

Molecular Survey on *Tritrichomonas foetus* infection in cats of Southwestern Iran

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Abstract

Trichomoniosis is caused by the obligatory parasite, *Tritrichomonas foetus* in cats. This protozoan causes some gastrointestinal symptoms such as colitis, semi-formed to liquid diarrhea, and sometimes fresh bloody or mucoid feces, bloating, and bowel incontinence in the infected cats. The present study aimed to diagnose the *Tritrichomonas foetus* in cats in Ahvaz city by direct smear and culture methods in the Dorset medium. After observation of motile trichomonads, polymerase chain reaction (PCR) is a diagnostic technique carried out to confirm the organism. In the present study, fecal sampling was taken from 100 cats directly using swap. In wet smear, the motile flagellates that were similar in size to *T. foetus* by rolling motion were identified. Positive samples were cultured in the Dorset medium. A portion of the culture medium was used for extracting genomic DNA followed by nested-PCR assay with two pair primers. The molecular findings showed that 18% of the cats (positive cases) were infected with *Tritrichomonas foetus*. The cats with diarrhetic history had the most infection rate with 83/3% and 66/66%, respectively. Also, the rate of infection in cats less than one year was 14% and more than the cats of more than one year (4%) significantly. PCR assay was useful in differentiating between *T. foetus* and another trichomonad observed in fecal samples of the cats.

Key words: *Tritrichomonas foetus*, Culture medium, Trichomonosis, Polymerase chain reaction, Cat

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References

- Bell, E. T., Gowan, R. A., Lingard, A. E., McCoy, R. J., Šlapeta, J., & Malik, R. (2010). Naturally occurring *Tritrichomonas foetus* infections in Australian cats: 38 cases. *Journal of Feline Medicine and Surgery*, *12*, 889–898.
- Chakrabarti, D., Dame, J. B., Gutell, R. R. & Yowell, C. A. (1992). Characterization of the rDNA unit and sequence analysis of the small subunit rRNA and 5.8S rRNA genes from *Tritrichomonas foetus*. *Molecular and Biochemical Parasitology*, *52*, 75–84.
- Chen, X. G., & Li, J. (2001). Increasing the sensitivity of PCR detection in bovine prepuccial smegma spiked with *Tritrichomonas foetus* by the addition of agar and resin. *Parasitology Research*, *87*, 556–558.
- Dąbrowska, J., Karamon, J., Kochanowski, M., Sroka, J., Skrzypek, K., Zdybel, J., Różycki, M., Jabłoński, A., & Cencek, T. (2020). *Tritrichomonas Foetus*: A Study of Prevalence in Animal Hosts in Poland. *Pathogens*, *9*(3), 203.
- Delgado-Viscogliosi, P., Viscogliosi, E., Gerbod, D., Kulda, J., Sogin, M. L. & Edgcomb, V. P. (2000). Molecular phylogeny of parabasalids based on small subunit rRNA sequences, with emphasis on the Trichomonadinae subfamily. *Journal of Eukaryotic Microbiology*, *47*, 70–75.
- Doi, J., Abe, N., & Oku, Y. (2012). Molecular survey of *Tritrichomonas suis* (= *T. foetus*) ‘cat’ and ‘cattle’ genotypes in pigs in Japan. *Journal of veterinary medical science*, *12*, 377.
- Felleisen, R. S. J. (1997). Comparative sequence analysis of 5.8S rRNA genes and internal transcribed spacer (ITS) regions of trichomonadid protozoa. *Parasitology*, *115*, 111–119.
- Felleisen, R. S. J., Lambelet, N., Bachmann, P., Nicolet, J., Muller, N., & Gottstein B. (1998). Detection of *Tritrichomonas foetus* by PCR and DNA enzyme immunoassay based on rRNA gene unit sequences. *Journal of Clinical Microbiology*, *36*, 513–519.
- Filho, R. B. O., Malta, K. C., & Borges, J. M. (2018). Prevalence and risk factors associated with *Tritrichomonas foetus* infection in cattle in the state of Paraíba, Brazil. *Acta Parasitologica*, *63*(2), 346–353.
- Foster, D. M., Gookin, J. L., Poore, M. F., Stebbins, M. E., Levy, M. G. (2004). Outcome of cats with diarrhea and *Tritrichomonas foetus* infection. *Journal of the American Veterinary Medical Association*, *225*, 888–892.
- Frey, C. F., Schild, M., Hemphill, A., Stunzi, P., Muller, N., Gottstein, B., & Burgener, I. A. (2009). Intestinal *Tritrichomonas foetus* infection in cats in Switzerland detected by *in vitro* cultivation and PCR. *Parasitology research*, *104*, 783–788.
- Gookin, J. L., Birkenheuer, A. J., Breitschwerdt, E. B., & Levy, M. G. (2002). Single-tube nested PCR for detection of *trichomonas foetus* in feline feces. *Journal of clinical microbiology*, *40*(11), 4126–4130.
- Gookin, J. L., Hanrahan, K., & Levy, M. G. (2017). The conundrum of feline Trichomonosis. *Journal of Feline Medicine and Surgery*, *19*, 261–274.
- Gookin, J. L., Levy, M. G., Law, J. M., Papich, M. G., Poore, M. F. & Breitschwerdt, E. B. (2001). Experimental infection of cats with *Tritrichomonas foetus*. *American Journal of Veterinary Research*. *62*:1690–1697.
- Gookin, J. L., Stebbins, M. E., & Hunt, E. (2004). Prevalence of and risk factors for feline *Tritrichomonas foetus* and *Giardia* infection. *Journal of Clinical Medicine Research*, *42*(5), 2707–2710.
- Gruffydd-Jones, T., Addie, D., Belák, S., Boucraut-Baralon, C., Egberink, H., Frymus, T., Hartmann, K., Hosie, M. J., Lloret, A., Lutz, H., Marsilio, F., Möstl, K., Pennisi, M. G., Radford, A. D., Thiry, E., Truyen, U., & Horzinek, M. C. (2013). Trichomoniasis in cats: ABCD guidelines on prevention and management. *Journal of Feline Medicine and Surgery*, *15*(7), 647–930.
- Gunn-Moore, D. A., McCann, T. M., Reed, N., Simpson, K. E., & Tennant, B. (2007). Prevalence of *Tritrichomonas foetus* infection in cats with diarrhoea in the UK. *Journal of Feline Medicine and Surgery*, *9*, 214–218.
- Holliday, M., Deni, D., & Gunn-Moore, D. A. (2009). *Tritrichomonas foetus* infection in cats with diarrhoea in a rescue colony in Italy. *Journal of Feline Medicine and Surgery*, *11*, 131–134.
- Hora, A. S., Miyashiro, S. I., Cassiano, F. C., Brandão, P. E., Reche-Junior, A., & Pena, H. F. J. (2017). Report of the first clinical case of intestinal trichomoniasis caused by *Tritrichomonas foetus* in a cat with chronic diarrhoea in Brazil. *BMC Veterinary Research*, *13*(1), 109.

- Hosein, A., Kruth, S. A., Pearl, D. L., Richardson, D., Maggs, J. C., Peach, H. A., & Peregrine, A. S. (2013). Isolation of *Tritrichomonas foetus* from cats sampled at a cat clinic, cat shows and a humane society in southern Ontario. *Journal of Feline Medicine and Surgery*, *15*, 706–711.
- Kuehner, K. A., Marks, S. L., Kass, P. H., Sauter-Louis, C., Grahn, R. A., Barutzki, D., & Hartmann, K. (2011). *Tritrichomonas foetus* infection in purebred cats in Germany: Prevalence of clinical signs and the role of coinfection with other enteroparasites. *Journal of Feline Medicine and Surgery*, *13*, 251–258.
- Lucio-Forster, A., & Bowman, D. D. (2011). Prevalence of fecal-borne parasites detected by centrifugal flotation in feline samples from two shelters in upstate New York. *Journal of Feline Medicine and Surgery*, *13*, 300–303.
- Manning, K. (2010). Update on the diagnosis and management of *Tritrichomonas foetus* infections in cats. *Top Companion Animal Medicine*, *25*(3), 145–148.
- Miró, G., Hernández, L., Montoya, A., Arranz-Solís, D., Dado, D., Rojo-Montejo, S., Mendoza-Ibarra, J. A., Ortega-Mora, L. M., & Pedraza-Díaz, S. (2011). First description of naturally acquired *Tritrichomonas foetus* infection in a Persian cattery in Spain. *Parasitology research*, *109*, 1151–1154.
- Parker, S., Lun, Z. R., & Gajadhar, A. (2001). Application of a PCR assay to enhance the detection and identification of *Tritrichomonas foetus* in cultured preputial samples. *Journal of Veterinary Diagnostic Investigation*, *13*, 508–513.
- Pereira-Neves, A., & Ribeiro, K. C. (2003). Pseudocysts in trichomonads—new insights. *Protist*, *154*, 313–329.
- Polak, K. C., Levy, J. K., Crawford, P. C., Leutenegger, C. M., & Moriello, K. A. (2014). Infectious diseases in large-scale cat hoarding investigations. *Veterinary Journal*, *201*, 189–195.
- Profizi, C., Cian, A., Meloni, D., Hugonnard, M., Lambert, V., Groud, K., Gagnon, A. C., Viscogliosi, E., & Zenner, L. (2013). Prevalence of *Tritrichomonas foetus* infections in French catteries. *Veterinary parasitology*, *196*, 50–55.
- Slapeta, J., Craig, S., McDonnell, D., & Emery, D. (2013). *Tritrichomonas foetus* from domestic cats and cattle are genetically distinct. *Experimental Parasitology*, *126*(2), 209–213.
- Tysnes, K., Gjerde, B., Nødtvedt, A., & Skancke, E. (2011). A cross-sectional study of *Tritrichomonas foetus* infection among healthy cats at shows in Norway. *Acta veterinaria scandinavica*, *53*, 39.
- Walker, R. L., Hayes, D. C., Sawyer, S. J., Nordhausen, R.W., Van Hoosear, K. A. & BonDurant, R. H. (2003). Comparison of the 5.8S rRNA gene and internal transcribed spacer regions of trichomonadid protozoa recovered from the bovine preputial cavity. *Journal of Veterinary Diagnostic Investigation*, *15*, 14–20.
- Xenoulis, P. G., Lopinski, D. J., Read, S. A., Suchodolski, J. S., & Steiner, J. M. (2013). Intestinal *Tritrichomonas foetus* infection in cats: a retrospective study of 104 cases. *Journal of Feline Medicine and Surgery*, *15*, 1098–1103.
- Xenoulis, P. G., Saridomichelakis, M. N., Read, S. A., Suchodolski, J. S., & Steiner, J. M. (2010). Detection of *Tritrichomonas foetus* in cats in Greece. *Journal of Feline Medicine and Surgery*, *12*, 831–833.
- Yang, N., Cui, X., Qian, W., Yu, S., & Liu, Q. (2012). Survey of nine abortifacient infectious agents in aborted bovine fetuses from dairy farms in Beijing, China, by PCR. *Acta veterinaria Hungarica*, *60*, 83–92.
- Yao, C., & Koster, L. S. (2015). *Tritrichomonas foetus* infection, a cause of chronic diarrhea in the domestic cat. *Veterinary Research*, *46*(7), 70–79.
- Yildiz, K., & Sursal, N. (2019). The first report of *Tritrichomonas foetus* in cats from Turkey. *Israel Journal of Veterinary Medicine*, *74*, 127–133.