The Human Seroprevalence of *Echinococcus Granulosus* in Sulaimani Governorate

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ABSTRACT:

BACKGROUND:

Hydatidosis is one of the major zoonotic diseases that cause considerable economic losses and public health problems worldwide. This study was conducted in order to determine the seropositive aspect of hydatid disease among people in Sulaimani.

OBJECTIVE:

To determine the Seroprevalence of hydatid disease among people in Sulaimani and it's relation with age, Gender, occupation and education level.

MATERIALS AND METHODS:

Two areas of Sulaimani governorate (the Sulaimani city center and Saedsadq as a rural area) were investigated from April to October 2007. In Sulaimani 372 subjects, 248 were females and 124 were males. In Saedsadq 164 subjects, 78 female and 86 males were randomly collected.

A Seroepidimiological survey was conducted by using two methods; a- enzyme-linked immunosorbent assay (ELISA), and b- Indirect Haemagglutination (IHA) test to detect anti *Echinococcus granulosus* antibody. There were no significant differences between the Seropositivity by the two tests (P > 0.05).

RESULTS:

The Seropositivity in Saedsadq was (3.7%) higher than in Sulaimani (2.4%). The Seropositivity in females (2.8%, 6.4%) was higher than in male (1.6%, 1.2%) both in Sulaimani and Saedsadq respectively.

There was no statistically significant difference between different age groups.

There were no significant differences (P> 0.01) between the seropositive cases and different occupations in both areas.

Our results implied that the prevalence of Cystic Echinococcosis (CE) had significant relationship with the level of education. Among 15 infected persons in Sulaimani and Saedsadq 9(60%) were illiterate.

CONCLUSION:

Seropositivity for hydatid disease was significantly higher in Saedsadq (3.7%) than Sulaimani city (2.4%), also it was significantly higher among female, housewife, and illiterate persons.

KEY WORDS: *echinococcus granulosus*, ELISA.

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 reservoirs for the disease in humans [1]. Infection of humans occurs during the natural transmission of the parasite between the definitive hosts and domestic livestock intermediate host [2].

The disease is widespread globally. It causes a series of health problems for humans and animals in many countries in the world. Hydatidosis is one of the important and serious diseases in the world

because the migration of infected people and exchange of livestock, and more prevalent in rural areas because of a closer relationship between intermediate hosts and final hosts such as dogs [3].

Diagnosis of Cystic Echinococcosis is based currently on identification of the parasite's structures by imaging techniques, including ultrasound, computerized tomography and magnetic resonance imaging[4] .However, imaging techniques are relatively complex, do not always offer a good prospect for early diagnosis, and produce data that are sometimes difficult to interpret, being often confused with those from abscesses and neoplasm. In addition, imaging technology is not always available in developing countries with inadequately equipped medical

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facilities [5,6]. Clinical symptoms do not appear until the larva of the parasite has reaches a certain size, which normally requires many years after the primary infection. Therefore, the clinical diagnosis is based only on assumption, and needs specific tests, For these reasons, serological methods using ELISA are important not only for confirmation of CE case, but also to differentiate hydatidosis from other cystic lesions and tumors [7,8], also for epidemiological studies in endemic areas. Serological techniques are also very useful for the follow-up of patients after surgical or pharmacological treatment [9,10].

In many countries including Iraq hydatidosis is important both to human and animal health, because of the morbidity and occasionally mortality cases by the infection of humans with this disease.

The aim of this study is to assess the prevalence of human hydatidosis in two different areas in Sulaimani governorate which include Sulaimani city and Saedsadq district.

MATERIAL AND METHOD:
Setting:
After achieving agreement of the ethical committee, two areas in Kurdistan region were selected for the study, Sulaimani city and Saedsadq district.

Study Design:
It was across sectional survey.

Study Duration:
From April to October 2007.

Sample Size:
There was 536 subjects included in the study, 372 samples from Sulaimani and164 samples from Saedsadq were collected.

Data collection Procedures:
The study conducted using a simple random sampling from the primary health centers. An informed consent was taken from all participants in the study.

For each participant, a questionnaire designed to obtain information regarding demographics data including age, sex, dog contact, occupation and educational level.

From each participant, 3ml. venous blood samples withdrawn and transferred into conical centrifuge tubes, then centrifuged for 5 minutes at (450 rpm), the obtained serum was labeled, and stored at -20 Cº until used.

We used two Serological tests, ELISA and IHA, for detecting specific anti *Echinococcus granulosus* antibodies in patients' sera.

ELISA used was (Echinococcus ELISA IgG- IBL-Hamburg, Germany –RE 56201) kit.

IHA test, using commercial kits prepared by (Echinococcus fumouze diagnosis –France).

Reactions of IHA assessed as either;

1-**Positive Reaction**: Haemagglutination, Presence of a reddish-brown carpet in well bottom sometimes, presence of a thin peripheral ring.

2-**Negative Reaction:** No haemagglutination Presence of more or less wide ring in well bottom.

Statistical analysis:
The data were analyzed with (chi-square) test; the level of significance was set at $P < 0.05$ (11, 12).

RESULTS:
In Sulaimani, 9 (2.4%) and 5 (1.3%) were seropositive, While in Saedsadq 6 (3.7%), 5 cases (3%), were seropositive by ELISA and IHA tests respectively.

Statistically, there were no significant differences between the two different tests P =1 Table-1

Table 1: Seroprevalence of Hydatidosis in Sulaimani and Saedsadq By ELISA and IHA methods.

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)

df = 1
X^2 = 0.24   P-value = 1

The outcomes of both tests (ELISA, IHA) are shown in table 2. The sensitivity of IHA was 33.3% and specitivity of 99.04%. That means that we can exclude with confidence the condition by combination of these two methods because the negative predictive value was very high 98.09 %.

Table 2: The Results of ELISA and IHA tests

IHA	ELISA		Total
	Positive	Negative	
Positive	5	5	10
Negative	10	516	526
Total	15	521	536

In Sulaimani, 7 females (2.8%) and 2 males (1.6%) were seropositive.

In Saedsadq, 5 female (6.4%) and 1 male (1.2%) were positive by ELISA test, Table-3.

Table 3: Seropositivity of Hydatidosis by ELISA due to Gender.

Gender	Sulaimani			Saedsadq		
	Sample No.	positive	(%)	Sample No.	positive	(%)
Male	124	2	1.6	86	1	1.2
Female	248	7	2.8	78	5	6.4
Total	372	9	2.4	164	6	3.7

P-value = 0.02

Age of the participants ranged between 2-80 years, with the average age of 33.5 years in Sulaimani and 30.8 years in Saedsadq.
In Sulaimani, out of the nine positive cases, the highest rate, 4 (8.2%) were found among age groups above 51 years, followed by the age group 21-30 years with 4(3.8%) positive cases .
In Saedsadq among the age-group 41-50 years 2 cases(11.1%) were positive,   There were no significant differences in Seropositivity among different age groups (P= 0.20) Table-4

Table 4: Seropositivity of Hydatidosis among different Age groups by ELISA.

Age (year)	Sulaimani			Saedsadq		
	Sample No.	positive	(%)	Sample No.	positive	(%)
≤ 20	70	0	0	53	1	1.9
21-30	106	4	3.8	47	1	2.1
31-40	87	1	1.1	24	1	4.2
41-50	60	0	0	18	2	11.1
> 51	49	4	8.2	22	1	4.5
Total	372	9	2.4	164	6	3.7

df = 4 $X^2 = 6.25$ p-value = 0.20

Despite no significant differences found between seropositivity and the participant occupation, most positive cases were among housewives, In Sulaimani 7 (5.5%) and in Saedsadq 4 (3.3%) positive subjects were housewives as shown in table-5.

Table 5: Seropositivity of Hydatidosis by ELISA among different occupation.

	Sulaimani		Saedsadq	
Occupation	No.	Positive No. (%)	No.	Positive No. (%)
House wives	128	7(5.5)	50	4 (10)
Students	64	1(1.5)	40	2 (5)
Farmers	5	2(40)	9	0
Total	197	9(4.6)	99	6 (6.01)

df = 1 $X^2 = 4.39$ p-value = 0.35

DISCUSSION:

This cross sectional study, as far as authors' knowledge, is the first Cystic Echinococcosis (CE) related serologic population-based study carried out in this part of the Kurdistan. Two area, Sulaimani city and Saedsadq in Sulaimani province were covered.

Two serological tests were used for the diagnosis of human hydatidosis, the ELISA and IHA test for determining antibody against CE. The sensitivity of IHA was 33.3%, while the specificity was 99.04%. This means that IHA was fairly sensitive and highly specific. The positive predictive value was 50%, and Negative predictive value was 98.09 % as shown in table-2.

The Seroprevalence results by ELISA and IHA were (2.4%, 1.3%) in Sulaimani and (3.7%, 3%) in Saedsadq respectively, All ELISA negative samples were IHA negative.

A study in (Tabriz-Iran), conducted to evaluate the efficacy of two techniques used for the serological diagnosis of human hydatid disease the (IHA) and (ELISA). The sensitivity, specificity, for IHA test were 90%, 91% respectively and for ELISA test they were 96%, 100% respectively. These results showed that although both IHA and ELISA had similar results, but ELISA was a better test for initial screening of suspected cases of human hydatidosis and was more acceptable due to its higher sensitivity, specificity and simplicity in practice [13]. This is similar to the current study, so the researcher decided to rely on the ELISA results in the discussion.

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 state, lower income, limited education, livestock ownership, home slaughterhouse and stray dogs. It is known that stray dogs and guard dogs are common in the rural and semi rural area [14].

In Basra-Iraq, a Seroepidimiological study, ELISA method was used to screen for IgG antibodies in humans, the study was conducted in 3 areas; (rural, urban and semi rural). The prevalence of hydatidosis was (23%, 35.5%, and 35.5%) respectively, these results are much higher than this study, and the prevalence rates was high in a semi rural area, which is similar to this study [15].

In this study, the seropositivity among female was significantly higher (P = 0.023) than in male probably because women are more involved in farming and herding livestock, as well as more likely to have contact with dogs or contaminated vegetables during food processing and preparation, and increased susceptibility of female to Echinococcus infection (16).

The age of CE seropositive participants ranged from 20-80 years. There was no statistically significant difference between age groups. (P = 0.20). Ages above 50 years were more seropositive (4 cases), probably because of longer exposure period. CE occurs in age groups from younger than 1 to over 75 years. In some areas of endemic infection, most hospital cases are recorded in the age groups between 21 and 40 years [17]. Hepatic 1cysts 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 [18].

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, which is comparable to our results [19], While a study from Basra showed that there were no significant differences in the rate of infections between males and females in any area except for a significantly higher prevalence of hydatidosis among males 24.0% compared with females 15.2% in city center [15].

A study from Iran recorded the highest infected cases observed in age group of 20-40 years old.

70% of infected cases were female; most of them were housewives [20].

In this study Housewives were more likely to be seropositive among different occupation both in Sulaimani and Saedsadq (5.5%, 9.1%) respectively. Housewives are usually responsible for home, and in the semi rural area the seropositive were higher because the lifestyle is different, including feeding, and milking livestock. Thus, women and girls may have more opportunity to be exposed to Echinococcus- infected dogs and the contaminated environment. This is similar to another study conducted in Arbil [21].

The prevalence of Cystic Echinococcosis had significant relationship with the level of education. Among 15 infected persons in Sulaimani and Saedsadq 9(60%) were illiterate, this finding support the relation between personal knowledge, hygiene and chance of getting infection.

Hydatid disease is preventable, and education is one of the most effective tools to achieve this. It is important that health authorities take a responsible attitude towards increasing community awareness, and implement control strategies through education [22].

CONCLUSION:

Seropositivity for hydatid disease was significantly higher in Saedsadq (3.7%) than Sulaimani city (2.4%), also it was significantly higher among female, housewife, and illiterate persons.

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