diagnosis is made through epidemiology, clinical signs, histology, bacterial culture, and Gram-stained smear and polymerase chain reaction (PCR). (Olinda et al., 2009; Shaibu et al., 2010). Antibiotics are used to treat the disease

(Domingues et al., 2018). There is no vaccine for dermatophilosis, and prophylaxis must be carried out by disinfecting facilities and materials (Pereira & Meirelles, 2007).

Since there are few studies on the prevalence of dermatophilosis in the Rio Grande do Sul, this study aimed to determine the epidemiological trends of the disease, and its relative frequency among non-proliferative skin lesions diagnosed in the southern region of Rio Grande do Sul.

2. Materials and methods

All cases/outbreaks of dermatophilosis diagnosed in ruminants and horses at the Laboratório Regional de Diagnóstico, Faculdade de Veterinária da Universidade Federal de Pelotas (LRD/UFPel) were surveyed between 2009 and 2019. Samples were collected in the field, in autopsies performed by LRD/UFPel technicians, or sent by veterinarians who work on farms. The samples analyzed included hair, skin scrapings, biopsies, and crusts from skin lesions. The material was fixed in 10% buffered formalin, cut 3µm thick, and stained the slides using the standard hematoxylin and eosin (H&E) technique for histological evaluation. Biopsy fragments were also sent to the bacteriology laboratory and submitted to Gram stain to identify the filamentous form of the bacterium (Pereira & Meirelles, 2007). A query was carried out at Hospital de Clínicas de Porto Alegre/RS and at DATASUS about dermatophilosis in humans.

3. Results

A total of 44 diagnoses of dermatophilosis were done out of 89 cases of ruminants and horses that had non-proliferative skin lesions. In 33 opportunities, only one animal was affected, and in 11, outbreaks were recorded with several affected animals.

Among the outbreaks diagnosed, 5 (46%) were in horses, 4 (36%) were in cattle, and 2 (18%) were in sheep. Cases occurred in all seasons, with 2 (18%) outbreaks in winter, 2 (18%) outbreaks in summer, 3 (28%) outbreaks in autumn, and 4 (36%) outbreaks in spring. The morbidity rate in cattle ranged from 2.5% to 80%, in horses from 66% to 100%, and in sheep from 9% to 10%. Outbreaks in sheep presented mortality ranging from 2% to 3%.

Clinical signs in cattle and horses were similar, characterized by crusted and alopecic lesions, with agglutination of hairs and itching. Lesions were observed throughout the body, with more frequent on the loin, back, tail, hind limbs, ears, and face (Figure 1). In sheep, the animals had crusted dermatitis on the ears, and wool fall from the lumbar region (Figure 2).

Figure 1- Cattle with crusted and alopecic lesions on the flank, back, neck, limbs, and base of the tail.



Source: Authors.

Figure. 2- Sheep with crusts and loss of wool in the back and limbs.



Source: Authors.

Histologically, the lesions were similar in all species. There was para and orthokeratotic hyperkeratosis in the skin epithelium, with aggregates of degenerated neutrophils alternately distributed in the form of parallel layers. Intralesional bacterial filaments were also observed.

It was impossible to obtain data on dermatophilosis in humans in consultation with public health bodies. According to physicians from the Hospital de Clínicas de Porto Alegre/RS, the disease is not mandatory to be registered in the SUS database (Brasil, 2021).

4. Discussion

In the present study, the diagnosis of dermatophilosis was made by epidemiology, clinical signs, macroscopic and histological lesions associated with identifying the filamentous form of the agent by Gram stain. Work performed in other countries used the same diagnostic criteria, including identifying the agent with Gram and Giemsa staining (Nath et al., 2010). Some studies used only clinical-epidemiological criteria for diagnosing dermatophilosis (Olinda et al., 2009). However, the importance of laboratory confirmation (skin scrapings, Gram stain, biopsy, and PCR) is emphasized (Aufox et al., 2018), as the differential diagnosis includes other skin diseases such as dermatophytosis, squamous cell carcinoma, bacterial folliculitis, and contagious ecthyma. in sheep (Pereira & Meirelles, 2007; Olinda et al., 2009).

Dermatophilosis is especially prevalent in countries with tropical and subtropical climates, especially after rain. Countries in Africa record a high prevalence of this disease (Olaogun & Onwuzuruike, 2018). In the present work, outbreaks occurred throughout all seasons, being more frequent in spring. Dermatophilosis is frequently observed after periods of rain and high humidity in several regions of Brazil (Vieira et al., 2017). In Brazil, in the semi-arid region of the Northeast, where the highest rainfall is limited to a few months of the year, outbreaks occur in these periods of heavy rain (Vieira et al., 2017). In contrast, the southern region of Rio Grande do Sul is particularly conducive to the development of the disease due to the consistently high level of rainfall throughout the year (Pereira & Meirelles, 2007; Caballero et al., 2011).

In addition to climate, the prevalence of outbreaks is dependent on other factors such as age, sex, breed, and type of animal husbandry (Nath et al., 2010; Ojong et al., 2016; Olaogun & Onwuzuruike, 2018). In a study of sheep in the Brazilian semi-arid region, the morbidity of 0.77% to 31% and mortality of 10% were observed on one of the farms. The outbreaks occurred shortly after periods of heavy rains. Mortality was associated with concomitant factors such as poor nutrition and parasites (Vieira et al., 2017).

Another critical variable cited by Vieira et al. (2017) that influenced morbidity and mortality outcomes was the type of production. The highest morbidity was associated with the high stocking rate due to increased contact between the animals. The sheep properties in the present work had a relatively low stocking rate because they are extensive farming, contributing to the low morbidity observed. On the other hand, cases in cattle were more frequent in dairy breeds in intensive or semi-intensive farming. In Rio Grande do Sul, cattle herds are predominantly beef and extensively raised (SCHILD, 2020. Personal communication), indicating that dairy cattle are more susceptible to the disease due to how they are presented.

Studies show that susceptibility to infection by *D. congolensis* varies significantly between different breeds of cattle, with the Brahman breed being susceptible (Ojong et al., 2016). One gene, related to the MHC (Major Histocompatibility Complex), BoLA-DRB3, is involved in resistance and immunity to dermatophilosis in cattle (Razafindraibe et al., 2008). These studies were carried out in African countries and may not represent the genetic profile of Brazilian cattle.

In horses, it was observed that the disease most of the time affected one or two animals, not being considered a disease of economic importance. The low number of cases is likely related to the raising of few animals on rural properties that use horses for work and because they are usually raised in the field without very close contact with each other. Most reports of dermatophilosis in horses are from individual cases (Olinda et al., 2009; Domingues et al., 2018)

D. congolensis infection is considered uncommon in humans, with few descriptions in the literature. In most cases, the affected individuals had previous contact with animals (Burd et al., 2007; Lorenzi et al., 2021). The exact mechanism of infection is not fully elucidated, but mechanical transmission through contact with infected animals or contaminated materials and products is the most accepted form (Amor et al., 2011; Gebreyohannes & Gebresselassie, 2013; Aubin et al., 2016). As with animals, skin imbalance caused by high humidity or previous injuries to the epidermis increase the risk of infection (Burd et al., 2007).

Human dermatophilosis lesions are highly variable and nonspecific, often resembling dermatitis caused by other etiologic agents. The disease can manifest through pruritus, keratolysis, pustule formation, exudative and erythematous scaly lesions, folliculitis, macerations, and skin fissures (Burd et al., 2007; Brasil, 2021). In most cases, the lesions heal without treatment after two to six weeks (Amor et al., 2011; Aubin et al., 2016). Laboratory diagnosis of human dermatophilosis is difficult because skin samples are often contaminated by bacteria commensal to the skin (Aubin et al., 2016). For these reasons, the disease is likely to be underdiagnosed, explaining the low number of reports. In this study, it was observed that both in public hospitals and the SUS database, skin diseases are registered in a non-specific way. Since dermatophilosis is a skin disease with non-specific lesions, the definitive diagnosis with the agent's characterization, in general, is not made.

5. Conclusions

The results of this work allowed us to conclude that dermatophilosis has a relative importance in domestic species of production since mortality in cattle and horses is null. Still, the drop in milk production in cattle must be considered. In sheep, there was mortality and losses due to the decline in wool quality, which should be considered in diagnosing skin lesions in this species. In humans, the fact that the disease is underreported alerts the possibility of its occurrence in rural areas; however, the cases rarely reach the knowledge of the laboratory.

Acknowledgments

This study was financed in part by the “Coordenação de Aperfeiçoamento de Pessoal de Nível Superior” (CAPES), Brazil, Finance Code 001.

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