

Toxoplasma gondii and Pregnancy Problems

Toxoplasma gondii is a parasitic infection that can have significant implications for pregnancy outcomes. This report examines the association between Toxoplasma gondii infection and pregnancy problems, including miscarriage, stillbirth, and birth defects.

Overview of Toxoplasma gondii

Toxoplasma gondii is a parasite found worldwide that can infect humans through various routes, including consumption of undercooked meat, unwashed fruits and vegetables, contaminated water, or contact with cat feces^[1]. While most people with healthy immune systems can fight off the infection without symptoms, toxoplasmosis poses particular risks during pregnancy^[2].

Transmission to the Fetus

When a pregnant woman becomes infected with Toxoplasma gondii, the parasite can cross the placenta and infect the developing fetus, resulting in congenital toxoplasmosis^[3]. The risk of maternal-to-fetal transmission varies depending on when during pregnancy the infection occurs^[4].

Transmission Rates by Trimester

The likelihood of transmission increases as pregnancy progresses:

- First trimester: 5% transmission rate^[5]
- Second trimester: 13% transmission rate^[5]
- Third trimester: 32% transmission rate^[5]

While the risk of transmission is higher in later pregnancy, the severity of fetal effects is typically worse when infection occurs earlier in pregnancy^[6]. This creates an inverse relationship between transmission risk and severity of outcomes^{[3] [4]}.

Pregnancy Complications Associated with Toxoplasmosis

Toxoplasma gondii infection during pregnancy is associated with several serious complications:

Miscarriage and Stillbirth

Toxoplasmosis can cause:

- Miscarriage (pregnancy loss before 20 weeks)^[7]
- Stillbirth (fetal death after 20 weeks of pregnancy)^[7]
- Preterm birth (delivery before 37 weeks)^[7]

Research has found a statistically significant difference in Toxoplasma IgM antibody presence between women experiencing spontaneous abortion and those with normal pregnancies, suggesting acute toxoplasmosis increases the risk of miscarriage^[8]. Maternal acute toxoplasmosis is considered one of the factors that increase the chance of spontaneous abortion^[8].

Birth Defects and Congenital Abnormalities

Congenital toxoplasmosis can cause a range of birth defects and abnormalities, including:

1. Neurological problems:

- Hydrocephalus (fluid buildup in the brain)^{[9] [10]}
- Microcephaly (abnormally small head)^{[10] [11]}
- Intracranial calcifications^{[9] [10]}
- Seizures^{[9] [11]}
- Intellectual and developmental disabilities^{[7] [9]}

2. Eye problems:

- Chorioretinitis (inflammation of the retina)^[9]
- Vision problems and blindness^{[7] [11]}
- Microphthalmia (abnormally small eyes)^[12]

3. Other organ involvement:

- Enlarged liver and spleen^[11]
- Heart defects^[13]
- Kidney problems^[13]
- Pneumonia^[7]

4. Long-term complications:

- Hearing loss^{[7] [11]}
- Cerebral palsy^[7]
- Developmental delays^{[2] [12]}

Up to 1 in 2 babies (50%) infected with toxoplasmosis during pregnancy are born prematurely^[7]. Each year, between 800 and 4,400 babies in the United States are born with toxoplasmosis^[7].

Severity Based on Timing of Infection

The timing of maternal infection significantly impacts the severity of congenital toxoplasmosis:

- First trimester infection: Higher risk of severe abnormalities, including miscarriage or stillbirth^{[8] [6]}
- Second trimester infection: Moderate to severe manifestations^[4]

- Third trimester infection: Often results in milder or asymptomatic infection at birth, though untreated cases may develop problems later in life^[7] ^[6]

The highest risk of early and long-term clinical signs occurs in women who seroconvert (develop antibodies indicating new infection) between 24 and 30 weeks of gestation (about 10%)^[4].

Long-Term Effects in Children

Even when babies appear asymptomatic at birth, congenital toxoplasmosis can lead to long-term health problems:

- Ocular disease: Chorioretinitis may develop months or years after birth, even in initially asymptomatic children^[9] ^[12]
- Neurological problems: Seizures, developmental delays, and intellectual disabilities may manifest later in childhood^[7] ^[12]
- Hearing impairment: Progressive hearing loss can develop over time^[11] ^[12]

Without treatment, newborns may develop problems later in life, even 20 or 30 years later^[7]. In a study of children diagnosed with congenital toxoplasmosis, researchers observed severe sequelae in vision, hearing, and neurodevelopmental aspects during follow-up^[12].

Risk Factors and Prevention

Several factors increase the risk of acquiring toxoplasmosis during pregnancy:

- Consuming undercooked or raw meat^[1] ^[8]
- Gardening without gloves in contaminated soil^[1] ^[14]
- Contact with cat feces, particularly when cleaning litter boxes^[1] ^[15]
- Drinking contaminated water^[1]

Prevention strategies include:

- Thoroughly cooking meat to recommended temperatures^[1]
- Washing fruits and vegetables before consumption^[1]
- Wearing gloves when gardening or handling soil^[14]
- Having someone else clean the cat litter box during pregnancy, or wearing gloves and washing hands thoroughly if unavoidable^[16] ^[15]
- Avoiding contact with stray cats^[14]

Treatment During Pregnancy

If toxoplasmosis is diagnosed during pregnancy, treatment options include:

- Spiramycin: Used as prophylaxis to prevent transmission to the fetus when maternal infection is confirmed but fetal infection is unknown^[17] ^[18]
- Pyrimethamine, sulfadiazine, and folinic acid: Used when fetal infection is confirmed or highly suspected, typically after 18 weeks of gestation (pyrimethamine is avoided in the first

trimester due to potential teratogenic effects)^{[17] [18]}

Early diagnosis and treatment can reduce the risk of congenital toxoplasmosis and the severity of symptoms in infected infants^{[3] [18]}. Treatment effectiveness appears to be higher when initiated early in pregnancy, with one study showing 80% of babies born to mothers who received spiramycin in the first trimester had no sequelae^[19].

Conclusion

Toxoplasma gondii infection during pregnancy is clearly associated with serious pregnancy problems, including miscarriage, stillbirth, and birth defects^{[7] [8] [9]}. The risk of transmission to the fetus increases with gestational age, while the severity of outcomes is typically worse with earlier infection^{[4] [5]}.

Preventive measures, early diagnosis, and appropriate treatment are essential to reduce the risk of adverse pregnancy outcomes related to toxoplasmosis^{[14] [18]}. Women planning pregnancy or who are pregnant should be educated about prevention strategies and consider screening if they are at high risk of infection^[18].



1. <https://www.fda.gov/food/people-risk-foodborne-illness/toxoplasma-prevention-you-become-pregnant-food-safety-moms-be>
2. <https://my.clevelandclinic.org/health/diseases/9756-toxoplasmosis>
3. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9862191/>
4. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4046541/>
5. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4022675/>
6. <https://www.frontiersin.org/journals/pediatrics/articles/10.3389/fped.2022.894573/full>
7. <https://www.marchofdimes.org/find-support/topics/pregnancy/toxoplasmosis>
8. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6642426/>
9. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4164182/>
10. <https://www.merckmanuals.com/professional/pediatrics/infections-in-neonates/congenital-toxoplasmosis>
11. <https://medlineplus.gov/ency/article/001360.htm>
12. <https://turkiyeparazitolog.org/articles/congenital-toxoplasmosis-and-long-term-outcomes/doi/tpd.galenos.2024.74046>
13. <https://www.ncbi.nlm.nih.gov/books/NBK582993/>
14. <https://pmc.ncbi.nlm.nih.gov/articles/PMC1784564/>
15. <https://www.frolicpetservices.com/news/kitty-litter/>
16. <https://www.youtube.com/watch?v=NxEIv-EeE94>
17. <https://academic.oup.com/cid/article/47/4/554/304753>
18. <https://pubmed.ncbi.nlm.nih.gov/23343802/>
19. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9867407/>

