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Serum Malondialdehyde level in Patients with Hydatid cyst in Mosul City

ABSTRACT

Objectives: The aim of this study was to investigate the difference in the serum malondialdehyde (MDA) between hydatid cyst patients and controls**.**

Design : case –control study .

Patients and methods: The study was conducted on patients with CE before the surgical treatment in two general teaching hospitals in Mosul city (Al-Zahrawy hospital, Al-Salam hospital) between June 2009 - September 2012. Eighty seven patients with positive *Echinococcus granulosus* IgG ELISA tests and 103 apparently healthy controls with negative *E.granulosus* IgG ELISA tests . total MDA activities of both patients and controls were determined by using thiobarbituric acid Test Assay method (TBA assay method).

Results : The mean age of patients was (32.1 ±11.45) years and (30.81 ±12.19) years for controls . The MDA levels of patients and controls was statistically significant ($p<0.05$). The difference between MDA levels of patients and control group was statistically significant both for females ($p<0.05$) and males ($p<0.05$) in the patient and control group, The MDA levels of liver and lung CE was statistically significant ($p<0.05$). while no correlation was found between age and MDA levels no statistically significant ($p>0.05$) both in females and males.

Conclusions: In the present study found the plasma concentration of malondialdehyde (MDA) levels is higher in hydatid cyst patients than controls.

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Introduction:

Cystic echinococcosis (CE) or Hydatid disease is a zoonotic parasitic disease of human and mammalians caused by the larval stage of dog tapeworm *Echinococcus granulosus*. Humans may become intermediate hosts either through direct contact with infected dogs or indirectly from the ingestion of contaminated water or food with eggs of worms (1-2). Cystic echinococcosis has worldwide distribution and is endemic in many countries, especially the Mediterranean region, Australia, South America, the Middle East, South Africa, and Eastern Europe (2-3).

Hydatid disease can affect any organ in the body and a high suspicion of disease is justified in a cystic lesion of any organ in endemic region(4).

The most common site in human being is the liver (59-65%), followed in frequency by lung (24%), and Other organs (13 %). The higher rate of hepatic infection may be attributed to the fact that the liver acts as the primary filter in the human body and the lung is often thought to be the second filter (5-6).

The clinical presentation of *E. granulosus* infection depends upon the site of the cysts and their size. Small and/or calcified cysts may remain asymptomatic indefinitely. In larger cysts, there may be symptoms due to compression or rupture into neighbouring structures (7) .

diagnosis of the hydatid disease is complex and requires clinical, laboratory investigations and imaging techniques (X-ray, Ultrasound, CT and MRI) and immunodiagnostic tests (Enzyme-Linked Immunosorbent Assay (ELISA), Indirect Fluoresent Antibody Test (IFAT), PCR, and immunoblot) for confirmation. IgG-ELISA is about 90% sensitive for liver cyst infection but less sensitive for lung cyst (80%) or other organs (90%), and its specificity is 90% (8-9) .

Several defense mechanisms have been developed in the body to prevent the formation of reactive oxygen radicals and delay or prevent the damage caused by these radicals, these

mechanisms are known as antioxidant defense mechanisms. The levels of oxidants and antioxidants are at a balance in a healthy human. Oxidative stress results from increased production of oxidants, reduced level of antioxidants or a combination of both (10-11). Several studies have demonstrated that malondialdehyde (MDA) which is a final product of lipid peroxidation used as a marker of oxidative stress was increased significantly in patients with various parasitic diseases (12-17). The objective of this study is to investigate the levels of (MDA) in the sera of patients diagnosed with hydatid cyst.

SUBJECTS, MATERIALS AND METHODS

The present study was conducted in two general teaching hospitals in Mosul city (Al-Zahrawy hospital and Al-Salam hospital), between September 2009 - June 2012.The study was conducted on 87 patients with CE (mean age: 32.1 ±11.45 years) before the surgical treatment including (48 liver CE and 39 lung CE) with imaging methods which were positive for *Echinococcus granulosus* by using IgG ELISA tests and 103 apparently healthy Subjects (mean age : 30.81 ±12.19 years) which were negative for hydatid cyst by *E .granulosus* IgG ELISA tests .MDA level of both patients and controls were determined by using Thiobarbituric Acid Test Assay method (TBA assay method). None of them (patients and controls) were smokers, or alcoholic, or had any known pathologies or parasitic infection other than CE , no steroids or others medications were taken by case and control subjects which might give rise to differences in MDA level .

Venous blood samples were collected from each subject by venipuncture in tubes after an 8-10 hour fasting state. The tube were centrifuged at 1500 rpm for 10 mint. Sera were separated and stored at -20 °C until used. Serum samples were assayed for the presence of anti *E. granulosus* lgG

antibodies using Enzyme-Linked Immunosorbent Assay (ELISA) for the gualitative determination of IgG class antibodies against *E. granulosus* (NovaTec immunodiagnostica GmbH, Germany).

The kit performed in the present study were done according to the instructions of the manufactures (Figure 3) .

Figure 3: the set of *Echinococcus* IgG ELISA kit.

Serum MDA levels of both CE patients and controls were measured by TBA assay method (18).The principle of these method was based on the spectrophotometric measurement of the color occurred during the reaction to thiobarbituric acid with MDA at 532nm (18) .

Ethics

Prior to the study the approval was obtained and only those patients and control voluntary to donate samples were included.

Statistical analysis

The data obtained in the current study were analyzed by using statistical package for social sciences (SPSS .version 16). Standard statistical methods were used to determine the mean and standard deviation .

Unpaired t-test was used to compare the results of patients with their matched controls, values of ($p<0.05$) were accepted as significant.

Results

The results of this study demonstrated that in the patients with hydatid cyst 38 (43.68%) were male and 49 (56.32 %) were female, and the mean age ± SD was (32.1 ±11.45) years. In the control group, 47 (45.63%) individuals were male and 56 (54.37%) were female, with a mean age of (30.81 ±12.19) years.

The MDA levels of patients with CE was (1.81 ±0.245) and in healthy controls was (0.75 ±0.193). The difference between MDA levels of patients and controls was statistically significant ($p<0.05$).

The MDA levels of patient and control group was statistically significant both for females ($p<0.05$) and males ($p<0.05$).In the patient and control group, no statistically significant was found between age and MDA levels ($p>0.05$) both in females and males (Table 1 and Figure 1**).**

Table 1 - Malondialdehyde levels of patients infected with the hydatid cyst and controls

Gender	**Patient**			**Control**		
	No	**mean age**	**MDA level µmol/l**	**No**	**mean age**	**MDA level µmol/l**
Male	**38**	**34.37± 10.o5**	**1.91 ± o.148**	**47**	**29.51± 9.82**	**0.84 ± 0.07**
Female	**49**	**29.11± 1o.59**	**1.72 ± 0.185**	**56**	**31± 11.43**	**0.67 ± 0.17**
Total	**87**	**32.09± 11.46**	**1.81 ±0.245**	**103**	**30.81± 12.19**	**0.75 ±0.193**

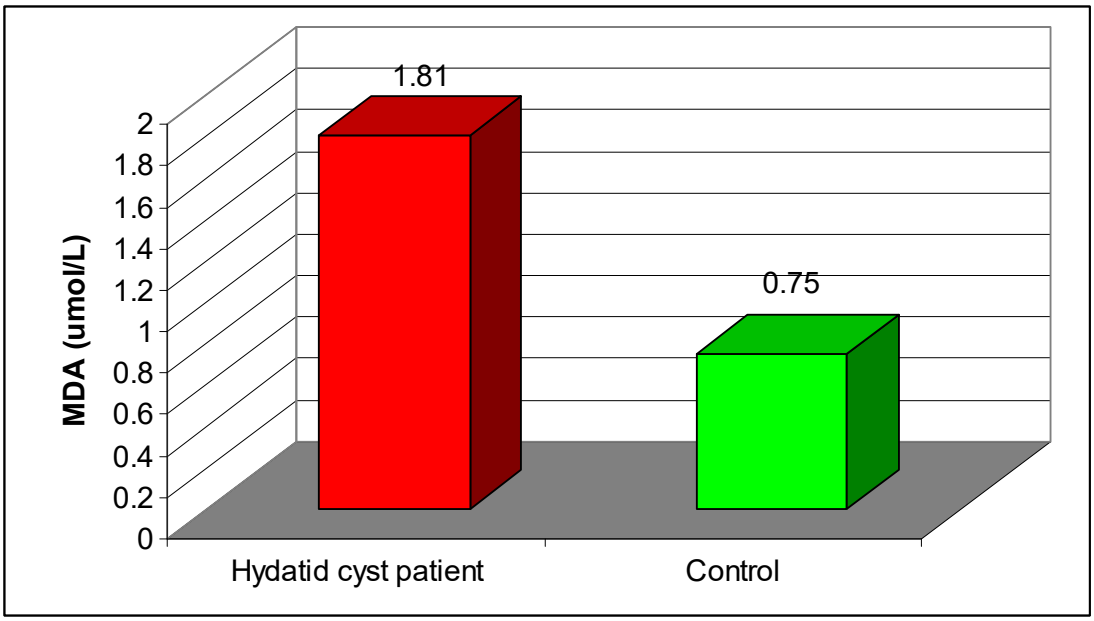

Figure 1:comparison between MDA level in hydatid cyst patient and control .

The most frequent localizations of hydatid cyst were the liver (48/87) followed by the lung (39/87). The difference between MDA levels of

Liver CE (1.914±0.141 µmol/l) and lung CE (1.706±o.272 µmol/l) was statistically significant (p<0.05) as shown in (Figure 2).

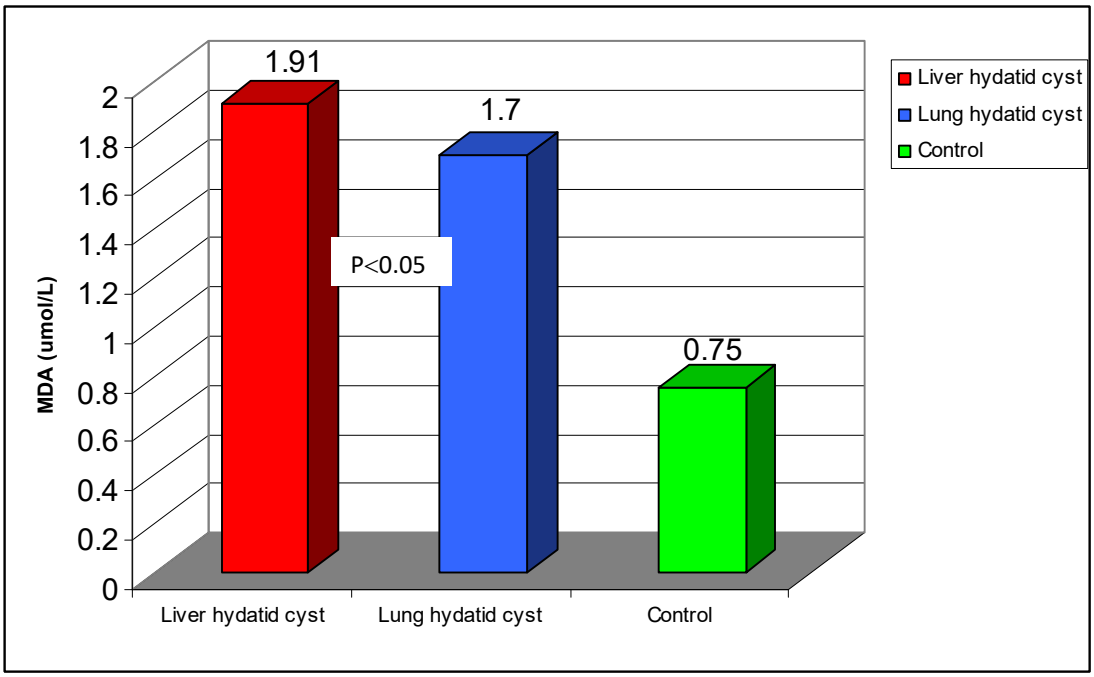

Figure 2: comparison between MDA level in liver and lung hydatid cyst patient and control

DISCUSSION

As far as the literatures concerned, this is the first study to characterize the relationship between hydatid cyst patients and MDA level (lipid peroxidation) in Mosul City. *E.granulosus* is one of the most common parasites infection of human being ,the majority of infections are symptomless for a prolonged period , diagnosis is often established incidentally as a result of imaging studies performed for other reasons or due to complicated hydatid cyst (3,9). malondialdehyde, an important product of lipid peroxidation, is produced as a result of the peroxidation of fatty acids containing three or more double bonds. The MDA product can cause the cross linkage of membrane elements by affecting the ion exchange from cell membranes, which results in a change in ion permeability and enzyme activity(10).

The Results revealed that the level of MDA is significantly higher in patients with hydatid cyst compared to the controls ($p<0.05$) .The difference between MDA levels of patients and control group was statistically significant both for females ($p<0.05$) and males ($p<0.05$).

These results strongly suggest that one of the main reasons for high MDA levels in patients infected with *E. granulosus* could be due to decreased activity of defense system protecting tissues from free radical damage and the increase in lipid peroxidation .

The results of this study are in accordance with the study done by Alrawi *et al* (17), Atomby *et al* (13) and Koltas *et al* (12) who found that MDA level was high in patients infected with *E. granulosus*. Further more the present results showed a difference between MDA levels of liver and lung CE which was statistically significant ($p<0.05$). These results are in accordance with the study done by Alrawi *et al* (2011) (17)

In conclusion, an increase in MDA levels in patients with hydatid cyst was observed . This study has got its own limitation , however, The relation between the changes in the levels of MDA and the treatment and the course

of hydatid cyst disease should be investigated in further studies.

References

1-Roberts LS, Janovy J. Foundations of parasitology. *Echinococcus granulosus.* 7th ed. New York: McGraw Hill; 2006. pp. 350-3.

2-Benner C, Carabin H, Sánchez-Serrano LP, Budke CM, Carmena D: Analysis of the economic impact of *cystic echinococcosis* in Spain. *Bull World Health Organ* 2010. 88(1):49–57.

3-Grosso G, Gruttadauria S, Biondi A, Marventano S, Mistretta A iWorldwide epidemiology of liver hydatidosis including the Mediterranean area. *World J Gastroenterol* . 2012. 18(13): 1425-37.

4- Torgerson PR, Deplazes P. *Echinococcosis*: diagnosis and diagnostic interpretation in population studies. *Trends Parasitol*. 2009. 25:164-70.

5- Bal N, Kocer NE, Arpaci R, Ezer A, Kayaselcuk F: Uncommon locations of hydatid cyst. *Saudi Med J*.2008. 29:1004–8.

6- Al-Shibani1 L.A, Samira M.A. Al-Eryani1, Ahmed A. Azazy1, Abdulsalam M. Al-Mekhlafi. Cases of hydatidosis in patients referred to Governmental hospitals for cyst removal in Sana'a City, Republic of Yemen .*Tropical Biomedicine* .2012. 29(1): 18–23.

7- Brunetti E, Kern P. Vuitton D.A, Writing Panel for the WHO-IWGE Expert consensus for the diagnosis and treatment of *cystic* and *alveolar echinococcosis* in humans.*J.Acta Tropica*. 2010. 114:1-16.

8- Sandhu P.S., Attri A.K., Chandra M.. Diagnostic Sensitivity of enzyme linked immunosorbent assay for IgG in hydatid disease. *Indian J. Surg.* 2009. 71:202-5.

9- Harandi MF, Moazezi SS, Saba M,Grimm F, Kamyabi H,Sharifi I, Deplazes P. Sonographical and serological survey of human *cystic echinococcosis* and analysis of risk factors associatedwith seroconversion In rural communities of Kerman. *Zoonoses and Public Health*, 2011; 58: 582–8.

10- Mackenzie E.L. Reactive Oxygen/Reactive Metabolites and Toxicity. In: Smart R C; Hodgson E, editors. Molecular and biochemical Toxicology. 4th ed. John Wiley & sons.2008: 389-411.

11- Çavdar C, Sifil A, Camsarı T. Reactive oxygen particles and antioxidant defence. Turkish Nephrology, *Dialysis and Transplantation Journal*. 1997. 3:92-5.

12-Koltas IS, Yucebilgic G, Bilgin R, Parsak CK, Sakman G. Serum malondialdehyde level in patients with *cystic echinococcosis. Saudi Med J*.2006. 27:1703-5.

13- Atambay M, Karaman U, Kiran TR, Colak C, Karabulut AB, Celik T,Daldal N. Glutathione and malondialdehyde levels in patients with hydatid cyst. *Saudi Med J*. 2008. 29:87-9.

14- Karaman U, Çelik T, Kiran TR, Colak

C, and Daldal N. Malondialdehyde, Glutathione, and Nitric Oxide Levels in *Toxoplasma gondii* Seropositive Patients .*Korean J Parasitol*. 2008 . 46(4): 293–5.

15- Karaman U , Kiran TR, Colak C, Iraz M, Celik T and Karabulut AB.Serum Malondialdehyde, glutathione and nitric oxide levels in patients infected with *Entamoeba coli* .*Int. J. Med. Med. Sci* .2009. 1(5): 235-7.

16-Kiran TR, Karaman U, Colak C, Karabulut AB, Daldal N.Malondialdehyde, glutathione and nitric oxide levels in patients with *Enterobius vermicularis* infection. *Mikrobiyol Bu*. 2010 .44(1):165-7.

17-Alrawi M, Alshammaa S, Ataya A .Glutathione and malondialdehyde levels in patients with hydatid cyst .*SCLA*. 2011. 6(3):41-4

18-Uchiyama M, Mihara M. Determination of malonaldehyde precursor in tissues by thiobarbituric acid test. *Anal. Biochem.* 1978. 34:271-8.