

Original Article

## Pattern of Human Hydatid Cyst in the Province of Yazd, Iran (2006-2011)

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### ABSTRACT

#### Article history

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#### Key words

Echinococcus granulosus

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**Background and Aims:** Hydatidosis is a major health problem caused by larva stage of cestodes belonging to the genus *Echinococcus granulosus* with a cosmopolitan distribution. Zoonoses have a mountain side distribution in Iran. *Echinococcus granulosus* takes places in two models; sylvatic and domestic. Both life-cycles are present in Iran and human is considered as an afferent host. The prevalence rate of hydatidosis is different, ranging from 1-220 cases in 100000 individuals and mortality rate of hydatidosis up to 2-4%. The aim of the present study was to explore the frequency of human hydatid cyst in Yazd province, Iran from 2006 to 2011.

**Materials and Methods:** This is a retrospective study applied through census for five years which investigated all of the profiles concerned with surgeries.

**Results:** A total of 26911 surgeries were performed on individuals for five years; 12 cases (0.045%) were infected with hydatid cyst out of which 9 cases (75%) were affected through liver, 1 case (33.34%) through pulmonary, 1 case (33.33%) through intestine and 1 case (33.33%) through cerebellum. 50% of the infected individuals were females. Morbidity age was 8-69 years, 7(66.67%) cases who were infected with *Echinococcus granulosus* were natives and 5 cases (33.33%) were non-natives. Among non-native individuals 2 cases were foreigners.

**Conclusions:** Yazd province is a dry area and the desert cycle of *Echinococcus granulosus* is present in it. Jackals and wolves act as final hosts and goats and camels are the intermediated hosts. Based on the findings compared with those in other areas, the prevalence rate in these areas are similar requiring more control in using water, beverages, fruits and vegetables.

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## Introduction

Human Hydatidosis is a parasitic disease caused by eucestode of the genus *Echinococcus*. The two most important forms of the disease in human are cystic and alveolar hydatidosis. Humans are infected through ingestion of parasite eggs in contaminated food, water, soil, or through direct contact with animal hosts. Hydatidosis is often complicated to treat and may require extensive surgery and prolonged drug therapy. Prevention programmes involve deworming of dogs, improved slaughterhouse hygiene, and public education campaigns; vaccination of lambs is currently being evaluated as an additional intervention. It is estimated that more than 1 million people are affected with hydatidosis at any one time. World health organization is working towards the validation of effective cystic echinococcosis control strategies by 2018 [1]. Hydatidosis is endemic in Iran so it must be considered as a dilemma. In the Iranian desert areas, its life-cycle circulates between foxes and jackals with goats and camels but humans act as aberrant hosts for it [2]. *Echinococcus granulosus* is a cestodes parasite, which causes a zoonotic disease, known as echinococcosis or hydatid disease. "The larval stage (hydatid cyst) infects both livestock such as herbivores and humans whereas it is found in the small intestine of the carnivores (mainly canines)" [3,4]. Protoscoleces are derived from the germinal layer of hydatid cyst, which if ingested by carnivores, develop into worms in the small intestine [5, 6]. Dog and other carnivores have

faeces containing eggs that produce hydatidosis [7, 8]. Eggs may be eaten by herbivores or humans thus inducing the disease. Hatch releasing larvae invade the intestinal wall and evolve to hydatid cysts [9, 10]. However, studies have been conducted many years ago in Iran. The rate of infection with *Echinococcus granulosus* in stray dogs shows a prevalence of 5% to 49% in different parts of Iran. This is followed by sheep with 88% fertilized cysts, camel with 70%, and cattle with 19% as the weakest intermediate host of *Echinococcus granulosus* respectively. Cystic is considered endemic in the entire Mediterranean zone including all countries from the Middle East, but alveolar echinococcosis is less prevalent and has been reported only from Iran, Turkey, Iraq and Tunisia [11]. There is no statistics available about wild carnivores particularly jackals. In the present study, we made an attempt to estimate the pattern of human hydatid cyst in the province of Yazd, Iran from 2006 to 2011.

## Materials and Methods

The present retrospective study was conducted to indicate the prevalence of human hydatidosis in the province of Yazd, Iran. Therefore, all the patients who had been hospitalized and undergone surgery from 2006 to 2011 and documented in Yazd Central Health Services were carefully studied and reported. In general, the Central Health Service is located in the city of Yazd and physicians work in different clinics or

hospitals of the Center. Collection of information through Questionnaire was performed by the health service workers. It is important to note that the medical part of our work is limited to the registration of the human cases and the collection of cyst samples for biological investigations. The logistic, technical and management problems raised by medical studies led us to wait for epidemiological and biological results that could be used to validate a serological test.

## Results

A total of 26911 surgeries were performed on individuals for five years; 12 cases (0.045%) were infected with hydatid cyst out of which 9 cases (75%) were affected through liver, 1 case (33.34%) through pulmonary, 1 case (33.33%) through intestine and 1 case

(33.33%) through cerebellum. 50% of the infected individuals were females and 50% were males. Morbidity age was 8-69 year old, 7(66.67%) cases who were infected with *Echinococcus granulosus* were natives and 5 cases (33.33%) were non-natives. Among non-native individuals 2 cases were foreigners.

According to the results, the organ with the highest rate of infection was liver having *Echinococcus granulosus* with 9 cases (75%), the lowest rate with *Echinococcus granulosus* was related to pulmonary, intestine and cerebellum 1 cases (33.33%) and the difference was significant ( $P > 0.05$ ). In terms of gender, the highest rate of infection was observed in males with 8 cases (66.67%), the lowest rate was related to females with 4 cases (33.33%) and difference was significant ( $P > 0.05$ ). The results are shown in table 1.

**Table 1.** Distribution of cases of hydatid cyst surgery in patients infected according to organ and sex

Organ/ Genus	Liver		Pulmonary		Intestine		Cerebellum	
	No.	%	No.	%	No.	%	No.	%
Male	6	50	1	33.34	0	0	1	33.33
Female	3	25	0	0	1	33.33	0	0
Total	9	75	1	33.34	1	33.33	1	33.33

Fifty percent of the infected individuals were females and 50% were males. The most frequent age was 8-28 and 49-69 years

representing 33.32%, followed by 29-48 and 69-88 years representing 08.34% (Table. 2).

**Table 2.** Distribution of cases of hydatid cyst surgery in Infected Patients according sex & age

Sex	Male	Female	Total	%
Age				
08-28	2	2	4	33.32
29-48	1	0	1	08.34
49-68	1	3	4	33.32
69-88	2	1	3	24.99
Total	6	6	12	100

Seven (66.67%) cases who were infected with *Echinococcus granulosus* were natives and 5 cases (33.33%) were non-natives. Among non-natives individuals 2 cases were foreigners.

## Discussion

Although different organs of the body were involved with hydatid cyst, liver was the most affected organ followed by the lungs. The predominance of liver and lung localization of hydatid cyst found in the present study is in line with findings of other studies [12, 13]. Lung is the second most common involved organ but in children it is the most common site. In the present study, lung was recorded to be infected more commonly in the cases younger than 10 years of age. The involvement of the lung being common in children has also been reported in other studies carried out in other endemic regions [14-16]. Although prevalence of human cases has been decreased in comparison with a decade ago, a new study conducted here shows that the incidence of human hydatidosis in 2002 as 72/10,000 has decreased to % 0.54 in 2006 and hydatidosis must be considered as a dilemma in Iran in terms of health policy. Because of its endemicity in the country, improving sanitation, health education, increasing the people knowledge regarding public health and improving the mechanism of the slaughterhouses present in many cities must be considered as the most important strategies in this regard [12]. A major part of the study on hydatid cyst

emphases on antigenic characteristics for diagnosis, structure, epidemiology aspect and treatment and but there is little knowledge about composition of hydatid cyst fluid and determining genotypic variation in *Echinococcus granulosus* in Iran [17]. Surgical removal of cysts/cystic masses, cyst drainage or organ, are the main form of treatment, often supported by high dose albendazole cover; the latter also has a benefit in medically-only treated cases [18]. Most previous studies showed: that the most common sites of disease are the liver (approximately 70%), the lungs (15%–47%), while the kidney (2-4%), bones and brain are less to be involved. Reports indicate very rare incidence of the disease in other sites such as the heart, spleen, pancreas and muscles. Simultaneous involvement of two organs is about 5-13% of cases [19]. The splenic involvement in hydatid disease is uncommon, representing less than 2- 6% of all human infestations by *Echinococcus*. The infestation of the spleen usually occurs either by arterial route through the hepatic and pulmonary filters or retrograde venous route in portal hypertension. Thus, hydatid cysts in spleen may occur as a part of disseminated disease or may be isolated. Because of the rarity of splenic hydatid disease, the probable concomitance of the liver and splenic hydatid cysts should be taken into consideration by clinicians, especially in nonendemic areas [20].

## Conclusion

Although *Echinococcus granulosus* has been designed on elimination program in Iran, for its importance in causing space-occupying lesions as well as suffering that depends on the location of the cyst in the body, and other infectious disorders which are not being negligible, it must draw attention of the authorities to itself. Hydatidosis must be considered as a dilemma in Iran in terms of health policy for its endemicity although the

rate of human and animal cases is decreasing in comparison with a decade ago.

## Conflict of Interest

The authors report no conflicts of interest.

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## References

- [1]. WHO, Fact sheet N°377, Updated March 2014.
- [2]. Anvari MH, Moubedi I, Masoud J, Mansourian A. Cameles camelu sdromed arius as intermediate host of *Echinococcus granulosus* in the central region of Iran, Journal of Shahid Sadoughi University of medical sciences 2001; 8(4):74-79.
- [3]. Peter MS. Progress in diagnosis, treatment and elimination of echinococcosis and cysticercoids'. Parasitol Int. 2006; 55:7-13.
- [4]. Stamatelos MC, Sargedi CH, Stefanaki C, Stefanaki Ch, Safioleas C, Matthaiopoulou I, Safioleas M. Anthelminthic treatment: An adjuvant therapeutic strategy against *Echinococcus granulosus*. Parasitol Int. 2009; 58(2):115-20.
- [5]. Yang YR, Rosenzvit MC, Zhang LH, Zhang JZ, McManus DP. Molecular study of *Echinococcus* in west-central china. Parasitology 2005; 131:547-55.
- [6]. Yasuhito S, Minoru N, Kazuhiro N, Hiroshi Y, Akira I. Recombinant antigens for serodiagnosis of cysticercoids' and echinococcosis. Parasitol Int. 2006; 55: 69-73.
- [7]. Arene EO. Prevalence of hydatidosis in domestic livestock in the Niger. Delta. Trop Anim Health Prod. 1985; 17:3-4.
- [8]. Ekert J, Gemmel MA, Matays Z, Soulsby JL. Directive pour la surveillance et la prévention de l'échinococcose/ hydatidosis et la lutte contre ces maladies. Genève: OMS ; 1984.
- [9]. David H, Wen Y, Tiaoying L, Yongfu X, Xingwang CH, Yan H, et al. Control of hydatidosis. Parasitol Int. 2006; 55: 247-52.
- [10]. Torgerson PR, Heath DD. Transmission dynamics and control options for *Echinococcus granulosus*. Parasitology 2003; 127:143-58.
- [11]. Hadighi R, Mirhadi F, Rokni M. Evaluation of a dot-ELISA for the serodiagnosis of human hydatid disease. Pak J Med Sci. 2003; 19(4):268-71.
- [12]. Shiryazdi SM, Mirshamsi MH, Hosseini B, Ebadi M. Cases of the hydatid cyst that were operated upon in Yazd. Journal of Shahid Sadoughi University of Medical Sciences and Health Services 2000; 1(8):25-30.
- [13]. Larrieu EJ, Frider B. Human cystic echinococcosis: contributions to the natural history of the disease. Ann Trop Med Parasitol. 2001; 95(7):679-87.
- [14]. Pezeshki A, Kia EB, Gholizadeh A, Koozhare A. An analysis of hydatid cyst surgeries in Tehran Milad Hospital, Iran, during 2001-2004. Pakistan Journal of Medical Sciences 2007; 23(1): 138-40.
- [15]. Ahmadi NA, Hamidi MA. Retrospective analysis of human cystic echinococcosis in Hamedan province, an endemic region of Iran. Ann Trop Med Parasitol. 2008; 102:603-609.
- [16]. Rokni MB. Echinococcosis /hydatidosis in Iran, Iranian Journal of Parasitology 2009; 4(2):1-16
- [17]. Rostaminejad M, Nazemalhosseini Mojarad E, Norouzina M, Fasihi Harandi M. Echinococcosis: based on molecular studies in Iran, Gastroenterology and Herpetology From Bed to Bench 2010; 3(4):169-76.

- [18]. World Health Organization. International classification of ultrasound images in cystic echinococcosis for application in clinical and field epidemiological settings. In: PAIR, an option for the treatment of cystic echinococcosis. WHO, Geneva, 2001.
- [19]. Malik AA, ul Bari S, Younis M, Wani KA, Rather AA. Primary splenic hydatidosis. *Indian J Gastroenterol.*2011; 30(4):175-77.
- [20]. Jabbari Nooghabi A, Raoufian K, Motie MR. Concomitant Splenic and Hepatic Hydatidosis: Report of Two Cases and Review of the Literature. *Acta Med Iran.* 2015; 53( 1):74-77.