



Can Pregnant Women Keep Cats at Home in Terms of Congenital Toxoplasmosis Risk?

Konjenital Toksoplazma Riski Açısından Gebeler Evde Kedi Besleyebilir mi?

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Question: Can Pregnant Women Keep Cats at Home in Terms of Congenital Toxoplasmosis Risk? **Ilknur Akansu, MD.**

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Answer (Pelin Laleoğlu, MD; Mustafa Kemal Hacımustafaoğlu, MD)

Introduction and general information: To answer this question properly, it would be useful to mention some general information (the sexual cycle of toxoplasma in cats, routes of transmission to humans, seroprevalence and frequency of primary infection in cats, risks, etc.).

What is the life cycle of toxoplasma?: Toxoplasma is an intracellular protozoan parasite. It is a zoonotic agent that causes disease in both humans and animals. Toxoplasma primarily exhibits a sexual cycle in cats. That is, cats can become infected after ingesting infected oocysts in the soil or toxoplasma in tissue cysts of small animals such as birds or mice that they hunt. Toxoplasma (oocyst or tissue bradyzoite) infects the cat's intestinal epithelium and replicates in the intestine. After replication, oocysts are formed and excreted in the cat's feces. Within the first 24 hours after excretion, the oocysts are in the non-infectious unsporulated oocyst form (10-12 microns in diameter). After 1-5 days, the oocysts transform into the infectious form, the sporulated oocyst (11-13

microns in diameter). When infectious sporulated oocysts are ingested by humans or other animals (including cats), they open in the intestines. Sporozoites are released. Sporozoites divide to form tachyzoites. Tachyzoites are indicative of the active infection stage. They pass through the intestines and spread throughout the body via the blood and lymphatic systems, where they are confined by the immune system in the form of tissue cysts containing bradyzoites. In this form, they can remain latent in the body for life. Bradyzoites are indicative of chronic latent infection. With the development of immunity, a serological response (IgM, IgG) develops. IgG positivity persists for life. In animals other than cats and in humans, the pathogenesis of toxoplasma infection shows an asexual (non-sexual) cycle. Oocysts do not form in the intestine; humans do not transmit the infection through their feces (1-4).

Cats primarily shed oocysts only during primary infection, and shedding occurs only once in their lifetime. This shedding usually lasts 3-10 days (<3 weeks). Cats can shed millions of oocysts daily in their feces. Fresh (unsporulated) oocysts (<1 day) are not yet infectious. They can become infectious

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(sporulated) within 1-5 days. Even ingestion of a very small number (1-10) of sporulated oocysts can cause infection. After ingesting infected oocysts from soil, or animals containing infected bradyzoites, or animals containing tachyzoites with active infection, cats develop infection after an incubation period of 3-24 days and begin to shed oocysts. During this period, cats show symptomatic or, more commonly, asymptomatic infection. The risk of primary infection is generally higher in young cats (<1-2 years old, kittens) than in cats ≥ 2 years old. The toxoplasma seroprevalence in feral cats that hunt animals and roam in soil is higher than in domestic cats that do not eat raw meat and are fed prepared food.

Infective oocysts can remain infectious for 1-2 years in cool, moist, and shaded soil. However, this period may be less than one month in dry, hot, sunny, and dry soil. Oocysts can remain infectious in water for months and are resistant to chlorine in drinking water. In this regard, it is important to use clean or filtered drinking water (2,4,5).

What is the toxoplasma seroprevalence in cats (animals)?: Toxoplasma seroprevalence (IgG positivity) in cats may vary among wild, domestic, and stray cats in different regions of the world. Global meta-analysis studies have reported that the toxoplasma seroprevalence in domestic cats is around 32-38%; however, there are significant differences between countries (6,7). Studies conducted in Türkiye generally show similar results. In a study conducted in Izmir, the seroprevalence was determined to be 37%. In the microscopic examination of cat feces, the oocyst shedding rate, which indicates active infection, was found to be 0.43% (8). However, it should be kept in mind that seropositivity rates may vary significantly depending on geographical regions and the cats' connection to nature (2,4,5). Toxoplasma serology kits for cats are different from those used for humans. Therefore, kits validated for cats must be used for cats. Toxoplasma kits used for humans are not suitable for cats (2). A positive toxoplasma seroprevalence (IgG) in cats indicates a past infection, not an active infection.

When can a cat transmit toxoplasmosis to a pregnant woman?: Cats are infectious only during a limited period (1-3 weeks) and only during the primary infection when oocyst shedding occurs. Generally, only about 1% or less of the cat population can be considered active shedders. In the early stages of active infection in cats, infectious oocyst shedding may occur before seropositivity develops (2,8). In general, a cat that has previously had a primary infection, i.e., is seropositive (if not in the active infection stage), does not produce infectious oocysts and is not considered infectious in this environment.

Do animals other than cats pose a toxoplasma risk (for cats and pregnant women)?: Birds and similar animals only

carry tissue cysts. They do not shed oocysts in their feces. The prevalence of toxoplasma infection in birds (tissue cyst positivity and/or IgG positivity) was found to be 16-24% in wild birds globally in a meta-analysis; the highest prevalence was found in birds in the European Region (9,10). When tissue cysts carrying bradyzoites are ingested from birds and other animals through food, there may be a risk for pregnant women.

What precautions should be taken?: Prevention of toxoplasma infection during pregnancy is of great importance. In immunocompetent pregnant women who have had toxoplasma infection before pregnancy (pre-pregnancy toxoplasma IgG positive), the risk of infection due to reinfection and congenital toxoplasma infection is negligible; in principle, it is not expected. However, primary infection during pregnancy has the potential to pose a risk (11). In this context, pregnant women who are susceptible, i.e., who have not previously had toxoplasma infection, should avoid drinking water that may be contaminated and should prefer filtered or drinking water from reliable sources. Hands must be washed after working with soil or gardening. Fruits and vegetables that carry a risk of contamination should be thoroughly washed under running water before consumption. Consumption of raw or undercooked meat products should be avoided, as should tasting meat before it is fully cooked. Knives, cutting boards, and other kitchen utensils used to cut raw meat, poultry, and similar products should be carefully cleaned to prevent cross-contamination. Raw consumption of seafood such as mussels, which may be contaminated with sewage, should also be avoided. Keeping meat and similar products in the deep freezer (≤ -12 °C) for at least 24 hours or cooking them at a sufficient temperature (internal meat temperature ≥ 66 °C) are effective methods for eliminating tachyzoites and bradyzooids (12).

Can toxoplasma be transmitted through inhalation of cat litter or skin contact?: Oocysts in cat litter are 10-12 μm in diameter and can become airborne during cleaning or stirring. However, apart from the oral route, toxoplasma infection via inhalation is not expected in principle. Only infective tachyzoites that have undergone eversion can cause infection through mucosal contact, although this is very rare. One case of infection in this manner has been reported in a laboratory worker (13).

Infection does not develop through contact of infected oocysts in cat litter with intact skin or mucosa. This is because, for oocysts to cause toxoplasma infection, they must be broken down by stomach acid and intestinal enzymes to form sporozoid and tachyzooid forms. However, infection may develop in the host through mucosal contact with infectious material containing infectious tachyzoites (14). In conclusion,

toxoplasma infection is not transmitted through inhalation of cat litter or skin/mucosal contact, but infection may develop after oral transmission if hygiene is not observed after contact.

In conclusion, does keeping a cat at home during pregnancy pose a risk?: Cat ownership is essentially a low risk factor for toxoplasma infection in pregnant women. This is because, as mentioned above, cats shed infectious oocysts only during their initial primary infection and for a period of about three weeks throughout their entire lives. This is more likely in young cats (<1-2 years old) that go outside and are likely to hunt. The risk of transmission from cats is higher in cats that live outdoors, where the risk of toxoplasmosis is higher, compared to cats fed prepared food at home (15).

In summary, it can be said that there is no significant risk for a pregnant woman or a woman who may become pregnant to live with her current cat, provided that general health precautions are followed. It is advisable that the cat does not consume raw meat, is fed prepared food, and, if possible, does not go outside or hunt. Daily cleaning of the cat litter box (ideally by someone else; if not, using gloves and washing hands afterward) is recommended. After cleaning, pouring boiling water into the litter box and letting it sit for about five minutes is advised.

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