

LEVELS OF LIVER ENZYMES IN PATIENTS WITH HYDATID DISEASE

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ABSTRACT:

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Received: 09/01/2024

Accepted: 23/02/2024

Online ISSN: 2735-3540

Background: Hydatid cyst infection is a serious disease that affects humans who come into touch with the infective stage of the tapeworm *Echinococcus granulosus*, which is found all over the world. Echinococcosis is a zoonotic infection caused by the larvae of the Cestoda genus *Echinococcus*.

Aim of the Work: This research examines the demographic features, clinical manifestations, and treatment of hydatid cyst of the liver (HCL) within the context of a tertiary care center in Iraq. The primary objective of this research is to provide doctors with valuable insights into the epidemiology and clinical presentation of the illness within the context of a developing nation.

Participants and Methods: This study included 50 patients with liver hydatid cyst diagnosed clinically and surgically a specialized consulting physician confirmed the presence of hydatid cysts in the liver using clinical and surgical means. They ranged in age from ten to seventy-five. From January to October of 2023, these individuals were seen during the general surgery consultations at Al-Sadr Hospital in AL_Najaf, of the 50 liver patients analyzed, 34 had cysts larger than 5 cm, whereas 13 had cysts less than 5 cm. These two groups were then divided further according to cyst size. The degree and kind of illness were used to categories the patients; 31 had the Control Group, which consists of twenty-five individuals who are free of hydatid cyst disease. The liver function was directly affected by the hydatid cyst infection, which led to a significant rise in GOT, GPT, and ALP levels. As a result, there was an increase in total bilirubin in the patients' serum compared to the control group. This trend was also observed in secondary infections compared to primary ones. Patients with a cyst size greater than 5 cm had significantly higher levels of the aforementioned markers than those with a cyst size less than 5 cm, suggesting a disruption in liver functions in those individuals. Patients with hydatid cysts had significantly higher blood total bilirubin levels than the control group and patients with primary and secondary infection, according to the findings of the study's total bilirubin level measurement.

Results: The outcomes of individuals with hydration cysts that are bigger than 5 cm have also shown some variation. There are a few possible explanations for this increase: damage to the liver cells, the cyst's size (which puts more pressure on the cells), or the cyst's closeness to the bile ducts, which makes the liver less efficient at what it does.

Conclusion: Patients with a cyst size greater than 5 cm had significantly higher levels of the aforementioned markers than those

with a cyst size less than 5 cm, suggesting a disruption in liver functions in those individuals. Patients with hydatid cysts had significantly higher blood total bilirubin levels than the control group and patients with primary and secondary infection, according to the findings of the study's total bilirubin level measurement.

Keywords: liver enzymes, Hydatid cyst, bilirubin.

INTRODUCTION:

The occurrence of a hydatid cyst of the liver (HCL) is mostly attributed to the parasitic tapeworm *Echinococcus granulosus*, and it represents a noteworthy public health concern in underdeveloped countries such as Iraq. However, this issue has received little attention and resources. According to research conducted by the World Health Organization (WHO) in 2010⁽¹⁾.

The estimated occurrence of cystic echinococcosis for 100,000 individuals in Iraq was 0.8, with a 95% uncertainty range ranging from 0.2 to 2. However, quantifying the impact of HCL in Iraq poses challenges due to many factors. The total frequency of the illness is significantly underestimated in several epidemiological studies and series due to the absence of comprehensive investigations and surveys that cover the full population at risk. Furthermore, it has been observed that the Health Management Information System, that acts as the official surveillance system for the Government of Iraq, has a tendency to inaccurately record or underreport data pertaining to parasitic zoonosis, such as HCL, in an incomplete manner⁽²⁾.

Notwithstanding these limitations, a research conducted by⁽²⁾ shown that cystic echinococcosis ranked third, behind neurocysticercosis as well as congenital toxoplasmosis, in terms of disability-adjusted life years among parasitic zoonosis in the Middle East over the period from 2010 to 2021⁽³⁾.

The life cycle of *Echinococcus* include a definitive host, often canines, an intermediate host, which may include sheep, goats, or cattle, and sometimes an accidental host, namely humans. According to available reports, the prevalence of *E. granulosus* infection among domestic dogs in Iraq is estimated to range from around 2% to 5%⁽⁴⁾.

The act of slaughtering domestic animals and providing them with uncooked offal as a source of nutrition is a widely observed convention. The excretion of eggs in faecal matter has the potential to contaminate other environmental elements, such as food sources, hence serving as a potential mechanism of transmission to human individuals. The clinical presentation of *Echinococcus* infection is contingent upon the location and dimensions of the cyst⁽⁵⁾.

During the first stages, the infection has the potential to stay asymptomatic, particularly when the cyst is of a small size. Over time, as the illness advances, hydatid cyst of the liver (HCL) may manifest with symptoms such as epigastric or right upper quadrant stomach discomfort, nausea, vomiting, and hepatomegaly. The use of imaging investigations, in conjunction with immunodiagnostic methods, often aids in the establishment of a diagnosis. Ultrasonography (USG) is often used as the primary imaging modality because to its ease of use, widespread accessibility, affordability, and ability to provide valuable information on the quantity, location, dimensions, and viability of cysts⁽⁶⁾. Antibody tests have the potential to enhance the credibility of the preliminary imaging diagnostic.

Nevertheless, it is important to note that a negative serologic test for echinococcosis does not often definitively exclude the presence of the disease. Computed tomography (CT) scanning and magnetic resonance imaging (MRI) are imaging techniques that may be used to identify deep-seated lesions and assess the size and status of avascular fluid-filled cysts⁽⁷⁾.

Various therapy modalities are available for the management of hydatid cyst of the liver (HCL), including surgical interventions, percutaneous techniques, pharmacological interventions, and a watchful waiting strategy. The conventional and widely accepted approach for definitively managing HCL is by surgical excision of the cyst⁽⁸⁾.

Nevertheless, other therapy techniques such as cyst puncture, injection of chemicals, aspiration, and respiration (PAIR) have increasingly complemented and, in some instances, even supplanted surgery as the preferred treatment option. The use of albendazole in conjunction with chemotherapy has been seen to decrease the incidence of recurrence, making it a frequently employed adjunctive therapy⁽⁹⁾.

AIM OF THE WORK:

This research examines the demographic features, clinical manifestations, and treatment of hydatid cyst of the liver (HCL) within the context of a tertiary care center in Iraq. The primary objective of this research is to provide doctors with valuable insights into the epidemiology and clinical presentation of the illness within the context of a developing nation

PATIENTS AND METHODS:

Study categories are divided into two main groups. The first group consists of patients: This group includes 50 individuals who were clinically and surgically verified to have hydatid cysts in the liver by

a specialized consulting physician. Their ages varied from 10 to 75 years. They are a group of patients that attended Al-Sadr Hospital's general in AL_Najaf surgery consultation from January 2021 to October 2021.

The liver patients (50 in total) were separated into two groups depending on the size of the cysts, with 34 and 13 patients having cysts bigger than 5 cm. They were also separated into 31 and 14 patients with original infection and 14 patients with secondary infection, based on the kind and severity of the condition. The second group is the Control Group, which comprises of 25 healthy persons who do not have hydatid cyst illness.

Blood Sample Collection:

Blood samples were taken from infected people's veins using a disposable plastic syringe of 10 milliliters for each subject in the two research groups. The blood was split according to the requirements of the tests under consideration, and the serum was isolated and stored until use. The colorimetric approach was used to assess the efficacy of the AST and ALT enzymes, using specific equipment designed by L.B. German Bohle. The activity of the enzyme alkaline phosphatase ALP was also tested, as was total serum bilirubin, using specific equipment developed by the Tunisian firm Biomaghrab for this purpose.

Statistical Analysis:

The statistical analysis of the results of the current study was conducted using the Statistical Package for the Statistical Program Social Science (SPSS 26). The average and standard error were extracted for all parameters of the study, and a one-way ANOVA test was used, as well as using the Least Significant Difference (LSD) of 0.05 and 0.01 to evaluate the differences between the study groups.

Ethical consideration:

Ethical approval was granted by Al-Sadr Hospital Consent form was obtained

from the patients for the purpose of this control case study 887/27/7 [14/3/2023].

RESULTS:

Upon doing an analysis of the infected instances within the research sample, it was determined that the initial infection rate accounted for around 62.19% Table (1) of the aforementioned sample. Also as shown in the table below Table (2) and Table (3) the secondary infection rate of around 31.81%.

AST Enzyme Activity:

The results shown in Table (4) indicate that there are significant differences with a probability ratio greater than 0.05 in the effectiveness of the AST enzyme in patients (0.43 ± 14.29 units/l). The statistical analysis of the results showed that there is a significant difference between patients with cysts of size less than 5 cm (0.22 ± 8.34 units/l) and among patients with cysts larger than 5 cm with a probability of less than 0.05, as indicated in the table below (4). The results also showed that there were significant differences when comparing patients with a primary infection with a rate of (0.53 ± 15.31) units/liter compared to patients with a secondary infection that had a rate of (0.56 ± 13.29) units/liter Table (6).

ALT Enzyme Activity:

The statistical analysis showed that there were significant differences in the level of the ALT enzyme in patients by (0.44 ± 16.51 U/L), compared to the control group, which was equal to (0.17 ± 7.712 U/L) as indicated in Table (4). It was also concluded that There are significant differences in the activity of the enzyme with a probability score of less than 0.05 when comparing patients with cysts with a size of 5 cm (0.71 ± 13.72 units/l) and patients with cysts with a size larger than 5 cm (0.39 ± 16.71 units/l) as indicated in the table (5). Table(6)

indicates that there is a significant difference with a probability of less than 0.05 for the activity of the enzyme in patients with primary infection (0.46 ± 14.52 units/L) compared to patients with secondary infection, and the percentage was (0.37 ± 18.69 units/L).

ALP Enzyme Activity:

The results shown in Table (4) indicate an increase in the ALP level in patients by (7.56 ± 96.33 units/l) compared to the control group, which amounts to (3.19 ± 53.13 units/l). The difference gained statistical significance of less than 0.01, and significant differences appeared for the level of ALP effectiveness in patients with cysts whose size was less than 5 cm (5.33 ± 89.43), compared to patients whose size of cysts was greater than 5 cm (9.29 ± 132.1 units/l), as in Table (5). Significant differences also appeared for patients with primary infection (5.88 ± 97.12), compared to those with secondary infection (16.88 ± 143.51), as shown in Table (6).

Total bilirubin level (TSB):

The results in Table (4) show that there was an increase in the level of TSB in patients by (0.51 ± 10.36 micromol/L) compared to the level of the control group (0.21 ± 6.64 micromol/L), and this difference gained a significant difference with a probability of less than 0.05. Significant differences also appeared in patients with cysts less than 5 cm in size (0.49 ± 9.32 micromol/l) compared to patients whose cysts were larger than 5 cm, which amounted to (0.71 ± 12.56 micromol/l) as indicated in Table (5). When comparing the TSB rate among patients with primary infection, which amounted to (0.41 ± 11.43 micromol/L) with patients with secondary infection (0.73 ± 15.47 micromol/L), there were clear significant differences with a probability of less than 0.05, as shown in Table (6).

Hydatid disease and liver enzymes

Table 1: Distribution of patients with hepatic Hydatid cysts according to type of infection and gender.

Type of infection	sex		Total
	Male %	Female %	
Primary infection	9	19	62.19% (28)
secondary infection	8	14	31.81%. (22)
Total	17	33	50

Table 2: Distribution of patients with hepatic hydatid cysts according to the location of the cyst in the liver.

Location of the cyst in the liver	sex		Total
	Female %	Male %	
Right lobe	22	13	84.12% (35)
Left lobe	10	5	15.88%. (15)
Total	32	18	50 (100%)

Table 3: Patient distribution with hepatic hydration cysts stratified by cyst size.

size of cysts	sex		Total
	Female %	Male %	
less than 5 cm	11	4	15 (31.5%)
larger than 5 cm	25	10	35 (69.5%)
Total	36	14	50 (100%)

Table 4: The level of liver enzymes and total bilirubin in the serum of patients with hepatic cysts and controls.

Size of the cysts	No	Liver functions			
		AST * Unit/liter	GPT* Unit/liter	ALP* Unit/liter	T.S.B* Unit/liter
Patient group	50	0.43± 14.29	0.44± 16.51	7.56± 96:33	0.51± 10.36
Control Group	25	0.22± 8.34	0.17± 7.712	3.19±53.13	0.21± 6.64

Table 5: The level of liver enzymes and total bilirubin in the serum of patients with hepatic hydration cysts, depending on the size of the cyst.

Size of the cysts	No	Liver functions			
		AST * Unit/liter	GPT* Unit/liter	ALP* Unit/liter	T.S.B* Unit/liter
Less than 5 cm	19	0.59± 13.75	0.71± 13.72	5.33± 89.43	0.49± 9.32
Larger than 5 cm	31	0.53± 15.31	0.39± 16.71	9.29±132.1	0.71± 12.56

Table 6: The level of liver enzymes and bilirubin in the serum of patients with hepatic hydatid cysts depending on the type of infection.

Size of the cysts	No	Liver functions			
		GOT * Unit/liter	GPT* Unit/liter	ALP* Unit/liter	T.S.B* Unit/liter
Primary Infection	29	0.44± 12.93	0.46± 14.52	5.88± 97.12	0.41± 11.43
Secondary Infection	21	0.56± 13.29	0.37± 18.69	16.88±143.51	0.73± 15.47

DISCUSSION:

The liver is considered one of the most important organ accessories to the digestive system. It performs many vital functions in

the body. In this study, we focused on one of the most important diseases to which the liver may be exposed, which is hepatic hydatid cysts⁽¹¹⁾. This study showed results indicating that the infection rate in the liver

is higher than in other organs. The injury rate in the right lobe was higher than the injury rate in the left lobe⁽¹²⁾.

The reason behind this may be due to the large size of the right lobe of the liver, which is higher than the left lobe. The reason may be the responsibility that falls on the right lobe, which supplies the largest percentage of blood in the human body, and this result is consistent with the results of the research conducted by⁽¹³⁾.

The study showed that the rate of growth of hydatid cysts in the host varies, as it depends on several factors, including the location of the target tissue in the liver, its anatomical and functional nature, in addition to the host's immune response^(14,10). This explains the results of the current study with a higher percentage of bags with a size greater than 5 centimeters compared to those measuring less than 5 centimeters. The results of the current study agreed with many previous studies, such as⁽¹⁵⁾ as well as the study⁽¹⁶⁾.

When investigating the effect of hydatid cysts on liver function, the current study showed an increase in the level of liver enzymes ALT, AST, and ALP in patients with a clear significant difference compared to the control group. It also increased in patients with cysts larger than 5 cm, with patients with secondary injury, with those with secondary injury. Initial⁽¹⁷⁾.

The reason behind this increase is the growth of cysts in the liver tissue and the occurrence of pathological changes represented by necrosis in the liver cells, which causes an increase in the permeability of cell membranes or their destruction and thus the release of their content of these enzymes into the peripheral circulation⁽¹⁸⁾. There may be another reason, which is the expansion of the area of damage occurring in the liver cells, as in the case of cysts larger than 5 cm. The results of the study

were similar to the results of the research conducted by⁽¹⁹⁾ and with⁽²⁰⁾.

The study also included measuring the level of total bilirubin in the serum, and the results recorded a significant increase in the level of total bilirubin in patients with hydatid cysts compared to the control group, and between patients with primary and secondary infection. Differences have also been observed between the results of patients with hydration cysts in which the size of the cyst is larger than 5 cm^(21,22).

This increase may be the result of damage to the liver cells, or it may be due to the large size of the cyst, which leads to an increase in the pressure placed on the liver cells, or it may be due to the proximity of the location of the cyst to the bile ducts, and thus the inability of the liver to perform its functions efficiently⁽²³⁾.

Conclusion:

The study found hydatid cyst infection in human patients from the Iraqi city of Al-Najaf. This logically implies the presence of the adult form, *Echinococcus granulosus* tapeworms, in dogs in these cities. Patients with > 5 cm showed significant increase in the enzyme's levels compared with < 5 cm, which indicated the disturbance of the liver functions in patients whose revealed the growth of the cyst in the liver.

Competing interests:

no conflicts of interest

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مستويات إنزيمات الكبد لدى مرضى الاكياس المائية

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هناك نوعان أساسيان من التصنيفات المستخدمة في هذا البحث. يشكل الأشخاص الذين يخضعون للعلاج المجموعة الأولى: خمسون شخصاً هم جزء من هذه المجموعة. أكد طبيب استشاري متخصص وجود الأكياس المائية في الكبد بالوسائل السريرية والجراحية وتراوحت أعمارهم بين العاشرة والخامسة والسبعين في الفترة من يناير إلى أكتوبر 2023، تمت رؤية هؤلاء الأفراد خلال استشارات الجراحة العامة في مستشفى الصدر، ومن بين 50 مريضاً كبدًا تم تحليلهم، كان لدى 34 منهم كيسات أكبر من 5 سم، بينما كان لدى 13 كيساً أقل من 5 سم. ثم تم تقسيم هاتين المجموعتين حسب حجم الكيس. تم استخدام درجة ونوع المرض لفئات المرضى؛ وكان 31 منهم مصابين بعدوى أصلية، و14 مصابين بعدوى ثانوية، و14 مصابين بأي منهما.

بعد ذلك، لدينا مجموعة المراقبة، والتي تتكون من خمسة وعشرين فرداً خالين من مرض الاكياس المائية. تأثرت وظيفة الكبد بشكل مباشر بعدوى الاكياس المائية مما أدى إلى ارتفاع كبير في مستويات GOT و GPT و ALP.

ونتيجة لذلك، كان هناك زيادة في البيليروبين الكلي في مصل المرضى مقارنة بالمجموعة الضابطة. ولوحظ هذا الاتجاه أيضاً في الإصابات الثانوية مقارنة بالعدوى الأولية. المرضى الذين لديهم حجم كيس أكبر من 5 سم لديهم مستويات أعلى بكثير من العلامات المذكورة أعلاه من أولئك الذين لديهم حجم كيس أقل من 5 سم، مما يشير إلى وجود اضطراب في وظائف الكبد لدى هؤلاء الأفراد. كان لدى المرضى الذين يعانون من الأكياس المائية مستويات أعلى بكثير من البيليروبين الكلي في الدم مقارنة بالمجموعة الضابطة والمرضى الذين يعانون من العدوى الأولية والثانوية، وفقاً لنتائج قياس مستوى البيليروبين الإجمالي في الدراسة.

كما أظهرت نتائج الأفراد الذين يعانون من الاكياس المائية التي يزيد حجمها عن 5 سم بعض الاختلاف. هناك بعض التفسيرات المحتملة لهذه الزيادة: تلف خلايا الكبد، حجم الكيس (مما يزيد الضغط على الخلايا)، أو قرب الكيس من القنوات الصفراوية، مما يجعل الكبد أقل كفاءة في ما يفعله.