

## Prevalence of *Echinococcus granulosus* and other intestinal helminths of stray dogs in Mashhad area, Iran

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### ABSTRACT

In order to determine prevalence of *Echinococcus* and other intestinal helminths infection one hundred stray dogs were examined in Mashhad area, Khorasan province of Iran. Helminths were collected from intestinal contents obtained at the time necropsy. Ninety one percent of the dogs were infected by different helminths. The prevalence of *Echinococcus granulosus* was (22%). Eighteen (81%) of infected dogs had (1-100) worm burden and 3(13%) and 1(4%) had (100-1000) and (>1000) worm burdens, respectively. The most heavily infected dog had 10,000 worms in the intestinal contents. Dogs were divided into three age group of 3 months-2 years, 2-6 years and > 6 years. The prevalence of *Echinococcus* infection was not significant by sex and age factors. Other intestinal helminths infections were as follow: *Dipylidium caninum* (41%), *Taenia hydatigena* (37%), *Taenia ovis* (8%), *Mesocestoides lineatus* (6%), *Taenia multiceps* (3%), *Joyeuxiella echinorhyncoides* (1%) and observed nematodes were *Toxocara canis* (37%), *Toxascaris leonina* (6%) and *Ancylostoma caninum* (1%). There was no significant difference in parasite prevalence between male and female dogs. The highest prevalence of *Toxocara canis* and as *Dipylidium caninum* infection were observed in 3 months to 2 years of dogs and in as contrast, in *Taenia hydatigena* was in 6> years. ( $p<0.05$ )

**Keyword:** Prevalence, *E. granulosus*, Intestinal helminths, Dog, Mashhad

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### INTRODUCTION

The high rates of infection with *Echinococcus granulosus* occur in most countries in the Middle East. Large stray dog populations found in most Middle Eastern countries are an important reservoir of the infection. Although humans have limited or no directed contact with stray dogs, these dogs are

abundant and have free access to vegetable farms, which are often unfenced, and are believed to expose humans indirectly with the eggs (Macpherson and Craig 2000). In Iran, a large population of stray dogs lives around of city and veterinary services do not able to control with prophylactic treatment. The prevalence of *E. granulosus* in stray dogs is estimated to vary from 5-50% in different regions (Motakef *et al* 1976, Hoghoughi & Jalayer 1967, Hoghoughi 1971,

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Eslami 1991, Mehrabani *et al* 1999, Maleky and Moradkhan 2000, Dalimi *et al* 2002). Also, infection rate of hydatid cyst in ruminants has been reported 2.36 to 26.4% (Hoghoghi 1971, Mobedi *et al* 1971, Mehrabani *et al* 1999). Annual incidence of human hydatid cyst varies between 0.1 to 4.45 per 100,000 in different provinces and the highest incidence has been reported from Khorasan province of Iran. (Eslami & Hosseini 1998). Identification of infected dogs in the endemic area is very important for surveillance of hydatid cyst. Because, from 1976 (Motakef *et al* 1976) to recent year, there is not any new data about prevalence of *E. granulosus* in stray dogs of Khorasan province. The objective of this study was to determine the prevalence of *E. granulosus* and other intestinal helminths in stray dogs of the province.

## MATERIALS AND METHODS

The study was carried out for one year (2002 – 2003) in the Mashhad area, capital city of the Khorasan province, which is situated in the northeast of Iran.

One hundred stray dogs of different age groups were killed by euthanasia with administration magnesium sulfate solution and necropsized immediately. The small intestines of dogs were clamped and removed completely. The intestinal contents and epithelial scrapings from each dog were washed through a mesh sieve. The contents of the sieve were then re-washed with water before checked for intestinal helminths under stereomicroscope. A total number of *Echinococcus granulosus* was calculated by counting in 10% aliquots of the contents. The collected helminths were preserved in 10% formalin buffer. Any cestods worms were stained with hematoxylin (Ash and Orihel 1991) and all helminths were identified based on figures and descriptions given in Soulsby (1982) and Khalil *et al* (1994). The data resulting of the present study were analyzed by Chi-square test.

A significant association was statistically significant identified when a p-value of less than 0.05 was observed (Remington & Schork 1970).

## RESULTS

A total 100 necropsized stray dogs, 91(91%) were infected with intestinal helminths. Forty (40%) of female and 51(51%) male dogs carried the parasites. This difference was not statistically significant. Our results indicated that 22 (22%) of stray dogs were infected with *E. granulosus* (Table 1).

**Table 1.** Prevalence of *Echinococcus granulosus* and other helminths in 100 stray dogs in Mashhad area, 2002-2003.

Species	Number of infected dogs (%)
<i>Echinococcus granulosus</i>	22 (22%)
<i>Taenia hydatigena</i>	37 (37%)
<i>Taenia multiceps</i>	2 (2%)
<i>Taenia ovis</i>	8 (8%)
<i>Dipylidium caninum</i>	41 (41%)
<i>Joyeuxiellaechinorhynchoides</i>	1 (1%)
<i>Mesocestoides lineatus</i>	6 (6%)
<i>Toxocara canis</i>	39 (39%)
<i>Toxascaris leonina</i>	7 (7%)
<i>Ancylostoma caninum</i>	1 (1%)

The prevalence of infection in sex and age groups were not significant ( $p>0.05$ ) (Table 2). The mean worm burden in 22 infected dogs was 636. Eighteen (82%) of infected dogs had (1-100) worm burden and 3(13.5%) and 1(4.5%) had (100-1000) and ( $>1000$ ) worm burdens, respectively. The mean worn burden rate of infection in 3 month to 2 years old was higher than other groups (Table 3). Monospecific infections were found in 10% of the dogs, whereas concurrent infections with 2 or more species were found in 81% of the dogs. The highest prevalence of *Toxocara canis* and *Dipylidium caninum* infection were observed in 3 months to 2 years old of dogs and in contrast, in

*Taenia hydatigena* was in 6> years old of dog. ( $P<0.05$ ). (Table2).

**Table 2.** Prevalence of *Echinococcus granulosus*, *Taenia hydatigena*, *Dipylidium caninum* and *Toxocara canis* in three age groups of stray dogs in Mashhad area, 2002-2003.

Species	Ages (years)		
	< 2	2-6	> 6
	Number of examined=32 infected (%)	Number of examined= 43 infected (%)	Number of examined= 25 infected (%)
<i>E. granulosus</i>	99 (28%)	7 (16.2%)	6 (24%)
<i>T. hydatigena</i>	10 (31%)	15 (34%)	22 (91%)*
<i>D. caninum</i>	17 (53%)*	17 (39.5%)	5 (20%)
<i>T. canis</i>	20 (62.5%)*	19 (43%)	6 (24%)

\* Significantly different between ages groups by Chi-square test ( $P<0.05$ ).

**Table 3.** Prevalence and mean worm burden of *E.granulosus* in different age groups of stray dogs in Mashhad area , 2002-2003.

Age (years)	No. of infected dogs	No. of worms	
		Mean	Range
3 months to 2 yrs	9	1207	20-10000
2 -6	7	277	20-1000
> 6	6	187	20-1000

## DISCUSSION

*Echinococcus granulosus* is the most prevalent helminths of dogs in Iran (Eslami 1991). Earlier study from 1976 (Motakef 1976) to recent here was shown that the rates of *Echinococcus* infection stayed almost unchanged in Khorasan province. The result confirms this fact that the hydatidosis control program was not efficient for decreasing the rate of *Echinococcus* infection in this province. In this study, the mean worm burden of *Echinococcus* was 636 in the dogs. This mean is similar to the rate that reported from the dogs of Kazakhestan (Torgerson et al 2003) and lower than the dogs from Iraq (Molan & Baban, 1992). The mean worm burden in

dogs varies considerably between endemic localities. In most endemic regions in developed countries worm burdens of 200 are usually found (Gemmell et al 1987). Much heavier worm burden have been reported in dogs living in many of the driest parts of the world, which must increase the biotic potential of the parasite and would be useful for the survival of the eggs (Wachira et al 1991). No difference was observed in our study between prevalence of *Echinococcus* in all ages groups of the dog examined but the abundance of infection was higher in young dogs. Data concerning *Echinococcus* population in different ages is relatively sparse. Kritsky and Leiby (1978), Schott and Müller (1990), Eslami and Hosseini (1998) and Maleki and Moradkhan (2000) noted that age-dependent difference was not significant. But, Tackmann et al (1998) found the prevalence was significantly higher in juveniles under high-endemic conditions and higher in adults under low-endemic conditions. They estimated those findings were related to the level of acquired intestinal immunity to the cestodes in various endemic conditions. Roberts et al (1986) modelled the effect of immunity in dogs as a decrease in the asymptotic prevalence of infection when compared to dogs that did not develop immunity. By repeated numbers of challenge infections, susceptibility of dogs to *E. granulosus* was reduced to approximately 50% by the sixth infection and theoretically at 99% by the 12th infection. (Gemmell et al 1986, Gemmell 1997). There was not any significant difference in the prevalence of *Echinococcus* infection in male and female dogs. The results along with the previous studies that carry out by Eslami and Hossieni (1998) in Iran and by Ramirez-Barrios et al (2004) in Venezuela.

The prevalence of other cestodes and nematodes were similar reported previously in Iran. (Sadighian 1969, Mirzayans, et al 1972, Eslami and Mohebali 1988 Sadighian 1969). In this study, the prevalence of *Toxocara canis* is higher in young animals than

in adults' dogs, in contrast, *Taenia Hydatigena* infections were significantly lower in young animals than in adults. Increased prevalence of *T.canis* in young dogs and comparably lower prevalence in older dog was expected because of the parasite's proclivity for transplacental infection of the fetus and documented evidence of age associated immunity in adult dogs. (Glickman & Schantz 1981, Greve 1971). The findings about *Toxocara canis* are similar to those obtained in previous studies (Visco et al 1977, Blagburn et al 1996). In this study, the prevalence of *Dipylidium caninum* infection was significantly more in young animals. According to study of Saeki et al (1997) the highest *D.caninum* infection was found in 7 months to 4 age's years of dogs. Also, Tassi and Widenhorn (1977) identified *D. caninum* infection as the most frequently in dogs over a year of age.

The finding may be due to more opportunities of infestation with lice and flea in young stray dogs compared to adult dogs. In contrast, *Taenia hydatigena* infections were significantly lower in young animals than in adults. Pandey et al (1987) reported that *T. hydatigena* infection only in animals older than one year old. The reasons explaining highest prevalences of *T. hydatigena* in the old dogs are unknown. This result implied that the dog did not acquire immunity to reinfection or superinfection with *T. hydatigena*. We concluded that stray dogs in Mashhad are one of the main sources of Hydatid cyst and other helminthic zoonoses in human and have to eliminate stray and unwanted dogs.

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