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**CASRP PUBLISHER**

International Journal of Advanced Biological  
and Biomedical Research 3(4) (2015) 320–325

doi: 10.18869/IJABBR.2015.320



Original Article

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# Human Cystic Echinococcosis in Lorestan province, Southwest Iran: A retrospective epidemiological study of surgical cases during a 10 years period (2005-2014)

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Received 11 November 2015

iThenticate screening 15 November 15

Accepted 12 December 2015

English editing 10 December 2015

Available online 18 December 2015

Quality control 14 December 2015

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## Abstract

The aim of this study was to determine the prevalence of hydatidosis in Lorestan province during a 10 year period (2005-2014). We surveyed medical records of infected patients with hydatid cyst who had been operated in referral hospitals of Lorestan province, Iran. Several parameters were analyzed including age, gender, place of residency, hospitalization time, and the location of cysts. Cystic Echinococcosis (CE) affected more males 114 (52.52%) than females 84 (47.47%). The age of the patients ranged from 3 to 76 years, and the age group 20–30 years (27%) was the most affected. Cysts were localized in liver and lung in 62.63% and 37.37% of cases respectively and unusual cyst locations in kidneys, brain, pelvic area, spleen and spine was not observed. The average hospitalization time was 7 days. The distribution of residence in patients showed 124 (62.63%) of them to have urban origin and 74 (37.37%) were rural residents. Significant relationships were found between gender and cyst location, and place of residency and cyst location ( $p < 0.05$ ). Single organ involvement was found in 80% of the patients, and was more common in males (51.25%) than in females (48.75%). Farmers had the highest rate of infection (19.19%) followed by students with 18.69%. Because of the growing trend of hydatid cyst operation in Lorestan province, which may be due to many different reasons further studies are needed for evaluation of economic burden and risk factors for CE in this region.

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**Keywords:** Echinococcosis, Epidemiology, Lorestan, Iran.

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## 1. Introduction

Hydatidosis or Cystic Echinococcosis (CE) is a zoonotic disease caused by larval stage of the genus *Echinococcus*. The habitat of the worm is in the intestine of some of the carnivores including candies. Hydatidosis is common in areas with continuous contact between humans and certain carnivores, such as dogs and some ungulates including sheep. The disease is endemic in many parts of the world, particularly the Mediterranean countries, the Middle East (including Iran), South America, Africa, New Zealand, Russian Federation, Central Asia, and Australia (Harlaftis et al., 2005; Kavukçu et al., 2006; Burgos et al., 1999). Average prevalence rates of 24.41%, 8.51%, 18.89%, and 35.76% have been reported in sheep, goat, cattle, and buffalos, respectively (Rokni, 2009) A study showed that the prevalence of CE in camels was 35.21% (233/661) (Ahmadi, 2005).

In Iran *E. granulosus* and *E. multilocularis* are two causative agents of human hydatidosis (Rokni, 2009). Alveolar echinococcosis is less prevalent around the world and has been reported only from Iran, Turkey, Iraq and Tunisia (Sadjjadi, 2006). Hydatidosis is responsible for approximately 1% of admission to surgical wards (Lotfi, 1992). Based on the number of operated hydatid cysts in Iran, it is estimated that during 1985-2004 the rate of disease was about 4.8 per hundred thousand people. It might be an underestimate of the real prevalence of the infection, due to the weakness of statistical systems at the country; this estimation should be assumed as the lowest rate of infection (Yousefi, 2008). On the other hand, seroprevalence of disease in different parts of the country has been reported as 4.42% (Yousefi, 2008).

Careful study of retrospective hospital records provides a useful tool to evaluate the regional epidemiological situation of the disease (Pierangeli et al., 2007; Ahmadi and Hamidi, 2008). However, from Lorestan province (Southwest of Iran), there is no figure available at international level concerning the human CE in university medical centers. Therefore, this retrospective study was undertaken to study epidemiological and some clinical characteristics of Hydatidosis treated surgically at university medical centers in Lorestan over a 10-year period.

## 2. Materials and methods

### 2.1. Study area

Lorestan province is located in the southwest of Iran, bordering with the states of Markazi, Hamedan, Kermanshah, Khuzestan, Ilam, and Isfahan. The estimated population of Lorestan is 1,754,243. The district covers an area of approximately 28,294 km<sup>2</sup> [Figure 1]. The province comprises of 11 counties (Azna, Aligudarz, Borujerd,

Pol-Dokhtar, Khorram-Abad, Dorud, Dure-Chegeni, Delfan (Nur-Abad), Selsele (Aleshtar), Kuhdasht, Rumeshkan), 29 districts, and 85 habitations. (Source: [http://amar.sci.org.ir/index\\_e.aspx](http://amar.sci.org.ir/index_e.aspx)).

## 2.2. Collection of records of hydatid cyst patients

All the cases that were referred to Shohada Ashayer and Shahid Rahimi hospitals of Khorram Abad (as a referral center) with diagnosis of echinococcosis and underwent surgery for hydatid cyst between October 2005 and November 2014 were included. People from different parts of the province are mostly referred to these hospitals for surgery. Information including demographic data, organ involvement, morbidity and mortality, relapse and days of hospitalization were collected from medical records of CE patients.

## 2.3. Statistical analysis

All statistical analyses were carried out using SPSS for windows version 11.5 Statistical evaluation was performed by Chi square test and  $P < 0.05$  was considered significant.

## 2.4. Ethical consideration

Approval of the study protocol was obtained from the Ethical Review Board of Lorestan University of Medical Sciences. Written informed consent was obtained from all the study participants or their parents/guardians.

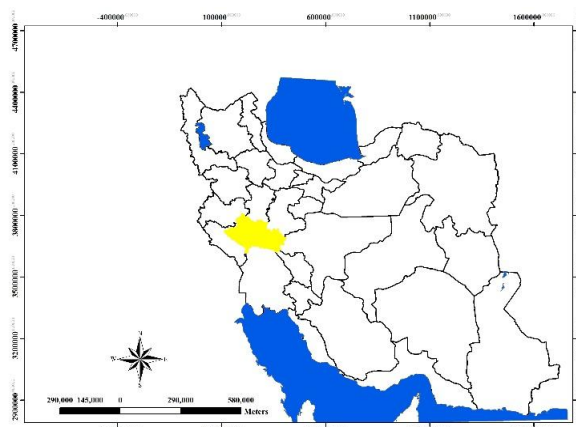


Fig. 1. Location of Lorestan province within Iran.

## 3. Results

Overall, 198 cases were operated for CE during the 10 year period in Lorestan referral hospitals. From these cases, 114(52.52%) were male and 84(47.47%) were female. Age and gender distribution pertaining to 198 confirmed cases of human CE and the male/female ratio by age groups are shown in Table 1. The youngest patient operated was 3 years old and the oldest was 76 years old age. Age group 20-30 years was the most affected and represented 27.27% of the total number of cases. An overall analysis of gender and age of the CE cases revealed that the number of males infected was higher than that of females with a 1.11 male to female ratio (Table 1). The lowest number ( $n=2$ ) of operation recorded in 2003 and 2007 and the highest number ( $n=40$ ) of operation recorded in 2012; Additional, the average number of operated cysts per year was 19.8.

The distribution of residence in patients showed 124(62.63%) of them having urban origin and 74 (37.37%) were rural residents. Additional, farmers had the highest rate of infection (19.19%) followed by students (18.69%), jobholders (16.16%) and laborers (14.14%).

In this study, the involvement of liver (62.63%) was the most frequent, followed by the lung (37.37%). Unusual cyst locations in kidneys, brain, pelvic area, spleen and spine was not observed. Significant relationships were found between gender and cyst location, and place of residency and cyst location ( $p < 0.05$ ). On the other hand there was no relationship between age and cyst location ( $p = 0.07$ ).

In present study, single organ involvement was found in 80% of the patients, and was more common in males (51.25%) than in females (48.75%). The age group distribution of the patients with liver or lung cysts is shown in Table 2. The ratio of hepatic hydatidosis to pulmonary hydatidosis was about 1.64.

In this study, 98% of patients didn't have any complications after the surgery; and only 1% of them had recurrent hydatidosis. The average hospitalization time was 7 days.

**Table 1**

Age and gender distribution of surgically confirmed cystic Echinococcosis cases at referral hospitals of Lorestan province, Iran (2005-2014).

Age group	Number and (%) of cases			Male/Female ratio
	Male	Female	Total	
0-10	10 (5.05)	2 (1.01)	12 (6.06)	5
10-20	8 (4.04)	4 (2.02)	12 (6.06)	2
20-30	26 (13.13)	28 (14.14)	54 (27.27)	0/93
30-40	26 (13.13)	8 (4.04)	34 (17.17)	3.25
40-50	8 (4.04)	18 (9.09)	26 (13)	0.44
50-60	16 (8.08)	12 (6.06)	28 (14.14)	1.33
60-70	0 (0.0)	20 (10.10)	20 (10.10)	0.0
>70	10 (5.05)	2 (1.01)	12 (6.06)	4
Total	104 (52.52)	94 (47.47)	198 (100)	1.11

**Table 2**

Distribution of surgically confirmed CE cases based on age groups and site of Cysts in Lorestan province, Iran (2005-2014).

Involved organ	Liver			Lung			Liver/Lung ratio
	Male	Female	Total	Male	Female	Total	
Age group							
0-10	6	0	6	4	2	6	1
10-20	1	3	4	7	1	8	0.5
20-30	15	19	34	11	9	20	1.7
30-40	16	6	22	10	2	12	1.83
40-50	5	5	10	3	13	16	0.63
50-60	9	9	18	7	3	10	1.8
60-70	0	20	20	0.0	0.0	0.0	--
>70	8	2	10	2	0	2	5
Total	60	64	124	44	30	74	1.64

#### 4. Discussion

Echinococcosis is an important disease and a neglected public health problem, especially in rural communities of Iran. The existence of very young children with hydatidosis and the new cases registered every year show that the disease is being actively transmitted in this country (Mohammadzadeh Hajipirloo et al., 2013).

In the present study, 52.52% of patients were male. This rate has been reported as 44.3% in Kermanshah (Hamzavi et al., 2011), 46.7% in West Azerbaijan (Mohammadzadeh Hajipirloo et al., 2013), 44.1% in Hamedan (Ahmadi & Hamidi, 2008), 42.5% in East Azerbaijan (Vahedi & Vahedi, 2012) and 50.8% in Turkey (Gulsun et al., 2010). Equal involvement of men and women in this area can be attributed to this fact that both of men and women work because of difficult living conditions.

In the current survey, most of the CE patients were 20-30 years. Similar observations have been made elsewhere in Hamedan, West Azerbaijan, Tehran, Jordan, and Argentina (Vahedi and Vahedi, 2012; Mohammadzadeh Hajipirloo et al., 2013; Pezeshki et al., 2007; Pierangeli et al., 2007). The high rate of surgeries for CE in people who are in the age group 20-40 years old can be explained by the chronic nature of this disease; In other words, hydatid cyst grows very slowly in human when compared to animals. It takes years for a hydatid cyst to bring on the clinical disease in human host.

Our study showed that 62.63% of patients were from urban areas and 37.37% from rural areas, this finding is in contrast with the results of other studies (Mohammadzadeh Hajipirloo et al., 2013). This matter may be the

result of more consumption of vegetables, and more contact with domestic herbivorous animals (sheep, cattle, etc.) and dogs in urban patients in Lorestan.

The most affected organ was liver (62.63%) in both males and females. This observation is consistent with reports from several other studies, in Hamedan (Ahmadi & Hamidi, 2008), Tehran (Pezeshki et al., 2007), Yasuj (Sarkari et al., 2010), Arbil province of Iraq (Saeed et al., 2000), and Kyrgystan (Torgerson et al., 2003).

In present study, Lung involvement was observed in 37.37% of patients and unusual cyst locations in kidneys, brain, pelvic area, spleen and spine was not observed. Greater involvement of the liver in comparison to other organs is attributed to the fact Echinococcus oncospheres after penetrating the intestinal wall are disseminated to the liver via the portal vein. These oncospheres are first filtered through the liver capillaries before they can reach other organs. But it should be noted that this is in contrast to studies conducted in Bulgaria (Todorov and Boeva, 2000), Jordan (Al-Qaoud et al., 2000) and Argentina (Pierangeli et al., 2007). In fact, these studies have reported that the lungs were more frequently invaded than the liver in children and adolescents.

In present study, single organ involvement was found in 80% of the patients, this result is consistent with reports from other studies, in Hamedan (Ahmadi and Hamidi, 2008), Yasuj (Sarkari et al., 2010), Tehran (Ahmadi and Badi, 2011), and Argentina (Pierangeli et al., 2007). Explanation of this issue is based on the nature of CE so that most of the patients with primary CE have single organ involvement as was observed in this study (Eckert and Deplazes, 2004). 98% of patients didn't have any complications after the surgery; this can be due to appropriateness of the surgical techniques and adequate post-operative care.

## 5. Conclusion

Despite advances in medical science, CE continues to be one of the most important health problems among Iranian's societies. In the meantime, Because of the growing trend of hydatid cyst operation in Lorestan province, which may be due to many different, reasons further studies are needed for evaluation of economic burden and risk factors for CE in this region.

## Acknowledgments

We would like to thank all hospital staff who had assisted us in this study. This study received financial support from Vice Chancellor for Research in Lorestan University of Medical Sciences (Project No. 1843).

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**How to cite this article:** Ahmadinejad, M., Obeidavi, Z., Aaliehpour, A., Beiranvand, B., Sheikhi, E., Habibi, M., Babaei, S., 2015. Human Cystic Echinococcosis in Lorestan province, Southwest Iran: A retrospective epidemiological study of surgical cases during a 10 years period (2005-2014). *International journal of Advanced Biological and Biomedical Research*, 3(4), 320-325.

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