



ISSN: 2456-2912

VET 2024; 9(4): 06-11

© 2024 VET

[www.veterinarypaper.com](http://www.veterinarypaper.com)

Received: 08-05-2024

Accepted: 13-06-2024

**G Sravani**

P.G. Scholar, Department of  
Microbiology, N.T.R College of  
Veterinary and Animal Science,  
Gannavaram, Andhra Pradesh,  
Indian

**PI Ganesan**

Professor & Head, Department  
of Veterinary Medicine, Apollo  
College of Veterinary Medicine,  
Jaipur, Indian

**Corresponding Author:**

**G Sravani**

P.G. Scholar, Department of  
Microbiology, N.T.R College of  
Veterinary and Animal Science,  
Gannavaram, Andhra Pradesh,  
Indian

## The multiple infections of a golden retriever dog with dermatophytosis and its attributed pre-disposing risk factors

**G Sravani and PI Ganesan**

**Abstract**

Two years old Golden Retriever dog, treated for more than 3 months for skin lesions was presented to Veterinary Clinical Complex, Apollo college of Veterinary Medicine, Jaipur for detailed investigation. The dog was examined and the lesions were observed in around the eyes, forehead and in the shoulder region with hyperemia. Skin scrapings examination revealed the presence of *Demodex*. Cultural examination of the skin scrapings and staining methods confirmed the prevalence of *Candida albicans*, *Microsporum audouinii*, *Microsporum nanum*, *Trichophyton rubrum*. The attributed predisposing risk factors were the possibility of a host jump, therapeutic failure due to inappropriate use of steroid-containing antifungals, and host immunosuppression. Moreover, improper treatment of old saprophytic fungi, climatic changes associated with anthropogenic pressure favouring harmless fungi to become infectious, interaction with other prokaryotic micro-organisms, rising cases of the opportunistic fungal infections due to exogenous and endogenous pathogens, persistence of carrier state in human beings, expansion of the currently known fungal pathogens in the areas with higher average temperatures and wetter environment are the possible predisposing factors.

**Keywords:** *Demodex*, *candida*, *microsporum*, *trichophyton*, mixed infections

### 1. Introduction

In canines *Demodex* mites inhabit hair follicles and sebaceous glands. Michael Dryden (2023)<sup>[34]</sup> and Ralf. S. Mueller *et al.* (2020) reported canine demodectosis due to genetics and immunosuppressive conditions and the pathogenesis is not completely understood. Dermatophytes usually remain in superficial tissues such as the epidermis, hair and nails in living hosts. The infections may be disfiguring and uncomfortable when the lesions are widespread. (Center for food security and public health (2004-2013). Geophilic dermatophytes are normal soil borne organisms. Cutaneous tissues become infected by fungal organisms and they colonize the epidermal surface or hair follicle. The epithelial barrier of the skin breached and the systemic fungal disease established. Canine skin and hair coats contaminated by the saprophytic fungi from the environment, some of which are opportunistic infections. (Foil CS *et al.* 1998a; Scott *et al.* 2001)<sup>[22, 42]</sup>. The diagnosis of the fungal infections carried out by isolation of the concerned fungi from the infected tissues and visualization of the organisms by morphology. (Foil CS *et al.* 1998b)<sup>[22]</sup>. Jadhav and Pal (2013)<sup>[30]</sup> reported 12.5% of positive cases for *C. albicans* by culture studies in canines. *Candida* is a contagious disease of high prevalence worldwide, considered one of the most common zoonosis (Farias *et al.* 2011)<sup>[20]</sup>. Prescott (2003) isolated *Candida* from the integument of healthy dogs and cats that may cause diseases when their immune system or host integument micro environmental changes. Sonal Saigal *et al.* (2023)<sup>[45]</sup> identified *Candida albicans* using SDA media and confirmed it by LPCB staining technique. Scott DW *et al.*, (2001)<sup>[42]</sup> reported that more than 300 animal fungal pathogens have been reported so far. Superficial cutaneous fungal infections caused by *Microsporum*, *Trycophyton* or *Epidermophyton* sp. William Kaplan and George K.C (1956)<sup>[54]</sup> isolated *Microsporum audouinii* from a puppy in U.S. *Microsporum gypseum* is the common one in geophylic group infects canines. Zoophylic dermatophytes are in animals, rarely found in the soil. *Microsporum canis* is a zoophilic, infect dogs and cats. Sylvatic dermatophytes like

*Trichophyton mentagrophytes* are zoophilic, adapted to rodents and hedgehogs. (Scott DW *et al.*, 2001; Foil CS *et al.* 1998) [42, 22]. *Microsporium audouinii* and *Trichophyton rubrum* causing milder cutaneous disorders and spread among families and school children (Donghi *et al.* 2011; Tartor *et al.* (2019) [17, 50]. *Trichophyton rubrum* in domesticated animals was reported by Su *et al.* 2019 [48]; Moskaluk and Vande Woude (2022) [35]. The most common fungi infecting the dogs are *Microsporium gypseum*, *Microsporium canis* and *Trichophyton mentagrophytes*. Valandro M. A. (2017) [51] reported dermatophytosis in canines due to *Microsporium nanum* that was used for wild boar hunting. Chao Tang *et al.* (2024) [10] reported that geo and zoophilic species of dermatophytes tend to have a wider host range of animal groups and the human beings carries a large number of adopted species of dermatophytes i.e *Trichophyton*, *Microsporium* and *Epidermophyton* sp. Outerbridge CA *et al.* (2006) [38] reported that the infection occurs in animals due to stress, poor nutrition, debilitating disease, compromised immune status or young age.

## Materials ad Methods

### Case report

#### 1. Clinical examination of the infected dog

In this case a two years old Golden Retriever dog, treated for more than 3 months for skin lesions was presented to Veterinary Clinical Complex, Apollo college of Veterinary Medicine, Jaipur for detailed examination.

#### 2. Laboratory examination of the infected dog's skin scrapings for mite infection

Deep skin scrapings examination was done by microscopy for confirmation of mites (Fig 2) as suggested by Ralf S. Mueller *et al.* (2020) and Michael Dryden (2023) [34] by its morphological features.

#### 3. Laboratory examination for mycologic identification by culture and staining methods

The dermatophytes were diagnosed for their white or off white in color as suggested by Outer bridge, C, A (2006) [38] using SDA medium (Fig. 3). Species identification of dermatophytes were carried out by picking up the colonies from SDA culture as per their morphology and then stained with LPCB staining for their microscopic structures as suggested by Center for food security and public health (2004-2013). *Candida albicans* was identified by its yeast shaped round to oval in shape, known for it's as white cells and the chlamydo spores under the wet mounts. *Candida albicans* was stained in Gram's stain in this case (Fig. 4) as suggested by Kalis *et al.*, 2014 [31] and Sonai Saigal *et al.* (2011). *M. audouinii* (Fig. 5) was identified for their, irregular, spindle shaped macroconidia, 5-15 cells without terminal knob in SDA culture and by LPCB staining as suggested by Faith Mokobi, (2021) [19].

*Microsporium nanum* was identified by its septate hyphae, macroconidia, and 1-to 4 celled, thin walled, oval to elliptical in shape and their club shaped microconidia. (Fig. 6) as suggested by St-Germain, G., R. Summer bell 1996 [47]; Sutton, D.A., A.W. Fothergill, and M, G. Rinaldi (ed) 1998 [49]; Larone D.H. (1995). *Trichophyton rubrum* was identified by its slender, clavate microconidia, thin walled, cigar shaped macroconidia, some with terminal appendages. (Fig. 7) as suggested by Hemandes- Hemandes *et al.* (2007).

## Results

### Clinical examination

Clinical examination of the infected dog revealed the skin lesions with erythema, papules, alopecia, oily seborrhea, edema, and crusts. The lesions observed throughout the body confirmed the dermatophytosis (Fig. 1).

### Skin scrapings examination

Deep skin scrapings examination showed the presence of *Demodex* mites Fig. 2).

### Laboratory examination for mycologic identification by morphology, culture and staining methods

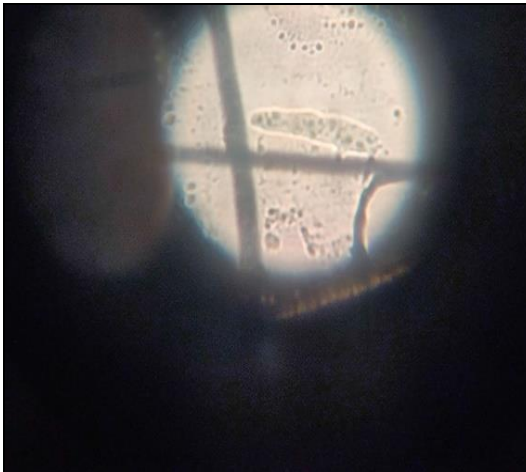
The dermatophytes were diagnosed for their white or off white in color using SDA medium (Fig. 3). Species identification of dermatophytes were carried out by picking up the colonies from SDA culture as per their morphology and then stained with LPCB staining for their microscopic structures. Culture and staining methods revealed the prevalence of *Candida albicans* (Fig. 4), *Microsporium audouinii* (Fig. 5), *Microsporium nanum* (Fig. 6), *Trichophyton rubrum* (Fig. 7)

## Discussion

Michael Dryden (2023) [34] diagnosed demodecosis by clinical studies. The lesions observed were erythema, papules, alopecia, oily seborrhea, edema, hyperpigmentation and crusts. Nicole Williams *et al.* (2017) diagnosed Candidiasis in a young dog by its clinical signs of subcutaneous nodules, pyrexia, lethargy and developed lameness. William Kaplan and George K.C (1956) [54] diagnosed *Microsporium audouinii* in a puppy by its multiple, circular, scaly, erythematous areas of alopecia on the ventral surface of the abdomen, chest and on the anterior surface of the front leg. Donghi *et al.* 2011 [17]; Tartor *et al.* (2019) [50] diagnosed *Microsporium audouinii* and *Trichophyton rubrum* by their milder cutaneous disorders in school children. Su *et al.* 2019 [48]; Moskaluk and Vande Woude (2022) [35]. Diagnosed *Trichophyton rubrum* in domesticated animals. Pascal Van Rooj *et al.* (2011) diagnosed *Microsporium nanum* by its clinical signs in a 9 years old male Shar - Pei dog with alopecia, papules, pustules, haemorrhagic bullae, scaling, crusting and hyper.



**Fig 1:** Infected Golden Retriever



**Fig 2:** *Demodex*



**Fig 3:** Morphology of *multiple dermatophytes*



**Fig 4:** *Candida* in SDA culture stained in Gram's



**Fig 5:** Macroconidia- *M. audouinii*



**Fig 6:** Macroconidia- *M. nanum*



**Fig 7:** *Trichophyton rubrum* pigmentation

Valandro M.A (2017) <sup>[51]</sup> reported dermatophytosis in canines due to *Microsporum nanum* with the clinical signs of hypotrichosis, alopecia, erythema, and non-pruritic desquamation in the back of the neck and chest. In this case study the dog suffered with skin lesions and the observed lesions were erythema, papules, alopecia, oily seborrhea, edema, and crusts which were coincided with the observations of the above mentioned authors.

#### **Mixed infection in animals with dermatophytes**

Wetzman and Summerbell 1995 <sup>[53]</sup>; Deng *et al.* 2008 <sup>[16]</sup>; Seyed-mousavi *et al.* (2015) reported that zoophilic species on domesticated hosts, when transmitted to humans or susceptible animals, may cause persistent, inflammatory infections, posing a risk to veterinary and public health. De Hoog *et al.* (2017b) <sup>[15]</sup>. Opined that the zoophylic dermatophytes tend to have a closer association with the mammal host and less with the terrestrial habitat leading to loss of sexuality. Cafarchia *et al.* (2013) <sup>[6]</sup> reported the fungal infections *M.canis*, *M.equinum*, *T.equinum*, *Alternaria*, *Aspergillus* and yeast species in horse diseases. Sravani and Ganesan (2024) <sup>[25]</sup> reported concurrent infections of *Microsporum audouinii* and Mucormycoses in buffaloes and its attributed risk factors for fungal infections. Ganesan *et al.* (2024) <sup>[25]</sup> reported multiple infection of an equine with dermatophytosis i.e. *Microsporum nanum*, *Trichophyton rubrum* & *Trichophyton mentagraphytes*, *Alternaria alternata*, *Exserohilum rostratum* and *Candida albicans* and their associated risk factors. Vipparthi 2014 <sup>[52]</sup>; Gawaz and Weisel (2018) <sup>[26]</sup> reported co-existence of yeast-like fungi and dermatophytes or mould in the same lesion.

#### **Attributed pre-disposing risk factors for the development of multiple dermatophytes infection in animals**

Zhan *et al.* (2015) <sup>[55]</sup> described a shift in the prevalence of agricultural dermatophytes to pet-associated mycoses during the economic emergence of China. The recent infections included *M.canis* from cats, *Trichophyton benhamiae* from guinea pigs (Ansari *et al.* 2021) <sup>[4]</sup> and *Trichophyton erinacei* from African pygmy hedgehogs (Abarca *et al.* 2017; Cmokova *et al.* 2022) <sup>[1, 12]</sup>. Jabet *et al.* 2022 <sup>[29]</sup> and Chollet *et al.* (2015) <sup>[11]</sup> reported that the presence of *T.indotineae* in domestic animals suggests the possibility of a host jump, increased virulence due to inappropriate use of steroid-

containing antifungals. De Crecy *et al.* 2009 <sup>[13]</sup>; Casadevall *et al.* 2019 <sup>[8]</sup>; Casadevall *et al.* (2020) <sup>[9]</sup> opined that the climatic changes associated with anthropogenic pressure led to adaptation of harmless fungal species to become infectious. Leclair and Hogan, 2010 <sup>[33]</sup>; Nogueira *et al.* 2019 <sup>[37]</sup> & Amanati *et al.* (2020) <sup>[3]</sup> reported that the yeast and the other filamentous fungi can interact with other prokaryotic microorganisms. Fisher *et al.* 2012 <sup>[21]</sup>; Bisnoi *et al.* 2018 <sup>[5]</sup>; Shenoy, M. and Jayaraman, J; 2019 <sup>[44]</sup> & Gnat *et al.* (2021) <sup>[27]</sup> reported a growing tendency of yeast and fungal infection diseases by true and opportunistic pathogens in animals and human beings, both exogenous and endogenous in origin, Aho R. (1983) <sup>[2]</sup> reported that many saprophytic fungi isolated from treated cases were present in immunosuppression status, and they can be pathogens, if left untreated. Chao Tang *et al.* (2024) <sup>[10]</sup> reported that human beings act as host carriers for many dermatophytes which include *Trichophyton rubrum*, *Microsporum audouinii*, *Microsporum ferrugineum*, *Trichophyton indotineae*. Friedman and Schwartz (2019) <sup>[24]</sup> stated that the expansion of the currently known fungal pathogens happens in the areas with higher average temperatures and wetter environment. The spectrum of microorganisms causing these diseases is very wide and hence studies needed on causative pathogens and the host-dependent factors predisposing the canine population for such multiple infection status. In this study, the infected dog suffered with *Demodex folliculorum*, *Candida albicans*, *Microsporum audouinii*, *Microsporum nanum* and *Trichophyton rubrum* infections because of the above mentioned factors either individually or in combination.

#### **Conclusions**

Two years old Golden Retriever dog, with skin lesions was confirmed for the multiple infection status of *Demodex*, *Candida albicans*, *Microsporum audouinii*, *Microsporum nanum* and *Trichophyton rubrum*.

The attributed predisposing risk factors for causation of multiple species dermatophytosis is discussed. Studies needed to know the actual changes of opportunistic and other pathogens, the expansion of the known fungal pathogens occurring in the animal population in the present day climatic

changes, the carrier status and the asymptomatic infections of the animals for better management of dermatophytosis.

#### Conflict of Interest

Not available

#### Financial Support

Not available

#### References

- Abarca ML, Castella G, Martorell J, Cabanes FJ. *Trichophyton erinacei* in pet hedgehogs in Spain: occurrence and revision of its taxonomic status. *Med Mycol.* 2017;55:164-172.
- Aho R. Saprophytic fungi isolated from the hair of domestic and laboratory animals with suspected dermatophytosis. *Mycopathologia.* 1983;83(2):65-73.
- Amanati A, Lotfit M, Masoudi M. Cerebral and pulmonary aspergillosis, treatment and diagnostic challenges of mixed breakthrough invasive fungal infections: Case report study. *BMC Infect Dis.* 2020;20:535.
- Ansari S, Ahmadi B, Tabatabaeifar SN, Hedayati MT, Javidnia J, *et al.* Familial cases of *Trichophyton benhamiae* infection transmitted from a guinea pig in Iran. *Mycopathologia.* 2021;186:119-125.
- Bisnoi A, Vinay K, Dogra S. Emergence of recalcitrant dermatophytosis in India. *Lancet Infect Dis.* 2018;18:250-251.
- Cafarchia C, Figueredo LA, Otranto D. Fungal diseases of horses. *Vet Microbiol.* 2013;167(1):215-234.
- Casadevall A. Climatic change brings the specter of new infectious diseases. *J Clin Invest.* 2020;130:553-555.
- Casadevall A, Kontoyiannis DP, Robert V. On the emergence of *Candida auris*: climate change, azoles, swamps, and birds. *MBio.*, 2019, 10.
- Center for Food Security and Public Health. Dermatophytosis. 2004-2013. p. 11-13.
- Chao Tang, Xin Zhou, Jacques Guillot, Gudrun Wibbelt, Shuwen Deng, Hazal Kandemir, *et al.* Dermatophytes and mammalian hair: aspects of the evolution of Arthrodermataceae. *Fungal Divers.* 2024;125:139-156.
- Chollet A, Cattin V, Fratti M, Mignon B, Monod M. Which fungus originally was *Trichophyton mentagrophytes*? Historical review and illustrations by a clinical case. *Mycopathologia.* 2015;180:01-05.
- Cmokova A, Kolarik M, Guillot J, Cabanes FJ. Host-driven sub-speciation in the hedgehog fungus, *Trichophyton erinacei*, an emerging cause of human dermatophytosis. *Pers. Mol. Phylogeny Evol.* 2022;48:203-218.
- de Crecy E, Jaronski S, Lyons B, Lyons T, Keyhani N. Directed evolution of a filamentous fungus for thermotolerance. *BMC Biotechnol.* 2009;9:74.
- de Hoog GS, Dukik K, Monod M, Packeu A, Stubbe D, Hendrickx M, *et al.* Toward a novel multilocus phylogenetic taxonomy for the dermatophytes. *Mycopathologia.* 2017a;182:25-31.
- de Hoog GS, Dukik K, Monod M, Dawson T, Boekhout T, Mayser P, Graser Y. Skin fungi from colonization to infection. *Microbiol Spectr.* 2017b;5:855-871.
- Deng S, Bulmer GS, Summerbell RC, *et al.* Changes in frequency of agents of tinea capitis in school children from Western China suggest slow migration rates in dermatophytes. *Med Mycol.* 2008;46:421-427.
- Donghi D, Hauser V, Bosshard PP. *Microsporium audouinii* tinea capitis in a Swiss school: assessment and management of patients and asymptomatic carriers. *Med Mycol.* 2011;49:324-328.
- Ellis D. *Microsporium audouinii*. Descriptions / Dermatophytes / *Microsporium* / *Microsporium audouinii*. The University of Adelaide; c2013.
- Mokobi F. *Microsporium* spp - An Overview. *Microbes Notes.* 2021 June 25.
- Farias MR, Condas LAZ, Ramalho F, Bier D, Muro MD, Pimpao CT. Evaluation of the asymptomatic carrier state of dermatophytes in cats destined to adoption in zoonosis control centers and animal protection societies. *Vet Zootecnia.* 2011;18(2):306-312.
- Fisher MC, Henk DA, Briggs CJ, Brownstein JS, Madoff LC, McCraw SL, Gurr SJ. Emerging fungal threats to animal, plant and ecosystem health. *Nature.* 2012;484(7393):186-194.
- Foil CS. Dermatophytosis. In: Greene CE, ed. *Infectious diseases of the dog and cat.* 2<sup>nd</sup> ed. Philadelphia, PA: WB Saunders Company; 1998a:362-370.
- Foil CS. Miscellaneous fungal infections. In: Greene CE, ed. *Infectious diseases of the dog and cat.* 2<sup>nd</sup> ed. Philadelphia, PA: WB Saunders Company; c1998b. p. 420-430.
- Friedman DZP, Schwartz IS. Emerging fungal infections: new patients, new patterns, and new pathogens. *J Fungi.* 2019, 5.
- Ganesan PI, Anamika M, Sanskruti SS, Kausal KM. The multiple infection of an equine with dermatophytosis and its associated risk factors. *Int. J. Vet. Sci. Anim. Husbandry.* 2024;9(3):357-361.
- Gawaz A, Weisel G. Mixed infections are a critical factor in the treatment of superficial mycoses. *Mycoses.* 2018;61:731-735.
- Gnat S, Łagowski D, Nowakiewicz A, Dyląg M. A global view on fungal infections in humans and animals: opportunistic infections and micro-sporidiosis. *J Appl Microbiol.* 2021;131(5):2095-2113.
- Hernández-Hernández F, Manzano-Gayosso P, Córdova-Martínez E, Méndez-Tovar LJ, López-Martínez R, de Acevedo BG, Cerbón MA. Morphological varieties of *Trichophyton rubrum* clinical isolates. *Rev. Mex. Micología.* 2007;(25):09-14.
- Jabet A, Brun S, Normand AC, Imbert S, *et al.* Extensive dermatophytosis caused by terbinafine-resistant *Trichophyton indotineae*, France. *Emerg Infect Dis.* 2022;28:229-233.
- Jadhav VJ, Pal M. Human and animal infections caused by *Candida albicans*. *J Mycopathol Res.* 2013;51:243-249.
- Kalis FM, de Koster CG, Brul S. Cell wall-related bio-numbers and bio-estimates of *Saccharomyces cerevisiae* and *Candida albicans*. *Eukaryot Cell.* 2014;13(1):02-09.
- Larone DH. Medically important fungi. *Rev Inst Med Trop Sao Paulo.* 1994;36:432-432.
- Leclair LW, Hogan DA. Mixed bacterial-fungal infections in the CF respiratory tract. *Med Mycol.* 2010;48.
- Dryden M. Mange in dogs and cats - Integumentary System - MSD Veterinary Manual; c2023.
- Moskaluk AE, Vande Woude S. Current topics in dermatophyte classification and clinical diagnosis. *Pathogens.* 2022;11:957.

36. Williams N, Houwers DJ, Schlotter YM, Theelen B, Boekhout T. Disseminated candidiasis in a young, previously healthy, dog and review of literature. *Mycopathologia*. 2017;182:591-596.
37. Nogueira MF, Pereira L, Jenull S. *Klebsiella* prevents spore germination and hyphal development of *Aspergillus* species. *Sci. Rep.* 2019;9:218.
38. Outerbridge CA. Mycologic disorders of the skin. Small Animal Practice. 2006. pp 128-134. In: Prescott JF. *Veterinary Microbiology and microbial disease*. Can. Vet. J. 12(44):986.
39. Van Rooj P, Dewcleercq J, Beguin H. Canine dermatophytosis caused by *Trichophyton rubrum*: an example of man to dog transmission. *Mycoses*. 2011;55.
40. Müller RS, Rosenkrantz W, Bensignor E, Karas-Tecza J, Paterson T, Shipstone MA. Diagnosis and treatment of demodicosis in dogs and cats. *Vet Dermatol*. 2020;31(4-e2).
41. Scott J, Sueiro-Olivares M, Ahmed W, Heddergott C, Zjao C, Thomas R, *et al.* Pseudomonas aeruginosa-derived volatile sulfur compounds promote distal *Aspergillus fumigatus* growth and a synergistic pathogen interaction that increase pathogenicity in co-interaction. *Front Microbiol*. 2019;10:2311.
42. Scott DW, Miller WH, Griffen CE. *Müller and Kirk's small animal dermatology*. 6th ed. Philadelphia, PA: WB Saunders Company; 2001.
43. Seyedmousavi S, Guillot J, Toloee A, Verweij PE, de Hoog GS. Neglected fungal zoonoses: hidden threats to man and animals. *Clin. Microbiol. Infect.* 2015;21:416-425.
44. Shenoy MM, Jayaraman J. Epidemic of difficult-to-treat tinea in India: Current scenario, culprits, and curbing strategies. *Arch Med Health Sci*. 2019;7(1):112-117.
45. Saigal S, Bhargava A, Mehra SK, Dakwala F. Identification of *Candida albicans* by using different culture media and its association in potentially malignant lesions. [www.ncbi.nlm.nih.gov/articles/PMC 3214525](http://www.ncbi.nlm.nih.gov/articles/PMC3214525). 12/9/23. 2023.
46. Sravani G, Ganesan PI. Concurrent infections of *Microsporium audouinii* and Mucormycoses in buffaloes and attributed risk factors for fungal infections. *Int. J Vet. Sci. Anim Husbandry*. 2024;9(3):252-255.
47. St-Germain G, Summerbell R. Identifying filamentous fungi - A clinical laboratory handbook. 1st ed. Belmont, CA: Star Publishing Company; 1996. p. 152.
48. Su H, Packeu A, Ahmed SA, Al-Hatmi AMS, *et al.* Species distinction in the *Trichophyton rubrum* complex. *J Clin Microbiol*. 2019;57:1-14.
49. Sutton DA, Fothergill AW, Rinaldi MG. *Guide to clinically significant fungi*. xix+471.
50. Tartor YH, Abo Hashem ME, Enany S. Towards a rapid identification and a novel proteomic analysis for dermatophytes from human and animal dermatophytosis. *Mycoses*. 2019;62:1116-1126.
51. Valandro MA, Da Exaltação Pascon JP, de Arruda Misteri ML, Lubeck I. Dermatophytosis due to *Microsporium nanum* infection in canine. *Semina: Ciências Agrárias*. 2017;38(1). Universidade Estadual de Londrina, Londrina, Brasil.
52. Vipparti SJ. Mixed fungal infection with *Aspergillus fumigatus* and *Candida albicans* in an immune-compromised patient: case report. *J Clin Diagn Res*. 2014;8.
53. Weitzsman I, Summerbell RC. The dermatophytes. *Clin Microbiol Rev*. 1995;8:240-259.
54. Kaplan W, George LK. Isolation of *Microsporium audouinii* from a dog. Communicable Disease Center, Public Health Service, U.S. Department of Health, Education, and Welfare, Atlanta, Georgia; c1956.
55. Zhan P, Li D, Wang C, Sun J, *et al.* Epidemiological changes in tinea capitis over the sixty years of economic growth in China. *Med Mycol*. 2015;53:691-698.

**How to Cite This Article**

Sravani G, Ganesan PI. The multiple infections of a golden retriever dog with dermatophytosis and its attributed pre-disposing risk factors. *International Journal of Veterinary Sciences and Animal Husbandry* 2024; 9(4): 06-11.

**Creative Commons (CC) License**

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.