MEDWELL PUBLISHING
Journal of Animal and Veterinary Advances 8 (4): 803-806, 2009
ISSN: 1680-5593


# Mycological Examination of *Microsporum canis* Infection in Suspected Dermatophytosis of Owned and Ownerless Cats and its Asymptomatic Carriage

[1]Gamze Alpun and [2]N. Yakut Ozgur
[1]Ceva-Dif Ilac A.S. Istanbul, Turkey
[2]Department of Microbiology, Faculty of Veterinary, Istanbul University, Turkey

**Abstract:** A total of 162 hair and skin scraping specimens from suspected dermatophytosis and clinically healthy cats, from Istanbul, Turkey, were examined to detect cats with *Microsporum canis* infection and its asymptomatic carriage. The mycological analyses were conducted by direct microscopy and by fungal culture on Sabouraud Dextrose Agar and Dermatophyte Test Medium. *M. canis* was isolated from 22 of the 62 (35.48%) cats with suspected dermatophytosis. One hundred cats were clinically healthy without dermatological signs and *M. canis* was isolated from 11 (11%) cats. In all studied groups, the percentage of positive samples were found to be higher in the cats that were 1 and <1 year of age compared with the elders while, the difference was found statistically significant in cats with suspected dermatophytosis ($p = 0.011$). In males, the differences between the sexes and *M. canis* isolation rates in the total examined cats and in clinically healthy cats were statistically significant ($p = 0.007$ $p = 0.001$, respectively). Although, no statistically significance was found between *M. canis* isolation rates and seasonal differences in all studied groups, *M. canis* infection was determined to be higher in spring and summer while, asymptomatic carriage was determined to be higher in autumn.

**Key words:** Cats, dermatophyte, dermatophytosis, *Microsporum canis*, asymptomatic carriage

## INTRODUCTION

Dermatophytes are species of fungi belonging to the genera: *Microsporum*, *Trichophyton* and *Epidermophyton* (Brilhante *et al*., 2003, Moriello, 2004). These fungi have the ability to utilize keratin as a nutrient. Therefore, dermatophytosis are infections of keratinized structures, such as hair, nails and stratum corneum of skin (Muller *et al*., 1989a). The characteristic lesions are hair loss, scaling, crusting and pruritus. The hairs surrounding affected areas appear broken (Brilhante *et al*., 2003). The skin lesions are most commonly localized around the face, tail, paws, ears and head (Moriello, 2004). *M. canis* is the most common cause of feline dermatophytosis and cats serve as reservoirs of *M. canis* (Patel *et al*., 2005; Romano *et al*., 1997; Moriello and Deboer, 1991).

In cats, *M. canis* infections have a major importance as a reservoir of zoonosis. In rural areas, up to 80% of fungal infections of human skin may be of animal origin (Richard *et al*., 1994). The asymptomatic carrier state is the most important issue in the transmission of the disease from cat to cat and from cat to human (Mignon and Losson, 1997).

The prevalence of dermatophytosis varies according to climate, humidity, temperature, relative humidity and precipitation rate in different geographical regions and the natural reservoirs (Moriello, 2004; Cabanes *et al*., 1997). Although, in many countries, the epidemiology of feline dermatophytosis has been well studied, there has not been such a study in Istanbul. Therefore, the objective of this study was to provide a substantial evaluation of the prevalence of *M. canis* infection in cats with suspected dermatophytosis and its asymptomatic carriage in clinically healthy cats, in Istanbul where has very high population of pet animals and the biggest as population city of Turkey.

## MATERIALS AND METHODS

**Animals:** The specimens were taken from various veterinary clinics and shelters located in the city of Istanbul and the Veterinary Faculty clinics. Clinical specimens from 162 cats (100 of the cats without any dermatological lesions were determined as clinically healthy and 62 with suspected dermatophytosis) were examined. The ages, breeds, sex and health status of animals were recorded. The age of the cats was either

**Corresponding Author:** Gamze Alpun, Veterinary Surgeon, Ceva-Dif Ilac A.S. Istanbul, Turkey

given by owner or, in the case of the shelter cats, estimated from the information available from the person who captured the cat.

**Specimen collection:** Specimens were obtained from skin scrapings of each cat with suspected dermatophytosis, by scraping epidermal scales from suspected lesions of dermatophytosis with a surgical blade (Brilhante *et al*., 2003). Specimens of the clinically healthy cat were obtained from fur of each cat, by sterile brush. The samples from each cat were placed in separate sterile petri dishes. After specimen collection, all scales and fur were aseptically transported to the laboratory.

**Direct microscopic examination:** The fur and scraped scales were examined for fungal elements (ectothrix) by direct microscopy in 30% potassium hydroxide (Cafarchia *et al*., 2003).

**Culture and idendification:** The clinical specimens were inoculated onto Sabouraud Dextrose Agar (SDA) and Dermatophyte Test Medium (DTM) plates. The SDA cultures were incubated at 25°C for 3 weeks while, the DTM cultures were incubated for 2 weeks. All cultures examined daily during the incubation periods. Laboratory identification of all dermatophyte species was based on macroscopic and microscopic features. Additionally, in vitro hair perforation tests, urease tests were performed (Moriello *et al*., 1994; Moriello, 2004).

**Statistical analyses:** The $\chi^2$ tests were used for the statistical analysis of the results. A $p<0.05$ was considered significant (Ozdamar, 1999).

## RESULTS

At the results of direct microscopic examination of hair specimens belonging to 162 cats, ectothrix were observed in 73 (45.06%) of clinical specimens. Ectothrix were examined from 25 (25%) of the 100 clinically healthy cats specimens, while 48 (77.41%) of 62 cats with suspected dermatophytosis.

According to the mycological examinations, *M. canis* was isolated from 35.48% of the cats with suspected dermatophytosis. The asymptomatic carriage rate was determined in clinically healthy cats as 11%. The findings were summarized at the Table 1.

The isolation rates of clinically healthy cats and cats with suspected dermatophytosis, which were based to age, sex and seasons, were summarized in Table 2.

The difference in the *M. canis* isolation rates between male and female cats were statically significant between the total of examined male cats ($p = 0.007$) and clinically healthy male cats ($p = 0.001$). There was significant difference between >1 year old and 1 and <1 year old cats with suspected dermatophytosis ($p = 0.011$). In the all examined other groups, the percentage of positive were much higher in the 1 and <1 year old cats groups compare with the >1 year old cats groups.

Although, *M. canis* infection was much higher in the spring and winter and asymptomatic carriage was much higher in autumn, there was no significant difference between the isolation rate of *M. canis* and seasonal differences.

Although, the long hair breed has found to be more sensitive to the dermatophytosis (Moriello and Deboer, 1991; Mancianti *et al*., 2002) there is no correlation between the developing of infection and breed as statistically in this study.

One hundred twenty four cats were crossbreed and 24 were pure breeds such as Persian, Siamese and Turkish Van Cat in this study. The number of examined crossbreed cat was high because of the cats where live in house or shelter consists of crossbreed cats in Istanbul. Therefore, comparison related to the breeding not been performed.

Table 1: The number of *M. canis* isolated cats

| Paremeters | Total cats number | No. cat that is isolated *M. canis* | Percentage of Isolation | (%) |
|---|---|---|---|---|
| Clinically healthy/owned | 50 | 7 | 14.00 | 11.00 |
| Clinically healthy/ownerless | 50 | 4 | 8.000 | |
| Suspected dermatophytosis/owned | 33 | 12 | 36.36 | 35.48 |
| Suspected dermatophytosis/ownerless | 29 | 10 | 34.48 | |

Table 2: According to the age, sex and seasons, the isolation rate (%) of *M. canis* in clinically healthy cats and cats with suspected dermatophytosis

| Paremeters | Positive | Negative | Total | Isolation rate (%) |
|---|---|---|---|---|
| **Clinically healthy** | | | | |
| ≤1 age | 5 | 35 | 40 | 12.50 |
| >1 age | 6 | 54 | 60 | 10.00 |
| Male | 9 | 28 | 37 | 24.32 |
| Female | 2 | 61 | 63 | 3.17 |
| Spring | 1 | 13 | 14 | 7.14 |
| Summer | 2 | 25 | 27 | 7.40 |
| Autumn | 5 | 17 | 22 | 22.72 |
| Winter | 3 | 34 | 37 | 8.10 |
| **Suspected dermatophytosis** | | | | |
| ≤1 age | 12 | 9 | 21 | 57.14 |
| >1 age | 10 | 31 | 41 | 24.39 |
| Spring | 10 | 23 | 43 | 32.35 |
| Summer | 9 | 9 | 18 | 50.00 |
| Autumn | 1 | 1 | 2 | 50.00 |
| Winter | 1 | 7 | 8 | 12.50 |
| Male | 9 | 10 | 19 | 47.36 |
| Female | 13 | 30 | 43 | 30.23 |

## DISCUSSION

Many studies related to the rate of *M. canis* isolation in cats with suspected dermatophytosis were carried out in different countries around the world. The rate of dermatophyte isolation were established as 26.3% in Turkey (Bagcigil *et al*., 2005), 24.27% in England (Patel *et al*., 2005), 33.9% in Spain (Cabanes *et al*., 1997), 40.7% in Zagrep (Pinter *et al*., 1999), 24.7% in Italy (Mancianti *et al*., 2002), 87.2% in Iran (Khosravi and Mahmoudi, 2003) and 36.8% in Brazil (Brilhante *et al*., 2003). In this study, *M. canis* were isolated from 22 of 62 cats with suspected dermatophytosis and the rate of infection was determined as 35.48%. The findings of this study showed that the prevalence of *M. canis* infection was high in Istanbul and *M. canis* infections should take into consideration at the etiologic diagnosis of cats, which has dermatologic lesions.

A number of studies were carried out on the fungal flora of cats and according to the results of these studies, it has been determined that *M. canis* do not present at the normal fungal flora of cats (Moriello and Deboer, 1991; Kaplan and Ivens, 1961). The isolation rate of *M. canis* was established as 2.2% in a study carried out on the clinically healthy cats in the Southwest of England (Sparkes *et al*., 1993) and as 2.16% in the Southeast of England (Patel *et al*., 2005). The asymptomatic carriage prevalence of *M. canis* was declared as 5% in the study in USA (Boyanowski *et al*., 2000). It has been highlighted that the rate of asymptomatic carriage of *M. canis* rose up to 88% in the countries where a population of stray cats existed (Quaife, 1982; Kaplan *et al*., 1961).

In this study, an 11% rate of asymptomatic carriage of dermatophytosis on the hair coat of healthy owned and ownerless cats in Istanbul was determined. This finding shows that the asymptomatic carrier cats play an important role for spreading of infection. It has been considered that the higher prevalence of owned cats compared to the ownerless cats may be related to following situations. Four of *M. canis* isolated cats were living in the veterinary clinic therefore the possibility of contacting with infected cats was high. Two cats were living together with multiple cats and were going out freely. Although, 1 cat was living solely, he had a chance to go out freely.

The ectothrix arthrospor were observed in 73 of 162 skin scrapings and hair specimens by direct microscopy and *M. canis* were isolated from 33 of these positive specimens. The findings showed that the sensitivity of direct microscopy was low and the isolation of the agent was very important to determine *M. canis* infection and its asymptomatic carriage.

Dermatophytosis can occur at any age in cats. It has been determined in the various studies that the less than one-year-old cats were more sensitive against the dermatophytosis (Khosravi and Mahmoudi, 2003; Mancianti *et al*., 2002; Pinter *et al*., 1999). In this study, the rate of *M. canis* were found to be higher in the cats that were 1 and <1 year of age compared with >1 year of age in all studied groups, while the difference was found statistically significant in cats with suspected dermatophytosis. This difference might be related to undeveloped immune system, the deficiency of fungistatic sebum or linoleic acid on the young cats, biochemical exchange on the skin, being of the anagen phase of hairs and physiological situation (Pinter *et al*., 1999; Mancianti *et al*., 2003).

According to several authors, the sex is not a predisposing factor to develop dermatophytosis. However, Pinter *et al*. (1999) suggested that male cats were infected with dermatophytosis more common than female cats. Patel *et al*. (2005) reported that the dermatophyte species were isolated from 3 times as many male cats as female cats. Boyanowski *et al*. (2000) specified that however, neutered male cats had a significantly higher ($p = 0.047$) risk of having a positive dermatophyte culture than intact male cats and female cats. In this study, the rates of *M. canis* in male cats were higher than in female cats in all examined groups. There were a significant differences in based to all cats ($p = 0.007$) and clinically healthy cats group ($p = 0.001$). It has been thought that the reasons of the higher isolation rate from the male cats may be related to the different composition of sebum in male cats like male dogs () and being more active than female cats.

Although, some authors had been reported that there were no statistically differences between the rate of *M. canis* isolation and seasonal differences (Khosravi and Mahmoudi, 2003; Cafarchia *et al*., 2003; Patel *et al*., 2005) the others had been reported that the isolation rates were more higher in autumn-winter season (Sparkes *et al*., 1993; Cabanes *et al*., 1997). In this study, according to the findings, it had been clarified that although there was no significantly statistical difference, *M. canis* infection was more common in spring and summer; its asymptomatic carriage was more common in autumn. It has been thought that the difference may be related to temperature, relative humidity and hygiene conditions of the places that samples were collected.

## CONCLUSION

*M. canis* were isolated not only from cats suspected dermatophytosis and also, from healthy cats. The rate of

*M. canis* infection was 35.48% on cats with suspected dermatophytosis; the asymptomatic carriage was 11% on clinically healthy cats. However, the age factor as statistically was significantly difference on cats with suspected dermatophytosis ($p = 0.011$), the rates of positive from 1 and <1 year old cats were much higher compared to the >1 year old cats. The isolation rate of *M. canis* was much higher on male cats compared to female cats. Our findings showed that *M. canis* carrier stage of cats should be considered as a potential risk factor in the transmission of infection to humans. Finally, in Istanbul, many people have begun to keep cats in their home as pets and also much more to carry about stray cats and they have close contact with them and *M. canis* infection are transmitted from them to their human and cat contacts.

## REFERENCES


Bagcigil, A.F., S. Ikiz, N.Y. Ozgur, E. Or and A. Ilgaz, 2005. Mycological studies on the clinically infected dogs and cats, (5). 4. Ulusal Mantar Hastaliklari ve Klinik Mikoloji Kongresi. Mayis; Konya, pp: 3-6.

Brilhante, R.S., C.S. Cavalcante, F.A. Soares-Junior, R.A. Cordeiro, J.J. Sidrim and M.F. Rocha, 2003. High rate of *Microsporum canis* feline and canine dermatophytoses in Northeast Brazil: Epidemiological and diagnostic features. Mycopathologia, 156 (4): 303-308.

Boyanowski, K.J., P.J. Ihrke, K.A. Moriello and P.H. Kass, 2000. Isolation of fungal flora from the hair coats of shelter cats in the Pacific coastal USA. Vet. Dermatol., 11 (2): 143-150.

Cabanes, F.J., M.L. Abarca and M.R. Bragulat, 1997. Dermatophytes isolated from domestic animals in Barcelona, Spain. Mycopathologia, 137: 107-113.

Cafarchia, C., D. Romito, M. Sasanelli, R. Lia, G. Capelli and D. Otranto, 2003. The epidemiology of canine and feline dermatophytoses in southern Italy. Mycoses, 47: 508-513.

Kaplan, W. and M. Ivens, 1961. Observation on the seasonal variation in the incidence of ringworm in dogs and cats in the United States. Sabouraudia, 1: 91-94.

Khosravi, A.R. and M. Mahmoudi, 2003. Dermatophytes isolated from domestic animals in Iran. Mycoses, 46: 222-225.

Mancianti, F., S. Nardoni, S. Cecchi, M. Corazza and F. Taccini, 2002. Dermatophytes isolated from symptomatic dogs and cats in Tuscany, Italy during a 15-year-period. Mycopathologia, 156: 13-18.

Mancianti, F., S. Nardoni, M. Corazza, P.D. Achille and C. Ponticelli, 2003 Environmental detection of *Microsporum canis* arthrospores in households of infected cats and dogs. J. Feline Med. Surg., 5: 323-328.

Mignon, B.R. and B.J. Losson, 1997. Prevalence and characterization of *Microsporum canis* carriage in cats. J. Med. Vet. Mycol., 35: 249-256.

Moriello, K.A. and D.J. DeBoer, 1991. Fungal flora of the haircoat of cats with and without dermatophytosis. J. Med. Vet. Mycol., 29: 285-292.

Moriello, K.A., G. Kunkle and D.J. DeBoer, 1994. Isolation of dermatophytes from the haircoats of stray cats from selected animal shelters in 2 different geographic regions in United States. Vet. Dermatol., 5: 57-62.

Moriello, K.A., 2004. Treatment of dermatophytosis in dogs and cats: Review of published studies. European Society of Veterinary Dermatology. Vet. Dermatol., 15: 99-107.

Muller, G.H., R.W. Kirk and D.W. Scott, 1989a. Small Animal Dermatology. 4th Edn. Philadelphia, W.B. Saunders, pp: 295.

Ozdamar, K., 1999. SPSS ile Biyostatik (3. baski), Kaan Kitabevi Eskiþehir, pp: 341-349.

Patel, A., D.H. Lloyd and A.I. Lamport, 2005. Survey of dermatophytes on clinically normal cats in the southeast of England. J. Small Anim. Prac., 46 (9): 436-439.

Pinter, L., Z. Jurak, M. Ukalovic and V. Susic, 1999. Epidemiological and clinical features of dermatophytoses in dogs and cats in Croatia between 1990 and 1998. Veterinarski Archiv, 69 (5): 261-270.

Quaife, R.A., 1982. *Microsporum canis* isolations from show cats. Vet. Rec., 110: 333-334.

Richard, J.L., M.C. Bebey, R. Chermette, A.C. Pier, A. Hasegawa, A. Lund, A.M. Bratberg, A.A. Padhye and M.D. Connole, 1994. Advance in veterinary mycology. J. Med. Vet. Mycol., 32: 169-187.

Romano, C., L. Valenti and R. Barbara, 1997. Dermatophytes isolated from asymptomatic stray cats. Mycoses, 40: 471-472.

Sparkes, A.H., T.J. Gruffydd-Jones, S.E. Shaw, A.I. Wright and C.R. Stokes, 1993. Epidemiological and diagnostik features of canine and feline dermatophytosis in the United Kingdom from 1956-1991. Vet. Rec., 133: 57-61.