**Original Article**

# Prevalence of hydatid cyst in human and animals in Sulaimaniya city and Saedsadq distract

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***Fac Med Baghdad 2008; Vol.50, No.2***
*Received April 2007*
*Accepted Oct.2007*

## Summary:

**Background:** Hydatid disease is widespread and considered endemic in the Middle East and the Mediterranean, Iraq is one of the countries with a high endemicity of this disease.

**Objectives:** The aim of this study is to diagnose hydatidosis and to identify the prevalence in human and animals in two different areas Sulaimaniya governorate which include Sulaimaniya city and Saedsadq district.,

**Methods:** Seroepidemiological survey was conducted by using enzyme-linked immunosorbent assay (ELISA) and Indirect Haemagglutination IHA to detect anti Echinococcus granulosus antibody in random blood samples (536) of different sex, ages, and occupation out patients, in Sulaimaniya and Saedsadq. In the animal study inspection and examination of the internal organs (liver, lungs, spleen and heart)

**Results:** The Seropositivty in Saedsadq was higher( 3.7% )than in Sulaimaniya( 2.5%), and in female (2.8%, 6.4%) were higher than in male (1.6%, 1.2%) respectively both in Sulaimaniya and Saedsadq. In animal study results revealed that In Sulaimaniya infection rates were (1.5% of sheep, 0.5% of goats and 0.2% of cattle), less than in Saedsadq (7.5%, 2.8% and 1.7%) respectively,

**Conclusion:** The seropositive was higher in Saedsadq than Sulaimaniya , and higher among females than males in all age groups. The prevalence and fertility of hydatid cysts in sheep is higher than goat and cattle, sheep. Liver is the main involved organ.

**Keywords:** Ecchinococcosis, hydatidosis, ELISA, IHA, Sulaimaniya

## Introduction:

Echinococcosis is a zoonotic disease that occurs throughout the world and causes economic losses and public health problems in many countries. Domestic intermediate hosts (sheep, goats, and cattle) are major intermediate for the disease in humans (1). In addition, large hydatid cysts in the liver and lungs of sheep, goat and cattle can result in significant economic loss to the meat industry through refused of the infected organs (2).

Hydatid disease is widespread and considered endemic in the Middle East and the Mediterranean, Iraq is one of the countries with a high endemicity of this disease.During the period (1935-1938) there were 107 cases of the Hydatid diseases in Baghdad (3), While the total cases registered in Iraq during the period (1955-1970) were 6880 patients(4).

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During the period of three years in the medical city hospital (5)recorded 642 cases. Surgical operations in Arbil over the period 1980-1989 confirmed operations of 153 patients with hydatid disease (6). During the period of 1990-1998, (7), recorded 98 cases of human cystic hydatidosis (12.4 cases per year) in Arbil province, northern Iraq. The hydatid disease is considered one of the common chronic lung diseases in Iraq,(8,9) The .105 patients of hydatid cysts in Mosul, 18.09% were children (10).

Prevalence of hydatidosis in animals slaughtered at abattoirs was studied in Baghdad and other provinces by (11,12,13,14,7),they found that the infection rates was differ according to animals species and the infected organs . Studies in livestock using abattoir inspection, from Iran, Jordan, Kuwait,Syria concluded that the rate of infection was higher in sheep than otherspecie(15,16,17,18).

The aim of this study is to diagnose hydatidosis and to identify the prevalence in

human and animals in two different areas Sulaimani city and Saedsadq district.,by using two Serological tests ELISA &IHA, for detecting specific antibodies in patients' sera . This study ,also,was conducted in order to determine and compare the prevalence and fertility of hydatid cysts in sheep, goat and cattle in both Sulaimani and Saedsadq.

## Materials and methods;

**Human Blood sample collection:**
Two areas in Kurdistan region were selected for the study Sulaimani city and Saedsadq district.Randome blood samples were collected of different sex , ages, and Human results: Results of the present study revealed that there were no significant differences( P > 0.05)between the seropositive rates by the two different tests, ELISA for human immunoglobulin G, indirect haemagglutination IHA as shown in Table 1. In Sulaimani the seroprevalence ,from a total number of 372,were 9 cases (2.4%) and 5 cases (1.3%), While inSaedsadq, from a total number of 164, 6 cases (3.7%), 5 cases (3%), respectively for ELISA and IHA. Results in table (2) showed that,7cases (2.8%) were seropositive from 248(66.67%) females, while among
occupation, distributed as following ,in Sulaimani (372 samples ), from April to July 2006, in Saedsadq (164 samples ) from August to October 2006.(ELISA) and Indirect Haemagglutination IHA were used to detect anti *Echinococcus granulosus* antibody in serum sample.

**Animal Inspection and sample collection:**
Samples were collected from April to July 2006 in Sulaimani slaughterhouse and from August to October 2006 in Saedsadq slaughterhouse. Inspection of the internal organs (liver, lungs, spleen and hearts) had been performed during the study period (8200 sheep, 2581 goats and 2289 cattle) from Sulaimani, and (1118 sheep, 216 goat and 172 Cattle from Saedsadq) were examined. The infected organs (fig,-l)with hydatid cysts were examined for the type of the cysts (fertile, sterile) as described by Al-taie (1983).Cyst fluid was extracted from each cyst and put on a Petridish under a microscopically (40x) for the presence of protoscoleces as showen in fig.-2 .Cysts which contained protoscoleces which were fertile and cysts which did not produce protoscolices were sterile cyst.

**Statistical analysis:** The data were analyzed with (chi-square) test, used to evaluate the data. The level of significance was set at P < 0.05 and P < 0.01 (19).

## Results

124(33.3%) males, 2 cases (1.6%) were seropositive. Saedsadq , 78(47.6%) were female, 5 cases (6.4%), were positive while among 86 (52.4%) male, 1 case (1.2%) was positive. There were no significant differences between the seropositivity among different age groups (P>0.05).In Sulaimani, out of the nine positive cases, the highest rate, 4 cases (8.2%) were found among age groups above 51 years, followed by the age group 21-30 years with 4 seropositive cases (3.8%). The lowest rate of infection, 1 case (1.1%) was recorded among age group 31-40 years, while in Saedsadq the highest rate, 2 cases (11.1%) among the age-group 41-50 years, one case (4.45%) was among group above 51 years old, one case (4.2%) was among group of 31-50 years old, one case (2.1%) was above 20 years old and another case (1.88%) was under 20 years old. Results shown in table (3) reveled that there is no significant differences between the different occupations (P> 0.05) Animals results:There was significant (p<o.ool) difference in the infection rates, in Saedsadq, was higher than in Sulaimani, from Saedsadq the total 1118 sheep ,216 goat, and 172 cattle were examined, (7.5%), (2.8 %) and (1.7%) were infected , respectivly. There was statistically significant differences of infection among the different animals in both Sulaimani and Saedsadq (PO.01). (Table 4). There was a statistically significant difference among the different infected animal organs (P < 0.01) (Table 5). ,ln sheep, involvement of liver human study:Two serological tests were used for the diagnosis of human hydatidosis disease the ELISA and 1HA for determining antibody against CE. The seropositive people in Saedsadq were significantly higher (3.7%) than Sulaimani (2.4%); this can be explained by many factors that can play important role in the spreading hydatidosis in that semi rural area like: poor hygienic, lower income, limited education, livestock ownership, home slaughterhouse and stray dogs. It is known that stray dogs and guard dogs are common in the semi rural area (20). These results are aggrede with the study of (21), which was conducted in

3 areas; (rural, urban and semi rural). The prevalence of hydatidosis was high in a semi rural area, which is similar to our study.

In this study, the seropositive among female was significantly higher than in male probably because women, specially those who are housewives, are more involved in farming and herding livestock, as well as more likely to have contact with dogs or contaminated vegetables during food and lung were simultaneously more common than involvement of either liver or lung in both Sulaimani and Saedsadq. In goat, liver involvement alone was more common than lung or liver and lung simultaneously in both areas, and in cattle liver was the only organ infected. In sheep and goat, majority of the cysts were fertile (77.95%, 67.85%) (46.2%, 33.3%) and in cattle majority of the cysts were sterile (80%, 100%) in Sulaimani and Saedsadq respectively,as showen in table (6) Although,There were no significant differences according to the age of infected animals($P > 0.05$), Infection rate was increasing with age in sheep, goat and cattle (table7).

Number of cysts were varies according to animal species ,sheep had higher numbers than goat and cattle ,either in Sulaimani or Saedsadq (table 8).

**Discussion**

processing and preparation. Increased susceptibility of female to Echinococcus infection ( 22). Ages above 50 years were more seropositive 4 cases probably because of longer exposure period. Hepatic cysts may exist as long as 20 years before becoming large enough to be visible or cause pressure-related problems such as pain, nausea, cirrhosis, and other manifestations of liver disease. Pulmonary cysts also may grow for many years before causing dyspnea, cough, or hemoptysis. Cysts in the brain produce problems consistent with a slow-growing space occupying lesion ( 23).A study in Libya showed that prevalence of CE increased significantly with age, and females were significantly more affected (2%) than males (1.3%) for all age groups, comparable to our results (24).

Animals study:The findings of this study indicate that hydatid cysts were more common among sheep in Sulaimani and Saedsadq (1.6%, 7.5 %), and can play important role in spreading the hydatid infection in those communities because sheep are the most commonly consumed slaughtered animals $P < 0.01$. The difference between the infection rates. In Saedsadq it was higher than Sulsimani could be explained as following: 1- livestock slaughtered in Sulaimani slaughterhouse most 60% came from southern area of Sulaimani such as (Karkuk province and garmian area), 40% came from villages near Sulaimani and there may be very few or zero of the ratios from Saedsadq.2- In Sulaimani there are livestock farms where livestock's remain for periods of (one month to one year) these farms are closed in front of dogs, while livestock slaughtered in Saedsadq are from Saedsadq and near villages.3- In Saedsadq there are no livestock farms, and livestock deployed in the pasture with stray dogs are present on large scale, in contrast to the Sulaimani city. Since the relationship between sheep herds and dogs is very close, infected faeces of dogs scattered near by the sheep herds and due to dryness of the area usually with movement of sheep, the eggs float in the air and dust, the eggs are very resistant to draught and chances of transmission will be increased. The stray dogs usually feed on the abattoir offal's and they will easily have access to the infected viscera of slaughtered animals because the abattoir control in most part of the country is poor and infected ofals usually not condemned(16). The infection rate in goats and cattle was lower than in sheep in both Sulaimani and Saedsadq. Cattle can be infected with the larval cestode, but cysts are usually sterile and degenerate, and thus propagation of the life cycle through these animals would not be expected (25). In Arbil (7) 1270 sheep, 550 goats and 320 cattle were examined at slaughterhouse for hydatid cysts and prevalence rates were found to be 15%, 6.2% and 10.9%, respectively .These findings are higher compared to the present study,may be attributed mainly to the elimination of stray dogs ,prevention of slaughtering out side the abattoirs, and the direct examination of carcasses by veterinarians ,which controlled by the local governor It was pointed out that in infected sheep, liver and lung were involved more than the infection of liver or lungs separately in both Sulaimani and Saedsadq (53%, 46.4%) respectively. In goats liver infection was more common than lung or liver and lung in both

areas, and in cattle liver was the only infected organ (PO.01). A study from Australia Hydatid cysts were mostly found only in the liver (11/15 Cattle). All liver cysts were degenerate. Cysts were locular and could be easily peeled out of the liver tissue (26).

In the Middle East, the most common location of hydatid cysts in sheep is the liver followed by the lungs (17,27,28,29). Cysts in cattle,baffole and goats were found mostly in lungs ( 14,30).Protoscolex formation from the germinal layer of hydatid cysts in natural primary infections of ***E. granulosus*** is of importance considering that it determines the fertility of the cyst, which should be considered both in diagnosis and therapeutic practice (31). In this study, the fertile cysts in sheep was significantly higher than in goats and cattle, in Sulaimani and Saedsadq (77.95%, 67.85%) respectively (PO.01).

The sterile cysts in cattle were higher than fertile in Sulaimani and Saedsadq (80%, 100%) respectively. The cysts are usually sterile and degenerate and thus propagation of the life cycle through these animals would not be expected (25). They were mostly found in livers in sheep (30).Not all hydatid cysts are fertile enough to produce brood capsules and protoscolices, and this depends upon host species and site of development (32).

The initial rate of development is fast as oncosphere recognition, and formation of laminated layers occurs within the first 14 days of infection (1). The developmental events that follow are slow and are thought to be affected by the strain of the parasite, species and strain of the host and the intensity of infection (33).

In this study, animals (more than 2 years old) were most infected, P<0.01 both in Sulaimani and Saedsadq. This is similar to the study of (17), in Jordan who conducted that; older animals had higher infection rates than younger ones. This can be explained by: 1- The older animals have more exposure time to the infected eggs. 2-The oncosphere has reached its final location in liver and lungs. It develops into the metacestode stage (primary cyst). The time for development of the cysts is variable and may take several months (6-12 months) (l).The developmental events of the cysts that follow are slow and are thought to be affected by the strain of the parasite, species and strain of the host and the intensity of infection (33). The rate of growth of the cyst is variable, but generally increase in diameter occurs by about 1 to 5 cm per year, depending on factors related to the type of infected tissue and animal species , but protoscolices formation may require more than one year (34).

**Table 1: Proportion of seropositive hydatid serological tests in Sulaimani and Saedsadq in human:**

| Serum Samples No. | ELISA Positive No. (%) | IHA Positive No. (%) |
|---|---|---|
| Sulaimani Total (372) | 9(2.4) | 5(1.3) |
| Saedsadq Total (164) | 6(3.7) | 5(3) |
| Total(536) | 15(2.8) | 10(1.9) |

P-value = 1

**Table 2: Proportion (%) human hydatid seropositive using ELISA according to age and sex in Sulaimani & Saedsadq:**

| | | Sulaimani | | | Saedsadq | | |
|---|---|---|---|---|---|---|---|
| | | Sample No. | positive | (%) | Sample No. | positive | (%) |
| Sex | Male<br>Female | 124<br>248 | 2 7 | 1.6<br>2.8 | 86<br>78 | 1<br>5 | 1.2 6.4 |
| | Total | 372 | 9 | 2.4 | 164 | 6 | 3.7 |
| Age ( year) | <20 21-30 31-40 41-50 >51 | 70 106 87 60 49 | 0 4 1 0 4 | 0 3.8 1.1 0 8.2 | 53 47 24 18 22 | 1 1 1 2 1 | 1.9 2.1 4.2 11.1 4.5 |
| | Total | 372 | 9 | 2.4 | 164 | 6 | 3.7 |

P- value = 0.20

**Table 3: Proportion and seropositive according to occupation in Sulaimani and Saedsadq:**

| | Sulaimani | | Saedsadq | |
|---|---|---|---|---|
| Occupation | No. | Positive No. (%) | No. | Positive No. (%) |
| House wives | 128 | 7(5.5) | 52 | 4(9.1) |
| Students | 64 | 0 | 47 | 2(4.1) |
| Farmers | 5 | 2(40) | 0 | 0 |
| Total | 197 | 9(4.6) | 99 | 6(6.01) |

P-value = 0.35

**Table 4: Distribution of hydatid cyst infection in slaughtered livestock in Sulaimani and saedsadiq:**

| | Sulaimani | | Saedsadq | |
|---|---|---|---|---|
| Animal | No. of Inspection | | No. of Inspection | Positive No. (%) |
| Sheep | 8200 | 127 (1.5) | 1118 | 84 (7.5) |
| Goat | 2581 | 13 (0.5) | 216 | 6 (2.8) |
| Cattle | 2289 | 5 (0.2) | 172 | 3 (1.7) |
| Total | 13070 | 145 (1.1) | 1506 | 93 (6.2) |

Pvalue = 0.001

**Table 5: Prevalence of infected animal organs:**

| | Sulaimani | | | | Saedsadq | | | |
|---|---|---|---|---|---|---|---|---|
| | Infection No. | Liver | Lung | Liver and Lung | Infection No. | Liver. | Lung. | Liver and Lung. |
| Animal | | No. (%) | No. (%) | No. (%) | | No. (%) | No. (%) | No. (%) |
| Sheep | 127 | 45(35.4) | 14(11) | 68(53.5) | 84 | 32(38.9) | 13(15.5) | 39(46.4) |
| Goat | 13 | 8(61.5) | 3(23.1) | 2(15.9) | 6 | 3(50) | 1(16.7) | 2(33.3) |
| Cattle | 5 | 5(100) | 0(0) | 0(0) | 3 | 3(100) | 0(0) | 0(0) |
| Total | 145 | 58(39.3) | 17(13.1) | 70(48.3) | 93 | 38(40.8) | 14(15.1) | 41(44.1) |

P-value = 0.025

**Table 6: Types of the Cyst (Fertile and Sterile) among the infected animals:**

| | Sulaimani | | | Saedsadq | | |
|---|---|---|---|---|---|---|
| Animal | Infection No. | Fertile No. ( %) | Sterile No. ( %) | Infection No. | Fertile No. ( %) | Sterile No. ( %) |
| Sheep | 127 | 99(78) | 28.0(22.5) | 84 | 57(67.9) | 27(32.1) |
| Goat | 13 | 6(46.2) | 7.0(53.9) | 6 | 2(33.3) | 4(66.7) |
| Cattle | 5 | 1(20) | 4(80) | 3 | 0(0) | 3(100) |
| Total | 145 | 106(73.1) | 39(26.9) | 93 | 59(63.4) | 34(36.56) |

P-value = 0.01

**Table 7: Relation of Hydatid Cyst infection with animal's age:**

| | Sulimania | | | Saedsadq | | |
|---|---|---|---|---|---|---|
| | | Age (years) | | | Age (years) | |
| Animal | Total Infection | <2 No. (%) | >2 No. (%) | Total Infectio n | <2 No. (%) | >2 No. (%) |
| Sheep | 127 | 33(26) | 94 (74) | 84 | 35(41.7) | 49(58.3) |
| Goat | 13 | 3(23.1) | 10(76.9) | 6 | 1(16.7) | 5(83.3) |
| Cattle | 5 | 1(20) | 4(80) | 3 | 0 | 3(100) |
| Total | 145 | 37(25.5) | 108(74.5) | 93 | 36(38.7) | 57(61.3) |

P-value = 1

**Table 8: Number of the Cyst in each infected animal in Sulaimani and Saedsadq:**

| | Sulaimani / No. (%) of cyst | | | | Saedsadq / No. (%) of cyst | | | |
|---|---|---|---|---|---|---|---|---|
| Animal | Infected No. | <5 | 5-10 | >10 | Infected No. | <5 | 5-10 | >10 |
| Sheep | 127 | 16(12.6) | 51(40.2) | 60(47.2) | 84 | 6(7.1) | 19(22.6) | 59(70.2) |
| Goat | 13 | 2(15.4) | 5(30.8) | 6(46.2) | 6 | — | 2(33.3) | 4(66.7) |
| Cattle | 5 | 3(60) | 2(40) | — | 3 | 1(33.3) | 2(66.7) | • — |

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