Japan. J. Med. Sci. Biol., 42, 137-141, 1989.

ECHINOCOCCOSIS IN IRAQ: PREVALENCE OF *ECHINOCOCCUS GRANULOSUS* IN STRAY DOGS IN ARBIL PROVINCE

Abdul Latif MOLAN and Louis Abdul-Ahad SAIDA

Department of Biology, College of Education, University of Salahaddin, Arbil, Iraq

(Received August 7, 1989. Accepted December 15, 1989)

SUMMARY: Of 67 dogs examined in 11 localities in Arbil Province, northern Iraq, 53 (79.1%) were found infected with *Echinococcus granulosus*. The infection rates in the 11 localities ranged from 66.7% to 100%. Infections were light (1-200 worms) in 37.7% of infected dogs, medium (201-1,000 worms) in 20.8% and heavy (over 1,000 worms) in 41.5%. The heaviest burden was detected in 13 dogs, in which 3,000 to 8,000 worms each were counted. Infection rates were slightly higher in male dogs (81.1%) than in bitches (76.7%).

INTRODUCTION

In Iraq, hydatid disease caused by *Echinococcus granulosus* is considered to be one of the most serious helminthic diseases with serious public health implications (1-7) and causes spectacular economic losses (8-11).

Since the main infection source of human hydatidosis is the *Echinococcus* eggs discharged from the infected canine, the prevalence of canine echinococcosis, the most readily obtainable index for the extent of the infection in a given area, will indicate the relative risk of the disease and the level of the infection pressure to man (12,13).

The present paper reports the results of post-mortem examinations of 67 dogs killed during a stray dog shooting campaign, which was established by the local government of Arbil in 1988. This survey is the first of its kind in the province, since all previous surveys have been undertaken in only two provinces, Baghdad and Mosul, out of 18 provinces of Iraq.

MATERIALS AND METHODS

A total of 67 stray dogs from 11 localities in Arbil Province were shot with hunting guns. At autopsy, the small intestine was removed and opened in a tray with saline and the mucosa scraped. The contents and scrapings were preserved in 10% formaline and searched for *E. granulosus*. The worms were counted for each dog, preserved in 70% ethanol or 10% formaline and stained with acid carmine. The descriptions of Yamaguti (14), Solusby (15) and Schemidt (16) were used to identify the parasite.

All the dogs were adults but unfortunately it proved impossible to determine the age of any dog examined.

RESULTS

Of the 67 dogs examined in 11 localities of Arbil Province, 53 (79.1%) were found to be infected with *Echinococcus* (Table I). The worms were all identified as

Table I. Prevalence of *Echinococcus granulosus* among stray dogs in Arbil Province

Locality	Number examined		Number infected		Total number infected	% of infection
	Male	Female	Male	Female		
Al-Arab Dist.	2	3	2	3	5	100.0
Al-Askari "	3	3	3	1	4	66.7
Al-Sunaee "	0	5	0	4	4	80.0
Barayiti "	6	4	4	3	7	70.0
Ainkawa "	4	1	4	0	4	80.0
Khangah "	4	2	4	2	6	100.0
Machzara "	3	2	2	2	4	80.0
Muntikawa "	6	1	4	1	5	71.4
7-Nissan "	4	3	3	3	6	85.7
Rezgari "	4	2	3	1	4	66.7
Tairawa "	1	4	1	3	4	80.0
Total	37	30	30	23	53	79.1

Table II. Degree of infection with *Echinococcus granulosus* in 53 infected dogs in 11 localities of Arbil Province

Locality	Total infection	Infections		
		Light (1-200 worms)	Medium (201-1000 worms)	Heavy (>1001 worms)
Al-Arab Dist.	5	2	3	–
Al-Askari "	4	1	1	2
Al-Sunaee "	4	1	–	3
Barayiti "	7	3	–	4
Ainkawa "	4	1	2	1
Khangah "	6	3	–	3
Machzara "	4	1	1	2
Muntikawa "	5	1	2	2
7-Nissan "	6	4	1	1
Rezgari "	4	1	–	3
Tairawa "	4	2	1	1
Total	53	20	11	22

E. granulosus. The highest infection rate recorded was 100% in Al-Arab and Khangah districts. The lowest rate was 66.7% in Rezgari and Al-Askari district.

It can be seen from Table I that 30 of the 37 male dogs (81.1%) and 23 of the 30 female dogs (76.7%) examined were infected with *E. granulosus*.

Overall, 37.7% of the dogs showed a light infection (total *Echinococcus* count up to 200 worms). Medium (201-1,000 worms) and heavy infections (more than 1,000 worms) were seen in 20.8% and 41.5%, respectively (Table II). It can be seen from this table that in six localities, most infections (50-75%) were of a high level. The heaviest burden was detected in 13 dogs (from Al-Arab, Khangah, Ainkawa, Machzara and Tairawa districts), in which 3,000 to 8,000 worms each were counted.

DISCUSSION

An overall incidence of *E. granulosus* of 79.1% in examined dogs confirms that hydatid disease is a serious problem in Arbil Province. The infection rate is much higher than any of those seen in dogs examined in neighboring countries, 23.0% in Kuwait (17), 34.4% in Iran (18), 23-44% in Turkey (19) and 14.0% in Jordan (20). The infection rate recorded in the present survey is, also, higher than any of those recorded in Iraq by Senekji and Beattie (21), Babero et al. (22), Abul-Eis (23) and Tarish et al. (24) which were 18.0%, 34.8%, 52.3% and 25.0%, respectively. This parasite, however, was not detected in three dogs examined by Al-Alousi et al. (25) in Mosul Province in Iraq.

The situation in Arbil Province seems very serious, where 66.7-100.0% of the dogs examined in different localities were found infected with *E. granulosus* and 41.5% of the infected dogs showed heavy worm burden. This high level of infection may be attributed to local animal husbundry practices, such as slaughtering sheep and other intermediate hosts at home and feeding raw offal to dogs. The high rate of infection may also be due to the traditional slaughtering of sheep on special Islamic occations such as Al-Adha Eid (religious festival). Infected viscera are usually thrown away and stray dogs can gain access to them.

Although the infection rate was slightly higher in male dogs than in bitches, the sex of the dogs did not appear to affect the incidence of *E. granulosus*. Similarly, Macpherson et al. (13) in Kenya and Gusbi (26) in Libya reported that the sex of dog did not affect the incidence and intensity of the *E. granulosus* infections.

ACKNOWLEDGEMENTS

We would like to thank the staff in the government of Arbil Province and the police officers for their help in shooting dogs during this survey. We also express our gratitude to the University of Salahaddin for the financial assistance.

REFERENCES

1. Babero, B. B. and Al-Dabagh, M. H. (1963): J. Fac. Med. Baghdad, 5, 149-158.
2. Hassoun, A. S. and Al-Salihi, M. (1973): Iraq. Med. J., 21, 39-51.
3. Niazi, A. D. (1974): Bull. End. Dis., 15, 37-50.
4. Al-Jeboori, T. I. (1976): J. Fac. Med. Baghdad, 18, 67-75.
5. Mahmoud, S. S. and Al-Janabi, B. A. (1981): Indian J. Parasitol., 5, 59-60.
6. Salih, N. E., Hakem, M. N. and Mekhlef, A. F. (1983): J. Egyp. Soc. Parasitol., 13, 501-508.
7. Molan, A. L. and Baban, M. R. (1989): Jpn. J. Parasitol., 38, 57-60.
8. Mahmoud, S. S. (1980): M. Sc. Thesis, University of Mosul, Iraq.
9. Al-Abbassy, S. N., Altaif, K. I., Jawad, A. K. and Al-Saqur, I. M. (1980): Ann. Trop. Med. Parasitol., 74, 185-187.
10. Wajdi, N. and Nassir, J. K. (1983): Ann. Trop. Med. Parasitol., 77, 583-585.
11. Molan, A. L. and Saeed, I. S. (1988): J. Agr. Water Reso. Res., 7, 105-114.
12. Walters, T. M. H. and Clarkson, M. S. (1980): Vet. Parasitol., 7, 185-190.
13. Macpherson, C. N. L., French, C. M., Stevenson, P., Karstad, L. and Arundel, J. H. (1985): Ann. Trop. Med. Parasitol., 79, 51-61.
14. Yamaguti, S. (1961): Systema Helminthium. New York, Inter. Science.
15. Soulsby, E. J. L. (1965): Textbook of Veterinary Clinical Parasitology, Oxford, Blackwell. 120 p.
16. Schemidt, G. D. (1986): Handbook of Tapeworm Identification. CRC. Press Inc., Florida. 675p.
17. Hassonah, O. and Behbhani, K. (1976): J. Helminthol., 50, 65-73.
18. Hoghoughi, N. and Jlayer, T. (1967): Ann. Trop. Med. Parasitol., 61, 437-438.
19. Guralp, N. (1984): A. V. Vet. Fak. Derg., 31, 304-315.
20. Ajlouni, A. Q., Saliba, E. K. and Disi, A. M. (1984): Z. Parasitenk., 70, 23-210.
21. Senekji, H. A. and Beattie, C. P. (1940): Trans. R. Soc. Trop. Med. Hyg., 33, 461-462.
22. Babero, B. B., Al-Dabagh, M. H., Al-Saffar, A. S. and Ali, F. M. (1963): Ann. Trop. Med. Parasitol., 57, 499-510.
23. Abul-Eis, E. S. (1988): M. Sc. Thesis, University of Mosul, Iraq.
24. Tarish, J. H., Al-Abbassy, S. N. and Kadhim, F. S. (1986): Ann. Trop. Med. Parasitol., 80, 329-331.
25. Al-Alousi, T. I., Al-Janabi, B. M. and Hayatee, Z. G. (1980): J. Coll. Vet. Med. Mosul, 1, 5-16.
26. Gusbi, A. M. (1987): Ann. Trop. Med. Parasitol., 81, 29-34.