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Toxoplasma infection in pregnancy: Diagnosis and treatment

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A B S T R A C T

The clinical pictures of congenital toxoplasmosis may be different depending on the time of infection during pregnancy, meanwhile death in uterus, nervous or ocular pathologies and an asymptomatic condition will be available. Therefore early detection of that at the beginning of the initial infection in pregnant women is considered very important for the protection of mother and the fetus. The aim of this study was evaluation of Toxoplasmosis in pregnancy and its treatment. In a cross-sectional, analysis study conducted at the Department of Obstetrics and Gynecology of Qazvin University of Medical Sciences and Department of infectious diseases of Tabriz University of medical sciences on pregnant women referred to the Genecology clinics and Infectious Diseases clinics, the risk of Toxoplasma gondii and the response rate to the treatment were evaluated in these cases. In this study, 195 pregnant women were examined during the period of 9 months. Mean age of studied women was 29.91 ± 6.84 year. 115 of omen were urban and 80 of them were rural. According to the investigation in terms of the Toxoplasma gondii antibody, 10 pregnant women (5.1%) were diagnosed with the acute Toxoplasma infection so they were treated by 3 gr Spiramycin for 6 weeks. In the 2 cases of 10 patients, amniotic fluid PCR was positive. One case attempted to miscarriage while one decided to continue the pregnancy.

Introduction

Toxoplasmosis is relatively prevalent parasitic disease which is common between humans and warm-blooded animals. This disease has a wide distribution globally and also its prevalence in Iran varies in different locations (1). In a study on congenital toxoplasmosis which was performed in

Amol City, the results indicated that 75.7% of mothers and 47.7% of infants had specific IgG antibody and 0.2% were mothers with IgM antibody, but none of the babies were positive in terms of IgM antibody (2). The prevalence of toxoplasmosis is diverse in pregnant women from different parts of the

world. The results of an investigation (1995) showed that in 53.9% pregnant women IgG antibodies are positive (3). In another research conducted on pregnant women, it has been reported the percents of women with positive antibodies were 83% in Paris, 31.7% in the United States, 49% in Algeria, 12% in Norway and 22% in London (4-5).

Diagnosis: If there is possibility of development of toxoplasmosis in the fetus due to the recent development of this disease in the mother or the ultrasonography findings associated with the fetus, supplementary tests will be needed (6).

When some disorders (such as placenta hyperdensity, numerous intracranial lesions, ventricular dilatation, liver lesions, hepatosplenomegaly, plural effusion, pericardial effusion, and ascites) are observed in the fetus through ultrasonography, there is a possibility for presence of toxoplasmosis. However, decisive diagnosis of this disease in fetus requires observation of the parasite in blood or the amniotic liquid. It is also possible to examine the fetal blood for presence of IgM or IgA antibodies. Today, with the accessibility of polymerase chain reaction (PCR) tests, this method is preferred to other methods (7). If the PCR examination of the amniotic liquid is positive and the results of fetal ultrasonography is normal, the PCR test needs to be repeated in another laboratory first of all. The reason is that diagnosis of this by this method requires highly precise laboratory procedures (8-9). There is disagreement on the screening of all pregnant women based on presence of toxoplasmosis. However, this is done in some parts of the world (10).

Treatment: In non-pregnant women with a healthy immune system, there is often no need for treatment. However, if a pregnant

woman develops the acute form of toxoplasmosis, she shall be treated immediately. There are different medicines for the treatment of this disease which include Spiramycin, Pyrimethamine, Sulfadiazine, and Azithromycin (11-14). Spiramycin scatters in the placenta and prevents transmission of the infection from the mother to the fetus. However, there is controversy over this function (11, 15). Since little concentrations of this drug reach the fetus, it cannot treat the disease in the fetus if the parasite is already in the fetus. Hence, four weeks after the onset of acute infection in pregnant mothers in their second trimester the amniotic liquid needs to be examined through PCR. Then if there is a parasite involved, intake of Spiramycin is stopped and other drugs are prescribed. However, if the PCR test result is negative, 1 gr of Spiramycin is administered every 8 hours to the end of pregnancy (15).

The aim of this study evaluation of Toxoplasmosis in pregnancy and its treatment.

Methods

In a cross-sectional, analysis study conducted at the Department of Obstetrics and Gynecology of Qazvin University of Medical Sciences and Department of infectious diseases of Tabriz University of medical sciences on pregnant women referred to the Genecology clinics and Infectious Diseases clinics, the risk of *Toxoplasma gondii* and the response rate to the treatment were evaluated in these cases. As mentioned, this is a cross-sectional study which consisted of the pregnant women referred to the Tabriz health centers as the study population. Furthermore, in this study, 195 pregnant women were examined during the period of 9 months. According to the investigation in terms of the *Toxoplasma gondii* antibody, 10 pregnant women (5.1%)

were diagnosed with the acute Toxoplasma infection so they were treated by 3 gr Spiramycin for 6 weeks. We examined our cases by amniocentesis in order to evaluate the response rate to the therapy and possible risk of the disease in the fetus during the third month of pregnancy. PCR was performed for the amniotic fluid samples in terms of the possible risk of the Toxoplasma infection.

The following essential information were obtained and recorded from the cases entered and enrolled into the research. Demographic parameter such as age, Location, gravidity, parity and abortion history of patients was recorded.

Now, the blood samples were obtained and stored in the Eppendorf tubes in order to examine the presence of Toxoplasma gondii antibody in the patients. Afterwards the samples were eventually preserved at - 20 ° C after the serum separation and finally all samples were tested simultaneously by using a commercially available ELISA kits (ELISA, trinity-Biotech Toxo IgG & IgM made by USA) according to the manufacturer's instructions. The patients with the positive IgM and IgG results diagnosed with the acute Toxoplasma infection so they were treated by 3 gr Spiramycin for 6 weeks. We examined our cases by amniocentesis in order to evaluate the response rate to the treatment and the magnitude of fetal conflicts at the end of the third month of pregnancy and afterwards PCR was performed for the samples of amniotic fluid. Whereas the positive cases were considered as the examples with no prepare response to the therapy and high magnitude of fetal conflicts indeed so the abortion was definitely recommended.

For these 10 patients, the regime of 3 gr Spiramycin was started daily in the third to

the eighth weeks of pregnancy and continued to the end of the 14th week of pregnancy. During weeks of 18-20 of pregnancy, patients went under amniocentesis for the diagnosis of fetal infection. In the 2 cases of 10 patients, amniotic fluid PCR was positive. One case attempted to miscarriage while one decided to continue the pregnancy.

Statistical Analysis

The collected data were analyzed by SPSS-17 statistical software. The collected data were expressed as percentage and mean \pm SD. Continuous (quantitative) variables were compared by Independent samples and Paired t test. Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's exact test. P-value ≤ 0.05 was considered statistically significant.

Results and Discussion

Mean age of studied women was 29.91 ± 6.84 year. 115 of omen were urban and 80 of them were rural. Demographic parameters of patients were shown in table I.

In this study, 115 of the pregnant women had positive Anti-Toxoplasma- IgG, while Anti-Toxoplasma-IgM was negative in these patients, even as Toxoplasma IgG Avidity >60% was obtained and both Anti-Toxoplasma-IgG and IgM was reported negative in 70 patients. Anti-Toxoplasma-IgG and IgM were both positive in 7 pregnant women with Toxoplasma IgG Avidity <60% which was considered as acute Toxoplasma infection. Also in 3 patients with positive Anti-Toxoplasma-IgG and negative Anti-Toxoplasma-IgM, Toxoplasma IgG Avidity <60% was obtained which was indicative of acute Toxoplasma infection

and so these patients went under treatment. 10 pregnant women(5.1%) were diagnosed with the acute Toxoplasma infection so they were treated by 3 gr Spiramycin for 6 weeks.

One of the most common parasitic infections in humans and warm-blooded animals is infection with *Toxoplasma gondii*, which is a protozoan apical complex. Infections with this protozoan have been reported from around the world. This parasite affects humans, a large number of mammals, and different bird species. It is capable of proliferating in a wide range of host cells. It is estimated that more than 500 million people around the globe are infected with this parasite (16). Congenital toxoplasmosis occurs during pregnancy. Therefore, if pregnant mothers, who are not immune to toxoplasmosis, develop this disease, the parasite will be transferred from the placenta to the fetus and may cause severe complications to the fetus. Previous studies in this regard indicated that the possibility of transfer of infection from mother to fetus is about 50%. Early diagnosis (in the early or acute phases) of infections in pregnant mothers is of great importance, because deadly infections normally outbreak as a result of transfer of infection from acute toxoplasmosis in mother (congenital toxoplasmosis) (16).

The clinical pictures of congenital toxoplasmosis may be different depending on the time of infection during pregnancy, meanwhile death in uterus, nervous or ocular pathologies and an asymptomatic condition will be available (17). Therefore early detection of that at the beginning of the initial infection in pregnant women is considered very important for the protection of mother and the fetus (18). In study of Cheraghi Poor (2007), a significant correlation was seen between the level of education and *Toxoplasma* (19).

In this study, all women were asymptomatic and acute *Toxoplasma* infection diagnosed in early pregnancy screen test. Catching an infection during pregnancy led to infection of embryos in 60-40% of cases causing serious side effects for them. According to CDC estimation, between 400 and 4,000 cases of congenital toxoplasmosis occur in the United States annually. Approximately, 1-5 per 1,000 pregnant women experience acute toxoplasmosis (20). The spectrum of clinical manifestations of congenital toxoplasmosis is wide and in the first half of pregnancy, it is accompanied by complications such as fever, hydrocephaly, microcephaly, hepato-splenomegaly, jaundice, convulsions, chorioretinitis (usually double-sided), brain calcification and mental retardation. The most common symptoms include chorioretinitis and the central nervous system lesions that may cause debilitating symptoms at birth or later in the event of lack of treatment (21).

In our study, 10 women(5.1%) had acute *Toxoplasma* infection that underwent medication by 3 gr Spiramycin for 6 weeks and despite treatment, 2 patients(20%) was positive for acute *Toxoplasma* infection in the PCR of amniotic fluid.

The sexual cycle of the parasite occurs in the intestine of feliformia and leads to formation and disposal of oocytes through their feces. Therefore, the parasite is indirectly transferred to humans and other warm-blooded vertebrates through consumption of the feces (22). If a woman develops toxoplasmosis infection for the first time during her pregnancy, there will be a possibility for the transfer of the parasite to the fetus. As a result of this transmission, either the fetus is aborted or develops abnormalities (23).

Table.I Demographics parameters of patients

	Location		Total	P
	City	Village		
age	29.66 ± 6.85	30.28 ± 6.85	29.91 ± 6.84	0.539
Parity	2.37 ± .89	2.26 ± 1.16	2.33 ± 1.01	0.449
Abortion count	.79 ± .89	.75 ± .80	.77 ± .86	0.741
Gravidity	3.17 ± 1.33	3.01 ± 1.53	3.10 ± 1.41	0.460

The prevalence of infection in pregnant women varies depending on the country. For instance, the prevalence varies from 9 to 67% in European countries and varies between 0.8% (Korea and Vietnam) and 55% (India, Malaysia and Nepal) in Asian countries. In Sudan, New Zealand and Brazil, anti-Toxoplasma antibodies were seen in 34.1%, 33% and 74.5% of pregnant women, respectively (24).

A pregnant mother can transfer infections to the fetus during her pregnancy. However, with an increase in the duration of pregnancy, the chance of transfer increases and the possibility of demonstration of complications in the fetus decrease (15). In humans without signs of immunosuppression, acute toxoplasmosis usually occurs without any symptoms. That is to say, it is estimated that about 80 to 90% of infections in children and adults remain undiagnosed. Therefore, the asymptomatic nature of infection can cause many problems in pregnant women whose infection remain undiagnosed (25).

Some of the means of diagnosing the mother, fetus and baby with a disease are serology tests, parasite detection, histology, and ultrasonography (26). The most common means of diagnosis is serology test. IgM antibody is normally developed in the first week of illness and reduces over the next months. However, this antibody remains in the body of some humans for several years (26). IgM antibody is developed after one or

two weeks and is at its peak during six weeks. It is minimized during two years and then remains in the body for ever. A mother is diagnosed with a recent development of diseases when the result of her previous test is negative and the result of the next serology test is positive. Moreover, if serology tests are positive more than 6 months before pregnancy, no risks are posed to the fetus (26). As the same of previous study, we used the serologic test for diagnosis of Toxoplasma infection in pregnant women.

Conclusion

Infection with Toxoplasma gondii is highly prevalent around the globe. Consumption of food or water contaminated with oocytes disposed by cats or consumption of half-cooked meat containing tissue cysts are two of the main means of transmission of parasite to humans.

Mothers' immunity to Toxoplasma gondii infection during pregnancy is of significant importance. Non-immune pregnant women may be exposed to the risk of development toxoplasmosis.

In this study, 10 patients had acute Toxoplasma infection than underwent treatment and despite the treatment, 2 patients had positive PCR for Toxoplasma gondii that one case attempted to miscarriage while one decided to continue the pregnancy.

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