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PREVALENCE, HISTOPATHOLOGY AND TREATMENT OF EAR MITES (Otodectes cynotis Hering) INFESTATION IN CATS IN SELANGOR, MALAYSIA

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PREVALENCE, HISTOPATHOLOGY AND TREATMENT OF EAR MITES (*Otodectes cynotis* Hering) INFESTATION IN CATS IN SELANGOR, MALAYSIA

By

PHAN KIM THAI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Master of Veterinary Science

September 2011

Dedicated to:

My beloved parents

Phan Thanh Son

Pham Thi Ut

For their love, support and trust

My sister, Phan Kim Thanh

And my younger brother, Phan Thanh Ngoc

Thanks for everything…

Abstract of thesis presented to the Senate of the Universiti Putra Malaysia in the fulfillment of the requirement for the degree of Master of Veterinary Science

PREVALENCE, HISTOPATHOLOGY AND TREATMENT OF EAR MITES (*Otodectes cynotis* Hering) INFESTATION IN CATS IN SELANGOR, MALAYSIA

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Chairman: Associate Prof. Datin Kalthum Hashim, PhD

Faculty: Veterinary Medicine

Otodectes cynotis is the most common infesting ear mite documented in 85% of cases of otitis externa in cats. Though *O. cynotis* is an important common cause of otitis externa, there is a lack of information on its prevalence in the feline population and the factors that could affect its potential survival in the ear canal of this species. Thus, the first objective in this study was to estimate the prevalence of *Otodectes cynotis* in cats at the University Veterinary Hospital, Universiti Putra Malaysia, submitted for treatment between March 2010 and May 2010. A total of 324 cats, age ranging between 2 and 96 months were examined. Samples were taken from both ears using cotton-tipped swabs. Thirty point six percent (30.6%) of cats were positive for *O. cynotis*. However, there was no statistical difference between sex, breed, style of living and type of hair coat. This study found that there was a significant difference ($P<0.05$) between 2 age groups: 3 years old and younger, and 3 years old and older. Clinical signs associated with ear mite infestation such as head shaking,

ear scratching, ear discharges, alopecia and crusts at the pinna are significantly correlated with the presence and absence of mites.

Tissues from the infected external ear canals were sampled and fixed in 10% buffered formalin. The tissues were embedded in paraffin wax, later sectioned for about 4 μm thickness and stained with Hematoxylin and Eosin stains. The results showed that the epidermis was generally moderate but sometimes severely hyperplastic, exhibited as orthokeratotic and/or parakeratotic hyperkeratosis and acanthotic thickening of epithelium. In addition, slight to moderate perivascular infiltration of inflammatory cells consisting of lymphocytes, plasma cells and some macrophages were also seen in the dermis. Ceruminous glands were dilated and full of secretion in the lumen associated with the proliferation of hair follicle and sebaceous gland cells and folliculosebaceous hamartoma.

Different groups of cats and kittens with ear mite infestation were treated with ivermectin at 200μg/kg, 300μg/kg and 400μg/kg dosage. Each cat was given 3 treatments on day 0, 7, 14 of each dosage level. All cats were examined for ear mites on day 0, 7, 14, 21, 28and 35. It was found that the efficacy of ivermectin was 100% by day 14 in all treatment groups. However, there was no significant difference between each treatment group.

Abstraktesis yang dikemukakankepadaSenatUniversiti Putra Malaysia sebagai memenuhikeperluanijazah Master SainsVeterinar

KELAZIMAN, HISTOPATOLOGI DAN RAWATAN SERANGAN HAMA TELINGA (*Otodectes cynotis* Hering) PADA KUCING DALAM SELANGOR, MALAYSIA

Oleh

PHAN KIM THAI

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Pengerusi: Profesor Madya Datin Kalthum Hashim, PhD

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Otodectes cynotis ialah hama telinga yang paling kerap yang melibatkan sehingga 85% kesotitis eksterna pada kucing. Walaupun *O. cynotis* adalah penyebab lazim otitis eksterna, masih terdapat kekurangan maklumat mengenai kelazimannya pada populasi kucing dan faktor yang boleh menjejaskan potensi hidup mereka dalam saluran telinga. Denganitu, objektif pertama kajian ini ialah untuk menganggar prevalen *O. cynotis* pada kucing yang dirawat di Hospital Veterinar Universiti, Universiti Putra Malaysia antara Mac 2010 dan Mei 2010. Sejumlah 324 kucing, berumur antara2 dan 96 bulan telah diperiksa. Sampel diambil dari kedua-dua telinga menggunakan putik kapas. Keputusan menunjukkan 30.6% kucing adalah positif dengan *O.cynotis*. Walau bagaimanapun, tidak ada perbezaan statistik di antara jantina, baka, gaya hidup dan jenis bulu. Kajian ini mendapati perbezaan signifikan ($P < 0.05$) diantara 2 kumpulanumur: 3 tahundanmuda, dengan 3 tahun danlebih. Tanda klinikal dikaitkan dengan serangan hama telinga termasuk mengoyangkan

kepala, menggarutelinga, lelehantelinga, botak dan kerak pada daun telinga nyata berhubungkait dengan kehadiran atau ketiadaan hama.

Tisu dari bahagian luar telinga yang dijangkiti hama disampel dan disimpan di dalam 10% timbal formalin. Tisu ditanam dalam lilin paraffin kemudian dihiris setebal 4 µm dandiwarnakan dengan Hematoxylin and Eosin. Keputusan menunjukkan yang epidermis secara umumnya sederhana tebal tetapi kadang-kala hiperplasia, menunjukkan hyperkeratosis ortokeratotik danparakeratotik, serta penebalan epithelium akantotik.Tambahan juga terdapat sedikit penyusupan perivaskular sehingga sederhana sel radang yang twdiri deripacla limfosit, sel plasma dan beberapa makrofaj dalam dermis. Kelenjar keruminus berdilatasi dan penuh denger rembesan dalam lumen dikaitkan dengan percambahan folikel bulu dan sel kelenjar sebum dan hamartoma folikulosebaseos.

Kumpulan kucing dan anak kucing yang berbeza yang diserang hama telinga telah dirawat dengan ivermectin pada dos 200µg / kg, 300µg / kg dan 400µg/kg. Setiap kucing diberi 3 rawatan iaitu pada hari 0, 7, 14 bagi setiap tahap dos. Semua kucing telah diperiksa pada hari 0, 7, 14, 21, 28 dan 35. Adalah didapati bahawa ivermectin 100% berkesan pada hari14 bagi semua kumpulan rawatan. Walau bagaimanapun, tidak ada perbezaan signifikan di antara kumpulan rawatan.

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I certify that a Thesis Examination Committee has met on **14 September 2011** to conduct the final examination of Phan Kim Thai on her thesis entitled "**Prevalence, Histopathology and Treatment of Ear Mites (*Otodectes cynotis* Hering) Infestation in Cats in Selangor, Malaysia**" in accordance with the Universities and University College Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the **Master of Veterinary Science**.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of **Master of Veterinary Science**. The members of the Supervisory Committee were as follows:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institutions.

PHAN KIM THAI

Date: 14 September 2011

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CHAPTER 1

GENERAL INTRODUCTION

Otodectes cynotis, also known as the psoroptiform ear mite or ear canker mite, is the most common mange mite of cats and dogs and the cause of otodectic mange, otoacariosis (Mullen and Oconnor, 2002). The disease has a worldwide distribution and is prevalent in animal shelters and breeding establishments (Wall and Shearer, 2001; Arther, 2009; Lefkaditis *et al*., 2009). These mites can infest a range of hosts, including wild arctic foxes (Gunnarsson *et al*., 1991), farmed polar and silver foxes (Sciesinski, 1996), ferrets (Hillyer and Quesenberry, 1997), wolverine (Wilson and Zarke, 1985), and other carnivorses (Wall and Shearer, 2001). Kittens and adult animals can be infested to the same extent but young cats seem to be more susceptible (Six *et al.*, 2000; Sotiraki *et al*., 2001). Nursing kittens and puppies are supposed to acquire the infestation from their dams and since otoacariasis is very contagious, the entire litters may be affected (Urquhart *et al*., 1996; Paterson, 2008). Although rare, zoonotic infestations have also been reported and *O. cynotis* has been found in the external ear canal of humans (Lopez, 1993) and other areas of the body in contact with the infested pets.

The mites can also spread through contaminated combs, brushes, bedding and other grooming accessories, especially where cats are bred or sheltered (Farkas *et al*., 2007). *O. cynotis* are typically found deep in the external ear canal, where they complete their entire life cycle comprising of four stages: egg, larva, protonymph and deutonymph, and adult, in about three weeks (Wall and Shearer, 2001). They do not burrow into the skin but live as a surface parasite that may pierce the skin to feed

on blood, serum, and lymph. These mites feed commonly on desquamated epithelial cells and possibly cerumen and other aural exudates (Mullen and Oconnor, 2002). This leads to irritation of the ear canal and hypersensitivity reactions soon after infestation. Chronic cases in cats may result in Arthus-type hypersensitivity (Farkas *et al*., 2007). Cats can tolerate a significant population of *O. cynotis,* so in most cases, lesions are not detected or observed early.

Although more than one parasite species have been isolated from otitis externa in dogs and cats, *O. cynotis* is responsible for 85% of cases in cats (Scott *et al*., 2001, Wall and Shearer, 2001). Cats infested with *O. cynotis* most commonly develop otitis externa characterized by vertical and horizontal canal erythema and a reddish-brown to black ceruminous otic discharges resembling coffee grounds. The cats suffering from otitis externa usually show intense aural irritation, pruritus, mild or severe dermatitis, frequently rubbing, twitching and scratching of the ears and head shaking, sometimes holding the head to one side or circling(Curtis, 2004; Medleau and Hnilica, 2006). The intense pruritus may lead to self-mutilation, bleeding and haematomas. Known as otodectic mange, this skin disease resembles miliary dermatitis, a common, crusty eruption found around the neck and head, dorsolumbar area, and inguinal area. In most severe cases, secondary infestations of bacteria and *Malassezia* yeast are involved and may lead to ulceration of the tympanic membrane resulting in otitis media (Crespo *et al*., 2002; Farkas *et al*., 2007). Severely untreated cases can lead to emaciation, self-induced trauma, spasms, and convulsions (Mullen and Oconnor, 2002).

In addition to otitis externa, ectopic infestations of the head, neck, rump, tail head and rarely the trunk can occur when mites escape the ear canals (Curtis, 2004). When an infested cat sleeps with its ear in the flank, the ear mites can leave the ear canal and get on the skin and hair of the interscapular area and paws. However, clinical signs of mite infestation are rarely found at these areas (Farkas *et al*., 2007).

In spite of the importance of *O. cynotis* as a cause of otitis externa, there is lack of information concerning its prevalence in cats in Malaysia. In addition, there is also limited data related to clinical signs to diagnose the risk factors of ear mite infestation to help owners to detect infestation at an early stage (Nagendram and Rajamanickam, 1976; Shaari, 1995; Krishnan, 2001; Junoh, 2007). Some authors in other countries also studied the prevalence of ear mites in cats and the factors that could affect their survival potential in the ear canal (Sotiraki *et al*., 2001; Akucewich *et al.*, 2002; Rodriguez-Vivas *et al*., 2003; Farkas *et al*., 2007; Lefkaditis *et al*., 2009).

Despite the common occurrence of otitis externa reported in cats, minimal attention has been given in the veterinary literature to the histologic features of normal and abnormal ear canals. While reviewing existing literature, most work were focused on the canine ear (Stout-Graham *et al*., 1990; Angus *et al*., 2002; Chaudhary *et al*., 2002; Huang *et al.,* 2009), and very limited investigations of the histopathology of the feline ear. It is noticeable that there is negligible publication related to the histopathology of the feline ear infested with ear mite *O. cynotis*

In order to eliminate ear mites it is important to treat the cat's ears. Ivermectin is a macrocyclic lactone and a fermentation product of an actinomycete, *Streptomyces avermitilis*. Dosages at microgram levels are used to treat numerous external and internal parasites in a variety of species, including cats, dogs, horses, cattle, sheep, swine and even humans (Chittrakarn *et al.,* 2009). Ivermectin is used to prevent dirofilariasis at a dosage of 6 µg/kg and 24 µg/kg in dogs and cats, respectively (Page *et al*., 2000). Broad spectrum activity against arthropods comprising of mites (*Sarcoptesscabei, Notoedrescati, Otodectescynotis, Cheyletiella* spp.*, Demodex canis, Pneumonyssoides caninum*) and gastrointestinal nematodes such as roundworms, hookworms and whipworms were obtained by using extra-label dosages of ivermectin formulation marketed for other species (Page *et al*., 2000).

Moreover, ivermectin has proven to be a very valuable drug to veterinarians in that when given in a proper form and recommended dosage, it has a wide margin of safety in all sizes and breeds of cats (Steenbergen, 2005). Recently, ivermectin has also been reported to be effective in treating ear mites (*O. cynotis*) in cats (Paradis, 1998; Huang *et al.*, 2000; Page *et al*., 2000; Bowman *et al*., 2001; Steenbergen, 2005).The hypothesis of this research was that ivermectin at the dosage of 300 µg/kg and 200 µg/kg was sufficient to kill ear mite infestation in adult cats and in kittens, respectively, after 3 treatments of 7 days apart of 21 days.

Thus, the objectives of this study were:

i. to investigate the prevalence of *O. cynotis* infestation in cats.
ii. to study the histopathology of feline external ear canal with ear mites infestation
iii. to determine the effective dosage of ivermectin in treating ear mites in cat.

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