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Meta-analysis of hydatid disease in Iranian children

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ABSTRACT

Background: Hydatid disease is still a significant risk worldwide. It is a parasitic infection in many cattle and sheep breeding areas, including Iran. Objective: The aim of this article is to review the clinical symptoms, laboratory parameters, imaging findings, and management of hydatid disease. Patients and Methods: Data were collected from medical records of patients with hydatid disease in eight hospitals in different provinces of Iran from 2001 to 2014. Results: Overall, 161 children with a mean age of 9.25 years (age range = 1-15 years) hospitalized with hydatid cyst disease between 2010 and 2024 were studied. The male to female ratio was 1.6:1. The most common organ involved in this regard was the lung (67.1%) followed by the liver (44.1%), and the combination of lung and liver accounted for 15.5% of the total. Cysts were mostly located in the right side of the liver and lung. The most common symptoms were fever (35.4%) and abdominal pain (31.7%), and the most common symptoms were abdominal mass in the liver and cough. Also, a high number of eosinophils was reported in 41% of the samples. Erythrocyte sedimentation rate or C-reactive protein was positive in 18.6% of the patients and leukocytosis was more than 150,000/micl in 29.2% of the patients. Ultrasonography was the main test with an accuracy of more than 96% and chest X-ray was performed in 88.6% of the patients. A survey was performed in 89% of the patients and selected patients were considered for medical treatment or injection. Conclusion: The lung was the most common organ involved in the children studied. Given the high probability of multiorgan involvement, we recommend that patients with hydatid be evaluated by ultrasonography and X-ray. In endemic areas, eosinophilia should be considered as a parasitic disease, as should hydatid and its complications.

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1. Introduction

Hydatid disease, also known as hydatidosis, is still a major problem in endemic areas such as Iran (1-2). Hydatid cysts are the larval stage of Echinococcus granulosus, which are hosted by dogs or other carnivores (3-4). Humans are intermediate hosts by ingesting the eggs of the tapeworms (5). According to recent estimates, echinococcosis is responsible for 1 to 220 infections per 10,000 people (2-6-7).
Hydatid disease is usually asymptomatic and most cysts are detected incidentally (8). In many cases, symptoms are highly variable and depend on the location, size, rupture, and infection of the cysts. The lungs and liver are the most commonly involved organs, and in children, the lungs are most commonly involved (10-14). Elevated eosinophil counts have been reported in patients from endemic areas with nonspecific symptoms such as abdominal pain, heartburn, and cough (15). Diagnosis is usually made by imaging (ultrasonography and chest X-ray) and confirmed pathologically. Surgery is the mainstay of treatment for HD, although it is now considered the first option in many cases (4-9). This study was conducted to evaluate the epidemiological aspects, clinical presentations, paraclinical findings, and management of HD in Iranian children.

2- Objective

Our aim was to evaluate the clinical symptoms, laboratory aspects, imaging findings, and management of hydatid disease.

3- Patients and Methods

In this study, we reviewed the clinical records of 161 patients (1-15 years old) diagnosed with hydatid disease (2001-2013). Data on gender, age, clinical symptoms, anatomical location of cysts, size and number of cysts, laboratory tests, and medical management were collected. Statistical analysis was performed using the statistical package version 18.

- Results

The study population consisted of 99 boys and 62 girls from eight hospitals in Iran (Table 1). Echinococcosis was diagnosed in all our patients by pathology. The mean age of the study subjects was 37.3 ± 25.9 years, and most patients (49.1%) were between the ages of 6 and 10 years (Figure 1). The most common anatomical site of hydatid cysts was the lung (in 108 (67.1%) patients), followed by the liver (in 71 (44.1%) patients). In addition, cysts were diagnosed in the kidney (2.5%), spleen (2.5%), brain (1.9%), colon (1.2%), heart (0.6%), and eye (0.6%). In the multiple organ group, a ratio of approximately 4:1 was found in 32 (19.8%) patients. No statistically significant differences were observed between age (P = 0.515/0) or sex (P = 0.243) and anatomical location of the cysts. Overall, our patients had 335 cysts: 181 (54%) right-sided and 138 (41%) left-sided cysts. Regarding size, 130 (39%) cysts were less than 5 cm in diameter, 157 (47%) cysts were between 5 and 10 cm in diameter, and 47 (14%) cysts were more than 10 cm (Table 2). The most important factor for pain was the presence of fever (35.4%). Cough was the most common symptom associated with pulmonary hydatid cysts, and abdominal mass was also observed in hepatic hydatidosis (Table 3). The laboratory data showed eosinophilia (≥ 500/μL) in 66 children, leukocytosis (WBC ≥ 15,000/μL) in 47 patients, erythrocyte sedimentation rate (ESR) ≥ 30 and positive serum protein (CRP) in 30 patients, and anemia (Hb ≤ 11 g/dL) in 28 patients. There were 79 chest X-ray reports, 70 of which were found to have pulmonary hydatid cysts. CT scan confirmed the diagnosis in all patients with cysts (Table 4).

Table 1: Number of patients from eight hospitals

University-Hospital Values
Isfahan-Imam Hossein 45 (28)
Shahid Beheshti-Mofid 32 (19.9)
Zahedan Ali Ibn Abtalib 24 (14.9)
Kurdistan-Besat 14 (8.7)
Kermanshah-Imam Reza 13 (8.1)
Iran Ali Asghar 12 (7.5)
Hamedan-Besat 12 (7.5)
Arak-Amir Kabir 9 (5.6)
Total 161 (100)

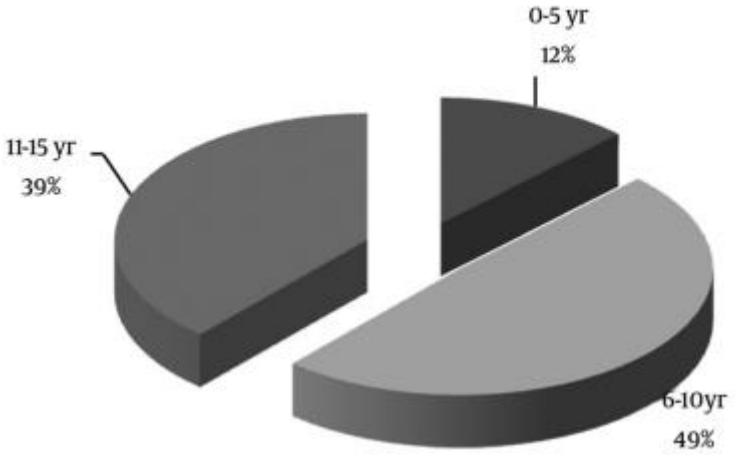

Table 2: Location of hydatid cysts in 161 patients

Location	No. of patients	No. of cysts
Liver	71 (44.1)	137 (40.5)
Right lobe	54 (57.4)	78 (56.9)
Left lobe	40 (42.6)	59 (43.1)
Lung	108 (67.1)	182 (54.3)
Right upper lobe	15 (11.1)	21 (11.5)
Right lower lobe	52 (38.2)	66 (36.3)
Right middle lobe	11 (8.1)	16 (8.8)
Left upper lobe	19 (13.9)	26 (14.3)
Left lower lobe	39 (28.7)	53 (29.1)
Other sites	15 (9.3)	16 (4.8)
Spleen	4 (2.5)	5 (31.25)
Kidney	4 (2.5)	4 (25)
Brain	3 (1.9)	3 (18.75)
Colon	2 (1.2)	2 (12.5)
Heart	1 (0.6)	1 (6.25)
Eye	1 (0.6)	1 (6.25)
Total	161 (100)	335 (100)

Table 3: Main symptoms (pain) 161 patients

Main pain	Values
Fever	57 (35.4)
Abdominal pain	51 (31.7)
Cough	48 (29.8)
Chest pain	34 (21.1)
Shortness of breath	34 (21.1)
Nausea and vomiting	21 (13)
Weight loss	20 (12.4)
Anorexia	20 (12.4)
Abdominal mass	15 (9.3)
Pulmonary and cerebral palsy	14 (8.7)
Hepatomegaly	12 (7.5)
Hemoptysis	11 (6.8)

Lung abscess 11 (6.8)
Respiratory distress 8 (5)
Allergic reaction 6 (3.7)
Cholestasis 3 (1.9)
Urinary tract infection 3 (1.9)
Biliary colic 2 (1.2)
Liver abscess 2 (1.2)
Splenomegaly 2 (1.2)
Seizures 2 (1.2)
Incidental findings 24 (14.9)

Table 4: Radiological findings of 161 patients

Radiological findings	Values
Chest X-ray, n = 79	
Normal	9 (11.4)
Abnormal	70 (88.6)
Pure cyst	35 (44.3)
Rupture	21 (26.6)
Mass	7 (8.9)
Abscess formation	5 (6.3)
Calcium	2 (2.5)
Ultrasound, n = 87	
Normal	4 (4)
Abnormal	83 (96)
Pure cyst	55 (52.4)
Daughter cyst	14 (13.3)
Rupture	7 (6.7)
Calcium	3 (2.9)
Echo	2 (1.9)
Mass	1 (1)
Abscess formation	1 (1)
CT scan, n = 87	
Normal	0 (0)
Abnormal	87 (100)
Pure cyst	45 (51.7)
Rupture	18 (20.7)
Abscess formation	9 (10.3)
Daughter cyst	7 (8)
Mass	5 (5.7)
Calcium	3 (3.4)

Overall, 143 patients (89%) underwent surgery, 12 (7%) of whom were treated with intravenous therapy, and 4% of whom received medication. Four of the six patients were transferred to another hospital for surgery.

5. Discussion

Hydatid disease is still a major health risk in endemic countries (14). In this study, demographic characteristics and infected areas, clinical symptoms, paraclinical data, and treatment strategy were evaluated in 161 patients aged 1 to 15 years. The majority of the study population was male (61.5% vs. 49.1% female) and the mean age was 25 ± 3.37 years. According to our findings, the lung was the most involved organ (67%), followed by the liver (44%) at 19.8%. Overall, the right side was the predominant site of infection (54%). Laboratory data showed that eosinophil count was increased in 41% and ESR/CRP in 18.6% of patients. Chest X-ray and abdominal ultrasound were the main imaging modalities with accuracy rates of 88% and 96%, respectively. The mean age of our patients

was 9.25 ± 37.3 years, and 49.1% of them were between 6 and 10 years of age. Males and females comprised 61.5% and 38.5% of the study population, respectively (male:female ratio = 1.6:1). Vlad et al. (8) studied 82 cases with a mean age of 10.8 years, most of whom were between 10 and 14 years of age. Dockrick et al. (18) reported a mean age of 10.1 years in a third study that included 149 patients under 18 years of age. The investigators did not observe any significant differences in terms of patient gender. In a large Iranian population, Mirshmirani et al. (1) reported a mean age of 11.8 years in 100 patients. In Iran, various studies have demonstrated that men are more likely to be affected by eosinophilic disease than women. It should be noted that in Iran, boys are more likely to be outdoors than girls, which could be a reason for the high prevalence of hydatid disease in men. Chagoupi et al. (17) studied 1195 cases of hydatid cysts in children aged 2 and 15 years in a pediatric hospital in Tunisia and reported that the lung was the most involved organ, followed by the liver. Their results are similar to those of this study. However, some other studies have shown hydatid cysts in the liver rather than the lung. Different genotypes of echinococcus from different sources are responsible for the heterogeneity of the results. Simultaneous involvement of the lung and liver was detected in 15.5% of cases, and the percentage of combined infected areas was 4.7%. The frequency of anatomic sites of hydratid cysts in this study was 9.3%. The kidney and spleen comprised the majority of sites. These results are higher than the values reported in the literature in the spleen and kidney (18, 23-33).

Unilateral involvement was 80.2% in this study, and the single-organ to multiple-organ ratio was 4:1, similar to that reported by Adani and Marad et al. and Talebzadeh and Maraghi. A higher ratio was reported by Al-Shaabani et al. in subjects under 20 years of age.

Only a few studies have examined laboratory data such as WBC and ESR values. In a review article by Morrow and Ashkantz (39), eosinophils were found in less than 25% of subjects. High eosinophil counts were also reported in 41% of samples. Erythrocyte sedimentation rate or C-reactive protein were positive in 18.6% of patients, and leukocytosis greater than 150,000/micl was present in 29.2% of patients. Ultrasonography was the primary test with an accuracy of more than 96%, and chest X-ray was performed in 88.6% of patients. The survey was conducted in 89% of patients and selected patients were considered for medical or injection treatment. Given the high probability of multiorgan involvement, we recommend that patients with hydatid be evaluated by ultrasonography and X-ray. In endemic areas, eosinophilia should be considered as a parasitic disease, as well as hydatid and its complications.

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