

Seroprevalence of *Leptospira interrogans* infection in Equids of Lorestan Province: Investigation the role of probable risk factors

Shahram Maleki^{1*}, Amir Zakian¹ and Gholamreza Abdollahpour²

¹ Assistant Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran

² Professor, Department of Internal Medicine, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Received: 16.04.2019

Accepted: 26.10.2019

Abstract

Environmental and hosts risk factors are considered as two essential elements in epidemiological studies of infectious diseases. The severity of the infection and also the chance of transmission of pathogenic *Leptospira interrogans* bacteria from herbivores to humans have always been exposed to environmental and hosts risk factors. This study aimed to investigate the presence of serum reaction in the equid's population of Lorestan province and the determination of native serovars as well as evaluation of the role of environmental and host factors on seroprevalence. A total of 327 equids including 223 horses, 46 mules, and 58 donkeys were sampled and sera samples evaluated against 7 different *Leptospira interrogans* serovars. Geographical location and environmental conditions of sampled areas were recorded to be used in statistical surveys. The results showed that the serum positive reaction rate in horses, mules, and donkeys was 18.38, 10.87 and 3.45%, respectively. Host risk factors such as sex, age, and breed were effective on serum response rate and a significant difference was found. Canicola serovar with 46.34, 100 and 60% infection in horses, donkeys, and mules, respectively was the most common infective serovar; but a significant difference was not observed between animal species. Also, the results indicated that annual temperature of the environment and altitude at sea level of sampled location have a significant effect on seroprevalence of leptospirosis, but relative humidity and annual rainfall did not have a significant effect. Results of the current study proved that infection with *Leptospira interrogans*, although in Lorestan province is less severe than in other parts of the country, the most important native serovar of this region is canicola.

Key words: *Leptospira interrogans*, equids, Lorestan, canicola, zoonosis

* **Corresponding Author:** Shahram Maleki, Assistant Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran, E-mail: maleki.sh@lu.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

- Adler, B., & Moctezuma, P. A. (2010). *Leptospira* and Leptospirosis. *Journal of Veterinary Microbiology*, 140: 287-296.
- Aiello, S. E., & Moses, A. (2016). *The Merck Veterinary Manual* (11th Edition). John Wiley & Sons. New Jersey, US.
- Alvarado-Esquivel, C., Cruz-Romero, A., Romero-Salas, D., Alvarado-Felix, A. O., Aguilar-Dominguez, M., Ochoa-Valencia, J. L., et al. (2018). Apparently high *Leptospira* antibody seropositivity in donkeys for slaughter in three municipalities in Durango, Mexico. *Journal of Veterinary Diagnostic Investigation*, 30(6): 929-939.
- Andre-Fontaine, G. (2004). Update on epidemiology and microbiological diagnosis of Leptospirosis in dogs: a review with emphasis on clinical aspects. *Veterinary Record*, 163: 409-413.
- Baverud, V., Gunnarsson, A., & Engvall, E. O. (2009). *Leptospira* seroprevalence and associations between seropositivity, clinical disease and host factors in horses. *Acta Veterinaria Scandinavica*, 51: 15-21.
- Benkirane, A., Noury, S., Hartskeerl, R. A., Goris, M. G. A., Ahmed, A., & Nally, J. E. (2016). Preliminary investigations on the distribution of *Leptospira* serovars in domestic animals in north-west Morocco. *Journal of Transboundary and Emerging Disease*, 63: 178-184.
- Cole, J. R., Sulzer, C. R., & Pursell, A. R. (1973). Improved microtechnique for the leptospiral agglutination test. *Applied Microbiology*, 25: 976-980.
- Constable, P., Hincheliff, K. W., Done, S., & Gruenberg, W. (2017). *Veterinary Medicine: A Textbook of the Disease of Cattle, Horses, Sheep, Pigs and Goats*. (11th Edition). Saunders Elsevier, Philadelphia, PA, USA. Pp: 1115-1128.
- Dacre, I., Dixon, P., & Gasden, L. (2008). Dentistry. In: *The professional Hand book of The Donkey*. (4th ed., Pp: 62-81). Whittet Books Ltd., London, UK.
- Ghneim, G., Viers, J., Chomel, B., Kass, P., Descollonges, D., & Johnson, M. (2007). Use of a case-control study and geographic information systems to determine environmental and demographic risk factors for canine leptospirosis. *Journal of Veterinary Research*, 38: 37-50.
- Haggag, Y. H., Yasser, N., Samaha, H. A., Nossair, M. A., El-Shafii, S. A., & Abdalla, T. A. (2015). Seroprevalence of *Leptospira* Hardjo in equine and human in Behera province, Egypt. *Alexandria Journal of Veterinary Sciences*, 47: 113-118.
- Hajikolahi, M. R., Gorbanpour, M., Heidari, M., & Abdollahpor, G. (2005). Comparison of leptospiral infection in the horse and donkey. *Bulletin of Veterinary Institute Pulawy*, 49: 175-178.
- Haji Hajikolaei, M. R., Nafisi Mozaffar, A., Lotfollahzadeh, S., Ghorbanpour, M., & Abdollahpour, G. R. (2016). Seroprevalence of *Leptospira interrogans* infection in horses from some horse clubs in Tehran by Microscopic Agglutination Test (MAT). *Journal of Veterinary Clinical Pathology*, 9(36): 347-356. [In Persian]
- Hamond, C., Pestana, C. P., Rocha-de-Souza, C. M., Cunha, L. E., Brandao, F. Z., Medeiros, M. A., & Lilenbaum, W. (2015). Presence of leptospires on genital tract of mares with reproductive problems. *Veterinary Microbiology*, 179: 264-269.
- Hassanpour, A., & Safarmashaei, S. (2012). Seroprevalence of leptospiral infection in horses, donkeys and mules in East Azerbaijan province. *African Journal of Microbiology Research*, 6(20): 4384-4387.
- Jung, B. Y., Lee, K. W., & Young, T. H. A. (2010). Seroprevalence of *Leptospira* spp. in clinically healthy racing horses in Korea. *Journal of Veterinary Medical Science*, 72(2): 197-201.
- Khousheh, Y., Hassanpour, A., Abdollahpour, G., & Mogaddam, S. (2012). Seroprevalence of *Leptospira* Infection in Horses in Ardabil-Iran. *Global Veterinaria*, 9: 586-589.
- Kitson-Piggot, A. W., & Prescott, J. F. (1987). Leptospirosis in horses in Ontario. *Canadian Journal of Veterinary Research*, 5: 448-451.
- Langoni, H., Da Silva, A. V., Pezerico, S. B., & De Lima, V. Y. (2004). Anti -leptospirosis agglutinins in equine sera, from São Paulo, Goias, and MatoGrosso do Sul, Brazil, 1996-2001. *Journal of Venomous Animals and Toxins including Tropical Diseases*, 10: 471-479.
- Lees, V. W., & Gale, S. P. (1994). Titers to *Leptospira* species in horses in Alberta. *Canadian Veterinary Journal*, 35: 636-640.

- Maleki, S. H., Sookhtehzari, A., & Abdollahpour, G. R. (2015). Seroepidemiologic Study of Horses Leptospirosis in Khorramabad, west Iran. *Buletin Teknologi Tanaman Bil*, 12(1): 135-138.
- Park, Y. G., Gordon, J. C., Bech-Nielsen, S., & Slemons, R. D. (1992). Factors for seropositivity to leptospirosis in horses. *Preventive Veterinary Medicine*, 13: 121-127.
- Pikalo, J., Sattler, T., Eichinger, M., Loitsch, A., Sun, H., Schmoll, F., & Schusser, G. F. (2016). Occurrence of antibodies against *Leptospira* in horses in Middle Germany. *Berliner und Munchener Tierarztliche Wochenschrift*, 129: 202-208. [In German]
- Pinto, P. S., Libonati, H., & Lilenbaum, W. (2017). A systematic review of leptospirosis on dogs, pigs, and horses in Latin America. *Tropical Animal Health and Production*, 49(2): 231-238.
- Ramin, A., Abdollahpour, G. H., & Irannejad, S. (2013). Determination of seroprevalence of *Leptospira* serotypes in Urmia equine. *Iranian Journal of Veterinary Clinical Sciences*, 7(1): 59-66. [In Persian]
- Rezazadeh, F., & Javidi-Brazandeh, M. A. (2010). *Age determination and oral and dental diseases in horse*. (1st ed). Pardis Bavaran Publication, Tehran, Iran. Pp: 55-101. [In Persian]
- Seshagiri, R. A., Krishna, R. P., Ramakrishna, K., & Dhananjaya, R. B. (1985). Serological and clinical evidence of leptospiral infection in horse. *Indian Veterinary Journal*, 62: 273-277.
- Simbizi, V., Saulez, M. N., Potts, A., Lotter, C., & Gummow, B. (2016). A study of leptospirosis in South African horses and associated risk factors. *Preventive Veterinary Medicine*, 134: 6-15.
- Stankeviciene, M., Buitkuvienne, J., Bartaseviciute, N., Adomkiene, R., and Statkeviciute, J. (2016). Seroepizootic survey of Leptospirosis in horses. *Journal of Veterinarija IR Zootechnika*, 74(96): 64-68.
- Tadich, T. A., Tapia, C., & Gonzalez, D. (2016). Seroprevalence of *Leptospira* spp. in working horses located in the central region of Chile. *Journal of Equine Veterinary Science*, 38: 14-16.
- Thangapandian, M., Potheppan Balachandran, C.; Sridhar, R.; Ravi, K. and Senthil, K. (2018). Seroprevalence of *Leptospira* Spp. in clinically healthy horses in Chennai, India. *Asian Journal of Animal Veterinary Advances*, 13(4): 305-308.
- Tsegay, K., Potts, A. D., Aklilu, N., Lotter, C., & Gummow, B. (2016). Circulating serovars of *Leptospira* in cart horses of central and southern Ethiopia and associated risk factors. *Preventive Veterinary Medicine*, 125(1): 106-115.
- Wangdi, C., Picard, J., Tan, R., Condon, F., Dowling, B., & Gummow, B. (2013). Equine leptospirosis in tropical Northern Queensland. *Australian Veterinary Journal*, 91: 190-197.
- Ward, M. P. (2002). Seasonality of canine leptospirosis in the United States and Canada and its association with rainfall. *Preventive Veterinary Medicine*, 56: 203-213.
- Whitwell, K. E., Blunden, A. S., Miller, J., & Errington, J. (2009). Two cases of equine pregnancy loss associated with *Leptospira* infection in England. *The Veterinary Record*, 165: 377-378.
- Williams, D. M., Smith, B. J., Donahue, J. M., & Poonacha, K. B. (1994). Serological and microbiological findings on 3 farms with equine leptospiral abortions. *Equine Veterinary Journal*, 26: 105-108.