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Assessment the relationship between the chemical components and the fate of hepatic hydatid cyst among infected human samples

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Abstract

This study was designed to find the relationship between chemical component of some elements in blood serum and hepatic cyst fluids in infected patients with hepatic hydatid cyst with respect to age and gender. Twenty serum sample were collected from patients before operative and other twenty serum samples were collected from patients after at least one year of operation surgery (removing of hydatid cyst), microscopic examination were done and estimation of some biochemical analyses including Sodium, Potassium, Glucose and Triglyceride in blood serum of the patients. The results found that age from (40-49) years was highly infected with hepatic hydatid cyst than other aged and females showed highly percentage than males, rural residence showed highly percentage than urban, the results also revealed highly concentration of Calcium, Magnesium and Potassium in patients' serum before operation than cyst fluid. Sodium and glucose also showed highly in hepatic hydatid fluids than serum of the patients. No differences was found in the concentration of Calcium, Magnesium, Potassium, and Sodium in healthy control patients serum after at least one year of operation while a significantly highly level of Triglyceride and glucose were found in serum of non healthy patients after at least one year of operation.

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Introduction

Hydatid disease is a parasitic infestation by a tapeworm of the genus *Echinococcus* with wide world distribution of the disease, the epidemiological situation of this parasite is complicated with endemic area which exhibit different degrees of infectivity to certain intermediate hosts. (Abdullah 2010).

Clinical signs and symptoms of the disease depend on the location of the cyst (Carmena and Cardona 2013). The cyst of *Echincococcus* can undetected for many years due to the slow growing and development and the response of the host immune system (Siracusano *et al.,* 2009).

The relationship between parasite and host is very important for understanding how parasites can grow in the body and what are the requirements of parasite can assist in understanding the ways for prevention of the parasitic infection (Mazzocco 1923).

Hydatid cyst fluid is an important component of the internal environment and fills the entire cyst, it's composed of many organic and nonorganic materials, and the cyst forms a relatively stable internal environment to avoid damage to the larvae from the host immune system. (Thompson and Lymbery 1995; Juyi *et al,* 2013).

Sometimes Differences in the biochemical composition of hydatid cyst fluids suggest the possible existence of more than one strain of *Echinococcus granulosus* in human (George and Rima 2002) , significant values in the protoscolices (Sharif *et al.,* 2004).

The aim of this study was Estimation the concentration of some electrolytes and chemical elements in fluids of hepatic cyst fluids and serum of the patients before and after at least one year of operation done.

Materials and methods

Study of group

The designed study was conducted during the period from July 2017 to September 2018 on 40 subjects attending General Surgeon Department of Baghdad Teaching Hospital at Medical City, Baghdad province, which included twenty patients (15 female, 5 male) and twenty healthy control(10 female, 10 male), their ages ranged from 39 to 50 years, inhabitants the urban and rural areas. History information was taken from the patient directly and arrange in an informative clearly detailed formula sheet including: name, age, gender, medical history and type of residence.

Twenty serum sample were collected from patients before operation and other Twenty serum sample collected from other patients after at least one year surgery operation done, microscopic examination was done and some biochemical analyses were also used for estimation of sodium, potassium, Magnesium, calcium glucose and triglyceride in hydatid cyst fluid and serum of patients studied.

Sampling

Ten ml from hepatic hydatid cyst fluid on the drown by surgeon in operative room, separated by centrifuged at 3000 rpm for 3 min. and then eight ml from supernatant was taken in sterilized plane tube, and then stored at -70.

Five ml of venous blood were collected from 20 patients suffer from echinococcosis and other 20 samples from healthy control humans separated by centrifuged at 5000 rpm for 5 min. and then 2ml serum was taken in sterilized plane tube, and then store at -20C. Chemical elements and electrolytes were measured estimation of electrolytes (Sodium, Potassium, Magnesium and calcium) by using flam photometer assay according to method by (Fraihat and Bahgat 2013) and biochemical compositions, Triglyceride, Glucose also measured calorimetrically on a wave length ranged between (500-620) nm according to method by (Kurilenko and Kostyreva 2016).

Statistical analyses

Statistical analysis was carried out with the SPSS software, after translating data into codes, suitable statistical methods were used in order to analyze and assess the results.

Results

The results of this study where presented in three tables, (Table 1) presented significant differences between data, ages from (40-49)years showed highly percentage(50%) than other age , number of females showed highly percentage (75%) than males (25%), while rural residence shows highly percentage (75%) than Urban (25%).

Table 1. The Frequency distribution of individuals studied.

Data		Count	Column N %
Age	<30	3	%15
	49-40	10	%50
	> 50	7	35%
Gender	Male	5	%25
	Female	15	75%
Residency	Urban	5	%25
	Rural	15	75%

Table (2) summarized the mean and standard error of the concentration of (Calcium, Magnesium, Potassium, Glucose, Triglyceride and Sodium) in the patient serum before operation and cystic fluid and showed highly mean of Calcium (9.05±.15), (7.58± .42), Magnesium (2.01± .06), (1.32± .09), Potassium (4.51± .13), (24.62±2.76) and significantly different at (P.Value≤0.005) the hydatid cyst fluid contained highly concentration of Potassium than serum (24.62±2.76), (4.51± .13), Sodium and glucose also showed significant differences highly and mean of the concentration of sodium and glucose (138.60± .90), (201.25±17.19), (92.05± 2.77), (76.31± 4.37) in cyst fluid and serum before operation at P.Value≤0.002, 0.004 ,significant differences was also noticed in the mean of concentration of Calcium in hydatid cyst fluids and serum of the patients (7.58±.42), (9.05±.15) at P.Value≤0.003 No significantly differences showed in mean of Calcium, Magnesium, Potassium, Sodium in the patients serum after at least one year of operation and healthy individuals(9.05±0.15,9.17±0.13),(2.01±.06,2.09±0,06),(4.51±0.13,4.63±0.08),(138.60±.90,139±0,6),whie significantly differences were also showed in the mean and SE of Triglyceride in serum of patients after at least one year of operation and healthy group (173.30± 8.2986.4±2.02)), (100.35± 2.18 ,173±8.29) at P. value ≤0.005 the mean of glucose concentration showed also significantly differences),(92.05±2.77) in serum of patients after operation compared with healthy control individuals.

Table 2. The mean and standard error of the concentration of (Calcium, Magnesium, Potassium, Glucose, Triglyceride & Sodium) in hepatic cyst fluids and serum of the patients before operation.

	Media				
Type	Serum		Cyst fluid		P-Value
	Mean	SE	Mean	SE	
S. Ca. mg/dl	9.05	.15	7.58	.42	0.003*
S.Mg. mg/dl	2.01	.06	1.32	.09	0.005*
S. K. mmol/L	4.51	.13	24.62	2.76	0.005*
S. Glucose mg/dl	92.05	2.77	76.31	4.37	0.004*
S.TG. mg/dl	173.30	8.29	162.15	12.77	0.468
S. Na mmol/L	138.60	.90	201.25	17.19	0.002*

Discussion

Biochemical substances play a major role in the metabolism, physiology of the cystic echinococcosis. The quantitative differences in the metabolism of *Echinococcus granulosus* and variation in the biochemical composition of hydatid fluids reflect strain variation in different intermediate host. (McManus and Macpherson1984).

Table 3. The mean & standard error of the concentration of Calcium, Magnesium, Potassium, Glucose, Triglyceride & Sodium in serum sample of the patients after at least one year of operation (removal of hydatid cyst) and healthy control studied.

	Group				
Type	Patient serum		Control serum		P-Value
	Mean	SE	Mean	SE	
S. Ca mg/dl	9.05	.15	9.17	.13	0.510
S. Mg mg/dl	2.01	.06	2.09	.06	0.346
S. K mmol/L	4.51	.13	4.63	.08	0.417
S. Glucose mg/dl	92.05	2.77	86.40	2.02	0.107*
S. TG. mg/dl	173.30	8.29	100.35	2.18	0.005*
S. Na. mmol/L	138.60	.90	139.95	.60	0.222

The distribution of infection by echicococcusis showed that population between (40-49) was more frequent more incidence from other group studied, this result disagree with (Sadjjadi 2006) and explained that these age groups were the most active worker group the result agree with (Rasha 2014) who considered that the infection more prevalent in old age, hydatidosis is a disease of long incubation period (20-30) years and accordingly a wide range of ages was obvious in infected patients.

The distribution of the incidence of hydatid cyst according to the area, showed, that the infection in urban area was less than the in the rural area in all group studied, these results agree with (Ammann and Eckert 1996; Vultton 2003) , (Siddharth *et al.,* 2012) and other modern study in who established that rural and Bedouin areas higher in infection by hepatic hydatid cyst of the due to herds of sheep are commonly accompanied by several dogs which are in strict contact with children, increasing their exposure to this parasite. Furthermore, it's a habit by villagers, young and adults, to eat leafy plants such as mallow (*Malva parviflora*).

The level of Sodium and Potassium with highly concentration in cyst fluid when compared with normal range value in serum of patients before operation since Na is the major extracellular substance, the highest Na concentration was observed in hepatic cyst fluid. While Potassium is the major intracellular substance, Potassium concentration in protoscoleces two folds than cyst fluid, when compared with its concentration in serum of healthy control, these results agree with (Frayha and Haddad 1980) the presence of Sodium and Potassium was very essential to maintain the growth of protoscoleces, to protect the osmolarity of the hydatid cyst.

The concentration of Calcium in cyst fluid was much lower than Sodium, Potassium in serum of patients before operation which agreement with the other study by (Radfar and Iranyar 2004) who decided that concentration of Potassium in the cyst fluid was slightly lower than in serum of patient. The presence of Calcium in the hydatid cyst fluid is of vital important since it prevent elevation of the hydatid cyst fluid acidity (Rahdar *et al.,* 2008).

The concentration of Magnesium in cyst fluid was much lower than in serum of patients, but with the normal references ranges this agree with (Bernath *et al.,* 1985) who documented that Magnesium had

narcotic action on the body activities, it may be due to parasite demand to electrolyte for production of calcareous body in cyst (Vidro *et al.,* 1985).

In this study also noticed, the concentration of glucose in the cyst fluid of patients was mild lower than those in human serum before operation and agree with (Juyi *et al.,* 2013), this may due to the consumption of glucose by the protoscoleses in nourishment processes.

Triglycerides showed normal concentration in the patient serum before operation and cyst fluid, this agree with (Mohmood and Al Janabi 2009) and disagreement with (Walkey and Fairbrain 1973) who considered that the triglyceride was in high concentration in the hydatid cyst. This variation in the values of chemical elements had significant role in the intensity of the disease.

In this study also noticed, the concentration of glucose in the cyst fluid of patients was mild lower than those in human serum before operation and agree with (Juyi *et al.,* 2013), this may due to the consumption of glucose by the protoscoleses in nourishment processes.

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