

# The clinical and epidemiological features of hydatid disease in Northern Jordan

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## ABSTRACT

**Objective:** To elaborate on the epidemiology of hydatid disease in Jordan as a model for the Middle East, and highlight the obstacles that face disease control in the region.

**Methods:** The clinical and epidemiological data for 65 patients with the diagnosis of hydatid cyst (who were treated in the Department of Surgery, Jordan University of Science and Technology, Irbid and its affiliated hospitals, between January 1994 through to September 2003) were analyzed. Fifty-five patients were interviewed for details of life style.

**Results:** Forty-six percent of patients were below 40-years of age. Fifty-seven percent were females. All

interviewed patients gave history of contact with dogs and history of ingestion of raw vegetable food. The latter in addition to a high zoonotic infection rate and uncontrolled animal movement were factors contributing to the high prevalence.

**Conclusion:** Optimization of control programs in the Middle East requires the establishment of a regional center. Wide traveling has made it essential for physicians practicing in non-endemic areas to be aware of the diverse presentations of this disease when dealing with immigrants from endemic areas.

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Infestation by *Echinococcus granulosus* is endemic in the Middle East.<sup>1-5</sup> Despite this, few reports are available from the region. The aim of this study is to elaborate on the epidemiology of hydatid disease (HD) in Jordan and highlight the obstacles that face regional disease control. Wide traveling expanded the global impact of this disease and made it essential for physicians practicing in non-endemic areas to be aware of HD. In addition, data from Jordan might be of interest to people in other continents as quite good numbers of tourists visit the country yearly to enjoy the Dead Sea, the Holy Sites, and the very unique ancient places such as Jerash and Petra.

**Methods.** Between January 1994 and September 2003, 65 patients from northern Jordan

were treated for hydatid cyst (HC) in the Department of Surgery, Jordan University of Science and Technology, Irbid and its affiliated hospitals. Data were collected regarding age, sex, place of birth, symptomatology, diagnostic approach, treatment modalities, and treatment outcome. Patients (or their families) were interviewed for details of life style regarding history of contact with dogs, history of ingestion of raw vegetable food, animal husbandry, the way they slaughter their animals, and the way they get rid of sheep remnants. These details could not be obtained for 10 patients who failed to attend the interview. Being an endemic country for HD, the diagnosis was suspected on clinical grounds and confirmed by ultrasonography in 100% of patients, in addition to computed tomography (CT) scan in 70% of patients.

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Hemagglutination test was performed for 45 patients and seropositivity was found in 75%. Forty-five patients with liver involvement were treated by wide de-roofing, evacuation, and omentoplasty. The remaining 24-year-old female patient with liver involvement was treated successfully by percutaneous aspiration, injection, and reaspiration (PAIR) technique. Preoperative endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy was performed for 3 patients who initially presented with jaundice. A case of an isolated splenic HC was treated laparoscopically.<sup>6</sup> One case with breast HC,<sup>7</sup> and 5 patients with musculocutaneous localizations were treated by total cyst excision. Three cysts in bones were treated by excision and bone grafting. Partial nephrectomy was performed for one patient with kidney affection while another patient was treated by de-roofing and evacuation of a renal HC. Seven pulmonary HCs were excised via open thoracotomy. Albendazole was given whenever per-operative leak was suspected, or when percutaneous and laparoscopic techniques were applied.<sup>6</sup> Due to the retrospective nature of the treatment data, no conclusions will be drawn in this regard.

**Results.** Tables 1 & 2 illustrate the cyst distribution and the spectrum of clinical presentations among our study group. These clinical data are not showing any significant departure from the experience of other authors.<sup>2,5</sup> The only exception was a slight increase in the ratio of musculo-skeletal localizations. Median age was 39.5 years (SD  $\pm$  19). Six patients (9.2%) were under 16 years of age, 24 patients (36.9%) were between 16 and 40 years of age and 35 patients (53.9%) were above the age of 40 years. Fifty-seven percent were females. Fifty-two patients (80%) were born in rural areas in northern Jordan, while the rest were born in Irbid, which is the largest city in the province. All patients presenting to the interview (55 out of 65) gave history of contact with dogs since their childhood, and history of lifelong ingestion of raw vegetable food. These included lettuce, celery, parsley, dill, scallion, mint, and coriander. Forty-four out of 55 interviewed patients (80%) were living a lifestyle connected with animal husbandry such as domestic farm duties, animal milking, and sheep breeding. In addition, 50% of the interviewed families mentioned that on multiple occasions they have slaughtered sheep by themselves violating the health authority rules stating that this should be performed only in licensed places, and they did not rule out the possibility that some sheep remnants might have been eaten by dogs. Two patients with liver HC developed recurrence and were treated successfully using a similar technique. Two patients developed

biliary fistulas that healed with conservative measures. No operative mortality was encountered in the whole group. To the best of our knowledge, no single case of *Echinococcus multilocularis* has been encountered in Jordan.

**Discussion.** Forty-six percent of our patients were below 40-years of age. This reflects the pyramidal age distribution among Jordanian population. About 42.1% of Jordanians are below the age of 15-years (1999 Official Figures). The region shares such a population distribution. This means that schools will be ideal places for educating a good proportion of the population at risk. Fifty-seven percent of our patients were females. "In rural Jordan women are closely associated with domestic and farm duties, such as milking animals and cultivating crops, while most men are military or government personnel",<sup>2</sup> accounting for this slight higher incidence among females. Working with sheep, cows, or a family environment connected with animal husbandry was found to be associated with an increased risk for hydatidosis.<sup>8</sup> A higher prevalence among females has also been reported in some other communities such as East Africa and Ethiopia.<sup>9,10</sup> Many factors contribute to the high prevalence of HD in Jordan. It is an endemic zoonotic infection in domestic animals including sheep, goats, and cattle.<sup>2</sup> Adult parasites were recovered from 13.8% of stray dogs in northern Jordan.<sup>11</sup> In rural areas people tend to slaughter sheep and cows by themselves violating the rules of health authorities. Sheep offal might be fed to dogs accounting for the high infection rate among dogs. Coexistence with dogs was found to increase the risk of hydatidosis, and this risk increases with the number of dogs, and years of exposure.<sup>8</sup> All interviewed patients had history of prolonged exposure to dogs. The central geographical position of Jordan and uncontrolled sheep trading across the borders with surrounding countries, where HD is even more prevalent,<sup>3,5</sup> adds to the increased human and zoonotic infection rate. The political conflict in the region exaggerates the difficulty of controlling of animal movement. For example, after the second Gulf War which took place in 1991, the prevalence of HC among sheep in Jordan raised up to 12.9% in 1992.<sup>12</sup> This figure was only 4% in 1985.<sup>13</sup> Sheep smuggling across the Iraqi-Jordanian borders has increased during, and after the war leading to this striking increase in the prevalence rate. Fresh green food is popular among Jordanians. We share other authors in believing that ingesting the parasite eggs with contaminated raw vegetables may infect humans.<sup>2,14</sup> However, a single case control study by Campos-Bueno et al<sup>8</sup> found no association between ingestion of raw green vegetables and hydatidosis. As suggested by Amr et

**Table 1** - Hydatid cyst localization in 65 patients.

Organ	n (%)
<b>Liver</b>	46 (70.8)
Right lobe	30 (65)
Left lobe	16 (35)
Musculoskeletal and cutaneous	8 (12.5)
Lung	7 (10.7)
Kidney	2 (3)
Spleen	1 (1.5)
Breast	1 (1.5)

**Table 2** - Presenting features for 65 patients with hydatid cyst.

Organ	n (%)
<b>Liver (n=46)</b>	
Abdominal pain ± mass	33 (71.8)
Jaundice ± fever	3 (6.5)
Accidental (ultrasound or plain film)	10 (21.7)
<b>Musculoskeletal and cutaneous (n=8)</b>	
Mass ± pain	8 (100)
<b>Pulmonary (n=7)</b>	
Cough, dyspnea, fever	4 (57.1)
Accidental (plain film)	3 (42.9)
<b>Kidney (n=2)</b>	
Abdominal mass	1 (50)
Abdominal pain	1 (50)
<b>Splenomegaly (n=1)</b>	1 (100)
<b>Breast mass (n=1)</b>	1 (100)

al<sup>2</sup> geophagia in children and pregnant women among the poor might provide an additional infection source. Contaminated domestic water might also constitute a risk factor in rural areas of Jordan.<sup>15</sup> Fortunately, the domestic nature of the dog-sheep cycle has been shown to enhance chances of disease control by appropriate programs as was seen in New Zealand, Tasmania, Iceland, Cyprus, mid-Wales, and Spain.<sup>14,16,17</sup> Such programs include health education, controlled slaughtering with proper disposal of livestock corpses, control of animal movement, and dog de-worming campaigns. Regular dosing of dogs with praziquantel has been shown to be effective in eliminating infestation of dogs and in reducing prevalence in sheep.<sup>16</sup> Surveys of dogs to target intervention and evaluation control measures have become more practical with the development of coproantigen test.<sup>18</sup> This is highly specific and can be used on either frozen or formalin fixed stool specimens.<sup>19</sup> There are initial encouraging results of the EG95 recombinant vaccine which seems to induce protection in sheep, and potentially, in humans in the future.<sup>20</sup> Health education and controlled slaughtering are easily applied in a country like Jordan. Good standard of health care facilities, and the relatively high education rate in Jordan should ease the process. However, control of animal movement, dog de-worming campaigns and, in the future, the use of vaccines require regional cooperation and financial support. The annual economic losses due to HD in Jordan are already estimated to be around US \$ 3,874,040.<sup>21</sup> In endemic areas like Jordan, the diagnosis of HC is relatively easy. The disease is usually suspected on clinical grounds and confirmed by the typical morphological features found on plain films, ultrasonography, and CT scans. However, due to wide traveling between different countries, clinicians practicing in non-endemic areas should

have a high index of suspicion when examining patients coming from endemic areas.<sup>22</sup> In addition, it is important to remember that HC might have very unusual presentations. We had such an unexpected experience with a benign looking breast mass that proved to be a HC during surgery.<sup>7</sup> At another occasion, a peri-anal abscess proved to be an infected HC!

In conclusion, control programs for HD will work only through a combined effort between all the countries in the region. The establishment of a regional center to monitor the epidemic situation of the disease and direct control programs seems to be mandatory. Political conflicts should be put aside when it comes to global disease control.

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