

## Prevalence Investigation of Dermatophytes in Rabbits in Qingdao Region, China

<sup>1</sup>Li Dai-Jun, <sup>1</sup>Zhou Yu-Fa, <sup>1</sup>Liu Jing-Bo, <sup>1</sup>Zhang Mingliang, <sup>1</sup>Cai Yu-Mei and <sup>2</sup>Miao Zeng-Min  
<sup>1</sup>College of Animal Sciences, Shandong Agricultural University, 271000 Tai'an, China  
<sup>2</sup>College of Life Sciences, Taishan Medical University, 271000 Tai'an, China

**Abstract:** To investigate the prevalence of dermatophytes in rabbits raised in Qingdao region, an Eastern area of Shandong province, China, a total of 880 rabbits with skin lesions were examined from June 2009 to May 2010. Of the 880 individuals studied 271 (30.8%) were positive for fungal elements by direct microscopic examination and 162 (18.4%) samples were culture positive for dermatophytes. Among 162 rabbits with dermatophytosis, the frequency of the isolated species in increasing order was as follows: *Microsporium gypseum*, 31 (19.8%); *Microsporium canis*, 56 (34.6%); *Trichophyton mentagrophytes*, 73 (45.7%). Rabbits <3 months of age showed a statistically significant higher prevalence of dermatophytes than other age groups ( $p < 0.05$ ). The isolation rate of dermatophytes in Summer and Autumn were higher than in Spring and Winter ( $p < 0.05$ ).

**Key words:** Dermatophyte, dermatophytosis, rabbit, winter, dermatophytes, China

---

### INTRODUCTION

Dermatophytoses caused by dermatophytes are common skin infections in animals especially rabbits, dogs and cats (Khosravi *et al.*, 1994; Filipello Marchisio *et al.*, 1996; Rind *et al.*, 2005). The transmission of dermatophytes from animals to humans usually occurs through direct contact or indirectly through fungus-bearing hair and scales from infected animals (Caretta *et al.*, 1989). The disease is of world-wide distribution especially in developing countries where it constitutes a great public health problem (Weitzman *et al.*, 1998; Abu-Elteen and Malek, 1999; El-Said, 2001; Mehraban *et al.*, 2003).

In recent years, the number of rabbits fed in Qingdao region has increased markedly. Considering the close contact between rabbits and breeders, these animals that are often symptomatic carriers of dermatophytes can be important sources of infection. The understanding of dermatophytes epidemiology in rabbits is very important for reducing the spread of dermatophytosis in both animals and humans.

Furthermore, the species of dermatophytes and the prevalence of dermatophytoses are well understood in many countries (Caretta *et al.*, 1989; Khosravi *et al.*, 1994; Weitzman *et al.*, 1998; Vangeel *et al.*, 2000; Mehraban *et al.*, 2003; Chermette *et al.*, 2008; Nardoni *et al.*, 2010). But to the best knowledge, studies of prevalence of dermatophytoses in Qingdao region are limited. Therefore, the main aim of the present study was to determine the species of dermatophytes and the prevalence of infections in Qingdao region which has a high population of rabbits.

### MATERIALS AND METHODS

**Study population and data collection:** The study conducted between June 2009 and May 2010, comprised 880 rabbits with suspected dermatophytosis from Qingdao animal hospital.

They were classified into four groups according to their ages: 0-3, 4-18, 19-30 and >30 months. To evaluate seasonal effects, samples were categorized according to the periods into; Spring (March-May), Summer (June-August), Autumn (September-November) and Winter (December-February).

**Sampling and treatment:** The hair and skin scrapings were collected from the lesions by a sterile lancet after cleaning with 70% alcohol. The collected samples were subjected to direct microscopic examination with 40% KOH for the presence of fungal elements. Other parts of the scraped materials were inoculated to Sabouraud Dextrose Agar plates (SDA) medium, containing 0.05 mg mL<sup>-1</sup> chloramphenicol and 0.5 mg mL<sup>-1</sup> cyclohexamide (Efuntoy and Fashanu, 2002). The plates were incubated at 25°C and examined for 1 month (Song *et al.*, 2000).

After the incubation, each of isolates was identified macroscopically and microscopically by lactophenol cotton blue in terms of hyphae, macroconidia and microconidia (Efuntoy and Fashanu, 2002; Pang *et al.*, 2008).

**Statistic analysis:** Infection rate of dermatophytosis was determined as:

$$\frac{\text{Number of positive samples}}{\text{Total number of samples}} \times 100\%$$

Differences in prevalence rates were compared according to age and season using the SPSS Software for Windows (Version 13.0) and  $p < 0.05$  was considered statistically significant.

### RESULTS AND DISCUSSION

Of 880 samples examined, 271 (30.8%) were positive for fungal elements by direct microscopic examination and 162 (18.4%) samples were culture positive for dermatophytes (Table 1). Altogether, 3 species were identified. In increasing order of frequency, the isolated species was the following: *Microsporum gypseum* (*M. gypseum*), 31 (19.8%); *Microsporum canis* (*M. canis*), 56 (34.6%); *Trichophyton mentagrophytes* (*T. mentagrophytes*), 73 (45.7%) (Table 2). Rabbits younger than 3 months of age showed a statistically significant higher prevalence of dermatophytes than other age groups ( $p < 0.05$ ). The isolation rate of dermatophytes in Summer and Autumn were higher than in Spring and Winter ( $p < 0.05$ ) (Table 3). The study investigated the species of dermatophytes and the prevalence of dermatophytosis in rabbits. The most frequently isolated dermatophyte was *T. mentagrophytes* followed by *M. canis* and *M. gypseum*. This result differs from other

studies (Weitzman *et al.*, 1998; Mehraban *et al.*, 2003). The geographical variations may be the reason for discrepancy in the distribution of species (Nardoni *et al.*, 2010).

In this study, rabbits <3 months of age showed a statistically significant higher prevalence of dermatophytes than other age groups ( $p < 0.05$ ). The higher susceptibility of young rabbits may be related to immunological immaturity, the deficiency of fungistatic sebum or linoleic acid, biochemical exchange on the skin being of the anagen phase of hairs and physiological situation (Al-Ali *et al.*, 1997).

Dermatophytoses were found in the present study throughout 1 year and the highest infection rate occurred in Summer. It was consistent with the findings of Al-Ali *et al.* (1997). The main reason may be appropriate environmental factors which are favorable for fungal reproduction.

### CONCLUSION

According to the identification results, rabbits were the important sources of dermatophytes. Therefore, this should be taken into account as veterinary practitioners, rabbit breeders and related persons may be exposed to these pathogens by touching and handling rabbits.

### REFERENCES

Abu-Elteen, K.H. and M.A. Malek, 1999. Prevalence of dermatophytoses in the zarqa district of Jordan. *Mycopathologia*, 145: 137-142.

Al-Ali, G., R.M. Natour and W. Al-Bitar, 1997. Distribution and prevalence of superficial fungal infections in Amman and other Jordan cities. *Med. Biol. Sci.*, 24: 219-227.

Caretta, G., F. Mancianti and L. Ajello, 1989. Dermatophytes and keratinophilic fungi in cats and dogs. *Mycoses*, 32: 620-626.

Chermette, R., L. Ferreiro and J. Guillot, 2008. Dermatophytoses in animals. *Mycopathologia*, 166: 385-405.

Efuntoye, M.O. and S.O. Fashanu, 2002. Fungi isolated from skins and pens of healthy animals in Nigeria. *Mycopathologia*, 153: 21-23.

El-Said, A.H.M., 2001. Mycological and physiological studies on fungi, isolated from skin diseases. *Pak. J. Biol. Sci.*, 4: 1432-1436.

Filipello Marchisio, V., L. Preve and V. Tullio, 1996. Fungi responsible for skin mycoses in Turin (Italy). *Mycoses*, 39: 141-150.

Khosravi, A.R., M.R. Aghamirian and M. Mahmoudi, 1994. Dermatophytoses in Iran. *Mycoses*, 37: 43-48.

Table 1: Comparison of results of samples examined by direct microscopic examination and fungal culture

Test	Fungal culture (n = 880)		Total
	Negative	Positive	
<b>Direct microscopy (n = 880)</b>			
Negative	547	62	609
Positive	171	100	271
<b>Total</b>	<b>718</b>	<b>162</b>	<b>880</b>

Table 2: Dermatophyte species isolated and the prevalence in rabbits

Dermatophytes	Rabbits	
	n	Percentage
<i>T. mentagrophytes</i>	74	45.7
<i>M. canis</i>	56	34.6
<i>M. gypseum</i>	32	19.7
<b>Total</b>	<b>162</b>	<b>18.4</b>

Table 3: Variables of season and age on rabbit dermatophytosis

Variables	Rabbits	
	No. of positive animal/No. of animal tested	Percentage
<b>Age</b>		
0-3	55/171	32.2
4-18	39/259	15.1
19-30	27/262	10.3
>30	41/188	21.8
<b>Season</b>		
Spring	24/245	9.8
Summer	84/260	32.3
Autumn	41/200	20.5
Winter	13/175	7.4

- Mehraban, F., A. Lame, R.L. Abdolaziz and A. Reza, 2003. Epidemiology of dermatophytoses in an area South of Tehran, Iran. *Mycopathol.*, 156: 279-287.
- Nardoni, S., R. Papini, R. Verin and F. Mancianti, 2010. Survey on the role of brown hares (*Lepus europaeus*, Pallas (1778) as carriers of zoonotic dermatophytes. *Ital. J. Anim. Sci.*, 9: 126-128.
- Pang, S.H., P. Ren and X.J. Wu, 2008. Diagnosis and treatment of rabbit skin mildew. *Anim. Sci. Vet. Med.*, 4: 70-70.
- Rind, S.A., A.A. Noor, M. Zardari and A.A. Mangi, 2005. Some studies of the physico-chemical and biological properties of the soil of taluka ratodero, district Larkana, Sindh, Pakistan. *Pak. J. Biol. Sci.*, 8: 156-159.
- Song, Y.W., Z. Xie, H.D. Jiang, J. Chen and H.C. Xu, 2000. Dermatophytosis of rabbits caused by *Epidermophyton floccosum*. *Chin. J. Vet. Med.*, 26: 29-30.
- Vangeel, I., F. Pasmans, M. Vanrobaeys, P. De Herdt and F. Haesebrouck, 2000. Prevalence of dermatophytes in asymptomatic guinea pigs and rabbits. *Vet. Rec.*, 146: 440-441.
- Weitzman, I., N.X. Chin, N. Kunjukunju and P. Della-Latta, 1998. A survey of dermatophytes isolated from human patients in the United States from 1993 to 1995. *J. Am. Acad. Dermatol.*, 39: 255-261.