Evaluation of some biochemical and immunological parameters changes in Iraqi male with Toxoplasmosis

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Abstract
A total of 33 Iraqi male positive for Toxoplasmosis and 33 Iraqi male negative for Toxoplasmosis (controls) were studied to Evaluation of some biochemical and immunological parameters changes . The parameters included lipid profile such as (Cholesterol), Triglycerides(TG), High-Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL) and very Low-Density Lipoprotein (VLDL) and complement component C3 and C4. The results revealed significant decrease in the total cholesterol, Triglycerides, LDL and non-significant in VLDL (129.96±1.63, 130.69±2.80, 87.19±1.97, 29.24±0.83 mg/dl respectively) and non-significant increase in HDL (24.22±0.62 mg/dl compared with control group(152.07±1.63, 156.48±6.55, 99.26±1.39, 31.49±1.30 and 21.31±0.36 mg/dl ).The immunological tests recorded a significant increase in C3, C4 (150.60±9.67, 31.47±1.71 mg/dl respectively) compared with control group (52.86±3.46, 15.15±0.47 mg/dl respectively). There for these results reveal that the infection with Toxoplasma gondii may have an essential role in alterations of lipid profile levels and complement components in infected men.

Keywords: Toxoplasma gondii, lipid profile, Toxoplasmosis, C3, C4.

INTRODUCTION

Toxoplasmosis, one of the most important parasitic zoonosis world-wide and the obligate intracellular protozoa T. gondii is the causative agent of this disease (1) (2) this parasite has a complex life cycle involving sexual replication in members including both domestic and wild felids as definitive host and asexual proliferation in a wide variety of warm blooded hosts included human as intermediate host (3)(4). There are three infective stages of T. gondii: a rapidly dividing invasive tachyzoite, a slowly dividing bradyzoite in tissue cysts, and an environmental stage, the sporozoite, protected inside an oocyst (4) (5) (6). Human infection is mainly developed by either oral ingestion of water and foods contaminated with parasite oocysts excreted by cat feces as final host, or eating raw and undercooked meat of intermediate hosts containing tissue cysts. Moreover, the infection can be transmitted through placenta, milk, organ transplantation, and blood transfusion (6) (7). T. gondii infection is widespread among humans and it’s prevalence varies widely from place to place approximately one-third of all humanity has been exposed to this parasite (5). Infections are usually asymptomatic in healthy individuals. But can cause severe disease in fetuses who cannot develop an effective immune response against the parasite and in immunocompromised individuals, such as AIDS patients or patients undergoing immunosuppressive therapy, can result in life-threatening disease (7)(8)(9).

Parasite can enter and infect any nucleated cells, then being to growth and replicate inside a parasitophorous vacuole (PV), way out, and then infect neighboring cells. This parasites activate a potent host immune response that eliminates most of the parasite and convert back into dormant cysts witch contain bradyzoites (3) (4) (9)(10).

Lipids such as Total cholesterol, Triglycerides High-Density Lipoprotein, Low-Density Lipoprotein and very Low-Density Lipoprotein have been shown to play an important role in defending against parasitic infections (11)(12) also consider important mediators of host defense during the acute phase of innate immunity. Infection and inflammation typically lower blood total cholesterol and high density lipoprotein cholesterol but increase triglycerides (13)(14).

Many studies observation alteration in the levels of serum lipid during infection with intracellular parasites such as malaria (15)(16), Leishmania (17)(18). The complement system consists of more than 30 proteins that are either present as soluble proteins in the blood or are present as membrane-associated proteins (19). Its play a major role in innate immunity where a robust and rapid response is mounted against invading pathogens. Also acting an important role in adaptive immunity involving T and B cells that help in elimination of pathogens (20)(21).

MATERIALS AND METHODS:

Subject’s collection: The study included 60 blood samples collected from voluntaries males (33 male infected with toxoplasmosis (patients group) and 27 healthy male witch negative to toxoplasmosis as control group) who had attended to Imamnein Kadhimine Medical City in Baghdad at the period March to September 2014. The ranged age between 18-52 years old. Five ml of venous blood were collected from each subject. The blood was placed in a plain tube and left to stand for 30 minutes at room temperature to clot. Then, centrifuged (3000 rpm) for 10 minutes to collect serum, which was frozen at -20°C till they were analyzed.

Biochemical Tests

Level of lipid profile included Total Cholesterol(C), Triglycerides (TGS) and High-Density Lipoprotein (HDL) were determined using a standard enzymatic assay (Linear chemicals, Montgat-Barcelona, Spain). While Low Density Lipoprotein (LDL) and very Low- Density Lipoprotein (VLDL) was calculated according to Friedewald formula (17)

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LDL_{mg/dl} = C – HDL – VLDL
\]

Where, C= Total cholesterol

TGS= Triglycerides

The immunological tests

The test was carried out by using the onsite Toxo IgG / IgM (Rapid Test Kit, USA), which was a lateral flow chromatographic immunoassay for the simultaneous detection and differentiation of IgG and IgM anti-Toxoplasma gondii in human sera or plasma. Complement component test is performed by using Radial immune diffusion (RID) kit (Human-Germany) for determination C3 and C4 in serum .The plate was removed from Its envelope and leaved to stand at room temperature for few minutes so that Any condensed water in the wells was evaporated. Then the wells were filled with 5μl of samples and controls and waited they have been completely Adsorbing Before handling the plate. The plate was closed and waited the required incubation period 72 hour. Measured the precipitating ring around the well after incubation and compared with conversion table that provided with the kit.

Statistical analysis:
The Data analyzed by using the software statistical packages social sciences (SPSS) version 13 and the contrast between the patients and control were analyzed by student t- test. The P ≤ 0.05, P ≤ 0.001 were considered to be statistically significant and results were expressed as mean ± standard error (SE).
Hormonal pathways  

Lipids are defined as organic compounds that are poorly soluble in water but miscible in organic solvents and they play a critical role in almost all aspects of biological life they are structural components in cells and are involved in metabolic and hormonal pathways. 

The aim of this study was to assess and comparison of lipids profile and complement components in males with toxoplasmosis (patients group) and non-toxoplasmosis males (control group).

RESULTS

The Results in the Table (1) of this study show that 34 male was positive to anti-toxoplasma antibodies IgG and negative to anti-toxoplasma antibodies IgM also 26 male was negative to anti-toxoplasma antibodies IgG and IgM (control group).

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Positive (%)</th>
<th>Negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgG</td>
<td>60</td>
<td>33 (55 %)</td>
<td>27(45 %)</td>
</tr>
<tr>
<td>IgM</td>
<td>60</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Mean±SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>patients</td>
<td>33</td>
<td>129.96± 1.63*</td>
</tr>
<tr>
<td>control</td>
<td>27</td>
<td>152.07± 1.63</td>
</tr>
</tbody>
</table>

* Significant= P ≤ 0.05

**Significant= P ≤ 0.001

DISCUSSION

The aim of this study was to assess and comparison of lipids profile and complement components in males with toxoplasmosis (patients group) and non-toxoplasmosis males (control group).

Lipids are defined as organic compounds that are poorly soluble in water but miscible in organic solvents and they play a critical role in almost all aspects of biological life they are structural components in cells and are involved in metabolic and hormonal pathways. 

The present results indicated that there were an increase levels of lipids characterized by decreased levels of total cholesterol, LDL, and HDL and by the increased levels of VLDL and triglycerides in children infected with *Plasmodium vivax*. Also identified Plasma lipid profile alterations like hypocholesterolemia and increased triglyceridemia are reported in patients infected with visceral leishmaniasis. Lipids are particular importance for pathogens, and some pathogens deliberately seek out lipid-rich host niches or enhance the availability of lipids by manipulating the host and don’t agree with Study of *Toxoplasma*.

The complement system plays an essential role as a first line of defense promoting the recognition, opsonization, and killing of pathogens. The complement system is triggered by different pathways that lead to the formation of a membrane attack complex (MAC) that can lyse or damage the target cell. 

The complement system is composed of a large number of proteins, including C3 and C4, that can be activated in response to various stimuli. In this study, the levels of C3 and C4 were measured in male patients infected with toxoplasmosis and in control subjects. 

<table>
<thead>
<tr>
<th>Group</th>
<th>Nos.</th>
<th>C3 mg/dl</th>
<th>C4 mg/dl</th>
</tr>
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<tbody>
<tr>
<td>patients</td>
<td>33</td>
<td>150. 60 ± 9.67**</td>
<td>31.47± 1.71**</td>
</tr>
<tr>
<td>control</td>
<td>27</td>
<td>52.86± 3.46</td>
<td>15.15± 0.47</td>
</tr>
</tbody>
</table>

**Significant= P ≤ 0.001

**Table (2) Lipid profile values of prevalence in male infected with toxoplasmosis and control**

**Table (3): C3 and C4 complement in male infected with toxoplasmosis and control**
differences while the highest level of C4 in patient without reported significant differences. Also Schreiber & Feldman, in vitro investigations showed that T. gondii tachyzoites are rapidly lysed by the activation of complement through the classical pathway in the presence of specific antibodies so that (Suzuki and Kobayashi, prove that the presence of Ca++ is essential for the antibody-dependent cytolysis of Toxoplasma organisms, and confirm that the lytic reaction is mediated by an activation of the classical complement pathway. Hence, it is possible that the antibody-dependent killing mechanism by the activation of complement, which was observed in vitro, contributes to host defense for Toxoplasma infection in vivo by the activation of complement, which was observed in vitro, contributes to host defense for Toxoplasma infection in vivo. The collaboration between specific Antibody and presence of complement have been found capable of killing extracellular T.gondii. All these studies indicated of an important of complement component in host defense against toxoplasma.

REFERENCES


