



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2022; 11(10): 936-939

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www.thepharmajournal.com

Received: 08-07-2022

Accepted: 16-09-2022

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Host and environmental risk factors of canine dermatophytosis

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Abstract

Dermatophytosis is a frequently occurring contagious fungal infection in human and animals. A total of 114 dogs with clinical signs suggestive of fungal dermatitis presented to Teaching Veterinary Clinical Complex, Pookode, Wayanad was selected for study. Out of which dermatophytes could be identified in 30 samples (26.32 percent) by culture. Infection was commonest in dogs less than one year of age. More females (53.33%) were infected when compared to males (46.67%). German Shepherd breed of dogs (26.67 percent) were more affected than other breeds. Higher number of cases were bathed once in a week. Grooming was also irregular in 66.67 percent of animals. It was concluded that breed and management factors were associated with the occurrence of dermatophytosis in dogs.

Keywords: dermatophytosis, german shepherd, grooming, management, occurrence

Introduction

Dogs are one of the earliest domesticated animals. The association of dogs and humans have facilitated co-evolution of various pathogens. Skin is the largest organ and first line of defense of the body. Skin is predispose to infections as it is mostly exposed to environment. Fungal diseases of skin acquire prime importance because of its cosmopolitan distribution and contagious nature. Although most of fungal dermatitis are secondary in nature, dermatophytes considered as a primary pathogen. Dermatophytosis is caused by keratinophilic fungi belonging to the genera *Microsporum*, *Trichophyton* and *Epidermophyton*. The invasion of fungal elements to the stratum corneum and further spread along the periphery result in the classical 'ring worm' appearance. Studying the risk factors of canine dermatophytosis will aid in better management strategies to prevent dermatophytosis.

Materials and Methods

The present study was conducted in the Department of Veterinary Epidemiology and Preventive Medicine, College of Veterinary and Animal Sciences, Pookode, Wayanad during the period from July 2021 to January 2022. A total of 114 dogs presented with dermatological problems were screened for dermatophytosis. Skin scrapings were collected and cultured using dermatophyte test medium (DTM). Dermatophytes were confirmed by staining of fungal isolates by Chicago sky blue staining. Detailed epidemiological data such as age, sex, breed, appearance and distribution of lesion, management practices such as bathing and grooming, method of disinfection of kennel and presence of ectoparasites were collected and analysed.

Results and Discussion

Out of 114 cases presented with dermatitis, dermatophytes were identified in 30 (26.32 percent) cases. Similar level of occurrence was reported by Debnath *et al.* (2016)^[3], Sever *et al.* (2017)^[11] and Tarra (2021)^[15], had reported 20.93, 29.6 and 25 percent, respectively. Highest incidence of infection (46.67 percent) was noticed in dogs aged less than one year followed by one- to three-year-old dogs. Devi and Vijayakumar (2013)^[4] explained that increased incidence of fungal dermatitis in young animals was attributed to poor cell mediated immunity arising from nutritional imbalances. Singathia *et al.* (2014)^[14] pointed that reduced incidence rate of fungal infections in adults could be due to acquired resistance of epidermal tissues through repeated exposure to low grade infection with mycotic elements. Sigirci *et al.* (2019)^[13] stated that there was no correlation between age and incidence of dermatophytosis in dogs. Similar findings were reported by Minnat (2019)^[7] and Tarra (2021)^[15]. Higher incidence of dermatophytosis was noticed in females (53.33 percent) when compared to males (46.67 percent) (Fig. 2).

Similar findings were reported by Devi and Vijayakumar (2013)^[4], Haggag *et al.* (2017)^[5] and Cunha *et al.* (2019)^[2]. Debnath *et al.* (2016)^[3] and Sigirci *et al.* (2019)^[13] stated that there was no significant difference between occurrence of dermatophytosis with respect to sex of the dog affected. The higher prevalence in females might be due to stress associated with parturition, lactation and oestrus.

In the present study, it was observed that German shepherd dogs (26.67 percent) were mostly affected by dermatophytosis followed by Labrador Retrievers (23.33 percent) and Rottweilers (16.67 percent) (Fig. 3). These observations were in accordance with Ziony and Arzi (2000) and Minnat (2019)^[7], and they reported that German shepherd dogs were more prone to dermatophyte infection than other breeds. Heo *et al.* (2018)^[6] observed that dog breeds with thick skin had more amount of keratocytes than the thin-skinned breeds which might predispose the thick-skinned dogs to infection with keratinophilic fungi like dermatophytes. Minnat (2019)^[7] proposed that breeds with long hair were more susceptible to dermatophytosis as grooming may not help in complete removal of fungal elements, which in turn result in prolonged contact with skin and greater the likelihood of sporulation.

A total of 23 (76.67 percent) cases were bathed at least once or more times a week (Fig. 4). Moriello (2003)^[3] reported that presence of moisture has enhanced the ability of dermatophytes to penetrate the skin and favored the germination of fungal spores. According to Devi and Vijayakumar (2013)^[4], higher the moisture content in the skin as a part of bathing promotes the growth of fungus. Hence, bathing of pets at lower frequency was advised. In the present study, 53.33 percent of dogs were kept outdoors while 46.67 percent dogs were kept indoor. Bhardwaj *et al.* (2012)^[1] and Singathia *et al.* (2014)^[14] reported that chances of getting fungal infection were more common in pets maintained indoor with cooler environment, as higher humidity favored the fungal growth.

Kennel cleaning was done using detergents by 53.33 percent

of owners and remaining 46.67 percent of owners used only water. Shyma and Vijayakumar (2012)^[12] stated that primary irritants like disinfectants and chemicals caused dermatological problems in animals. Regular grooming was practiced only in 33.33 percent dogs in the study group. Shyma and Vijayakumar (2012)^[12] stated that improper grooming might significantly affect the dermatological health. Regular grooming promotes the circulation of blood and also clearing undesirable damaged hairs and debris.

Localized form of dermatophytosis was observed in 17 (56.67 percent) and generalized form in 13 dogs (43.33 percent). Out of 30 positive cases, 10 (33.33 percent) were presented with papules and patches, which were the major primary skin lesions. Other lesions included pustules, macules, vesicle and nodule. Predominant secondary lesions observed were scales, alopecia, hyperpigmentation, erythema, epidermal collarettes, crust and scab (Fig. 1, Table. 2). Similar findings were reported by Singathia (2014)^[14], Moriello *et al.* (2017)^[4]. Cunha *et al.* (2019)^[2] explained that lesions of dermatophytosis could range from mild to severe, depending on the variety of factors such as the infecting organisms, virulence factors, location of infection, secondary infections and environmental circumstances.

The lesions were seen on hind limbs in 40 percent dogs, followed by forelimbs in 33.33 percent, face and dorsum in 26.67 percent each, neck in 23.33 percent, ventral abdomen and all over the body in 16.67 percent each (Fig. 5). Minnat (2019)^[7] noticed that highest distribution of lesions was found on limbs followed by face and dorsum.

Out of 30 dogs with dermatophytosis, concurrent infection with malassezia was observed in 11 (36.67 percent), pyoderma in seven (23.33 percent), demodicosis in six (20 percent) and flea infestations in four (13.33 percent). These findings are in agreement with Preeti (2019)^[10] who observed co-infection with yeast and ectoparasites in 32.98 percent of cases. Epidemiological data of canine dermatophytosis was depicted in table.1.



Fig 1: Clinical signs and lesions of dermatophytosis in dogs

Table 1: Epidemiological profile of dogs infected by dermatophytosis

| Sl. No. | Epidemiological data | | Number of dogs (N=30) | percent (%) |
|---------|----------------------|--------------------|-----------------------|---------------------|
| 1. | Age | 0 - 1Year | 14 | 46.67 * |
| | | 1-3 Years | 12 | 40 ^{ns} |
| | | > 3 Years | 4 | 13.33 ^{ns} |
| 2. | Sex | Male | 14 | 46.67 ^{ns} |
| | | Female | 16 | 53.33 ^{ns} |
| 3. | Breed | German shepherd | 8 | 26.67 ^{ns} |
| | | Labrador retriever | 7 | 23.33 ^{ns} |
| | | Rottweiler | 5 | 16.67 ^{ns} |
| | | Spitz | 2 | 6.67 ^{ns} |
| | | Pug | 2 | 6.67 ^{ns} |
| | | Non-descript | 2 | 6.67 ^{ns} |
| | | Others | 4 | 13.33 ^{ns} |
| 4. | Housing | Indoor | 14 | 46.67 ^{ns} |
| | | Outdoor | 16 | 53.33 ^{ns} |
| 5. | Kennel cleaning | Disinfectant | 16 | 53.33 ^{ns} |
| | | Water only | 14 | 46.67 ^{ns} |
| 6. | Grooming | Regular | 10 | 33.33 ^{ns} |
| | | Not regular | 20 | 66.67* |
| 7. | Deworming | Dewormed | 16 | 53.33 ^{ns} |
| | | Not dewormed | 14 | 46.67 ^{ns} |

^{ns} Non significant * Statistically significant at 5% level

Table 2: Clinical signs and lesions of canine dermatophytosis

| Lesions | | No of dogs (N=30) | Percent (%) |
|-------------------|----------------------|-------------------|-------------|
| Primary lesions | Papule | 10 | 33.33 |
| | Patch | 10 | 33.33 |
| | Pustule | 3 | 10 |
| | Macule | 2 | 6.67 |
| | Vesicle | 1 | 3.33 |
| | Nodule | 1 | 3.33 |
| Secondary lesions | Scale | 30 | 100 |
| | Alopecia | 27 | 90 |
| | Hyperpigmentation | 11 | 36.67 |
| | Erythema | 9 | 30 |
| | Epidermal collarette | 7 | 23.33 |
| | Crust | 5 | 16.67 |
| | Scab | 4 | 13.33 |
| | Ulcer | 2 | 6.67 |
| | Hyperkeratosis | 2 | 6.67 |
| | Fissure | 1 | 3.33 |
| | Comedone | 1 | 3.33 |

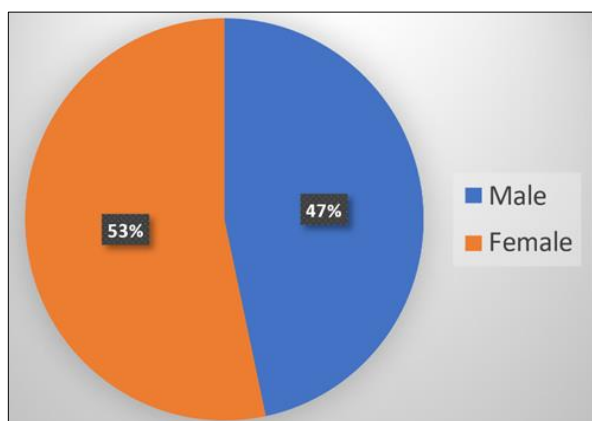


Fig 2: Sex-wise occurrence

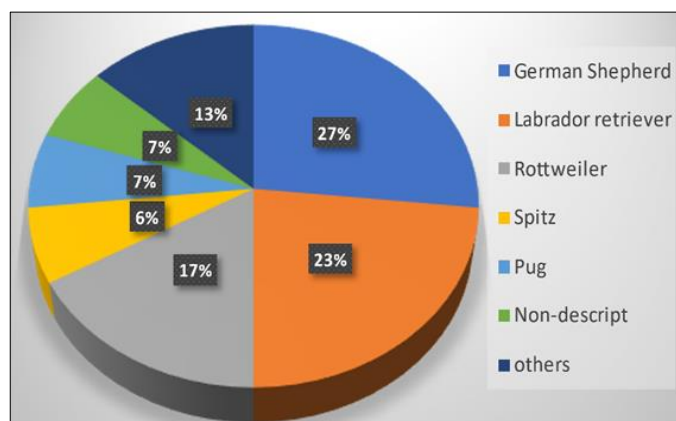


Fig 3: Breed-wise occurrence

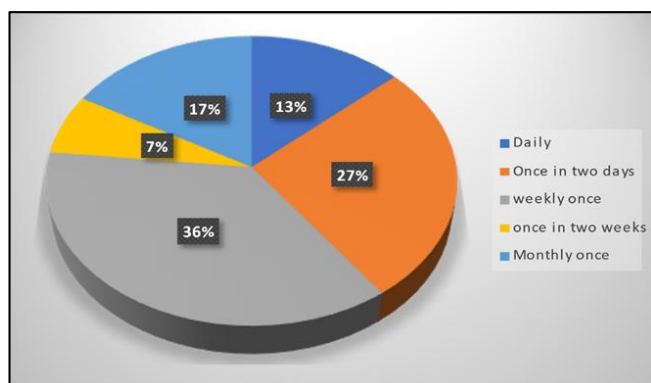


Fig 4: Frequency of bathing

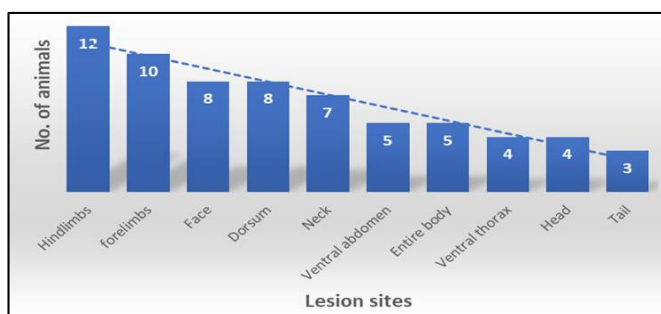


Fig 5: Distribution of skin lesions in infected dogs

Conclusion

The present study investigated on different epidemiological factors which predisposes dogs to dermatophytosis. Dermatophytosis was most commonly seen in puppies less than one year of age (46.67 percent) than adult dogs. Higher incidences of dermatophytosis was noticed in German shepherd breed of dogs (26.67 percent) than other breeds. Dermatophytosis was more frequently occurred in long haired breed like German shepherds. Frequent bathing predispose to dermatophytosis may be due to retention of moisture of skin. The occurrence was also noted in dogs which were not groomed regularly. Clinical signs observed were alopecia, pruritus, scales, papules and patches. Thus, it was concluded that less frequency of bathing and regular grooming may reduce occurrence of dermatophytosis, especially in long haired breeds of dogs.

Acknowledgement

The authors thank the Dean, College of Veterinary and Animal Sciences, Pookode for providing facilities for conduct of the study.

Conflict of interest

The authors declare that they have no conflict of interest.

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