Immunological evaluation of (HSP20) concentration in an aborted woman

Infected with Toxoplasmosis.

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Abstract

Background: Toxoplasmosis is one of the most common zoonotic pathogens worldwide; Immune response against this parasite was affected by synthesis of specific interleukins like HSP20.

Objectives: This study aims to detect the prevalence of expression of HSP20 among women in Kufa city.

Methodology: Case-control study, purposive (probability) sample was done among hindered and forty eight miscarriages women were attended to the Central Health Laboratory .The data collected from October 2020 to January 2021. The concentration levels of HSP20 in women were measured by ELISA technique according to many parameters such as age, residence and number of abortion.

Results: The current study revealed that the high (4.179±8.793) ng/ml concentration of Hsp 20 was recorded in cases with age 19-23 years through measuring its serum level.

Conclusion: HSP20 play a significant role in immunity against infection with Toxoplasma gondii.

Recommendation: Further studies are recommended to know the concentration of HSP20 among against another type of parasitic infection.

Keywords: HSP20, Toxoplasma gondii, aborted women.

INTRODUCTION

Toxoplasmosis is defined as a widespread parasitic disease caused by a tiny intracellular protozoan which is named toxoplasma gondii (1). This parasite has infected of human and most of warm blooded animals genus, but the cat is considered the essential host. The importance and dangerous implications of this disease not only on the pregnant women moreover its severe influences congenitally on fetuses. The transmission rate of this disease to the fetus ranges from 10-15% at the first trimester of pregnancy. In the third trimester of pregnancy the rate of disease transmission reach to 68% (2).The third leading infectious cause of US food- borne death after salmonellosis and listeriosis is Toxoplasmosis (3). The infection has a worldwide distribution. One –third of all human beings have been exposed to this parasite.
However, the seroprevalence varies considerably between countries (from less than 10% to more than 90%) \(^4\). Heat shock proteins (HSP) are considered one of the most important immune factors that plays a significant role in the prevention of infection with Toxoplasmosis \(^5\). HSP20 known as co-chaperone was a protein family that has more than 100 members \(^6\).

**METHODOLOGY**

**The Cases**

150 serum samples of women with abortion were involved in the present study. The women were between 19-43 or more years of age. They were attending AL-Zahra Maternity and Child Teaching Hospital, AL-Hakeem Hospital, and some private clinics, in Najaf province from October 2020 to January 2021. The sample were divided according to following parameters:

1- Age groups

2- Number of abortions

3- Geographical location

**Study Location**

This case control study was conducted in Al-Kufa city, one of the important city in Al-Najaf Province. Al-Najaf Province consists of six districts, namely, Najaf, Hydaria, Munathera, Al-Abbasia, Kufa, and AlMishkhab. In 2006 Kufa has a population of 1,042,900, which represent 3.7% of total population in Iraq \(^7\).

**Inclusion criteria**

The cases were defined as the pregnant women who are infected with toxoplasmosis in the age group (19-43) year living in the location of the study. However, the control group was the pregnant women without toxoplasmosis in the same age group at same study location.

**Exclusion criteria**

The women who does not infected with toxoplasmosis from different area.
Specimen collections

Blood samples were drawn from each patient and control groups by disposable syringe 5ml of blood were collected in sterile serum tube and left for one hour at room temperature\(^8\). Then, centrifuged at 3000rpm for (15) min to separate the serum that was stored at-20 C˚ until used. HSP20.ELISA kit. (US Biological/USA) was used to measure the serum levels of HSP20. Executed according to manufacturer.

Statistical methods and data analyses

The following statistical analysis approach by using social sciences (SPSS) version 20 in order to analyzed and assess the data of the study, (t) test and LSD was applied to find out the significant difference between the data. Differences were recorded as significant whenever the probability (P) was less than 0.05\(^9\).

RESULTS

Heat shock protein-20(HSP20)

1. HSP20 concentration level in-patient with control group.

There was a high significant increase of Hsp20 levels (P˂0.05) in the sera of patients with only seropositive toxoplasmosis (3.532±5.446) when compared to that of control group.

Table (1); figure (1).

Table (1) significant difference of Hsp20 concentration in infected aborted women and non-infected women.

<table>
<thead>
<tr>
<th>Serum Hsp</th>
<th>Mean concentration ±SD Hsp20 (Conc. ng/ml)</th>
<th>t. Test value</th>
<th>df</th>
<th>P- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>3.532±5.446</td>
<td>4.850*</td>
<td>94</td>
<td>0.001</td>
</tr>
<tr>
<td>Control</td>
<td>1.929±2.547</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^*\)Independent t-test between patient group & control group P˂0.05.
Figure (1) Distribution of serum Hsp20 concentration in clinical study.

Current study result come harmoniously with that register by \(^{(10)}\) who, said that increased secretion of HSP20, It works to rearrange the shortfall in the defense proteins that affecting on a range of relevant cells like dendritic cells and Thus providing these proteins work to reduce infection rates. It was nearly similar to result of experimental study by \(^{(11)}\) found that direct correlation between the increase in protein concentration and the development stages of pregnancy, especially after the occurrence of abortion.

2. Evaluation of Hsp20 level of concentration according age and geographical location.

The high concentration of Hsp20 in aborted women with age 19-23 years and 29-33 years was 4.179±8.793, 3.339±5.018 respectively, and the low level in aborted women with age ≥43 years was. It was found that there were significant differences (P<0.05) of serum concentration of Hsp20 in the cases of age groups. The high concentration appear in urban 6.873±12.013. Table (2) figure; (2).

Table (2) Mean of Hsp20 serum level in aborted women with toxoplasmosis and control groups.

<table>
<thead>
<tr>
<th>Study groups</th>
<th>Mean concentration ±SD Hsp20 (Conc. ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case(+ve)</td>
</tr>
<tr>
<td>Age group (years)</td>
<td></td>
</tr>
<tr>
<td>19-23</td>
<td>4.179±8.793</td>
</tr>
<tr>
<td>24-28</td>
<td>2.586±4.234</td>
</tr>
<tr>
<td>29-33</td>
<td>3.339±5.018</td>
</tr>
<tr>
<td>34-38</td>
<td>2.533±4.886</td>
</tr>
<tr>
<td>≥43</td>
<td>0.426±1.822</td>
</tr>
</tbody>
</table>
**P-value = 0.01**

<table>
<thead>
<tr>
<th>Geographical location</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.873±12.013</td>
<td>4.801±8.516</td>
</tr>
<tr>
<td></td>
<td>1.047± 2.683</td>
<td>0.811±1.367</td>
</tr>
</tbody>
</table>

**P-value = 0.02**

Result was mismatched with (12) who, recorded that the elevation of HSP-70 in aborted women with toxoplasmosis in age groups (30-35) years, It was not agree with others who recorded elevation in serum concentration was in urban area more than the rural (13). While agree with (14), (15), and compatible with (16), (17,18,19).

The logical explanation may be attributed to variable levels of exposure of environmental pollution factor, which affect directly on physical activities, Interpretation of the difference in protein levels during the different age groups related effects on circulating Hsp are may be based on cellular facts and their biological roles during the early periods of life, while its effect decreases with age.

![Figure (2) mean Hsp20 concentrations according to age (years).](image-url)
Figure (3) mean Hsp20 concentrations according to geographical location.

3. Hsp20 serum concentration according to number of abortion.

The present study reveals that the concentration of Hsp20 in aborted women with two numbers of abortion with toxoplasmosis was high (4.959±12.958). It was found that there were statistical differences (P<0.05) when compared with aborted women without toxoplasmosis. Table (3); figure (4).

Table (3) Mean of Hsp20 serum level in aborted women with toxoplasmosis and control group according to abortion numbers.

<table>
<thead>
<tr>
<th>Study groups</th>
<th>Mean concentration ±SD Hsp20 (Conc. ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case(+ve)</td>
</tr>
<tr>
<td>Abortion numbers</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.104±6.610</td>
</tr>
<tr>
<td>2</td>
<td>4.959±12.958</td>
</tr>
<tr>
<td>3</td>
<td>3.077±4.256</td>
</tr>
<tr>
<td>≥4</td>
<td>0.997±1.315</td>
</tr>
</tbody>
</table>

P-value=0.001

The results show statistical differences of concentration HSP20 in one and two abortions and this come no agree with (20) who found the elevation in serum concentration was in three and four number of abortions, also does not agree with (21),(22), according to concentration in aborted women with toxoplasmosis may be due to the occurrence of many problems in women's health including premenstrual syndrome(23).
CONCLUSION
From the results of this study, it is concluded that the HSP20 plays a significant role in immunity against infection with *Toxoplasma gondii*. There is an association between elevated concentration of HSP20 levels in miscarriages women with toxoplasmosis. HSP20 concentration is elevated at young age’s groups. HSP20 concentration is elevated at one and two number of miscarriags women groups.

RECOMMENDATION
The following points are recommended:

1- Further experimental studies are recommended to know the concentration of HSP20 among miscarriages women to be one of an important laboratory test in the induction of immune response against this type of infection.

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