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THE PRESENT STATUS AND INTENSITY OF *ECHINOCOCCUS GRANULOSUS* INFECTION IN 391 STRAY DOGS IN RURAL AND URBAN AREAS OF THE CITY OF KERMAN , IRAN

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Key words: *Echniococcus granulosus , prevalence , stray dogs*

Abstract

In the present study 6500 stray dogs were killed in 1993-4 to initiate a preliminary control program in rural and urban areas of the city of Kerman. 391 dogs including 169 (43.12%) females and 222 (56.8%) males were selected randomly , dissected and examined for *Echinococcus granulosus* macroscopically and microscopically. The overall prevalence rate was 7.4%. The younger dogs were more susceptible to infection than the older ones. The prevalence of the worms was generally higher in female dogs than males. On the other hand , the mean number of worm recovery was 20 (light infection) in female dogs while it was 98 (moderate infection) in male dogs. Due to the hostile climatic and topographical conditions , echinococcosis was relatively low in this part of the country.

Introduction

Echinococcus granulosus , still one of the most important zoonothic diseases medically and economically , is a small tapeworm , living in small intestine of dogs and related animals. Although hydatidosis caused by Echinococcus granulosus is more prevalent in sheep-raising areas , other herbivorous animals serve as intermediate hosts of the parasite worldwide (5). Hydatid disease is medically and economically one of the most important zoontic diseases (1,2,17,21). The importance shows little sign of diminishing, and in fact there is evidence that the causative parasites ,

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E granulosus and *E. multilocularis* are spreading and extending their ranges into areas previously considered to be free of infection (25).

On a global basis , *E granulosus* is the most important species. Geographically , it is the most widespread , with endemic foci on every inhabited continent (21). Because of the adaptibility of *E granulosus* to wide variety of domestic food animals , there is a direct relationship between the prevalence of unilocular hydatid disease and human activity.

The prevalence of echinococcosis in dogs from different parts of Iran indicates that the infection is present nationwide (4,12,15,16,20,23). Unfortunately , there is still a high level of operation rate for hydatid cyst in human (6,11,18). Recent reports show that sheep , goats and cattle are highly infected (3,9,12,24).

The objective of this study was to investigate the prevalence and intensity of infections with *E granulosus* in stray dogs in the city of Kerman. This work is a part of preliminary effort to intiate a control program on echinococcosis. Due to large number of dogs have been involved in this survey , which can hardly be found in other studies , this work would be of prime importance.

Materials and methods

About 6500 stray dogs were killed by shooting or baited with strychnine in rural and urban areas of the city of Kerman in 1993-4. All killed dogs were carried to the garbage disposal center , 15 km far from Kerman city. Of whom , 391 male and female dogs from different localities were selected randomly. The animals were dissected and entrire length of the small intestine was tied off , placed in 10% formalin and transported to the parasitology laboratory at medical school.

After 4-6 months each intestine was incised , opened entirely and the contents were washed through a fine sieve into a suitable container. The intestinal mucosa was also scraped and washed likewise as already mentioned. After two consecutive washings each portion of contents was carefully examined under a dissecting microscope. All recovered worms were collected and preserved in 10% formalin for further identification (22). Counts of *E. granulosus* were made for each infected dog. For age-determination Fraser's

dental formula was used (7). Z-test was used to determine any statistical significance between different age groups and sexes.

Results

Age and sex-distributions of 391 stray dogs who were shot during 1993-4 in the city of Kerman , are shown in Table 1. They consisted of 169 (43.2%) females and 222 (56.8%) males , including 124 (31.7%) , 174 (44.5%) and 93 (23.8%) dogs with the age groups of 0-2 , 3-4 and > 5 years old , respectively. The prevalence of *E. granulosus* infection in stray dogs is presented in Table 1. A total of 29 (7.4%) infected dogs were found among 391 dogs examined. The infection rate was 10.1% (17 dogs) in female , and 5.4% (12 dogs) in male dogs , but there was not a significant difference between them. The highest prevalence rate for *E. granulosus* was among 0-2 class groups in both sexes (12.7%) ; it was higher than 3-4 years (6.3%) or ⩾ 5 years (2.2%) and this difference was statistically significant , respectively ($Z=2$, $P<0.05$; $Z=2.83$, $P<0.002$).

The intensity of infection was calculated based on number of worms in the small intestine of stray dogs (Table 2). In general , the degree of infection declined with increasing age groups. It was light in female dogs (mean of 20 worms) while it was moderate in male ones (mean of 98 worms). The range of worms recovery was 2-100 in female and 5-800 in male dogs.

Discussion

In previous works the biological parameters that determine the existance and stability of *E. granulosus* in dog-livestock life cycle have been described (23,24). Considerable international interest is now being taken in the control of echinococcosis (26).

The overall prevalence rate of 7.4% in stray dogs is an index of the extent of echinococcosis in the city of Kerman. It is the most reliable indication of the danger to the human population (14). The results is somewhat similar to the infection rate (6.8%) found in previous pilot study of 74 stray dogs (23). This figure is considered low compared with findings obtained in other parts of the country (4,12,15,16,20).

This finding also suggest that the younger dogs are more susceptible to infection with *E. granulosus* than the older ones. The sharp decline of the intensity of infections in the oldest dogs could be due to a slowly developing immunity (21). There is still potentially a high degree of risk to the local human population. Possible reasons for this level of infection in clude local animal husbandry practices, inadequate availability and utilization of abattoir facilities , frequent domestic slaughtering of edible animals and the feeding of raw offal to dogs.

The prevalence of echinococcosis in this part of the country was relatively low. In this place the most significant relevent fectors are mainly the hostile climatic and topographical environments. Due to presence of hot an dry weather conditions , chances for long term survival of *E. granulosus* eggs will be decreased (13). It is of interest that , the infection rates were higher in females than in male dogs. The reason for such difference is not well known. The only possibility coulb be related to factors such as different scavenging and other feeding behaviour. Variability of *E. granulosus* infections in different sexes have already been reported (10,19). From the results reported here and with the prvalence rate of hydatidosis in previous work (24) , one may conclude that there is an on-going cycle of dog-livestocks-dog.

The current strategy for control of echinococcosis as recommended by WHO (26) is mainly based on destruction or treatment of infected dogs. The incidence of *E. granulosus* infection can be reduced by appropriate control measures (8). Contact with infected dogs must be avoided , infected carcasses and offal should be burned or buried.

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Table 1- Prevalnce of *E granulosus* in 391 stray dogs by age and sex , Kerman City.

Sex / age	Female			Male			Total		
	No. ex	No. inf	No. inf	No. ex	No. inf	No. inf	No. ex.	No. inf	No. inf
0-2	65	9	13.8	59	7	11.9	124	16	12.7
3-4	63	8	12.7	111	3	2.7	174	11	6.3
>5	41	0	0	52	2	3.8	93	2	2.2
Total	169	17	10.1	222	12	5.4	391	29	7.4

Table 2- The intensity of *Echinococcus granulosus* in 391 stray dogs in the city of Kerman.

Sex	Female			Male		
Age (year)	No. of worms (range)	Mean no.of wirns	intensity	no. of worms (range)	mean no. worms	intensity
0-2	2-100	18	light	15-800	189	Moderate
3-4	3-6	22	light	5-60	19	light
≥5	0	0	0	8-47	28	light
Total	2-100	20	light	5-800	98	Modeate

Light = 1-50 worms Moderate = 51-200 worms Heavy = >200 worms

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