J Vet Clin 23(1) : 1-5 (2006)

Journal of Veterinary Clinics
www.ksvc.or.kr

Prevalence of *Malassezia pachydermatis* in Canine Otitis Externa in Chonbuk

Seung-ki Chon*, Young-jae Park, Heui-eun Kim and Nam-soo Kim[1]

College of Veterinary Medicine, Chonbuk National University, Chonju 561-756, Republic of Korea
**Chon Seung Ki Animal Clinic*

(Accepted : February 7, 2006)

Abstract : This study investigated the prevalence of *Malassezia pachydermatis* (*M. pachydermatis*) in dogs which were presented with otitis externa at the Chonbuk area from January 2002 to December 2003. A total of 589 dogs were diagnosed with otitis externa among which 243 (37.6%) dogs were affected with *M. pachydermatis*. In addition, the prevalence of mutual relationship between the *M. pachydermatis* infection and ages, seasonality, breeds and ear types in otitis externa was investigated. The highest prevalence of *M. pachydermatis* was observed in 1 to 2 years age group, this was not statistically significant in comparison to other age groups. In summer, the prevalence of *M. pachydermatis* was significantly ($p<0.01$) higher (57.06 ± 2.01) as compared with than in the winter (21.03 ± 3.56), spring (36.4 ± 6.95) and fall (35.9 ± 6.24). A significantly ($p<0.01$) higher prevalence of *M. pachydermatis* was observed in pendulous ear dogs (49.1%) as compared to that in the erect ear dogs (23.6%). These results suggest that *M. pachydermatis*, the dominant causative organism of ear canal disease, strongly depends upon the seasonality and ear types.

Key words **:** *Malassezia pachydermatis*, otitis externa, dogs.

Introduction

In small animal clinics, canine otitis externa is one of the most common diseases in South Korea. *Malassezia pachydermatis* (*M. pachydermatis*) has been commonly isolated from the cerumen samples of otitis externa affected and is involved as a causative agent (4,8,17). The organism is a commensally inhabitant on the skin and ear of normal dogs, however, it can become an opportunistic pathogen because of alterations of host defense (1). The yeast belonging to genus *Malassezia* and includes 7 species; *M. pachydermatis, M. furfur, M. sympodialis, M. globosa, M. obtusa, M. restricta and M. slooffiae* (11). Though *M. pachydermatis* has been very often isolated in canine otitis externa, the mechanism, how it causes the disease has not yet clearly understood. Some previous reports, it has been evaluated as ear types, breeds and environment that influence to otitis externa of dogs (14,16,19,20). Environmental factor such as temperature and moisture can influence the prevalence of otitis externa in dogs. These environmental factors may contribute to growth of bacteria and yeast (18). Dogs with pendulous ears and heavy ear canal hair had more otitis externa than dogs with other ear types, whereas, dogs with erect ears had less risk of the disease than mongrel dogs (13). Also monthly variations in temperature, rainfall and humidity affect the prevalence of canine otitis externa in different geographic regions. Numerous studies have been conducted on ear canal bacterial and fungal flora of the dog in health and disease to establish which factors may affect to microorganism in ear canal (5,10,15). Yoshida *et al* (21) reported that relative humidity in the ear canals unlikely predisposes specific breeds to otitis externa and ear type does not affect the retention of heat and moisture in ear canal.

The purpose of this study was to evaluate the prevalence of *M. pachydermatis* in canine otitis externa during January 2002 to December 2003 in Chonbuk area, South Korea. In addition, it was also studied whether the age, breeds and ear type of the dog as well as seasonal variations on influence the disease incidence or not.

Materials and Methods

Dogs

The relationship between the prevalence of otitis externa according to the age, seasonality, breeds and ear types of dogs was investigated in the Chonbuk area from January 2002 to December 2003. A total of 589 dogs were presented with otitis externa. Most of the owners appealed that there were problems in ear of the dog such as shaking the head, scratching on ears, malodor from ears and rubbing the ear on ground. Dogs had pruritis, excessive aural discharge, congestion and swelling in the auditory canal. The samples were obtained with cotton swabs inserted into the external ear canal. The

[1]Corresponding author.
E-mail : namsoo@chonbuk.ac.kr

swabs were rolled out onto a slide glass, air dried, stained with Diff-Quick for microscopic examination.

Cultural examination

To confirm the *M. pachydermatis* infection, the samples were also inoculated on Sabouraud's dextrose and blood agar plates and incubated at 37°C for 3 to 5 days. The colonies were characterised using standard microbiological procedures.

Statistical analysis

Significant differences between the groups in the prevalence of otitis externa and the detection of *M. pachydermatis* were statistically analyzed using an analysis of variance (ANOVA). Student's *t*-test was used to determine significant differences among ages, seasonality, breeds and ear types. Probabilities of 0.05 ($p<0.05$) or less was considered statistically significant.

Results

During the period of January 2002 to December 2003, a total of 589 dogs were presented to the Chonbuk local Animal Clinic with otitis externa, among which 243 (37.6%) dogs were found to be affected with *M. pachydermatis* (Table 1).

Season

The prevalence of *M. pachydermatis* was significantly ($p<0.01$) higher compared to as 57.06°æ2.01 in summer (June, 59.3%; July, 56.5%; August, 55.4%) when that in winter as 21.03 ± 3.56 (December, 25.0%; January, 20.0%; February, 18.1%), spring as 36.4 ± 6.95(March, 30.0%; April, 35.4%; May, 43.8%) and fall as 35.9 ± 6.24 (September, 43.1%; October, 33.3%; November, 31.5%).

Ages

The highest prevalence (45.0%) of *M. pachydermatis* in canine otitis externa was observed in the 1 to 2 years group (Table 2). On the other hand, *M. pachydermatis* was not found in otitis externa over 9 yeas groups. The prevalence of *M. pachydermatis* was moderately decreased from 2 to 3 years group to 8 to 9 years group. Dogs under 1 year group were found most susceptible to prevalence of otitis externa, but, the prevalence of *M. pachydermatis* was lower (40.7%) as compared to that in the dogs of 1-5 years of age. However, this difference was not statistically significant.

Table 1. Prevalence of *Malassezia pachydermatis* from otitis externa in 589 dogs

Months	No. of examined cases	No. of positive for *M. pachydermatis*	Prevalence rates (%)
January	30	6	20.0
February	33	6	18.1
March	40	12	30.0
April	48	17	35.4
May	57	25	43.8
June	64	38	59.3*
July	69	39	56.5*
August	74	41	55.4*
September	51	22	43.1
October	45	15	33.3
November	38	12	31.5
December	40	10	25.0
Total	589	243	37.6

*There are significaunt differences($p<0.01$) in seasonal prevalence.

Table 2. Prevalence rates of *Malassezia pachydermatis* from the dog with otitis externa in different ages

Ages	No. of examined cases	No. of positive for *M. pachydermatis*	prevalence rates (%)
Up to 1yr	184	75	40.7
1 to 2 yrs	100	45	45.0
2 to 3 yrs	82	36	43.9
3 to 4 yrs	71	30	42.2
4 to 5 yrs	62	26	41.9
5 to 6 yrs	42	17	40.4
6 to 7 yrs	29	11	37.9
7 to 8 yrs	6	2	33.3
8 to 9 yrs	5	1	20.0
9 to 10 yrs	5	0	0
over 10 yrs	3	0	0
Total	589	243	31.3

Breeds

In prevalence by breeds, the number of otitis externa cases and positive for *M. pachydermatis* was shown in Table 3, Yorkshire Terrier (63/589), Maltese (61/589), Shih Tzu (57/589), Miniature Schnauzer (54/589) and Cocker Spaniel (50/589) breeds had high prevalences of otitis externa, whereas Jindo and Welsh Corgi breeds had lower prevalences of otitis externa than others. Furthermore, the breeds of high prevalence in otitis externa had high prevalence of *M. pachydermatis* except Yorkshire Terrier. Shih Tzu (61.4%), Pekingese (61.2%), Maltese (55.7%), Cocker Spaniel (54.0%) and Miniature Schnauzer (51.8%) had higher prevalence than that in the others. On the other hand, Siberian Husky (16.2%), Alaskan Malamute (16.1%) and Chihuahua (12.5%) had low prevalence with *M. pachydermatis* in otitis externa.

Ear types

M. pachydermatis, was isolated in dogs with otitis externa, 200 of 407 pendulous ear dogs (49.1%) and 43 of 182 erect ear dogs (23.6%) (Table 4). The prevalence of *M. pachyder-*

Table 3. Prevalence rates of *Malassezia pachydermatis* from the dog with otitis externa in different breeds

Breeds	No. of examined cases	No. of positive for *M. pachydermatis*	Prevalence rates (%)
Alaskan Malamute	31	5	16.1
Beagle	7	3	42.8
Chihuahua	8	1	12.5
Cocker Spaniel	50	27	54.0
Dachshund	15	6	40.0
Golden Retriever	29	13	44.8
Jindo	3	0	0
Labrador Retriever	30	12	40.0
Maltese	61	34	55.7
Miniature Pincher	10	2	20.0
Miniature Schnauzer	54	28	51.8
Old English Sheepdog	3	1	33.3
Pekingese	49	30	61.2
Pomeranian	10	2	20.0
Poodle	52	11	21.1
Pug	7	2	28.5
Shih Tzu	57	35	61.4
Shetland Sheepdog	5	1	20.0
Siberian Husky	43	7	16.2
Welsh Corgi	2	0	0
Yorkshire Terrier	63	23	36.5
Total	589	243	32.1

Table 4. Prevalence rates of *Malassezia pachydermatis* from the dog with otitis externa in different ear types

Pendulous type			Erect type		
Breeds	No. of examined cases	No. of positive for *M. pachydermatis*	Breeds	No. of examined cases	No. of positive for *M. pachydermatis*
Beagle	7	3 (42.8)	Alaskan Malamute	31	5 (16.1)
Cocker Spaniel	50	27 (54.0)	Chihuahua	8	1 (12.5)
Dachshund	15	6 (40.0)	Jindo	3	0
Golden Retriever	29	13 (44.8)	Miniature Pincher	10	2 (20.0)
Labrador Retriever	30	12 (40.0)	Pomeranian	10	2 (20.0)
Maltese	61	34 (55.7)	Pug	7	2 (28.5)
Miniature Schnauzer	54	28 (51.8)	Shetland Sheepdog	5	1 (20.0)
Old English Sheepdog	3	1 (33.3)	Sieberian Husky	43	7 (16.2)
Pekingese	49	30 (61.2)	Welsh corgi	2	0
Poodle	52	11 (21.1)	Yorkshire Terrier	63	23 (36.5)
Shih Tzu	57	35 (61.4)			
Total	407	200 (49.1%)*	Total	182	43 (23.6%)

*Significantly differences($p<0.01$) from the erect ear dogs

matis in otitis externa in the two ear types were significantly ($p<0.01$) different. Shih Tzu (61.4%), Pekingese (61.2%), Maltese (55.7%), Cocker Spaniel (54.0%) and Miniature Schnauzer (51.8%) breeds had high prevalence of *M. pachydermatis* in otitis externa in pendulous ear type. On the other hand, in the case of Poodle breed, there was the lowest prevalence (21.1%) in pendulous ear types. In erect ear types, Yorkshire Terrier (36.5%) and Pug (28.5) breeds had high prevalence rates of *M. pachydermatis* in otitis externa than that in others.

Discussion

The importance of *M. pachydermatis* in dogs has been extensively reported (12). This species can play an important role in chronic dermatitis and otitis externa in carnivores, especially in dogs. This yeast has an opportunistic nature, and it may become pathogenic with any alteration in the skin surface microclimate or in host defense. Canine otitis externa and seborrheic dermatitis are frequently associated with large numbers of *M. pachydermatis* (18). In this study, the prevalence of *M. pachydermatis* was 37.6% of 589 dogs which were diagnosed with otitis externa. These prevalences of *M. pachydermatis* were similar to data reported by Sharma and Rhoades (19) that had a high prevalence in cultural examination. In the study of other surveillance, *M. pachydermatis* was isolated from 62.2% and 50% of dogs with and without otitis externa, respectively (6), whereas Masuda *et al* (16) reported low prevalence rates of *M. pachydermatis* as 8.8% from otittis externa in cultural examination.

A clear difference of *M. pachydermatis* between in summer season and in winter season was found in the prevalence of otitis externa. Similar results were reported in several studies that a relatively high humidity within the ear canals becomes more susceptible to infect ears to *Malassezia spp.* replication in both health and disease (9,13). Elevated humidity may increase susceptibility of animals to skin infections with bacteria and fungi (2,7,9). These findings may suggest that seasonal influences on the prevalence of *M. pachydermatis* in this study were in agreement with those in previous studies (2,7,9).

The prevalence of *M. pachydermatis* was found highest (45.0%) in dogs in 1 to 2 years group. Over 1 to 2 years group, *M. pachydermatis* followed by 2 to 3 years group (43.9%), 3 to 4 years group (42.2%), 4 to 5 years group (41.9%) and 5 to 6 years group (40.4%) in decreasing order of prevalence. These findings may suggest that susceptibility for infection of *M. pachydermatis* is relatively high between 1 and 6 years age. Sharma and Rhoades (19) also reported that 35.63% of the dogs with otitis externa were between 1 to 4 years age.

The highest prevalence of dogs having *M. pachydermatis* in otitis externa were seen in Shih Tzu and Pekingese followed by Maltese and Cocker Spaniel. Recently, more evidence has shown the actual variations in histopathologic features of the external auditory wall that may predispose certain breeds to otitis externa (3,20). Springer Spaniel, Labrador Retriever and especially Cocker Spaniel, which are commonly affected with otitis externa, were found to have significantly more apocrine glands or ceruminous glands. In this result, Yorkshire Terrier had the highest prevalence in otitis externa, whereas the prevalence of *M. pachydermatis* was 36.5% among breeds with otitis externa. These findings may suggest that the relatively narrow ear canal, showing low prevalence of *M. pachydermatis* even though high prevalence of otitis externa in Yorkshire Terrier breed, has more susceptible to other organisms causing otitis externa.

The prevalence of *M. pachydermatis* in the pendulous ear type (49.1%) was higher than in the erect type (23.6%). Most of the pendulous ear type dogs also had high prevalence of otitis externa. On the other hand, Yorkshire Terrier and Pug had relatively high prevalence rates of *M. pachydermatis* with otitis externa in spite of being erect ear types. In previous studies (9,13,19), ear type has been reported to predispose the animal to otitis externa by altering the microclimate. There had been significant differences between other predisposed breeds for otitis externa, such as Cocker Spaniels and Labrador Retrievers, and other breeds. These findings may suggest that relative humidity in the ear canals predisposes specific breeds to otitis externa, and ear type (pendulous or erect) does affect the retention of heat and moisture in the ear canal.

Conclusion

For the treatment of canine yeast infection, the results of in this study are expected to be applied for the treatment of dermatitis with *M. pachydermatis*. Clinical proceedings of otitis externa should concentrate on diagnosis and treatment of the specific primary cause to minimize ongoing stimulation, combined with anti-inflammatory treatment to prevent secondary proliferative changes. On the based of this study, there appears to be limitations in breeds, especially when used a few dogs in several breeds. Further studies are needed to figure out the prevalence in various breeds and the cytopathology of otitic exudates from cases of otitis externa and the pathogenic role of these *M. pachydermatis*, its molecular-biological and clinical effects in inflammatory process of otitis externa in dogs.

References

1. Abou-Gabal MA, Chastain CB, Hogle RM. Pityrosporum pachydermatis "canis" as a major cause of otitis externa in dogs. Mykosen. 1979; 22: 192-199.
2. Aly R, Shirley C, Cunico B, Maibach HI. Effect of prolonged occlusion on the microbial flora, pH, carbon dioxide and transepidermal water loss on human skin. J Invest Dermatol 1978; 71: 378-381.
3. Angus JC, Lichtensteiger C, Campbell KL, Schaeffer DJ. Breed variations in histopathologic features of chronic severe otitis externa in dogs: 80 cases (1995-2001). J Am Vet Med Assoc 2002; 221: 1000-1006.
4. Baba E, Fukata T, Saito M. Incidence of otitis externa in

dogs and cats in Japan. Vet Rec 1981; 108: 393-395.
5. Cole LK, Kwochka KW, Kowalski JJ, Hiller A. Microbial flora and antimicrobial susceptibility patterns of isolated pathogens from the horizontal ear canal and middle ear in dogs with otitis media. J Am Vet Med Assoc 1998; 212: 534-538.
6. Crespo MJ, Abarca ML, Cabanes FJ. Occurrence of Malassezia spp. in the external ear canals of dogs and cats with and without otitis externa. Med Mycol 2002; 40: 115-121.
7. Faergemann J, Aly R, Wilson DR, Maibach HI. Skin occlusion: effect on Pityrosporum orbiculare, skin PCO_2, pH, transepidermal water loss, and water content. Arch Dermatol Res 1983; 275: 383-387.
8. Griffin CE. Otitis externa and otitis media, In Current Veterinary Dermatology (Griffin CE, Kwochka KW, MacDonald JM, eds), Mosby Year Book Inc 1993: 245.
9. Grono LR. Studies of the microclimate of the external auditory canal in the dog. 3. Relative humidity within the external auditory meatus. Res Vet Sci 1970; 11: 316-319.
10. Grono LR, Frost AJ. Otitis externa in the dog. The microbiology of the normal and affected external ear canal. Aust Vet J 1969; 45: 420-422.
11. Gueho E, Midgley G, Guillot J. The genus Malassezia with description of four new species. Antonie Van Leeuwenhoek 1996; 69: 337-355.
12. Guillot J, Bond R. Malassezia pachydermatis: a review. Med Mycol 1999; 37: 295-306.
13. Hayes HM, Pickle LW, Wilson GP. Effects of ear type and weather on the hospital prevalence of canine otitis externa. Res Vet Sci 1987; 42: 294-298.
14. Kiss G, Radvanyi S, Szigeti G. Characteristics of Malassezia pachydermatis strains isolated from canine otitis externa. Mycoses. 1996; 39: 313-321.
15. Marshall MJ, Harris AM, Horne JE. The bacteriological and clinical assessment of a new preparation for the treatment of otitis externa in dogs and cats. J Small Anim Pract 1974; 15: 401-410.
16. Masuda A, Sukegawa T, Mizumoto N, Tani H, Miyamoto T, Sasai K, Baba E. Study of lipid in the ear canal in canine otitis externa with Malassezia pachydermatis. J Vet Med Sci 2000; 62: 1177-1182.
17. Rosychunk RA, Luttgen P. Disease of the ear. In: Ettinger, S. J., E. C. Feldman, (eds), Textbook of veterinary internal medicine: disease of the dog and cat. W.B. Saunders Company. 2000: 1185-1235.
18. Scott DW, Miller WH, Griffin CE. Fungal skin disease. In: Muller and Kirk's small animal dermatology, 6th ed. Philadelphia: W. B. Saunders Company. 2001: 363-374.
19. Sharma VD, Rhoades HE. The occurrence and microbiology of otitis externa in the dog. J Small Anim Pract 1975; 16: 241-247.
20. Stout-Graham M, Kainer RA, Whalen LR, Macy DW. Morphologic measurements of the external horizontal ear canal of dogs. Am J Vet Res 1990; 51: 990-994.
21. Yoshida N, Natto F, Fukata T. Studies of certain factors affecting the microorganism and microflora of the external ear of the dog in health and disease. J Vet Med Sci 2002; 64: 1145-1147.

전북지역의 외이염에 감염된 개에 있어서 *Malassezia pachydermatis* 이환율

전승기*・박영재・김희은・김남수[1]

전북대학교 수의과대학
*전승기 동물병원

요 약 : 2002년 1월부터 2003년 12월까지 전북지역의 동물병원에 외이염으로 내원한 환자의 *Malassezia pachydermatis* 이환율을 조사하였다. 외이염으로 진단된 총 589두의 개에서 243두(37.6%)가 *M. pachydermatis*에 감염되어 있었다. 외이염에 감염된 개의 품종, 나이, 계절, 귀의 형태 등과 *M. pachydermatis* 의 이환율과의 상호 관계를 조사하였다. 연령별로는 1-2년, 계절은 여름철, 귀는 pendulous 형태의 귀가 이환율이 높게 나타났다. 특히 귀의 형태와 계절적인 요인이 *M. pachydermatis* 이환율과 가장 관계가 깊은 것으로 나타났다.

주요어 : *Malassezia pachydermatis*, otitis externa, dogs.