Evaluation Some Immunological Markers in Patients Infected with Hydatid Cysts

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Abstract

A hydatid cyst is the important disease reported parasite worldwide. The aim of this study was to investigate the PGE2, GM-CSF, TGF-β1 and IL-13 concentration in patients infected with hydatid cyst. We registered 60 patients with Hydatidosis which separated as 30 male and 30 female and the control groups consisted of healthy subjects 30 separated as 15 male and 15 female. The results demonstrated that there was a significant increase (P < 0.05) in the PGE2, GM-CSF, TGF-β1 and IL-13 levels, Hydatidosis patients as compared to the healthy group.

Key words: Hydatid cyst disease, IL-13, TGF-β1 and GM-CSF.

Introduction

Hydatidosis disease is an important human-animal disease especially in pastoral areas in the Middle East as well as in Europe, the Mediterranean, Asia, East Africa, Australia and South America. Hydatid cysts is caused by the *Echinococcosis granulosus*, an adult worm nesting in dogs, cats, foxes, wolves and other carnivores, where the adult worm is found in its tiny intestine called the alveolar cirrhosis of the cysts.

The most important species of the Echinococcosis genus is *E. granulosus*, which causes unicocular hematopoietic disease and *E. multilocularis*, which causes alveolar Echinococcosis (vesicular or multi-chamber vesicular cases). The eggs are broken down into the intestines of the final host and the eggs are released with the feces, these eggs can survive for 50 days at 21 °C and at 40 °C, transport to intermediate host especially sheep and other intermediate host that can be contact with dogs such as cattle, buffaloes, cows, pigs and camels. The eggs are rarely inhaled by respiratory system, which is hatched in the decimal and the fetus produces six thorns by digestive juices such as trypsin and pancreatin. This embryo becomes effective through the effectiveness of bile salt, according to. This embryo penetrates the mucus layer through the movement of the hooklets and this breakthrough penetration occurs within minutes and if the fetus fails to penetrate within one hour and dies and is digested. The embryo moves to the liver through the pyloric cycle and then into the lymphatic system, which then reaches the circulatory system and carries the bloodstream all over the body. The right lobe injury is greater than the left lobe of the liver due to the amount of blood that goes to the left lobe larger than the left hemisphere. In addition, the size of the right lobe of the liver is greater than the left. In the three to eight days, the plaque becomes clear in the bag, which is 1 mm in diameter from 1 month to 5-10 millimeters after about 5 months.

As the parasite grows to be a cyst filled with fluid filled the front of the sac with the initial principles and each head has the ability to form an adult worm when swallowed by the final host and these cyst contain hundreds or thousands of visions as they have the ability to grow to secondary cysts called Daughter cyst and switch to worms The adult in the final host. The human is an intermediate host and the dog is the final host; humans have the dead end of the life cycle of these worms. Most of the cysts are 75% in the liver, 15% in the lung and only 10% in the rest of the body. These include the spleen, kidney, brain, intestinal tract, bone and other
The infection of the human organs through dealing or playing with infected dogs, especially children or eating water and plants contaminated with eggs and wind, birds, flies and insects on the transfer of infection, found that the eggs stick to the hair of the dog, especially the hair around the opening of anus and feet Paws and mouth. Pro-inflammatory cytokines produce from deferent type of immune cell such as neutrophils, macrophages and dendritic cells due to secreted GM-CSF as immune regulatory cytokine produced by many type of body cells such as alveolar epithelial cells, macrophages, T cells and endothelial cells.

**Subjects and Methods**

**Subjects and Collection of Samples**

The collection of blood samples was accepted by the Institutional Ethics Committee of the Faculty of Science at the University of Kufa and all participants signed informed consent forms. From October 2016 till April 2017, 90 samples were collected from (30 male and 30 female patients) and 30 healthy control (15 male and 15 female) subjects who attended to the Hospital in AL-Najaf Province.

**Sample Processing**

At 3000 r/min for 5 min the blood specimens were centrifuged to isolated the serum. Then the serum transport to other sterile tubes after that, the serum divided into four parts and stored at -20℃ until use for evaluation of the PGE2, GM-CSF, TGF-β1 and IL-13 levels.

**Detection of Serum Markers**

The serum PGE2 levels, serum GM-CSF levels, serum TGF-β1 levels and serum IL-13 levels in the present study were determination by Eliza Kit's such as Elabscience Biotechnology Co., Ltd. A Catalog. E-EL-0034. Elab science Biotechnology Co., Ltd. A Catalog No: E-EL-H0081. Elabscience Biotechnology Co., Ltd. A Catalog No: E-EL-H0110 and Elabscience Biotechnology Co., Ltd. A Catalog No: E-EL-H0104 respectively.

**Statistical Analysis**

The data of current study were articulated as (Mean ± Standard Error), the statistical analysis (descriptive statistics, p value) were calculated by using Graphpad prism, when P value<0.05 was statistically a significant.

**GM-CSF (Granulocyte Macrophage Colony Stimulating Factor)**

Figure (1) revealed significant increase (P<0.05) in serum levels of GM-CSF in male and female patients with hydatid cysts (489.78± 44.123pg. /ml) and (478.12± 89.145 pg. /ml) respectively compared with control group (360.34±35.015 pg. /ml) and (340.55±53.631 pg. /ml) respectively.

![GM-CSF PG/ML](image)

**Figure 1: Shown serum levels of GM-CSF (pg. /ml) in Patients with hydatid cysts and Control Group**

* Significant difference P<0.05 between control group and patients
Prostaglandin E2 (PGE2)
The current study as shown in figure (2) conducted that the concentration of PGE2 was significant increase (P < 0.05) in male and female patients with hydatid cyst (1389±53.612pg. /ml) and (1320±89.145 pg. /ml) respectively compared with control group (899.24±103.20 pg. /ml) and (803±95.78 pg. /ml) respectively.

![Figure 2: Shown serum levels of PGE2 (pg. /ml) in Patients with hydatid cysts and Control Group](image)

*Significant difference P<0.05 between control group and patients

Serum TGF-β1 (Transforming Growth Factor β1)
The statistical analysis of present study exhibited significant increase (P < 0.05) in serum concentration of TGF-B1 in male and female patients with hydatid cyst (1320±75.223pg. /ml) and (1198±33.019 pg. /ml) respectively compared with control group (983.67 ± 9.837 pg. /ml) and (902.52±4.243 pg. /ml) respectively, as shown in Figure (3).

![Figure 3: Shown serum levels of TGF-β1 (pg/ml) in Patients with hydatid cysts and Control Group](image)
Interleukin – 13 (IL – 13)

Result of present study shown that serum levels of (IL-13) in male and female patients infected with hydatid cysts were significant increase (P < 0.05) (1100.24±65.037 pg. /ml), (1022.83±90.23 pg. /ml) respectively in compared to the control group (89.345±89.345 pg. /ml), (553.48±60.583 pg. /ml) respectively, as shown in figure (4).

Figure 4: Shown serum levels of IL-13 (pg. /ml) in Patients with hydatid cysts and Control Group
* Significant difference P<0.05 between control group and patients

Discussion

The result has revealed that the serum level of PGE2, GM-CSF, TGF- β1 and IL-13 significantly increase in hydatid cyst infection patients compared to control group.

The increase in serum level of PGE2 in patients infected with hydatid cyst maybe due to the stimulated cellular and humoral immune or may be to inflammatory response occur the parasite infection which lead the produced prostaglandin E2 by monocyte19.

As well as the essential role in increase the vascular permeability, vasodilation, leukocyte activator and enhancing the phagocytic activity of neutrophils and macrophages, also increase their capacity to kill the pathogens and produce antimicrobial mediators20, 21.

These study also conducted significantly increase in levels of TGF-b in patients with Hydatidosis in compared with healthy group, these increase may be due to the role of TGF-b in produce of cytokine production and essential role of TGF-b in infiltrate which surrounds the lesions22,23,24, some helminthes have ability to stimulated secreted of protein such as Foxp3 from T cells by his capacity the secreted of proteins such as the Echinococcus multilocularis25, also play essential role in immunoregulation, and regulatory T cells and promote Th17 differentiation in the presence of pro-inflammatory cytokines (IL-1b, IL-6) and resistance the pathogens26. Many cytokine increasing in the Hydatidosis disease such as IL-13, IL-4, IL-5, and IL-10 27. In hydatid cyst infection only two cytokine IL-4 and IL-13 association of with the cyst stage28. The deferent type of cytokine such as IL-5, IL-9, IL-13 and IL-21 Participate in the protective against many helminthes which produced by T helper 2 cells29(Robert et al., 2007).

Also several cytokine have a trigger for macrophage such as IL-4, IL-13, IL-10 and IL-2129, 30, 31. The increase of the serum levels of GM-CSF maybe due to his ability to stimulate the macrophage and to a directly activate of phagocytosis as well as to important role in hematopoietic growth factor and have function in the resolution of infectious diseases, the ability of GM-CSF to killed the pathogen from its ability to activate phagocytosis by stimulating phagocytic cells (macrophage) and stimulated immune cells to secreted cytokines, PGE2 and LTB432, 33.

Conclusion

The present study concluded that the PGE2, GM-CSF, TGF- β1 and IL-13 were markers
for detection and diagnosis in hydatid cyst.

References


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