

Detecting the frequency of *Yersinia enterocolitica* infection in companion dogs in Ahvaz

Bahman Mosallanejad^{1*}, Darioush Gharibi², Reza Avizeh¹ and Amin Heidari³

¹ Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

² Assistant Professor, Department of Pathobiology, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

³ DVM Graduated from Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Received: 22.09.2021

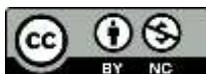
Accepted: 24.01.2022

Abstract

Yersinia enterocolitica is one of the most important pathogens transmitted through the digestive tract of pets (dogs and cats) to human. This bacterium is the causative agent of enterocolitis in human. The present study was performed on one hundred dogs (fifty clinically healthy and fifty affected to diarrhea) referred to Veterinary Hospital of Shahid Chamran University of Ahvaz. All characteristics of dogs such as age, gender, breed, gastrointestinal status for diarrhea and characteristic of diarrhea (hemorrhagic), history of raw meat consumption and dog origin were recorded. Then, two stool specimens were taken using sterile glove and swab of the rectum area. The samples were also examined for direct culture and enriched culture (in the buffered peptone water at temperature of 4° C). In cases that the grown colonies were suspected to *Yersinia*, initial tests (catalase, oxidase and gram staining) were performed and identified with biochemical tests. The probable isolates of *Yersinia enterocolitica* were recognized by PCR technique and then *foxA* gene was used to identify bacterium and determine the virulence with *ail* gene (pathogenicity). Three suspected isolates from one hundred samples (one case of healthy dogs and two cases of diarrheic animals) were included in the results of direct culture. Results of enriched culture were composed of six suspected isolates from one hundred cases (three out of healthy dogs and three other cases of diarrheic animals). Finally, out of the nine suspected isolates to *Yersinia*, only one sample was confirmed for *Yersinia enterocolitica* that was negative for *ail* virulence gene. The positive sample was belonged to a healthy, male and ten-months-old Pit bull terrier imported dog that was fed with raw meat. The results of this study showed that the dogs of this area cannot be considered as a potential reservoir for transmission of *Yersinia enterocolitica*. Further studies are necessary to determine the status of the disease, with more emphasis on the imported and rural dogs.

Key words: Ahvaz, Dog, Frequency, *Yersinia Enterocolitica*, Zoonotic disease

* **Corresponding Author:** Bahman Mosallanejad, Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran
E-mail: bmosallanejad@scu.ac.ir



© 2020 by the authors. Licensee SCU, Ahvaz, Iran. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0 license) (<http://creativecommons.org/licenses/by-nc/4.0/>).

References

- Byun, J. W., Yoon, S. S., Lim, S. K., Lee, O. S., & Jung, B. Y. (2011). Hepatic Yersiniosis Caused by *Yersinia Enterocolitica* 4:O3 in an Adult Dog. *Journal of Veterinary Diagnostic Investigation*, 23, 376–378.
- Estrada, C. S., del Carmen Velazquez, L., Favier, G. I., Di Genaro, M. S., & Escudero, M. E. (2012). Detection of *Yersinia* spp. in meat products by enrichment culture, immunomagnetic separation and nested PCR. *Food microbiology*, 30(1), 157-63.
- Fredriksson-Ahomaa, M., Korte, T., & Korkeala, H. (2000). Contamination of carcasses, offals, and the environment with yadA-positive *Yersinia enterocolitica* in a pig slaughterhouse. *Journal of food protection*, 63(1), 31-35.
- Fukushima, H., Nakamura, R., Iitsuka, S., Tsubokura, M., Otsuki, K., & Kawaoka, Y. (1984). Prospective systematic study of *Yersinia* spp. in dogs. *Journal of clinical microbiology*, 19(5), 616-622.
- Greene, C. E., & Prescott, J. F. (2012). *Enteric bacterial infections*. In: *Infectious diseases of the Dog and Cat*. Greene. Vol. 1. (4th Edition). St. Louis Missouri, USA. Pp: 333-334.
- Hashemi, S., Mahzounieh, M., & Ghorbani, M. (2016). Detection of *Yersinia* spp and *Salmonella* spp. in apparently healthy cats and dogs in Tehran, Iran, *Virology*, 12, 23-28.
- Hetem, D. J., Pekelharing, M., & Thijsen, S. F. T. (2013). Probable transmission of *Yersinia enterocolitica* from a pet dog with diarrhoea to a 1-year-old infant. *BMJ Case Report*, 16, 1-3.
- Huang, Y. (2010). Possible use of ail and foxA polymorphisms for detecting pathogenic *Yersinia enterocolitica*. *BMC Microbiology*, 10, 211.
- Jourdan, A. D., Johnson, S. C., & Wesley, I. V. (2000). Development of a Fluorogenic 5' Nuclease PCR Assay for Detection of the ail Gene of Pathogenic *Yersinia enterocolitica*. *Applied and Environmental Microbiology*, 66(9), 3750-3755.
- Joutsen, S., Eklund, K. M., Laukkanen-Ninios, R., Stephan, R., & Fredriksson-Ahomaa, M. (2016). Sheep carrying pathogenic *Yersinia enterocolitica* bioserotypes 2/O: 9 and 5/O: 3 in the feces at slaughter. *Veterinary microbiology*, 197, 78-82.
- Kameyama, M., Yabata, J., Obane, N., Otsuka, H., & Nomura, Y. (2016). Detection of pathogenic *Yersinia enterocolitica* in pet Djungarian hamsters in Japan. *Journal of Veterinary Medicine Science*, 78(10), 1639-1641.
- Kich, J. D., Souza, A. I. A., Montes, J., Meneguzzi, M., Costa, E. F., Coldebella, A., Corbellini, L. G., & Cardoso, M. (2020). Investigation of *Listeria monocytogenes*, *Salmonella enterica* and *Yersinia enterocolitica* in pig carcasses in Southern Brazil. *Pesquisa Veterinária Brasileira*, 40 (10), 781-790.
- Lambertz, S. T., & Danielsson-Tham, M. L. (2005). Identification and characterization of pathogenic *Yersinia enterocolitica* isolates by PCR and pulsed-field gel electrophoresis. *Applied and Environmental Microbiology*, 71(7), 3674-3681.
- Murphy, B. P., Drummond, N., Ringwood, T., O'Sullivan, E., Buckley, J. F., Whyte, P., Prentice, M. B., & Fanning, S. (2010). First report: *Yersinia enterocolitica* recovered from canine tonsils. *Veterinary Microbiology*, 146(3-4), 336-339.
- Nesbakken, T., Eckner, K. F., Hoidal, H. K., & Rotterud, O. J. (2003). Occurrence of *Yersinia enterocolitica* and *Campylobacter* spp. in slaughter pigs and consequences for meat inspection, slaughtering, and dressing procedures. *International Journal of Food Microbiology*, 80(3), 231-240.
- Sabina, Y., Rahman, A., Ray, R. C., & Montet, D. (2011). *Yersinia enterocolitica*: mode of transmission, molecular insights of virulence, and pathogenesis of infection. *Journal of pathogens*, 23, 155-1159.
- Simonova, J., Vazlerova, M., & Steinhäuserova, I. (2007). Detection of pathogenic *Yersinia enterocolitica* serotype O: 3 by biochemical, serological, and PCR methods. *Czech journal of food sciences*, 25(4), 214.
- Stamm, I., Hailer, M., Depner, B., Kopp, P. A., & Rau, J. (2013). *Yersinia enterocolitica* in diagnostic fecal samples from European dogs and cats: identification by Fourier transform infrared spectroscopy and matrix-assisted laser desorption ionization–time of flight mass spectrometry. *Journal of Clinical Microbiology*, 51(3), 887-893.

- Szczylo, K., Platt-Samoraj, A., Banczerz-Kisiel, A., Szczerba-Turek, A., Pajdak-Czaus, J., Labuc, S., Procajlo, Z., Socha, P., Chuzhebayeva, G., & Szweda, W. (2018). The prevalence of *Yersinia enterocolitica* in game animals in Poland. *PLoS one*, 13(3), e0195136.
- Tan, L. K., Ooi, P. T., & Thong, K. L. (2014). Prevalence of *Yersinia enterocolitica* from food and pigs in selected states of Malaysia. *Food Control*, 35, 94-100.
- Tsang, T. M., Wiese, J. S., Felek, S., Kronshage, M., & Krukonis, E. S. (2013). *Ail* proteins of *Yersinia pestis* and *Y. pseudotuberculosis* have different cell binding and invasion activities. *PLoS One*, 8(12), e83621.
- Torres, M., Pirez, M., Schelotto, F., Varela, G., Parodi, V., Allende, F., Falconi, E., Dell'Acqua, L., Gaione, P., & Mendez, M. (2001). Etiology of children's diarrhea in Montevideo, Uruguay: associated pathogens and unusual isolates. *Journal of clinical microbiology*, 39(6), 2134-2139.
- Wibbelt, G., & Kelly, D. F. (2001). Sudden death in a Rottweiler puppy with myocardial Yersiniosis. *European Journal of Veterinary Pathology*, 7(3), 135-137.
- Yanagawa Y., Maruyama T., & Sakai S. (1978). Isolation of *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* from apparently healthy dogs and cats. *Microbiology and Immunology*, 22 (10), 643- 646.