

Received 11th September 2004. Accepted for publication in final form 23rd October 2004.

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A sero-epidemiologic study on cystic echinococcosis in midwestern region of Turkey

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Cystic echinococcosis (CE) has been recognized as the most important helminth zoonoses. The parasite is distributed extensively in sheep and cattle raising areas of the world. It has great economic and public health significance in developing countries. It threatens both human and animal health and causes significant economic losses. The following are the risk factors of acquiring CE infection: agricultural or stock-raising lifestyle, low socioeconomic status, climate, bad hygiene and illegal or uncontrolled slaughter.^{1,2} The estimated prevalence of CE in our country depends on the data gathered from the Health Ministry records and retrospective evaluation of surgical interventions. In retrospective studies, the prevalence was found to be 0.8 - 2/100,000; however, the prevalence was reported to be higher (example, 291/100,000 - 585/100,000) in limited

number of seroepidemiologic studies. According to other local studies, the prevalence of *Echinococcus granulosus* infection in dogs varies widely between 0.32 - 40% in different areas of Turkey and varies widely with geographical location. The reported prevalence of CE in domestic animals in Turkey ranged from 11.2 - 68.7%. Having shepherd dogs and watchdogs, especially in rural areas leads to a higher prevalence of infection in these areas. These high prevalence in dogs have a great risk for human health.^{1,2} In this study, we aimed to investigate the prevalence of CE in people working in agricultural and stock-raising rural areas of Afyon, Turkey.

A total of 333 (54.5%) females and 278 (45.5%) males, aged 10-85 years (mean 38.8 ± 16.7), who are living in the villages of Bolvadin, Cay, Cobanlar, Hocalar and Kiziloren districts of Afyon, Turkey were enrolled randomly between January - March 2003. The main livelihood of the enrolled patients was agriculture and stock raising. The nature of the study was explained and informed consent was obtained from all patients. Some socio-demographic status (age, gender, education level, job, and others) and having shepherd dog or watchdog, as well as stock-raising participants were noted. Occupation was classified into 3 groups, where other includes officers, laborers, tradesmen, retired employees and students and compared it with the housewife group and farmer group to determine the seropositivity ratio. Stray dogs were also recorded (Table 1). Serum was harvested from blood collected from the peripheral venous vessels. The serums were stored at -40°C. In the collected serum samples, anti-*Echinococcus* antibodies were investigated by Indirect Hemagglutination kit (Fumouze Laboratoires, Fumouze Levallois-Perret, France). The statistical analysis of the collected data was performed by means of Statistical Package for Social Sciences version 10. Statistical significance was tested with the Chi-square test and Fisher's exact test.

Seronegativity was detected in 552 (85.4%) of 611 cases while 89 (14.6%) cases were detected with seropositivity (Table 1). The seropositivity in women (17.7%) was higher than men (10.8%) and this difference was statistically significant (OR: 1.8, CI 95%: 1.1-2.8, $p=0.016$). When education level was examined, it was determined that 118 (19.3%) of participants were illiterate, 9 of them were bachelors and no statistically significant difference was found between seropositivity and education level ($p=0.542$) (Table 1). Among the participants the rate of having a shepherd dog or watchdog was 72% and the rate of dogs living in certain places was 30.6%. It was also determined that the

seropositivity of patients not having any dogs by 17.5% rate was higher than people having shepherd dog or watchdog (13.4%), but the difference was not statistically significant ($p=0.193$). It was noticed that 406 (66.4%) participants had active relation in stock-raising but 205 (33.6%) were not. But, not statistically significant difference was found between these groups in regards to seropositivity of CE ($p=0.782$) (Table 1). For occupation however, it was found that 319 (52.2%) of participants were housewives, 190 (31.1%) of them were farmers and 102 (16.7%) of them were in "others" group. In these groups, the seropositivity was detected in 54 (16.9%), 28 (14.8%) and 7 (6.9%) people. There was no statistically significant difference between farmers and housewives with respect to seropositivity ($p=0.515$). But when the group of "others" was compared with the group of farmers and housewives, statistically significant difference was found and the results were given in Table 1.

Table 1 - Socio-demographic data and seropositivity in subgroups of participations.

Variables	Prevalence	N (base)	Odds ratio	95% CI	p value
Sex					0.016
Male	10.8	278	1		
Female	17.7	333	1.8	1.1 - 2.8	
Education					0.542
Illiterate	17.8	118	1		
Primary school	13.8	435	0.7	0.4 - 1.3	0.275*
Secondary school and College degree	13.8	58	0.7	0.3 - 1.8	0.501†
Having a dog					0.193
No	17.5	171	1		
Yes	13.4	440	0.7	0.4 - 1.2	
Livestock fattening					0.782
No	15.1	205	1		
Yes	14.3	406	0.9	0.6 - 1.5	
Occupation					0.043
Housewife	16.9	319	1		
Farmer	14.7	190	0.8	0.5 - 1.4	0.515
Others	6.9	102	0.4	0.2 - 0.8	0.012**

*Farmer with others (odds ratio = 0.4, confidence interval [CI] 95%; 0.2-1.1, $p=0.048$). †Illiterate with primary school, ‡illiterate with secondary school and graduated college, §Housewife with farmer, **housewife with others.

The incidence of CE has been reported as 11.4 % in the risk group in a sero-epidemiologic study carried out in a rural agricultural area of Jordan. It was also found that the incidence of CE ratio in males and females were equally likely to be seropositive.³ Todovo and Boeva⁴ expressed it as 3.1/100,000 in Bulgaria. In sero-epidemiologic study of Altintas et al.,⁵ the rate of echinococcosis over population was given 291/100,000. In our study, for people living in villages and whose livelihood was agriculture and stock raising, high seropositivity rate was detected as 14.6% (14,566/100,000).

In conclusion, we found a high prevalence of CE in the studied rural areas. It was suggested that the risk factors we identified earlier in our study should be recognized and measures should be undertaken to decrease the prevalence of CE, which is a public healthcare problem in rural areas.

Received 4th August 2004. Accepted for publication in final form 17th October 2004.

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