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Occurrence of dermatophytosis in dogs from Thrissur, Kerala

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Abstract

Dermatophytosis is one of the most common skin diseases that affect dogs. Geographic factors like temperature and humidity play an important role in determining prevalence of dermatophytosis. The aim of this study was to determine the macroscopic and microscopic identification of different types of dermatophytes from the dogs presented to University Veterinary Hospital, Kokkali and Teaching Veterinary Clinical Complex, Mannuthy. Skin scrapings and hair were collected from the dogs presented with complaint of alopecia and pruritus. Each sample was cultured on Sabouraud Dextrose Agar (SDA). The cultures were incubated at room temperature for maximum of four weeks. The isolates of fungi were examined macroscopically and microscopically. Lactophenol cotton blue staining technique was used for fungi morphology identification. The most common type of dermatophytes affecting dogs in Thrissur district, Kerala were Trichophyton spp. (68 per cent), Microsporum spp. (32 per cent) and other non-dermatophytes fungi viz. Aspergillus spp., Sporothrix spp., and curvularia spp. This study could assist investigators for understanding the prevalence of the dermatophytes and in zoonotic aspects.

Keywords: *Dermatophytosis, Sabouraud Dextrose Agar.*

Dermatophytosis is the most common superficial, infectious and highly contagious mycosis of both animals and humans. Dermatophytosis is caused by a group of fungi known as dermatophytes (Simpanya and Baxter, 1996). The various studies on prevalence of dermatophytosis reported that 49.7 per cent animals suffered with dermatophytosis in different regions of Iran (Shokri and Khosravi, 2016). Prevalence of dermatophytosis was more in dogs and cats (78.7 per cent) than in domestic livestock (33 per cent) in western parts of India (Murmu *et al.,* 2015). In dogs, prevalence of dermatophytosis ranged from four percent to 10 per cent while higher prevalence had been reported in Turkey (Brilhante *et al.,* 2018). Contaminated environment, inanimate objects,

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animals with subclinical or clinical infections, and animals that were mechanical carriers of the spores on their hair coat acted as reservoirs of infection for both people and animals (Moriello *et al.,* 2017). Based on ecological distribution, dermatophytes are divided into three main groups: *geophilic, zoophilic* and *anthropophilic.* Geophilic is a type of dermatophyte present in soil like *Microsporum gypseum.* It is widespread in warm, humid, tropical and subtropical environments. Zoophilic dermatophytes infect animal hosts and are rarely found in soil (Abdalla and Wisal, 2018). Anthropophilic fungi can infect humans and animals, but cannot survive in soil and includes *Trichophyton rubrum* and *Epidermophyton floccosum* (Moriello *et al.,* 2017). Dermatophytic infection is common worldwide with incidence rates increasing gradually because of the increase in rearing of pets. Mycotic lesions were extremely variable but most of them showed scaliness and alopecia (David *et al.,* 2004).

Materials and methods

The present study was conducted in the Department of Veterinary Epidemiology and Preventive Medicine during the period from January 2021 to September 2021. This study mainly aimed to detect the prevalence of dermatophytes in canine population through culture. A total of 100 dogs with the clinical signs of dermatitis like localized or generalized alopecia, pruritus and inflammatory lesions presented to University Veterinary Hospital (UVH), Kokkalai and Teaching Veterinary Clinical Complex (TVCC), Mannuthy were selected for this study. Selection criteria includes: Dogs with superficial skin lesions clinically diagnosed as dermatophyte infection, dogs with complaint of localized and generalized alopecia, pruritus and localized inflammatory lesions. Exclusion criteria includes: dogs whose skin scrapings were negative for fungal spores and dogs with moist skin infection were not screened for dermatophytosis which could be indicative of non-fungal infection in most of the cases.

Collection of samples

The samples such as skin and hair were collected from infected dogs with clinical signs suggestive of dermatophytosis presented to UVH, Kokkalai and TVCC, Mannuthy during the period from January 2021 to September 2021. A total of 100 cases were having signs of hair loss, scaling, crusts and desquamation were examined for dermatophytosis. Age, gender and season wise categorization of isolates were done for future study.

Direct microscopic examination

Skin scrapings from all the 100 dogs which showed either the presence of fungal spores in the hair shaft or presence of fungal hyphae in epithelial cells on KOH preparation were selected for the further isolation and identification.

Cultural examination and identification

All collected skin samples were subjected to cultural examination on Sabouraud dextrose agar with 0.05 per cent chloramphenicol. The samples were incubated at room temperature for two to four weeks to allow the sufficient growth. Characterisation of fungi morphology was carried out by macroscopic identification of fungi colony colour, growth rate, pigmentation and texture. Tease mount method and cellophane tape methods were used for microscopic identification of dermatophytes using Lactophenol Cotton Blue stain

Results and discussion

Among the 100 skin scraping samples, 25 samples showed colony characteristics of dermatophytes on SDA. In the remaining 60 per cent samples, non-dermatophyte fungal growth was identified based on the cultural characteristics on SDA, which included *Aspergillosis* spp., *Trichoderma* spp., *Sporothrix* spp., *Fusarium* spp. and *Curvularia* spp. No growth could be detected in 15 per cent samples. Among the 25 dermatophyte isolates, different types of dermatophyte species could be detected with higher occurrence of *Trichophyton* spp. (68 per cent), *Microsporum* spp. (28 per cent) and *Epidermophyton floccosum* (four per cent). Within the genus Trichophyton, different species could be isolated based on the microscopic appearance of microconidia with higher prevalence of *T. mentagrophyte* (64.7 per cent) and *T. rubrum*

(35.3 per cent). Within the genus Microsporum, *M. gypseum* (71.4 per cent), *M. nanum* (28.6 per cent).

Characterisation of *T. mentagrophytes* was carried out by appearance of flat, white to cream colonies, with a powdery to granular surface. Reverse pigmentation was usually yellow-brown colour. Septate hyphae had conidiophores extended from them. Numerous single-celled microconidia were formed, often in dense clusters. Microconidia were smooth-walled, and were predominantly spherical to subspherical in shape. Sessile (not on stalk) microconidia were produced in rather dense, grape like clusters on conidiophores. Pencil shaped macroconidia with 3 to 8 cells dividing the interior were produced. Colony morphology and appearance on lactophenol cotton blue staining (100x) is shown in Fig. 1. a, b, c and d.

Characterisation of *Trichophyton rubrum* was done by downy to cottony appearance of colonies with fine white aerial mycelium at surface. Surface was white in colour. Colony growth at bottom produce typically wine red to brown colour pigment. Fungi produced septate hyphae and clavate shaped microconidia and few macroconidia. Microconidia appearance was birds-on-wire appearance. Macroconidia were smooth walled and narrow club shaped (Fig. 2. a, b, c and d).

Characterisation of *Epidermophyton floccosum* was done by appearance of mustard yellow or yellowish-brown colour colonies. Colonies were velvety or felty in texture and folded in appearance as growth progressed. It has septate hyphae without microconidia. Macroconidia developed as lateral or terminal out growths from matured hyphae. Macroconidia were thin walled, containing 2to 5 cells singly or in clusters (Fig. 3. a, b, c and d).

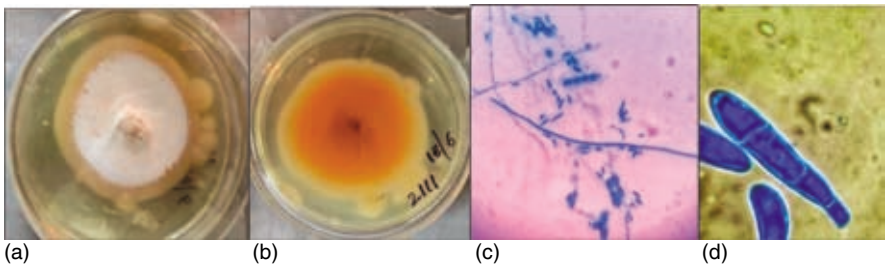
Characterisation of *Microsporum gypseum* was done by appearance of yellowish buff to a dark cream colour colony. Reverse was yellow to orange tan or brownish red in colour. Produced septate hyphae along which sessile or stalked clavate or club shaped microconidia grew. Macroconidia were thin walled, verrucose with bumpy surface and contained about 2 to 6 internal cells (Fig.4. a, b, c and d).

Characterisation of *Microsporum nanum* was done by appearance of thin, powdery and soft fibrous colonies, white at the centre, becoming light yellowish-brown towards the colony margin. In the younger colonies reverse side appears brownish-orange and reddish-brown in older colonies. The macroconidia were ovoid in shape and consisted of not more than three cells. Rare to moderate numbers of microconidia could be found (Fig. 5. a, b, c and d).

According to present epidemiological study, 25 per cent of dermatophyte occurrence was noticed in the Thrissur district of Kerala. Similar percentage of canine dermatophytosis incidence was noticed by Bernardo *et al.,* (1989) 21 per cent, Pinter and Stritof (2004) 24.55 per cent and Sever *et al.* (2017) 29.6 per cent. Some other authors reported lower incidence of dermatophytosis at various regions of world with 14 per cent (Brilhante, *et al.,* 2003), 18.7 per cent (Seker and Dogan, 2011) and 13.5 per cent (Sigirci *et al.,* 2019) in their respective studies, however, some researchers found high level of incidence about 36 per cent (Caretta *et al.,* 1989), 58 per cent (Ranganathan *et al.,* 1998), 45 per cent. (Guzman-Chavez *et al.,* 2000) and 49.5 per cent (Nweze, 2011) in their corresponding studies. The variation in incidence may be due to the differences in various geographical factors like temperature, humidity and rainfall. It also depends on size of the sample, sampling procedure.

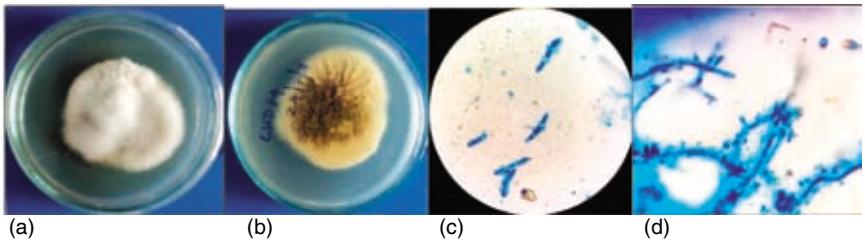
Incidence of dermatophytosis was most commonly seen among puppies of less than six months of age (48 per cent) than animals between six months to two years (36 per cent) and adult dogs from two years to six years of age (16 percent) (Fig.6). The higher incidence of dermatophytosis in puppies might be due to immaturity of the immune system. This is in accordance with Cafarchia *et al.* (2004), Debnath *et al.* (2005), Copetti *et al.* (2006), Seker and Dogan (2011), Cunha *et al.* (2017) and Minnat (2019).

Dermatophytosis occurrence was slightly high in male dogs (52 per cent) than female dogs (48 per cent), which was not significant. Similar findings were noticed by



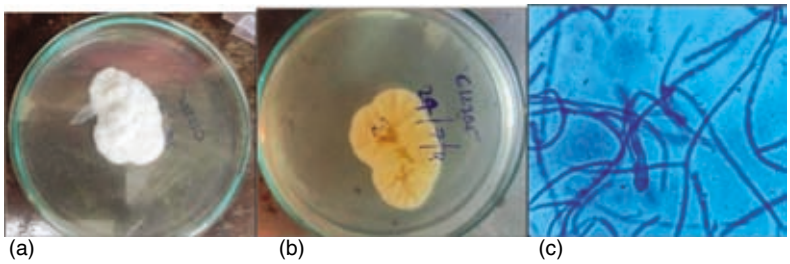
(a) (b) (c) (d)

Fig. 1. *T. mentagrophyte;* ***a.*** Flat, white to cream powdery colony; b. Yellow-brown colour pigment on reverse; c. Single-celled microconidia; d. pencil shaped macro conidia.



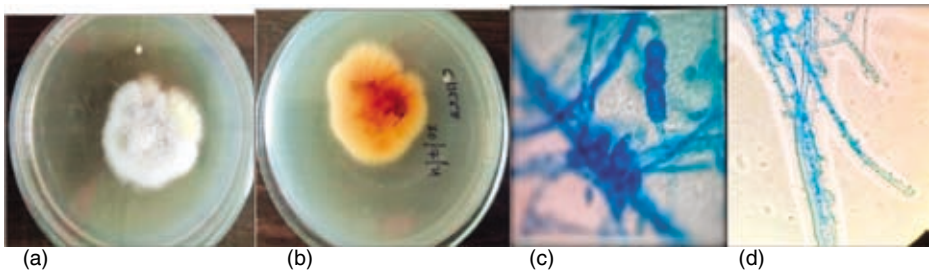
(a) (b) (c) (d)

Fig. 2. *T. rubrum.* a. Downy to cottony (upside); b. Brown in colour (Reverse); c. Smooth walled macroconidia; d. Birds on wire appearance of microconidia.



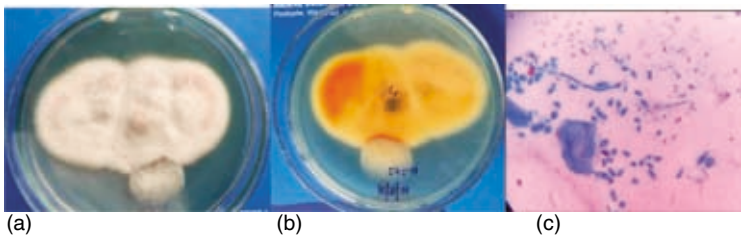
(a) (b) (c)

Fig. 3. *Epidermatophyton floccosum.* a&b. Mustard yellow colonies with folded appearance; b. Four celled macroconidia



(a) (b) (c) (d)

Fig. 4. *Microsporum gypseum* a. Dark cream colour (upside); b. Yellow to orange tan colour (reverse) c. Verrucose, bumpy surface macro conidia; d. Septate hyphae, club shaped and microconidia.



(a) (b) (c)

Fig. 5. *Microsporum nanum* a**.** Powdery and soft fibrous colony; b. Yellowish-brown towards margin (reverse); c. Macroconidia;

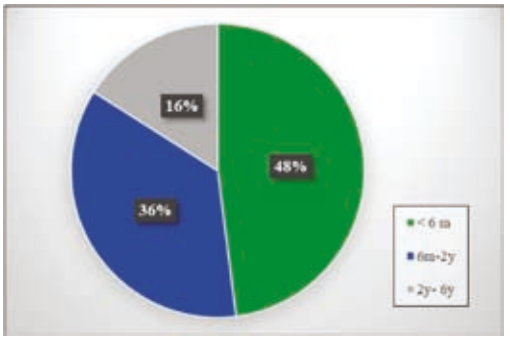


Fig. 6. Age wise distribution of dermatophytosis

Cafarchia *et al.* (2004), Guzman-Chavez *et al*., (2000), Debnath *et al.* (2005) and Seker and Dogan (2011). They explained this might be due to difference in composition of sebum of male dogs when compared with female dogs. Similar findings were noticed by Pinter and Stritof (1999) who reported that incidence was also influenced by nature of the study population in the study.

Conclusion

This study was performed to find out the most common cause of canine dermatophytosis in Thrissur district of Kerala. The results of this study revealed that dermatophyte infections are mostly prevalent in young animals than adults. Dermatophytosis occurrence was higher during summer season than monsoon and winter. *Trichophyton mentagrophyte* was the most common isolate in the study which has the zoonotic importance. So, such dogs can act as potential sources for human infections. This study can assist investigators in understanding the prevalence of dermatophytes in Thrissur district and their zoonotic implication.

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Conflict of interest

The authors declare that they have no conflict of interest.

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