

## Prevalence of Intestinal Worm in Free Ranging Domestic Cats in Bali

(PREVALENSI CACING USUS PADA KUCING  
PELIHARAAN YANG BEBAS BERKELIARAN DI BALI)

I Made Subrata<sup>1</sup>, Ida Bagus Made Oka<sup>2,4</sup>,  
Kadek Karang Agustina<sup>3,4\*</sup>

<sup>1</sup>Lab of Epidemiology,  
Public Health Study Program, Faculty of Medicine,  
<sup>2</sup>Lab of Veterinary Parasitology, <sup>3</sup>Lab of Veterinary Public Health,  
Faculty of Veterinary Medicine, <sup>4</sup>Center of Studies on Animal Diseases  
Udayana University, Jl. Sudirman, Denpasar, Bali, Indonesia, 80225  
Phone: (+6282)339449379; Email: k.agustina@unud.ac.id

### ABSTRACT

The aims of this study were to identify and to measure the prevalence of intestinal worm infections in free-ranging domestic cats in Bali. As many as 133 cat fecal samples were collected from Bali and preserved in sodium acetic formaldehyde solution. Coproscopy method (sedimentation concentration and flotation techniques) was used to identify the eggs of helminthes. Based on fecal examination, eggs of four helminthes species : *Toxocara*, *Ancylostoma*, *Cestoda* and *Capillaria* were identified. This result indicates the prevalence of intestinal worms in free ranging domestic cats were high, consisting of *Toxocara sp* (71.43%), *Ancylostoma sp* (37.59%), *Cestoda* (19.55%) and *Capillaria sp* (0.75%). Therefore, it is needed to conduct programs to reduce and eradicate that helminthes.

Key words: worm; prevalence; free ranging cats in Bali

### ABSTRAK

Penelitian ini bertujuan untuk mengidentifikasi jenis cacing dan mengukur prevalensi infeksi kecacingan pada kucing yang dibiarkan di Bali. Sebanyak 133 sampel feses kucing yang berasal dari seluruh Bali dikumpulkan dan disimpan dalam larutan *sodium acetic formaldehyde*. Seluruh sampel diperiksa secara koproskopi dengan dua metode berbeda yaitu metode konsentrasi sedimentasi dan metode pengapungan untuk mengidentifikasi telur cacing yang terdapat pada feses kucing. Pada penelitian ini teridentifikasi empat jenis cacing yang menginfeksi kucing yang dibiarkan di Bali yaitu *Toxocara*, *Ancylostoma*, *Cestoda* dan *Capillaria*. Hasil penelitian ini menunjukkan bahwa prevalensi infeksi kecacingan pada kucing yang dibiarkan di Bali masih tinggi, yaitu *Toxocara sp* (71,43%), *Ancylostoma sp* (37,59%), *Cestoda* (19,55%) dan *Capillaria sp* (0,75%). Untuk itu diperlukan program pemberantasan dan pencegahan terhadap infeksi kecacingan pada kucing di Bali.

Kata-kata kunci: cacing; prevalensi; kucing liar; Bali

### INTRODUCTION

Stray cats are predators that highly susceptible to a variety of parasitic infections because they can go everywhere and become a sources of parasite (Loss *et al.*, 2013; Borkataki *et al.*, 2013). Parasites in cats can impact to their health and to human in the vicinity (Krecek *et al.*, 2010; Subrata *et al.*, 2015), *Toxocara sp* and

*Ancylostoma sp* are known to cause larva migrans in human being (Overgaauw and Knapen, 2013; Wiwanitkit and Wiwanitkit, 2015). Therefore, public health education should be given to the pet owner and general public regarding the hazards of zoonotic diseases. Children are at most serious risk as they have the habit of playing with pet or even from the environment where cat feces may be present

(Borkataki *et al.*, 2013).

Many surveys regarding cat helminthes have been conducted in the world since long time ago. The data of helminthes prevalence in fecal cats reported in Republic of Korea was 82.2%. More than 29 helminthes species including adults or eggs were detected in visceral and fecal samples of the examined cats. A variety of *Cestodes*, including *Spirometra erinacei*, *Taenia taeniaeformis* and unidentified species of tapeworm were detected (Sohn and Chai, 2005). In Romania reported that the overall prevalence of endoparasites in household cats was 34.3% (Mircean *et al.*, 2010), the data also reported in Lisbon that found intestinal parasites in 23/74 samples and identified as *Toxocara cati*, *Isospora felis*, *Ancylostoma tubaeforme*, *Dipylidium caninum*, *Uncinaria stenocephala* and *T. leonine* (Duarte *et al.*, 2010). In Japan was reported, 43.1% cats infected by internal parasites (Yamamoto *et al.*, 2009). Studies of gastrointestinal parasites of cats in several parts of the countries have been limited to the stray cat population (Raji *et al.*, 2013). The data about parasites in cats in part area of Bali have been reported, the prevalence of *T. cati* in cats in Denpasar have been reported 32.5% was household cats and 65% was stray cats, overall prevalence was 48.8% (Nealma *et al.*, 2013).

Worldwide prevalence of *Toxocara sp* in local cats have been reported; 39% in Poland (Luty, 2001), 52.8% in Iran (Sadjjadi *et al.*, 2001) and 60.9% in Surabaya Indonesia (Kusnoto, 2005). The prevalence of *Ancylostoma sp* in cats was also high in develop countries, in Brazil that was 94.2% identified three species; *A. caninum* (67.3%), *A. braziliense* (21.1%) and *A. tubaeforme* (9.6%) (Coelho *et al.*, 2011) and the recent study reported 60.69% cats in Brazil infected by *Ancylostma sp* (Ramos *et al.*, 2013).

Internal parasites can decrease endurance by absorbing essential nutrients and interfering with vital organs (Agustina, 2013), the worm infection can make cats more susceptible to various diseases (Carter, 2001; Ward, 2009). Gastrointestinal parasites constitute a major source of diseases for cats in the tropics, and have been recognized as important public health problems in several parts of the world (Raji *et al.*, 2013). Therefore, it is necessary to conduct a research to identify and measure the prevalence of worm infected free ranging domestic cats in Bali.

## RESEARCH METHODS

A total of 133 fecal samples collected from free ranging domestic cats in all around Bali, Indonesia (Denpasar, Badung, Tabanan, Bangli, and Klungkung Regency). Free range domestic cats caught by net and put in cage until defecation, during the periods cats given feed and *ad libitum* of water. Fecal samples were put in a tube and preserved in sodium acetic formaldehyde solution (Marti and Escher, 1990). Coproscopy method was used to identify the eggs of helminthes by sedimentation concentration and flotation techniques (Sohn and Chai, 2005; Glinz *et al.*, 2010). All of the data were analyzed descriptively by using statistic program.

## RESULTS AND DISCUSSION

The prevalence of intestinal worm in free range domestic cats in Bali was presented im Table 1. The result showed that the prevalence of *Toxocara sp* in Bali was very high (71.43%), compare to other previous study; in Netherland was 2.9% (Overgaauw, 1997), 10% in USA (Al-Jabr *et al.*, 1997), 39.9% in Poland (Luty, 2001) and 43% in Colombia (Echeverry *et al.*, 2012). This result is in agreement with the research conducted in Denpasar, (Nealma *et al.*, 2013) reported 60% stray cats infected by *T. cati*, in Iran Zibaei *et al.* (2007) reported 92.9% of stray cats infected by *Toxocara sp*. The prevalence of *Toxocara sp* in cats in Europe have been reported, Epe *et al.* (2004) detected *T. cati* eggs in 3.9% of feline fecal samples in Germany, while Barutzki and Schaper (2003) found Ascarids eggs in 6.4% of fecal samples. In Italy, Riggio *et al.* (2013) found *T. cati* in 22% and hookworm eggs in 1.2% of feline fecal samples. In Spain, Gracenea *et al.* (2009) found *T. cati* eggs in 22%

Table 1. Prevalence of intestinal worm in free range domestic cats in Bali

Genus of Worm identified	Positive samples	Prevalence (%)
<i>Toxocara sp</i>	95/133	71.43
<i>Ancylostoma sp</i>	50/133	37.59
<i>Cestoda sp</i>	26/133	19.55
<i>Capillaria sp</i>	1/133	0.75

of feline fecal samples with distinct higher incidence in kittens. And in Romania *T. cati* were infected 20.3% of household cats (Micrcean *et al.*, 2010).

This result indicates that free ranging cats worms are a serious warning for human health because *T. cati* is one of *Toxocara* species reported as a zoonotic agent (Fisher *et al.*, 2003; Lee *et al.*, 2010). In particular, *Toxocara sp* are the most frequently encountered species that are known agents of visceral larva migrants (VLM) in humans (Hendrix *et al.*, 1996; Gerhold and Jessup, 2012; Overgaauw and Knapen, 2013). High parasitic loads or repeated infection can lead to VLM, which is primarily diagnosed in children, because they are prone to exposure and ingestion of infective eggs (Markell and Voge, 2006). Ocular larva migrants is rare compared with VLM. A light *Toxocara* burden is thought to induce a low immune response, allowing a larva to enter the host's eye (CDC, 2004). Transmission of *Toxocara* to humans is usually through ingestion of infective eggs. *Toxocara* can lay around 200,000 eggs per day. These eggs are passed in cat or dog feces, but the defecation habits of dogs cause *T. canis* transmission to be more common than that of *T. cati* (CDC, 2004; Markell and Voge, 2006).

The prevalence of *Ancylostma sp* in stray house cats in Bali was 37.59%. It was lower than in Brazil that was 94.2% identified three species; *A. caninum* (67.3%), *A. braziliense* (21.1%) and *A. tubaeforme* (9.6%) (Coelho *et al.*, 2011) and the recent study reported 60.69% cats in Brazil were infected by *Ancylostma sp* (Ramos *et al.*, 2013). But this prevalence higher than in Korea was 33% in feral cats (Sohn and Chai, 2005), in Romania was 10.1% in household cats (Micrcean *et al.*, 2010) and in Colombia which was 7.4% in house cats (Echeverry *et al.*, 2012), low prevalence of hookworm also reported in Spain (Gracenea *et al.*, 2009) found *A. tubaeforme* eggs in 4% of feline fecal samples. Hookworm larvae that normally mature in the intestinal tracts of animals can cause cutaneous larva migrants in people. Zoonotic hookworms known to cause this condition include *A. braziliense*, *A. caninum*, *A. ceylanicum*, *A. tubaeforme*, *Uncinaria stenocephala* and *Bunostomum phlebotomum*. Other species of hookworms found in animals, including wildlife and captive exotics, might also be able to cause cutaneous larva migrants (Acha and Szyfres, 2003).

Cats are the definitive host of some *Cestodes*. *Cestodes* that have been reporting infected cats were *Diphyllobothrium sp*, *Joyeuxiella sp*, *Spirometra sp*, *D. caninum*, *T. taeniaeformis* and *Echinococcus sp*. The prevalence of *Cestodes* found in this research was 19.55%. Other research reported that in Iranian stray cats detected *Cestodes* were *Joyeuxiella pasqualei* (34.3%), *D. caninum* (49.5%), *T. taeniaeformis* (12.3%) and *Spirometra sp*. (3.8%) (Zibaei *et al.*, 2007). The prevalence of cat *Cestodes* in Japan reported *Spirometra erinaceieuropaei* (8.3%), *D. caninum* (1.4%), *Taeniidae* (0.2%) and *D. nihonkaiense* (0.1%) (Yamamoto *et al.*, 2009). *D. latum* is a tapeworm that has a serious attention of public health because it is a zoonotic agent. Some previous studies reported that thus tapeworms were infecting humans (Revenga, 1993; Nicoulaud *et al.*, 2005).

The prevalence of *Capillaria sp* in this study was 0.75%, that result was lower than in Romania which 3.4% in household cats (Micrcean *et al.*, 2010) and in Italy was 1.2% (Riggio *et al.*, 2013). *Capillaria sp* is a nematode parasite that usually found in the respiratory tract of foxes, dogs and various other carnivorous mammals (Magi *et al.*, 2012; Lalosevic *et al.*, 2013), but in other case, Bedard *et al.* (2002) reported that they found a *Capillaria sp* in the bladder of an adult cat. Most reports of *C. aerophila* in wildlife are simply parasite field surveys, and do not mention specific symptoms. However, the involvement of *C. aerophila* infestation and pneumonia, in addition to other parasites, in the death of an opossum has been reported (Saeed *et al.*, 2006).

## CONCLUSION

It can be concluded that the prevalence of parasites in free range cats in Bali was high. The parasites that found in this study were *Toxocara sp* (71.43%), *Ancylostoma sp* (37.59%), *Cestoda* (19.55%) and *Capillaria sp* (0.75%).

## ACKNOWLEDGEMENTS

Many thanks to the Rector, Dean of The Faculty of Medicine and Dean of The Faculty of Veterinary Medicine of Udayana University who have supported this research.

## REFERENCES

- Acha PN, Szyfres B. 2003. Zoonoses and communicable diseases common to man and animals: Cutaneous larva migrans; Parasitoses. *Sci Tech Pub* 580: 249-52.
- Agustina KK. 2013. Identification and prevalence of *strongyle* type worm in pigs in Bali Indonesia. *Bul Vet Udayana* 5(2): 131-138.
- Al-Jabr OA, Storey DM, Akrigg A, Bryden AS. 1997. Prevalence of *Toxocara* Ova in dogs and cats faeces. *Vet Rec* 211-212.
- Barutzki D, Schaper R. 2003. Endoparasites in dogs and cats in Germany 1999-2002. *Parasitol Res* 90(3): 148-150.
- Bedard C, Desnoyers M, Lavallée MC, Poirier D. 2002. *Capillaria* in the bladder of an adult cat. *Canadian Vet J* 43(12): 973-974.
- Borkataki S, Katoch R, Goswami P, Godara R, Khajuria JK, Yadav A, Kaur R. 2013. Prevalence of parasitic infections of stray cats in Jammu, India. *Sokoto J Vet Sci* 11(1): 1-6.
- Carter GR. 2001. Internal Parasitic Diseases of Dogs and Cats. *Int Vet Inform Serv* 2001: 1-15.
- Centers for Disease Control (CDC). 2004. Guidelines for Veterinarians: Prevention of Zoonotic Transmission of Ascarids and Hookworms of Dogs and Cats. Centers for Disease Control and Prevention, Division of Parasitic Diseases.
- Coelho WMD, Amarante AFT, Apolinario JC, Coelho NMD, Bresciani KDS. 2011. Occurrence of *Ancylostoma* in dogs, cats and public places from Andradina city, Sao Paulo State, Brazil. *Rev Inst Med Trop Sao Paulo* 53(4): 181-184.
- Duarte A, Castro I, Pereira da Fonseca IM, Almeida V, Madeira de Carvalho LM, Meireles J, Fazendeiro MI, Tavares L, Vaz Y. 2010. Survey of infectious and parasitic diseases in stray cats at the Lisbon Metropolitan Area, Portugal. *J Feline Med Surg* 12(6): 441-446.
- Echeverry DM, Giraldo MI, Castaño JC. 2012. Prevalence of intestinal helminths in cats in Quindío, Colombia. *J Biomedica* 32(3): 430-436.
- Epe C, Coati N, Schnieder T. 2004. Results of parasitological examinations of faecal samples from horses, ruminants, pigs, dogs, cats, hedgehogs and rabbits between 1998 and 2002. *Dutsch Tierärztl Wochenschr* 111: 243-247.
- Fisher M, Cottage S, Road LH, Malvern, Worcestershire. 2003. *Toxocara cati*: an underestimated zoonotic agent. *Trends in Parasitol* 19(4): 167-170.
- Gerhold RW, Jessup DA. 2012. Zoonotic diseases associated with free-roaming cats. *Zoonoses Pub Hlth* 16: 1-7.
- Glinz D, Kigbafori D, Silué KD, Knopp S, Lohourignon LK, Yao KP, Steinmann P, Rinaldi L, Cringoli G, N'Goran EK, Utzinger J. 2010. Comparing Diagnostic Accuracy of Kato-Katz, Koga Agar Plate, Ether-Concentration, and FLOTAC for *Schistosoma mansoni* and Soil-Transmitted Helminths. *Plos Neglected Trop Dis* 4(7): 1-10.
- Gracenea M, Gomez MS, Torres J. 2009. Prevalence of intestinal parasites in shelter dogs and cats in the metropolitan area of Barcelona (Spain). *Acta Parasitol* 54: 73-77.
- Hendrix CM, Homer SB, Kellman NJ, Harrelson G, Bruhn BF. 1996. Cutaneous larva migrans and enteric hookworm infections. *J Am Vet Med Assoc* 209(10): 1763-76.
- Krecek RC, Moura L, Lucas H, Kelly P. 2010. Parasites of stray cats (*Felis domesticus* L.) on St. Kitts, West Indies. *Vet Parasitol* 172: 147-149.
- Kusnoto. 2005. Prevalensi Toxocariasis pada Kucing Liar di Surabaya Melalui Bedah Saluran Pencernaan. *Media Kedokteran Hewan* 21(1): 7-11.
- Lalosevic V, Lalosevic D, Capo I, Simin V, Galfi A, Traversa D. 2013. High infection rate of zoonotic *Eucoleus aerophilus* in foxes from Serbia. *Parasite* 20(3): 1-5.
- Lee A, Schantz PM, Kazacos KR, Montgomery SP, Bowman DD. 2010. Epidemiologic and zoonotic aspects of ascarid infections in dogs and cats. *Trends Parasitol* 26: 155-161.
- Loss SR, Will T, Marra PP. 2013. The impact of free-ranging domestic cats on wildlife of the United States. *Nature Comm* 4(1396): 1-7.



- Luty L. 2001. Prevalence of Species of *Toxocara* in dogs, cats and red foxes from the Poznan region, Poland. *J Helminthol* 75: 153-156.
- Magi M, Guardone L, Prati MC, Torracca B, Macchioni F. 2012. First report of *Eucoleus boehmi* (syn. *Capillaria boehmi*) in dogs in north-western Italy, with scanning electron microscopy of the eggs. *Parasite* 19(4): 433-435.
- Marti HP, Escher E. 1990. SAF: an alternative fixing solution for parasitological stool test. *Schweiz Med Wochenschr* 120:1473-1476.
- Markell EK, Voge M. 2006. *Medical Parasitology*. 9<sup>th</sup> Ed. St. Louis: Saunders Elsevier.
- Mircean V, Titilincu A, Vasile C. 2010. Prevalence of endoparasites in household cat (*Felis catus*) populations from Transylvania (Romania) and association with risk factors. *Vet Parasitol* 171(1-2): 163-166.
- Nealma S, Dwinata IM, Oka IBM. 2013. The Prevalence of *Toxocara cati* in local cat in Denpasar. *Indonesia Medicus Veterinus* 2(4): 428-436.
- Nicoulaud J, Yéra H, Dupouy-Camet J. 2005. Prevalence of *Diphyllbothrium latum*, L., 1758 infestation in *Perca fluviatilis* from Lake Lemnan. *Parasite* 12(4): 362-364.
- Overgaauw PAM. 1997. Aspect of *Toxocara* epidemiology: *Toxocarasis* in dogs and cats. *Critical Rev Microbiol* 23: 233-251.
- Overgaauw PAM, Knapen FV. 2013. Veterinary and public health aspects of *Toxocara* sp. *Vet Parasitol* 193(4): 398-403
- Raji AA, Magaji AA, Bello MB, Lawal MD, Mamuda A, Yahaya MS. 2013. Prevalence of gastrointestinal parasites of stray cats: a case study of two hospitals in Sokoto Metropolis, Sokoto, Nigeria. *J Bacteriol Parasitol* 4(4): 1-3.
- Ramos DGS, Scheremeta RGAC, Oliveira ACS, Sinkoc AL, Pacheco RC. 2013. Survey of helminth parasites of cats from the metropolitan area of Cuiabá, Mato Grosso, Brazil. *Rev Bras Parasitol Vet* 22(2): 201-206.
- Revenga JE. 1993. *Diphyllbothrium dendriticum* and *Diphyllbothrium latum* in fishes from southern Argentina: association, abundance, distribution, pathological effects, and risk of human infection. *J Parasitol* 79(3): 379-383.
- Riggio F, Mannella R, Ariti G, Perrucci S. 2013. Intestinal and lung parasites in owned dogs and cats from central Italy. *Vet Parasitol* 193(1-3): 78-84.
- Sadjjadi SM, Khosravi M, Mehrabani D, Orya A. 2001 Seroprevalence of *Toxocara* infection in school in Shiraz, Southern Iran. *Trop Pediatr* 46(6): 327-330.
- Saeed I, Maddox-Hyttel C, Monrad J, Kapel CM. 2006. Helminths of red foxes (*Vulpes vulpes*) in Denmark. *Vet Parasitol* 139(1-3): 168-179.
- Sohn WM, Chai JY. 2005. Infection status with helminthes in feral cats purchased from a market in Busan, Republic of Korea. *Korean J Parasitol* 43(3): 93-100.
- Subrata IM, Suryadhi NT, Astawa NM, Damriyasa IM. 2015. Epidemiological and molecular analysis of *Toxoplasma gondii* in faecal samples of cats obtained from house of maternal in Bali. *Bali Med J* 4(2): 68-75.
- Ward E. 2009. Roundworm Infection in Cats. Kingsbrook Animal Hospital. Hlm. 1-3.
- Wiwanitkit S, Wiwanitkit V. 2015. Feline disease with trend of human zoonosis in Thailand. *Asian Pac J Trop Dis* 5(3): 251-252.
- Yamamoto N, Kon M, Saito T, Maeno N, Koyama M, Sunaoshi K, Yamaguchi M, Morishima Y, Kawanaka M. 2009. Prevalence of intestinal canine and feline parasites in Saitama Prefecture, Japan. *Kansenshogaku Zasshi* 83(3): 223-228.
- Zibaei M, Sadjjadi SM, Sarkari B. 2007. Prevalence of *Toxocara cati* and other intestinal helminths in stray cats in Shiraz, Iran. *J Trop Biomed* 24(2): 39-43.