

## HUMAN HYDATIDOSIS IN ARBIL, N. IRAQ

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*SUMMARY: The status quo of hydatidosis in Arbil Province, based on outcome of surgical practice between 1980-1989, is presented. The surgical rate was 12.6 cases per annum. That inferred for the average population of Arbil throughout the period was approximately 2.8/100.000 inhabitants. The data was analyzed and discussed in relation to the distribution of the disease according to age, sex and occupation of the patients as well as to the cyst type and its location inside the body. It appears that the majority of infections were of autochthonous transmission and due to the metacestode of *E. granulosus*. That the subpopulation most at risk are those living in intimate association with dogs' ecosystem, like the housewives. Due to limitation of surgical index in representation of actual infection with hydatid cysts, other means for detecting the sub clinical cases of the disease were recommended. It was appraised that the prevalence data thus obtained will more objectively contribute to the control and prevention campaign hydatidosis in Iraq.*

*Key Word: Hydatidosis.*

### INTRODUCTION

Hydatidosis is a cytozoonotic disease which continues to be the most vexing socio-economic problem in many parts of the world. Researchers investigating in Iraq have reported on the common occurrence of adult *Echinococcus granulosus* in the stray dogs and on the hydatid disease caused by its metacestode in man and his livestock (1, 2). Despite this fact, the current pattern of prevalence of the disease in this country is still not established. This obviously restrain attempts aimed at its appropriate control, an objective point satisfactorily fulfilled in some other previously holoendemic regions of the world. Accordingly, to assess the extent of the problem through the determination of the disease incidence on a nation-wide scale would be of immense value and indeed is urgently needed.

Data inferred from the hospitals records is still considered the most dependable source of information on human hydatidosis (3, 4). Due to paucity of such data from Arbil (5-7). This study was undertaken which analysis all hydatid cases operated upon over a period of ten years.

### MATERIALS AND METHODS

The records of all patients admitted to the main hospitals in Arbil (viz. Saddam, Republic and Military) with surgically and/or histopathologically proven hydatid cysts over the period 1980-1989 inclusive were carefully examined. For each patient, data regarding the year of operation and her or his age, occupation and residence were obtained. Besides, cyst location and type and multiple organ involvement were recorded. Some positive cases operated upon were subjected to Casoni test, the result of which were emphasized too.

### RESULTS

#### Prevalence

Resolution of surgical practice in Arbil over the period 1980-1989 confirmed the existence of 153 patients having contracted hydatidosis (Table 1). One hundred and twenty six (82.4%) of them come from Arbil Province itself, with the remaining 27 (17.6%) from other N. Iraq Provinces (Sulaimaniah, Kirkuk and Dohuk). The overall incidence of hydatidosis among all patients admitted to surgical wards of the Arbil hospitals was about 1%. Considering the cases likely to be acquired autochthonously in Arbil, the surgical rate as an approximate index for the prevalence of the disease in the area was 12.6 per annum. Such a hydatid cyst-infection rate, in relation to Arbil mean population, roughly represents about 2.8 cases per 100.000 inhabitant.

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Table 1: The incidence of hydatid patients admitted to the Arbil hospital during 1980-1989.

Year	Male	Female	Total No
1980	1	8	9
1981	6	5	11
1982	1	5	6
1983	5	12	17
1984	7	11	18
1985	2	6	8
1986	7	4	11
1987	10	7	17
1988	18	9	27
1989	14	15	29
Total	71	82	153

**Sex and age**

Hydatidosis apparently affected females more frequently than males, since 82 (53.6%) of the patients being females and 71 (46.4%) being males. An analysis of age distribution at presentation with this disease gave the results shown in Table 2. They indicate that the peak age of incidence lay in the second decade for male and in the third decade for the female patients. That it lay in the third decade irrespective of the sex. Seventy four of the patients (37 females and 37 males) were under the age of 30 years, a figure which represents 48.4% of the total number of hydatid cases recorded. The youngest patient operated upon was less than 2 years old and the oldest 84 years of age. The mean age of all patients having suffered from hydatidosis was 33.9±18.1.

**Occupation**

Records on the principal occupations of patients are outlined in Table 3. They indicate that amongst 82 female

Table 2: Distribution of sex and age of 153 hydatid patients admitted to the Arbil hospitals during 1980-1989.

Age group	No. Infected (%)		
	Male	Female	Both
1-10	7(9.90)	3(3.70)	10(6.50)
11-20	17(23.90)	13(15.90)	30(19.60)
21-30	13(18.30)	21(25.60)	34(22.20)
31-40	8(11.30)	16(19.50)	24(15.70)
41-50	7(9.90)	15(18.30)	22(14.40)
51-60	8(11.30)	9(11.00)	17(11.10)
61-70	9(12.70)	5(6.10)	14(9.20)
71-80	1(1.40)	0(0.00)	1(0.60)
81-90	1(1.40)	0(0.00)	1(0.60)
Total	71(100)	82(100)	153(100)

patients 58 (70.7%) were identified as housewives, a figure which represents 37.9% of the total number of both female and male patients. Twenty six (17.0%) of the hydatid patients were students, wholly under the age of 16 years. The rest 69 (45.1%) of the patients were divided as follows: 17 (11.1%) unemployed, 11 (7.2%) laborers, 10 (6.5%) shopkeepers, 8 (5.2%) farmers, 7 (4.6%) for each of soldiers, preschool age children and teachers, and 2 (1.3%) retired individuals.

Table 3: Recorded occupation for hydatid patients admitted to the Arbil hospitals during 1980-1989.

Occupation	No. of cases (%)		
	Male	Female	Total No
Housewives	-	58(70.70)	58(37.90)
Students	17(23.90)	9(11.00)	26(17.00)
Unemployed	11(15.50)	6(7.30)	17(11.10)
Laborers	11(15.50)	-	11(7.20)
Shopkeepers	10(14.10)	-	10(6.50)
Farmers	7(9.90)	1(1.20)	8(5.20)
Soldiers	7(9.90)	-	7(4.60)
Pre-School age children	5(7.00)	2(2.40)	7(4.60)
Teachers	1(1.40)	6(7.30)	7(4.60)
Retireds	2(2.80)	-	2(1.30)
Total	71(100)	82(100)	153(100)

**Residency**

Ninety six (62.7%) of the 153 hydatid patients gave indication of limited travel history, thus were assumed permanently resident in the main City of Arbil. Thirty (19.6%) of the remainder were referred to the Arbil hospitals from different suburbs or counties of this Province. The rest of the patients were from outside of Arbil Province. It was judged that the majority of the patients, whether urban, rural or rural, had close contact with the ecosystem of the definitive hosts of *E. granulosus*.

**Cyst location**

The incidence of hydatid cysts in various anatomical sites of the patients operated upon are shown in Table 4. The maximum overall infection rate accounting for 72 (47.1%) instances occurred in the liver, 67.3% of which in its right lobe. Obviously, females contracted hepatic cysts more often than males (46.3% vs 35.2%, respectively). Next were the lungs, where their infection accounted for 24.2% of the total number of hydatid

cases. The right lung clearly affected more frequently than the left one, in the proportion of 2.8:1.0. In contrast to the liver, the sex distribution for hydatid cases involving the lungs revealed that males were slightly more infected than females (Table 4).

#### Multiple organ involvement

There were several diversified anatomical sites involved amongst the 153 patients. Solitary cysts and single organ involvement were noted in 144 (94.1%) and multiple organ involvement in 9 (5.9%) cases (Table 4). Multiple organ infections included liver and lung (2.6%), liver and spleen (2.0%), liver and gall bladder (0.6%) and liver and peritoneum (0.6%). While single organ infections were more frequently encountered in females than males (51.0% vs 43.1%), multiple organ infections were almost equally present in the two sexes.

#### Cyst type

The clinical presentation, course of the disease and cyst examination indicated that the vast majority of the lesions respected from various organs or body parts were typically of unilocular type due to *E. granulosus*.

Table 4: Distribution of single and multiple organ involvement amongst male and female patients.

Organs	No. infected (%)		
	Total No.	Male	Female
Liver	63(41.20)	25(35.20)	38(46.30)
R. Lung	21(13.70)	13(18.30)	8(9.80)
Eyes	10(6.50)	7(9.90)	3(3.70)
L. Lung	9(5.90)	4(5.60)	5(6.10)
Spleen	7(4.60)	1(1.40)	6(7.30)
Others	7(4.60)	3(4.20)	4(4.90)
Peritoneum	6(3.90)	4(5.60)	2(2.40)
L. Kidney	5(3.30)	2(2.80)	3(3.70)
R. Kidney	4(2.60)	1(1.40)	3(3.70)
Liver and lung	4(2.60)	2(2.80)	2(2.40)
Liver and spleen	3(2.00)	2(2.80)	1(1.40)
Both lungs	3(2.00)	1(1.40)	2(2.40)
Pancreas	3(2.00)	2(2.80)	1(1.20)
Breast	2(1.30)	-	2(2.40)
Both kidneys	2(1.30)	1(1.40)	1(1.20)
Gall bladder	1(0.60)	1(1.40)	-
Liver and gall bladder	1(0.60)	1(1.40)	-
Liver and peritoneum	1(0.60)	-	1(1.20)
Thyroid gland	1(0.60)	1(1.40)	-

That only one confirmed case of multilocular infection due to *E. multilocularis* was noted. This unique case was a 40-year-old female farmer not from Arbil Province but rather from Zakho, a town towards the Iraqi-Turkish border. She manifested hepatic lesion with pulmonary metastases. Surgeons at Arbil hospitals claimed that two additional cases of multilocular infections were noted, but we found no reliable evidences for that.

#### Casoni test

This test was performed on 40 surgically identified cases of hydatidosis involving different body organ. It was positive for 27 (67.5%) and negative for 13 (32.5%) of them. False negative results pertained to 10 out of 24 of the lung cases and one for each of liver, kidney and peritoneum.

#### DISCUSSION

The dilemma of obtaining accurate figures on the prevalence of human hydatidosis is well appreciated, since in many cases the disease manifests few specific signs and symptoms and it may even be symptomless. The surgical incidence rates, therefore, remain the basic index for evaluation of the efficacy of control measure (3, 4). A helpful system of measuring it is to calculate the annual index, which records the mean number of hydatid cases diagnosed in a given area each year for every 100,000 members of the population. Utilizing this measure, the present study inferred a figure of 2.8 /100,000 throughout the decade between 1980 and 1989 in Arbil, N. Iraq. Previous assessments have reported variable indices of human morbidity due to hydatidosis from this country. The approximate range of which, however, seems to lie between 1/100,000 and 12/100,000 (5,10). Most of this range is obviously higher than that of many other countries (6,12,14) and may reflect the serious spread of the disease in various districts of Iraq.

The data of the present study indicated that the rate of infection by hydatid cysts in the female was higher than in the male patients. Other workers judged from overall sex distribution either comparably similar findings (8-10), opposite results (1,5,13), or nearly equal affection of the two sexes (7,14). It is not possible to associate the above conflicting results concerning the sex with the existence of certain intrinsic conditions in one sex or the other. Some workers, therefore, prefer to attribute such a sex difference to some epidemiological factors such as socio-cultural and occupational risk (7,10). However, owing to the fact that there is no reli-

able methods for the estimation of these factors for the Iraqi communities, it is difficult to analyze completely their relation to human infection with the hydatid cysts.

In connection with the role of the sex in hydatid infection, it is probably of interest to mention that the experimental studies indicated that male mice were more susceptible to contract this disease than the females of this species (15). The analysis of such data may evolve a hypothesis suggesting that "the heavier infections with helminthes occur in male and the lesser in the female hosts". The principal basis for this hypothesis is that female gonadotrophins (oestrogens and androgens) have an inhibitory action on the level of parasitization, while the male hormone (testosterone) had little if any such effect indeed it might even increase the susceptibility of the host to infection.

As far as the age distribution is concerned, the present study revealed that hydatidosis affect all age groups, but that the maximum age of incidence was the third decade. This apparently fits well the findings of some workers (9-11,13,14,17). Interpretation of the results presented by other teams of researches, however, appear to exist a confliction concerning the highest incidence amongst the age group, it may be anywhere between the second and sixth decades (5, 6,10,11). It is probably reasonable to suggest that the fore mentioned variation might rather be taken as an evidence to dispute the value of age specific rates in human hydatidosis. Though generally prolonged, the period of this disease is of variable duration. The fact that in most endemic areas a considerable proportions of the total population at risk are children and youths (4,10,18) may indicate that though the disease mostly affect adult people at the labor age, most infections are actually acquired during the childhood but may take many years to manifest themselves as deleterious lesions.

In agreement with the present finding, several other workers (5, 9,10,19), noted that in many hydatidosis samples the majority of cases were among the housewives. This may be due to intimate association of this subpopulation with infection sources such as infected canies and/or heavily contaminated environment with *E. granulosus* ova from the dog population. It is not surprising for Iraqi communities since a considerable proportion of females continue to have some activities related to animal breeding and/or agriculture.

Alternatively, the high incidence of the disease among housewives may be due to their extreme domesticity but still living in a habitat which overlaps with the ecosystem of infected dogs.

The limited travel history of the hydatidosis patients from Arbil, besides analysis of their anamneses indicating close association with infected dogs, suggest that the majority of these cases are actually of autochthonous transmission.

Diversified organ involvement is a common feature of any representative sample of hydatid patients. Analysis of the present results verified this fact but indicated that the most frequent site was the liver with the lung being the next. A uniformly greater hepatic ingestion also reported by many other workers (3,4,11,15,16, 22). This observation, however, contradicts that of some other workers where they recorded the predominance of single pulmonary over single hepatic involvements (9,11,21). On the other hand, the greater liability of the right lung in comparison with the left one to contract hydatidosis presently noted corresponds the findings of Sarsam (22), Talip (20) also reporting on hydatidosis from Iraq. This phenomenon on might be attributed to the larger size of the right pulmonary artery than the left one and to more direct blood flow in the latter. Obviously, the exact mechanisms governing the predilection sites for the development of hydatid cysts in the same are as yet not clear. The higher rate of hepatic infection is attributed to the fact that liver acts as primary filter in the human body. Considering the other side, the lungs though often the second filter may behave as primary one under certain circumstances. A droughty environment accompanied by dusty atmosphere may facilitate the inhalation of *Echinococcus* ova by some individuals and subsequently respiratory infection may evolve. It should be emphasized that some patients from Arbil are referred to more specialized Medical Centers in Baghdad or Mosul. This might have reduced the relative frequency of pulmonary hydatidosis amongst the population under consideration.

The predominance of solitary and single organ involvement over multiple organ involvement noted in the present series of hydatidosis patients matches similar findings of others (6,7,11,19,20). In the absence of a historical evidence for a previous hydatid cyst resection, it is difficult to ascertain whether the multiple cyst are primary or secondary, though it is widely believed that primary cysts are mostly solitary in nature.

It appears in Arbil, as indeed in other Provinces of Iraq at large (2, 7), *E. granulosus* is responsible for the hydatid cysts recorded from various organ of man and any of the other susceptible hosts. A case of human hydatidosis attributed to *E. multilocularis* obtained from the records of the Arbil hospitals actually comes from

Zakho (Dohuk Province), which is the first confirmed case report of alveolar hydatid disease from Iraq. It has been described in details by Al-Attar, *et al.* (23).

Casoni test was the only mean available for immunodiagnosis of hydatidosis at Arbil hospitals. It is an intradermal reaction utilizing hydatid fluid as an antigenic source. However, is not very reliable and occasionally even disappointing. In best conditions, its accuracy do not exceed 80-90%, as it might display both immediate and late phases and could yield both false positive and negative responses (24, 25). Restricting the outcome of this test to the two more frequent sites of hydatidosis, viz. liver and lung its positivity was found lowest with pulmonary and higher with hepatic involvements (11). It may be argued that liver cysts are more likely to elicit a strong immune response than lung ones. However, neither the superiority of the response for multiple over solitary involvements nor of ruptured cysts over intact ones could be manifested to explain such a difference. Another feature of the Casoni test is the fact that its sensitivity amongst young patients, varies with the age being more specific for older than younger children. It must be emphasized that the positivity of this test is often lifelong. It therefore do not appear to be of appreciable use in following the patient who has had previous treatment for hydatidosis, since even perfect cure does not necessarily change the Casoni response.

One may conclude from the present and a like studies in Iraq that the clinical and surgically confirmed cases of hydatidosis represent no more than a fraction of the total existing infections. In some other hydatidosis endemic are as the use of radiologic, ultrasound and serologic screening methods for the detection of the silent cyst carriers has yielded prevalence indices many-folds greater than those represented by the annual surgical incidences (25-28). Application of such means in various parts of Iraq may further verify that human hydatidosis is hyper-endemic and omnipresent disease. The data so obtained will also contribute to the surveillance of a hydatid control and prevention programme. That multidisciplinary plan which should include many improvements in the hygienic and educational standards of people, eradication of all pariah dogs with regular anti-helminthic treatment of each of pet, guard herd dogs and hinder them from scavenging on carcasses or eating infected offal and viscera at the abattoirs or elsewhere. The abattoirs should be put under aggravating circumstances and provided with efficient incinerators. Finally, better livestock management and prevention of all sorts of traditional unauthorized slaughtering of meat animals.

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