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Hydatid Disease in the Central Region of Iran: A 5-year Epidemiological and Clinical Overview

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Abstract

Introduction: Hydatid cyst is caused by an infection by the larval stage of *Echinococcus granulosus*. Patients with cystic echinococcosis often remain asymptomatic until the hydatid cysts grow large enough to cause symptoms and signs. The cysts grow in the course of several years before reaching maturity and the rate of growth depends on the location of the cyst.

Methods: This study was conducted in the Central region of Iran and involved all patients diagnosed with hydatid disease from 2012 to 2016 with the records identifed from 10 centers for disease control. Descriptive statistics including range and percentage were used in analyzing the patient characteristics.

Results: Hydatid disease was confirmed in 84 cases. The mean age of patients was (23.1±5.1) years (range: 15-53 years) and 55.9% of cases were female. Single organ involvement was found in 86.9% of cases. 98.8% cases were successfully treated. The most common sites of infection were lung (42.9%), followed by liver (38.1%), and joint liver/lung (10.7%). The diagnosis was established by abdominal ultrasound, abdominal CT, and serology in all patients. The diagnosis was confirmed by histology in 80 (95.2%) of cases. All of cases were treated with albendazole, and 80 (95.2%) of cases had surgical intervention. The prevalence of human hydatidosis in our study was 1.16 per 100,000 population.

Conclusions: Hydatid disease is common in Iran and should be a focus of public health interventions. The organ sites affected in this study include lung and liver.

Keywords: *Echinococcus granulosus; Epidemiology; Hydatid disease*

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Research

Introduction

Echinococcosis is an infestation with a tapeworm of the genus *Echinococcus*[1]. Echinococcosis has been recognized since 1950 as a public health problem. Echinococcosis is included in the list of 17 neglected tropical diseases and in the list of priority neglected zoonotic diseases for which WHO advocates concerted control efforts. The vision of controlling, eliminating, and eradicating neglected tropical diseases has gathered momentum in recent years. Interventions in selected countries of Central Asia, North Africa, and Latin America for the control and elimination of the echinococcosis as a public health problem will be scaled up by 2020[2]. Echinococcosis is an important socioeconomic and public health problem in many areas of the world. Iran is known as one of the endemic regions of *E. granulosus* with high rates of infection, especially in rural communities. Three known species of *Echino-*

Variable	Subgroup	Males (n=37)	Females (n=47)	*P*-value *
Location	Urban	14(37.8%)	19(40.4%)	0.809
	Rural	23(62.2%)	28(59.6%)	
Age group	0–20	10(27%)	11(23.4%)	0.772
	21–40	20(54.1%)	29(61.7%)	
	>40	7(18.9%)	7(14.9%)	
Occupation	Farmer	12(32.4%)	14(29.8%)	0.003
	Housekeeper	3(8.2%)	18(38.3%)	
	Herdsman	14(37.8%)	5(10.6%)	
	other	8(21.6%)	10(21.3%)	
Organ involvement	liver	14(37.8%)	18(38.3%)	0.452
	lung	15(40.5%)	21(44.7%)	
	Liver + lung	3(8.2%)	6(12.7%)	
	Other organs	5(13.5%)	2(4.3%)	

*Statistical analysis was performed using Chi-square.

Table 1. Comparison of demographic characteristics of cases with hydatid cyst by sex in the Central region of Iran

coccus are of medical importance in humans. These are *E. granulosus*, causing cystic echinococcosis (CE), *E. multilocularis* causing alveolar echinococcosis (AE), and *E. vogeli*. *Echinococcus granulosus* is the most prevalent form of these; *E. multilocularis* is rare but virulent, while *E. vogeli* is the rarest. The humans are an accidental intermediate host in echinococcosis by eggs ingestion. The eggs then release oncospheres in the small intestine where oncospheres migrate through the circulatory system and produce hydatid cysts in the liver, lungs, muscles, and other organs[3]. The endemic areas are South America, New Zealand, southern parts of Africa, Middle East, Iceland, Australia, and Central Asia[4-6]. The overall incidence of cystic echinococcosis in endemic areas ranges from 1-220 cases per 100,000 population, while the incidence of alveolar echinococcosis ranges from 0.03-1.2 cases per 100,000 population. The hydatid disease has the capability of infecting individuals of different races equally and its incidence does not vary between females and males[7]. All common complications of hydatid disease are related to the enlargement of cyst and complications of surgical procedure[8].

Patients with hydatid disease are asymptomatic until hydatid cysts are sufficiently large to cause discomfort. The cysts grow in the course of several years before reaching maturity and the rate of growth depends on the location of the cyst. The hydatid cysts are commonly found in the liver and lungs but can also appear in any organ, including heart, bone, spleen, kidneys, and central nervous system. Rupture of the cyst is frequently caused by trauma and may cause mild to severe anaphylactic reactions and sometimes death[9-11]. There is a lack of information on the prevalence, epidemiology and clinical patterns of human hydatidosis in most provinces of Iran. Therefore, this retrospective study was conducted to determine the prevalence and to describe the clinical findings and outcomes of human hydatidosis in the Central region of Iran.

Methods

This study was conducted in the Central province of Iran and involved all patients diagnosed with hydatid disease from 2012 to 2016. All cases were identified by retrospective review of hospital records. Data on cases were obtained from registries in ten centers for diseases control of the central province of Iran, which has about 1,500,000 people, with about 23% of those

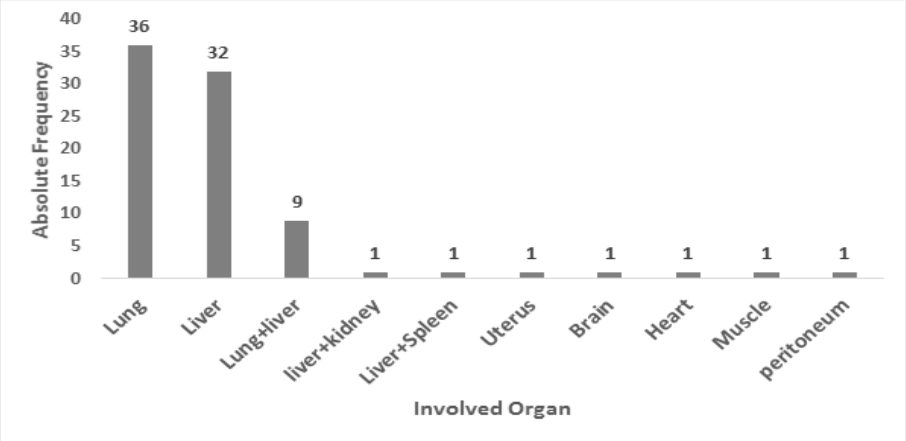

Figure 1. Absolute frequency of organ involvement in cases with hydatid cyst

residing in rural areas. Demographic data, clinical presentation, treatment received, and outcomes were extracted. The data were analyzed using SPSS 18 software (SPSS, Inc., Chicago, IL, US) using simple descriptive statistics. Chi-square test was also used, and all statistical analyses were performed at 0.05 significance levels. This study was given ethical approval by the medical research committee at Arak University of Medical Sciences (IR.ARAKMU.REC.1394.273).

Results

Hydatid disease was confirmed in 84 cases. The mean age of cases was (23.1±5.1) years (range: 15-53 years) and 55.9% of cases were female, with the majority residing in rural areas. Single organ involvement was found in 86.9% of cases. The most common sites of infection were lung 42.9%, followed by liver 38.1%, and joint liver/lung 10.7% (Figure 1). The diagnosis was established by abdominal ultrasound, abdominal computerized tomography, and serology in all patients. The majority of cases were found in the age group of 21-30 years. There were no significant differences between males and females in regards to location, age group, and organ involvement, except for occupation where 37.8% of infected males were herdsmen and 38.3% of infected women were housekeepers (p=0.003) (Table 1).

The diagnosis was confirmed by histology in 95.2% of cases. The prevalence of human hydatidosis in the Central region was 1.16 per 100,000 population. The prevalence of human hydatidosis in rural area was 2.96 per 100,000 population; while it was 0.57 per 100,000 ($P < 0.001$) in the urban area. All patients were treated with albendazole, and 95.2% patients received surgical intervention. Duration of albendazole therapy was 104.5±36.1 days (range: 28-180 days) and 98.8% cases were successfully treated. Lung cyst in one patient (1.2%) was ruptured and the patient died due to the anaphylactic reaction.

For the diagnosis of the cyst, CT scan and ultrasonography were performed and revealed that 38.1% of cysts were ≥10 cm. The chief complaint in 46.4% was abdominal pain. Other complains were abdominal mass in 7.1%, dyspnea in 21.4%, icterus in 4.8%, chest pain in 6%, dyspepsia in 3.6%, cough in 13.1%, heart pain in 1.2%, and headache in 1.2% of cases. Nine patients (10.7%), had complicated hydatid cyst including rupture,

infection, and obstruction. The most frequent site of complication was liver.

Discussion

In the present study, a total of 84 human hydatidosis cases were studied. Females were found to have a higher infection rate of hydatid cyst (55.9%) than males (44.1%). The prevalence of human hydatidosis in the Central region was 1.16 per 100,000 population. The prevalence of human hydatidosis in rural area was 2.96 per 100,000 population and in urban area was 0.57 ($P < 0.0001$). Although progress has been made in some regions, substantial effort is still required to move cystic echinococcosis and alveolar echinococcosis forward, to mitigate the burden of these diseases. Interventions should be tailored to each target area or region and take advantage of new tools for diagnosis and control of the disease.

The actual incidence of human hydatidosis in Iran is not precisely known. Hydatidosis must be considered as a public health problem in Iran because of its endemicity in our country[12, 13]. According to the results of our study, females were found to have a higher infection rate of hydatid cyst than males but the differences is not significant (55.9% versus 44.1% $P = 0.127$). This finding is similar to other reports on hydatid cyst in Iran[14-16] and consistent with other reports from other endemic countries in the Middle East[17, 18]. The rate of infection with hydatid cyst in any given group is determined by local customs involving contact with vegetables and soil that is contaminated with dogs' feces and its rate is relatively higher in women[19]. Hydatid disease is generally considered to be a female's rural disease, seemingly because Iranian women, especially in rural areas, have more contacts with domestic animals and infected products. They also have more frequent contact with unwashed raw vegetables, which may have higher contamination level with Echinococcus eggs. Although different organs were affected by hydatid cyst, only 13.1% of cases had multi organs infections with most of them being hepatopulmonary infection. These results are consistent with other published reports[20]. The age of cases ranged from 15 to 53 years and the highest rate of infection and complications were in patients of 20-30 years of age. In some studies, the peak incidence of hydatid cyst in Iran was between 20 - 40 years old, since this age group has the most contact with livestock. On the other hand, original infection might have occurred in childhood, as hydatid cysts grow very slowly[21]. Clinical examination revealed that abdominal pain was the most common complaint and was present in 46.4% of the cases. Other most common complaints were dyspnea, cough, abdominal mass, chest pain, icterus, dyspepsia, heart pain, and headache, which was similar to previously studies from Iran[22]. The prevalence rate of human hydatidosis in Iran was reported to be 0.61-2 per 100,000 population[13] and in our study, the prevalence of human hydatidosis in Central Province was 1.16 per 100,000 population.

Surveillance data is fundamental in order to show the burden of disease and to evaluate progress and success of control programs. However, as with other neglected diseases which are affecting underserved population and remote areas data are scarce and more resources are required for the disease control programs. This study might potentially serve as baseline data for monitoring future changing trends of this infection, and thus may help us to design strategies and programs for hydatid disease control.

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