

## Seropidemiology Of Human Hydatidosis In Kirkuk And Tikrit/ Iraq

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### Summary:

**Background:** Hydatid disease is a serious infection of man caused by larval stage (hydatid) of the small dog tapeworm. Serological tests are important in the diagnosis of hydatid disease.

**Objectives:** The study was carried out to detect the rate of seropositivity of hydatid cysts in Kirkuk and Tikrit cities.

**Materials and Methods:** The retrospective hospital based and seroepidemiological studies were carried out in Kirkuk and Tikrit cities, during the period from beginning of January 2000 until the end of October 2003. The hospital based study included 125-hydatid cyst operations in hospitals of Kirkuk (82) and Tikrit (43). The serological tests used for detection of hydatid cysts antibody were latex agglutination test (LA) and enzyme linked immunosorbent assay (ELISA). The seroepidemiological study included 288 individuals from different groups of populations: veterinarians (42), animal breeders (36), butchers (78), housewives (45), children (30) and other occupations (57).

**Results:** The rate of hydatid cysts operation in males (41.6%) was lower than females (58.4%). The highest rate of operation was at the age group between 21-30 years old (26.4%) and the lowest was among 51-60 years (12.8%). The highest rate of operation was sited in liver 91 (72.8%) followed by lung 19 (15.2%) and other sites 15 (12%).

The rate of seropositivity among different groups of occupation by using ELISA and LA tests were as follows: veterinarians (78.5% & 57.14%), animal breeders (58.3% & 22.22%), butchers (57.6% & 43.58%), housewives (60.0% & 48.8%), children (60.0% & 33.33%) and other occupations (38.6% & 21.05%) respectively. The rate of seropositivity in females was higher than males in both tests. In ELISA the rate in females and males was 74.1% and 51.20%, while in LA test the rate in females and males was 49.38% and 33.8 % respectively.

The distribution of seropositivity varied in different age groups. The highest rate was among the age group 31-40 years in both ELISA (74.07%) and LA (55.5%) tests.

**Conclusions:** The prevalence of hydatid disease in man was high in Kirkuk and Tikrit cities. The highest rate of seropositivity was among veterinarians followed by house wives, children and animal breeders. The ELISA test was more sensitive than LA for detection of seropositive cases of hydatid disease.

**Key words:** Seroepidemiology, hydatid cysts, Kirkuk and Tikrit.

### Introduction:

I-hydatid disease in man is a serious condition and the surgical removal of cysts remains the mainstay of treatment because the initial phase of primary infection is always asymptomatic, where they do not induce major pathology. may remain asymptomatic for many years. but it is assumed that some may become symptomatic with the time.[ 1]. Serological tests are important in the diagnosis of hydatid disease [2]. Many immunodiagnostic techniques have been used for echinococcosis. On the basis of recent experiences, the indirect hemagglutination test (IHA T) and the indirect immunofluorescence antibody techniques (IFAT) as standard routine methods are recommended, the enzyme linked immunodiagnostic assay (ELISA) was established in various laboratories [3].

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The cyst is normally spherical in shape. but its shape and size depends on the organ in which it grows. In humans approximately 70% of hydatid cysts are found in the liver usually in right lobe. 20% in lungs and remaining 10% are found in other organs and tissues [4].

Development of hydatid cyst is slow and variable. causes damage as they enlarge over period of 5- 20 years in about 1 - 5 per year. most patients with hydatid cyst of the liver are asymptomatic or have few symptoms when become large and lead to a pressure on the adjacent organs. The rupture of a primary hydatid cyst gives rise to development of numerous hydatid cysts in any organ or tissue to which protoscolices can reach in the body of the infected host [5]. The rupture of the primary cyst might be due to trauma during surgical operation. Spillage of hydatid fluid may result in development of secondary cysts. in addition to anaphylactic and sudden death [6].

Although all body organs and tissues could be infected by hydatidosis. but nails, hair and teeth have

no chance for infection because of their structures not allowed the cyst to grow [7].

The study was planned to show the prevalence of seropositivity of hydatid cysts among different groups of population in Kirkuk and Tikrit cities in Iraq.

**Materials And Methods:**

Study+ Population: -

The seroepidemiological study was carried out in Kirkuk province for the period from beginning of October / 2002 until end of October 2003. The study included 288 individuals: veterinarian (42), animal breeders (36), butchers (78), housewives (45), children (30), and other occupation (57): were 207 males and 81 females.

Blood samples were obtained from each person (10 ml) by using tourniquet and disposable plastic syringes kept over night at 4°C. then centrifuged at 1200x G for 10 minutes. Sera were separated from clotted blood by micropipettes and divided into two portions to avoid repeated freezing and thawing, then stored at -20 °C until used.

The retrospective hospital-based study was carried out in Kirkuk and Tikrit hospitals on 125 confirmed cases of hydatid cysts. for the period from beginning of January 2000 until end of August 2003.

**ELISA Principles:** -

For estimation of specific human E. granulosus IgE (allergenic protein). ELISA. was used following the procedure of the BIO RAD (Bio-Rad Laboratories. 3Brd R. poincare 92430, Marries la coquette. France).

**Latex Principles :**

The principles of the test are to coat latex particles with hydatid cyst antigen and their subsequent agglutination when patient's serum is added. The materials for latex test were obtained from Ismunit (Istituto hlmmunolo`gico Italiano. 00040 pomezia-Roma Agglutino test- Echinococcosis).

**Statistical analysis:** -

Chi-square test was performed to determine the significant difference between groups and student t-test was done to compare between each two groups. The difference at p<0.05, 0.01 was regarded significant.

**Results:**

**Hospitals Study:** -

The number of surgical operations for hydatid cyst performed in Kirkuk and Tikrit hospitals during the period from beginning of January 2000 until end of August 2003, were 125 operations in different sites (82 in Kirkuk and 43 in Tikrit) as shown in table 1. It is indicated in table 2. that the rate of hydatid cysts

in males (41.6%) was lower than females (58.4%). Regarding the age distribution, it was found the rate of hydatid cysts was highest at age group 21-30 (26.4%), followed by age groups, 11-20 (24%), 41-50 (20%), 31-40 (16.8%) and 51-60 (12.8%) respectively as shown in table 3.

It was observed in table (4). that most cases of hydatid cysts sited in liver 91(72.8%) followed by lungs 19(15.2%) and other sites 15(12%). which included kidney 8(6.4%), spleen 3(2.4%) and intestine, brain, under tongue and pancreas 1(0.8%) each.

**Serology:** -

Comparing the rate of seropositivity of hydatid cysts in different groups of population, it was found that the overall rate of seropositive hydatid cysts by ELISA was (57.63%), while by latex test was (38.19%) (Table 5).

As far as occupations of the patients are concerned it was shown that. the rate of seropositivity by ELISA and latex tests were among veterinarians (78.5%). (57.14%), animal breeders (58.3%), (22.22%), butchers (57.6%). (43.58%). house wives (60%). (48.8%), children (60%) ,(33.33%) and others (38.6%). (21.05%) respectively. The other occupations were included earner, doctors. pharmacists, teachers ... etc. Statistical analysis showed significant difference between different groups of patients (Table 5).

It was shown that the rate of seropositivity was higher in females than males. using both serological techniques. In ELISA test. the rate of seropositivity in males was (51.20%) and in latex test was (33.81%). while in females it was (74.1%) in ELISA and (49.38%) in latex test (Table 6).

Table (7) indicates that there was significant difference in seropositivity of hydatid cysts between different age groups. The rate of seropositivity in both ELISA and latex test, was highest among the age group 31-40 years (74.07. 55.55 %) followed by 41-50 (71.45%, 52.38%). 21-30 (65% and 45.83%). 11-20 (44.79%, 20.83%) and 51-above years (41.66% and 37.5%) respectively.

**Table 1: The number of surgically proved cases of hydatid cysts recorded from hospitals in Kirkuk and Tikrit, during 2000-2003.**

No.	Name of the hospital	No. of Recorded cases
1.	Kirkuk General Hospitals	82
2.	Tikrit General Hospital	43
<b>Total</b>		<b>125</b>

**Table 2: Sex distribution of hydatid cysts in patients admitted to hospitals in Kirkuk and Tikrit, during 2000-2003.**

Sex	Kirkuk	Tikrit	Total No.	Total%
Femal	47	6	73	58.4%
Male	35	17	52	41.6%
Total	82	43	125	

**Table 3: Age distribution of hydatid cysts in patients admitted to hospitals in Kirkuk and Tikrit, during 2000-2003.**

Age group (year)	Kirkuk	Tikrit	Total No.	Total
11-20	20	10	30	24%
21-30	21	12	33	26.4%
31-40	11	10	21	16.8%
41-50	14	11	25	20%
51-60	16	-	16	12.8%
Total	82	43	125	

**Table 4: Site distribution of hydatid cysts in patients admitted to hospitals in Kirkuk and Tikrit, during 2000-2003.**

Organs or Sites	Number of positive	Percentage (%)
Liver	91	72.8%
Lung	19	15.2%
Other sites	15	12%
Total	125	

**Table 5: Distribution seropositivity of hydatid cysts according to occupations.**

Occupation	No. examined	No. positive		Positive %	
		ELISA	Latex	ELISA	Latex
Veterinarian	42	33	24	78.5%	57.14%
Animal Breeders	36	21	8	58.3%	22.22%
Butchers	78	45	34	57.6%	43.58%
Wives	45	27	22	60%	48.8%
Children	30	18	10	60%	33.33%
Others	57	22	12	38.6%	21.05%
Total	288	166	110	57.63%	38.19%

ELISA :  $\chi^2 = 16.181$       d.f=5      p<0.01  
 Latex :  $\chi^2 = 66.856$       d.f=5      p<0.001

**Table 6: Distribution of seropositivity of hydatid cysts according to sex.**

Sex	No. examined	No. positive		Positive %	
		ELISA	Latex	ELISA	Latex
Female	81	60	40	74.1%	49.38%
Male	207	106	70	51.20%	33.8%
Total	288	166	110	57.63%	38.19%

ELISA :  $\chi^2 = 12.464$       d.f=1      p<0.001  
 Latex :  $\chi^2 = 5.976$       d.f=1      p<0.05

**Table 7: Distribution of seropositivity of hydatid cysts according to age. (Age / year)**

Age	No. examined	No. positive		Positive	
		ELISA	Latex	ELISA	Latex
11-20	96	43	20	44.79%	20.83%
21-30	120	78	55	65%	45.83%
31-40	27	20	15	74.07%	55.55%
41-50	21	15	11	71.4%	52.38%
51-above	24	10	9	41.66%	37.5%
Total	288	166	110	57.63%	38.19%

ELISA :  $\chi^2 = 16.277$       d.f=4      p<0.01  
 Latex :  $\chi^2 = 20.466$       d.f=4      p<0.001

**Discussion:**

In order to have a good control program of the public health problem of hydatid cysts, it is necessary to determine the incidence and prevalence of the disease. From the results of this study it is shown that the disease is endemic in Kirkuk and Tikrit provinces. Studying of the hospital records is one of the most reliable incidences for disease, because incorrect diagnosis in surgical cases of hydatid disease is rare [8].

The rate of patients were recorded in Kirkuk hospitals is higher than Tikrit hospitals, this might be due to two reasons the first one is the number of population in Kirkuk is higher than Tikrit and the second reason might be due to many patients from Tikrit are referred to Baghdad hospitals for surgical operations.

For sex distribution, the higher rate of hydatid cysts in females than males in this study is in agreement with previous studies done in Iraq [9, 10, 11]. It is also in agreement with studies done in other countries in Iran, Tunisia, Greece and Kenya [12, 13]. However, this result does not agree with the studies of other workers, where they found that males were more infected than females [14]. While still some workers insisting that there was no difference in the frequency of infection between males and females [15].

Concerning the age distribution of hydatid disease it was found the highest prevalence was between the age of 21-30 years old. Many workers [16] also reported the same finding. On the other hand our study found that the majority of cases were between the age group 11-20 years old, it is similar to the studies done by Mahmoud & Al-Janabi [17] in Mosul where they found the most of infected patients were children and young under 17 years old, while Molan & Baban [18] observed that the children and young patients under 21 years old had highest rate of infection. It is also in agreement with Beard [19] who reported that the highest rate of infection was under age 15 years, thus he concluded that the vast majority of infections had occurred in childhood, but discovered in older ages.

The high rate of infection among patients aging from 31-50 years old in this study, reflects that all ages are susceptible to infection with hydatid cyst. Molan & Baban [20] found the high rate of infection among 20-50 years old. Molan & Zangana [21] referred the infection in patients admitted to hospitals in Iraq between the age 25-40 years, while Al-Jeboori [22] in Baghdad found the high rate of infection between the age 20-30 years. Al-Samarrae & Al-Sarnarrae [9] observed that the majority of patients of hydatid cysts are young adult 30-40 years old. The lowest rate of infection with hydatid disease in this study was between the age 51-60 years old. This is similar to the finding of Al-Autabi [16] who found the lowest rate of infection above the age of 50 years old and Hashim [11] found the lowest infection rate between the age group 81-90 years old. The differences in the age groups might be due to time of ingestion of the egg of Echinococcus and the rate of development of the cyst, which persists for many years.

Regarding the site of hydatid cyst, the involvement of liver more than lungs in this study, is similar to finding of other workers in Iraq [9, 10]. This finding disagrees with Al-Autabi [16] who found the highest rate of infection was in the lung followed by liver in three hospitals in Baghdad and Al-Jeboori [22] who carried his study in Medical City Teaching hospital, Baghdad.

The highest rate of infection in lungs reported by some workers might be due to lung infection could make an airborne respiratory

infection [21]. The low rate of hydatid cysts in other sites (spleen, brain, under tongue, kidney, pancreas and intestine) is also reported by others [16].

In the present study, both latex (LA) and ELISA tests were used to investigate the rate of seropositivity of hydatidosis in different groups of population. The most frequent distribution of seropositivity was among veterinarians, housewives and children, reflects the direct contact of these groups of population with source of infection.

As expected the high rate of seropositivity was found among veterinarians and animal breeders as they are in direct contact with animals especially the dogs, which are the final host of this parasite. This finding is also in agreement with Kadir & Jawad [23] who found high rate seropositivity among veterinarians and animal breeder, using ELISA and IFAT techniques. But in contrast to their study, they did not find seropositivity among housewives and children. This might be related to the sample size and location of the study.

Regarding the sex distribution, it was found that the rate of seropositivity was predominant in females than males in both ELISA and LA tests. This is similar to finding of El-On et al [24] who reported higher rate of infection in females than males. This might be due to females are more in contact with source of infection as handling vegetables, working in farms and contact with domestic animals which led them to get the infection by taking the eggs of the parasite. French et al [131], in Turkana, showed that females were very reliant on dogs as "nurses" to clean and guard.

The finding of the present study is not in agreement with other workers, Kenny et al [25] found that the prevalence was equal in males and females by using finger-prick blood samples in ELISA test. On other hand, some researchers, in contrast, found that males were more frequently infected than females. The differences in the rate of infection in different studies may be due to sample size, place of study, period of study and technique used for diagnosis.

As far as the age distribution is concerned, it was found that the rate of seropositivity at age group above 11 years was higher than other age groups. This finding is almost identical to that reported by El-On et al [24] who found the slight elevation of infection above the age of 14 years old. The high rate of seropositivity between the age group 21-50 years old, is in agreement with Chematai et al [26] who found high rate of infection between the age group 19-45 years old, using IHA test, it is also almost similar to that reported by Moro et al [27] who found the high rate of infection between the age groups 26-56 years old. While our result is not in agreement

with Chematai et al [26] who showed low

rate of infection between the age group above 45 years old, but his observation of low rate of infection above 51 years old, goes with the finding of this study.

In all of the studied groups, the rate of seropositivity in ELISA test was higher than LA test. This indicates that ELISA test is more sensitive for detection of positive cases than LA test [26]. It has been reported that ELISA sensitivity was 88% and specificity was 96.9%. for demonstration of antibody [28]. While Craig et al [29] reported the sensitivity of ELISA was 100%.

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