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Toxoplasmosis in Pregnancy: Diagnosis, Risk Factors, and Management

Mohamed Abdelgadir Shaaeldin[a], Sumeya A. Khieri[b], Khalid Nasralla[c], Zaheera Saadia[d], Mohamed Alkhatim Alsammani[e*]

[a,b,e]*Department of Obstetrics and Gynecology, University of Bahri, Khartoum ,Sudan*

[c,e]*Obstetrics and Gynecology, College of Medicine, Qassim University, Buriadah, Saudi Arabia*

Corresponding author: Dr. Mohamed Alkhatim Alsammani, Department of Obstetrics and Gynecology, Qassim University, College of Medicine, Buriadah, KSA, P.OBox:665. Buraidah, 51452, KSA, cell phone +966568525808

Email: m_sammani@yahoo.com

Abstract

Toxoplasma gondiiis an opportunistic parasitic protozoan infection. Toxoplasmosis is the most common food-borne infection throughout the world. In pregnancy, fetal complications range from abortion, physically-disabled children to fetal demise. This review examined risk factors diagnosis and treatment of Toxoplasma gondii during pregnancy pregnant.Pregnant women contract the infection through contaminated food, unpasteurized milk and proximity with infected animals most commonly cats. Recent evident have demonstrated the benefit of screening and treatment for toxoplasmosis duringperiod of pregnancyby decreasing vertical transmission of the Toxoplasma gondiiparasite to the growing fetus. There are several ways for pregnant women to protect themselves from contracting the disease during pregnancy. In this review, we discussed diagnosis, prevention, and management of toxoplasmosis during pregnancy.

Key Words: Toxoplasmosis; pregnancy; diagnosis; prevention; mass screening; treatment.

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* Corresponding author.

1. Introduction

*Toxoplasma gondii*is intracellular protozoan with asingle-cell that infects all warm-blooded animals including human. This parasite causes toxoplasmosis infections, which is considered as most common human zoonotic and parasitic infections. It's estimated worldwide distribution ofseropositive for *T. gondii*, amongpopulation was about one-third [1]. However, seropositivity estimates vary among different countries, and in the same geographical areas within between different ethnic groups. The differences in seropositivity rates are greatly influenced by lack of standardized serological tests for used to diagnose T. gondii. Humans are infected via horizontal transmission by ingestion of the *T. gondii*Oocystsfound inundercooked or raw meat contaminated with feces ofcats, or from soil, or contaminated water [2]. Other rare methods of infection include vertical transmission from the infected mother to his fetus also duringorgantransplantation from infected donors [3]. Seropositivity among pregnant women in Arab and African countries is high compared to other part of the world [4].

Maternal infection with toxoplasmosis is usually subclinical, but it can complicate other maternal infection such as uterine gas gangrene leading to severe myonecrosis [5]. Congenital infection T. gondii can lead to long-term consequences that eventually lead to fetal death. The prevalence of congenital infection with T. gondii ranges from 1 / 1000 live births to 1 / 10,000 live births [6].

The risk of vertical transmission was increased among gestational age, 60% to 81% of infection occurs in the third trimester compared with 6% in the first trimester as previously shown [17]. The symptom and severity of the disease was decreased with gestational age, with first-trimester infection resulting in worst prognosis. In untreated cases, the overall risk of contracting congenital disease following acute infection in pregnancy ranges from 20% to 50% [8].90% ofA new baby born with congenital infection are asymptomatic at birth [9]. In immunocompetent, the disease is often asymptomatic; however, flu-like symptoms may be experienced including fever headache, muscular pain. The most significant clinical finding is generalized lymphadenopathy due to be reactive hyperplasia of lymph nodes [10].Usually infected mothers are asymptomatic, numerous fetal adverse outcomes have been reported including spontaneous miscarriage, prematurity, and fetal death. In congenital toxoplasmosis, a wide range of fetal manifestations has been documented. In untreated symptomatic patients, fetal Mortality is approximates 12 %. The majority of survivals developed intellectual impairment (93%), seizures (81 %), motor symptoms (70 %), and severe ocular impairment (60 %). Other manifestation included hydrocephalus or microcephaly in 33% and progressive hearing loss in 15 % of cases [11]. However, severe fetal morbidities are significantly more common in offspring whose mother's infection was infected early in gestation [12].

2. Methods

A systematic electronic data search was conducted to identify relevant published data on toxoplasmosis and pregnancy. The searching tools used were academic digital library of Qassim University which encompasses much global database for both books and electronic journals including PubMed, Medline, Elsevier, Ovid e-Journal, Oxford Journals, EBSCO, ProQuest Central, Science Direct, Wiley-Blackwell e-Journals, Springer

Online Journals and, Oxford Scholarship Online, and. Besides, search engines Google (http://www.google.com) and Google Scholar (http://www.scholar.google.com/) were used. The following search terms were used: Toxoplasma gondii, pregnancy, risk factors. There was no search restriction.

3. Diagnostic methods

Detection of anti-toxoplasma-specific antibodies is widely used for thelaboratory diagnosisoftoxoplasmosisinfection[13]. In pregnancy, it is essential to perform additional tests that must include PCR, Ig A, IgG avidity test, and IgE, on individuals with both positive IgG and IgM [14]. Also, it is important to determine Toxoplasma-specific IgM antibodies as this estimate the time of infection. The problem with Toxoplasma-specific IgM is its non-specificity; it may persist as long as 18 months after initial infection in addition to its interpretation. If the IgG is negative and the IgM is positive, the test should be repeated in 2 weeks' time. In positive cases the IgG antibodies will be positive, the same result is obtained the result should be considered false positive, and the patient is not infected. A third situation, when the serologic testing is positive for both IgG and IgM, the individual either has an acute infection or its false-positive result [15]. If an acute infection is suspected, it is recommended to repeat the test within 2 to 3 weeks from the initial results [16]. A 4-fold increase in IgG titers indicates a recent infection [17].

Previously, individuals were classified into three categories according to seropositivity as follows: 1/ immune subjects with past infection with (IgG+/IgM-); 2/ those who were susceptible to primary infection poses neither antibodies(IgG-/IgM-), and 3/ those with acute toxoplasmosis and poses both antibodies (IgG+/IgM+). Furthermore, there are three major genotypes of T. gondii (type I, II and III) that are responsible for 95% of the isolates and remaining 5% constitutes atypical genotypes that are harmless [18]. Recently, a study showed that congenital *T. gondii*infection can occur in immunogenic mothers (IgG+/IgM-) by atypical genotype which was previously described as harmless genotype ([19]. Furthermore, severe congenital toxoplasmosis was reported in non-immune mothers in the third trimester where the disease is thought to results in less severe morbidity [20]. Changing the pattern of the disease endorses a new understanding of natures and treatment. The definitive diagnosis of toxoplasmosis is only established by histopathologic demonstration of tachyzoites from obtained tissue biopsy. However, this invasive technique should be reserved for selected cases commonly outside the pregnancy [21].

4. Risk factors

Humans acquired *T. gondii* by three principal routes as follows: food-borne; animal-to-human and mother-to-child. Rare instances of transmission include organ transplant, blood transfusion, and laboratory workers. The risk of transmission to pregnant women does not differ from that of the general population.In general, for women, the risk of contracting the infection increases with increasing maternal age. In a study, the risk of developing *T. gondii* infection was found to increase by 7% for each year increase in maternal age [22]. Eating habits, especially consumption of raw or undercooked mean unwashed vegetables were reported as independent risk factors for toxoplasmosis[23]. The aforementioned risk factors are the main cited risk that lead to maternal seroconversion during pregnancy .Other important risk factors include living in rural areas (21)lower social

status and a low number of sheep owned and lower educational level were reported an association with high seroprevalence rates[24]. Unpasteurized goat's milk, having 3 or more cats and eating mussels were found to increase the risk of T. gondii infection (25).

5. Treatment in pregnancy

A Cochrane Review concluded that, prenatal treatment of established T. gondii does not prevent fetal infection, but it might reduce the severity of congenital toxoplasmosis[26]. The primary goal of treatment depends on presence or absent of fetal infectivity. Therefore, it important to performed polymerase chain reaction (PCR) on amniotic fluid to determine fetal status.

The treatment of established fetal and maternal infection varies greatly according to the center policy. In general, spiramycin is recommended by many centers for the treatment of acute maternal infection with T. gondii and the fetus is not infected. Spiramycin does not cross the placenta; therefore it has no benefit to the fetus if the amniotic fluid PCR analysis result is positive for T gondii. It is primarily used to prevent vertical transmission for the whole duration of pregnancy [27].

Pyrimethamine/sulfadiazine and leucovorin combination are used when fetal infection with T. Gondii is confirmed at or after 18 weeks of gestation, and it should be avoided in the first trimester, due to its teratogenicity and bone marrow toxicity in both mother and fetus [27]. Other workers suggest that pyrimethamine and sulfadiazine can use alternating with courses of spiramycin [28]. There is sufficiently evident that prenatal and postnatal treatment reduces the risk and severity of long-term symptoms. However, regular clinical and ophthalmologic examinations should be performed for many years following discontinuation of treatment [20, 29].

The recommended dose for treatment of T. gondii infection in pregnancy according to European Guidelines as follows; if fetal infection occurred in the first and early second trimesters (≤18 weeks of gestation) evident by positive PCR on amniotic fluid. The key drug is spiramycin 1 g (3 million U) every 8 h until delivery. Confirmed fetal infection in late second and third trimesters (≥ 18 weeks of gestation) the recommended regimen includes a combination of pyrimethamine, sulfadiazine, Leucovorin. The recommended dose for pyrimethamine is 100 mg per day in two divided doses for two days as a loading dose, then 50 mg per day until delivery. Sulfadiazine is given in a dose of 75 mg/kg / day in two divided doses (maximum 4 g per day) for two days, then 100 mg/kg per day in two divided doses (maximum 4 g per day). Leucovorin(folinic acid) is given 10-20 mg daily during and for one wk after pyrimethamine therapy to prevent bone marrow toxicity induced by pyrimethamine [30].

6. Prevention

The definitive host for the parasite is members of family Felidae. Human gets infected through ingestion of contaminated water or food by oocysts that are passed in the feces of cats, and then the tachyzoites multiply in an intracellular location of the host. There is good evidence to prevent maternal in infection during pregnancy with subsequent reduction in fetal morbidity and mortality. According to the Centers for Disease Control and

Prevention, there are 15% of women within the reproductive age are immune to toxoplasmosis and the number of women gets infected during pregnancy is too small [6]. Many measures can help in reducing the risk from contracting toxoplasmosis infection during pregnancy, including well-cooked meat, pasteurized milk, and wearing gloves and washing hands while dealing domestic animals.

7. Conclusion

The diagnosis of T. gondii in pregnancy poses challenges to health caregivers. The primary aim of treatment in acute cases is to prevent vertical transmission to the fetus. However, reduction of seroconversion rate in pregnancy can be achieved by introduction of health education materials on potential risk factors and early antenatal visits. Assessment of prepregnancy and pregnancy titer for toxoplasmosis is important in determining fetal risk and provides the basis for parents counseling. Postnatal follow-up is essential as most of the babies are born apparently healthy.

8. Recommendations

Each hospital should develop its own and approach to screening for and treatment of toxoplasmosis in pregnancy. Serologic testing should be offered to all pregnant women whereas advanced testing should be performed for women considered to be at risk for primary Toxoplasma gondii infection.

9. Limitations

The review lack meta-analysis on risk factors of toxoplasmsosi during pregnancy during pregnancy.

Conflict of interest

Nil to declare

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