

## Assessment of Immunopathological Response of Serum Immunoglobulins and Protective Role of Complement Components in Iraqi Patients with Hydatidosis

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### ABSTRACT:

#### BACKGROUND:

Hydatid disease is a widely distributed disease caused by the larval stage of the Cestode *Echinococcus*. Inflammation increases the synthesis of immunoglobulins and complement components (C3 and C4) presumably through the action of interleukin 1 & gamma interferon.

#### OBJECTIVE:

Assessment of immunopathological response of serum immunoglobulins and complement components (C3 and C4) in Iraqi patients that might be affected as inflammatory response to hydatid disease.

#### SUBJECT AND METHOD:

A total number of 50 patients with radiological diagnosis of HD were studied. Surgical interference had been done to 20 out of 50 patients and the results of surgery gave a clinical confirmation of the diagnosis of HD. Sera from patients with HD and 38 apparently healthy controls were obtained for measurement of immunoglobulins (IgG, IgM and IgA) and complement components (C3 and C4) by Radial Immunodiffusion Assay (Biomagheb).

#### RESULTS AND DISCUSSION:

Hydatid patients showed increases of IgG (P value < 0.001) IgM and IgA levels (p value < 0.05) in comparison to the control group, but these variables start to decrease after surgical treatment that is significant only in case of IgM (P value < 0.05). and this might be due to activation of humoral immunity against HD. Complement components were found to be insignificantly lower in patients with HD in comparison to control group (P value > 0.05) and higher in one week postoperative period in comparison preoperative period (P value > 0.05). This might mean consumption of complement and its activation or it might be due to anticomplementary action of the hydatid cyst.

#### CONCLUSION:

The picture that has emerged from this study is that HC wall might have anticomplementary action. And serum complement component tend to increase in postoperative period.

**KEYWORDS:** immunoglobulins, complement components, C3 and C4 levels, immunopathological response, hydatidosis.

### INTRODUCTION:

Hydatid disease is a widely distributed disease caused by the larval stage of the Cestode *Echinococcus*. Hydatidosis is considered as a most dangerous health problem in many countries especially agriculturally-based<sup>(1)</sup>. This disease is widely spread because it does not cause signs and symptoms at early stages unless the cyst increases

in size leading to pressure affect on the neighboring structures or in case of rupture and infection<sup>(2)</sup>. The hydatid disease remains today a common surgical condition that carry a significant morbidity and mortality<sup>(3)</sup> despite the use of medical<sup>(4)</sup> and new techniques of treatments<sup>(5)</sup>. New areas of infection in the world are being reported, giving to Echinococcosis the status of an emerging zoonosis<sup>(6)</sup>. Inflammation increases the synthesis of immunoglobulins and complement components (C3 and C4) presumably through the action of interleukin 1 & gamma interferon that will mediate other inflammatory mediators as a response to

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primary activator.

The aim of this study is to assess immunopathological response of serum immunoglobulins and protective immunity of complement components (C3 and C-4) against *Echinococcus granulosus* in Iraqi patients and also to detect any deterioration in the levels of the above parameters preoperatively that might be affected as inflammatory response to HD.

### SUBJECT AND METHODS:

This study is a prospective study conducted in Baghdad Medical City Teaching Hospital in the period from February to July 2005, and a total of 50 patients and 38 age and sex matched apparently healthy control were examined. From each patient, a full history, general information, clinical assessment and the findings of the Ultrasonography (US) and Computer Tomography (CT) scan reports were taken. The US and CT scan reports provide a diagnosis of hydatid disease and the surgery provide the clinical confirmation.

Fifty patients with radiological diagnosed Hydatidosis of both sexes were included in the present study. Seventeen patients (34 %) were males and thirty three patients (66 %) were females. Twenty cases out of fifty (40 %) were inpatients from the surgical wards that were surgically confirmed as hydatid disease cases. Thirty eight apparently healthy individuals who were sex and age matched with the patients group were taken as a normal control in this study. Fifteen volunteers were males and twenty three were females. From all

patients and control groups, venous blood samples were aspirated for measurement of serum level of immunoglobulins (IgG, IgM and IgA) and complement components (C3 and C4) by Radial Immunodiffusion Assay (Biomaghreb) (Ref. 80 800). From twenty cases out of fifty, venous blood samples were aspirated preoperatively and one week postoperatively to assess the above parameters preoperatively. A longer follow up was not possible due to the fact that patients leave the hospital after this period and they could hardly be followed up then; in addition to that, most studied patients were from the far rural areas with low educational and socioeconomic status.

### STATISTICAL METHODS:

All data are presented as means and the deviation are presented as standard deviation, and to test the significance in means of different quantitative data. Independent-Sample t-test of significance was applied. Correlation analysis was done in SPSS 11.0 for Windows 98. P values below 0.05 were accepted as statistically significant.

### RESULT:

The results of single RID assay for mean serum levels of immunoglobulins (IgG, IgM and IgA) in patients with Hydatidosis are shown in Table (1) which is compared to sex and age matched healthy volunteers with P values of the mean levels of IgG, IgM and IgA that are significant (< 0.001) in case of IgG and (< 0.05) in IgM and IgA levels.

**Table (1): Mean levels of serum immunoglobulins (mg/dl) in both patients with Hydatidosis and healthy volunteers**

Serum immunoglobulins	Patients with Hydatidosis (mean ± SD)(mg/dl) (n = 50)	Healthy volunteers (mean ± SD)(mg/dl) (n = 38)	P value
IgG	1472.49 ±379.53	1237.41 ± 163.39	< 0.001
IgM	181.89 ±57.31	158.06 ±43.08	•■ 0.05
IgA	141.31 ±26.50	127.61 ±33.99	•- 0.05

n=number of cases

P value < 0.05 is significant

P value < 0.001 is highly significant

The results of single RID assay for mean serum level (IgG, IgM and IgA) in preoperative patients are shown in Table (2). The Table shows that the mean levels of serum immunoglobulins in twenty out of fifty patients (40 %) in one day preoperatively and in one week postoperatively with

P values that are significant only in case of IgM (<0.05). This shows that the immunoglobulins tend to decline in one week postoperative period to a significant level in case of IgM (P value < 0.05) and insignificant level in the remaining immunoglobulins (P value > 0.05).

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**Table (2): Mean levels of serum immunoglobulins (mg/dl) in one day preoperatively and one week postoperatively in patients with Hydatidosis**

Serum immunoglobulins	Patients with Hydatidosis (mean ± SD)(mg/dl) (n= 20 patients)		P value
	Preoperatively (before one day)	Postoperatively (after one week)	
IgG	1642.10 ±432.51	1432.95 ±79.20	>0.05
IgM	208.52 ±69.66	163.00 ± 48.50	<0.05
IgA	138.74 ± 22.45	126.95 ±30.58	>0.05

n=number of cases

P value < 0.05 is significant

P value < 0.001 is highly significant

The results of single RID assay for mean serum levels of complement components levels ( C3 and C4) in patients with Hydatidosis are shown in Table (3) which are compared to 38 sex and age matched healthy volunteers with P values that are insignificant (> 0.05) in both.

**Table (3): Mean levels of serum complement components (mg/dl) in both patients with Hydatidosis and healthy volunteers**

Serum complement	Patients with Hydatidosis (mean + SD)(mg/dl) (n = 50)	Healthy volunteers (mean±SD)(mg/dl)(n=38)	P value
C3	17.96 ± 23.47	118.05-24.60	> 0.05
C4	23.44 ± 5.75	24.28 ± 4.20	> 0.05
Serum complement	Patients with Hydatidosis (mean + SD)(mg/dl) (n = 50)	Healthy volunteers (mean±SD)(mg/dl)(n=38)	P value
C3	17.96 ± 23.47	118.05-24.60	> 0.05
C4	23.44 ± 5.75	24.28 ± 4.20	> 0.05

n=number of cases

P value > 0.05 is insignificant

The results of single RID assay for mean serum levels of complement components (C3 and CA) in preoperative patients are shown in Table (4). This Table shows that the mean complement components levels in twenty out of fifty patients (40%) in one day preoperatively and in one week postoperatively

with P values that are insignificant (> 0.05) in both. This shows that the C3 and CA levels start to increase in one week postoperatively although the increase is statistically insignificant (P value > 0.05).

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**Table (4): Mean levels of serum complement components (mg/dl) in one day preoperatively and one week postoperatively in patients with Hydatidosis**

Serum complements	Patients with Hydatidosis (mean ± SD)(mg/dl) (n = 20 patients)		P value
	Preoperatively (before one day)	Postoperatively (after one week)	
C3	116.31 ±20.82	125.28 ±36.81	> 0.05
C4	25.92 ± 7.35	28.77 ±7.82	>0.05

n = number of cases

P value > 0.05 is insignificant

### DISCUSSION:

In the present study, immunoglobulins levels (IgG, IgM and IgA) were found to be significantly increased in patients with HD in comparison to the control group (P values < 0.001, <0.05 and <0.05 respectively) (Table 1) and this might be due to activation of humoral immunity against the hydatid cyst wall<sup>(7,8)</sup>. This is consistent with other studies<sup>(9, 10, 11,12)</sup>.

The IgG and IgA levels showed a tendency to decline in the postoperative period, and this might be due to some extent to the removal of most of the antigenic load during surgical treatment, as the hydatid cyst wall and its contents are removed by surgical operation so the humoral immune response start to decrease.

Significant reduction in IgM level was found (P value < 0.05) in the postoperative period as compared to the preoperative period (Table 2). Since a continued presence of hydatid antigen after death or surgical removal of a cyst might expected to give rise to a continuous production of IgM antibodies, a persistent or increase level of IgM after surgery might indicate the presence of a continuous antigenic stimulation i.e. presence of remnants of HC in the residual cavity which might be of benefit in following up the course of infection<sup>(12)</sup>. This is consistent with other study<sup>(12)</sup>.

Complement components were found to be insignificantly lower in patients with HD in comparison to control group (P value > 0.05) (Table 3) and insignificantly higher in one week postoperative period in comparison to preoperative period (P value > 0.05) (Table 4). This is consistent with other study<sup>(13)</sup>. The decrease in complement levels in patients group and subsequent increase postoperatively, although it is insignificant, but may mean consumption of complement and its

activation but not at the systemic level due to small amount of antigen that reach to the systemic circulation in addition to the presence of hydatid cyst wall neutral carbohydrates that might activate the alternative pathway of complement<sup>(14)</sup>, or it may be due to anticomplementary action of the hydatid cyst tissues<sup>(15,16)</sup> that inhibits complement response because all studied cases contain fully developed hydatid cyst wall and this may explain why there is a tendency of the complement level to increase in the complement level after the surgical removal of the HC.

### CONCLUSION:

- There is some sort of activation of humeral immunity in form of IgG, IgM and IgA antibodies against hydatid cyst.
- An increase level of IgM after surgery would indicates the presence of continuous antigenic stimulation. While the reduction in IgM level postoperatively might means successful removal of hydatid cyst.
- The picture that has emerged from this study is that HC wall might have anticomplementary action.
- Serum complement component tend to increase in postoperative period.

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