

Molecular Detection of Blood-Borne Parasites in Ticks Infested Dogs in Wasit Province, Iraq

Anas Hasan Hatthoot¹, Mousa Tavassoli^{2*}, Mohammad Yakhchali^{1,2} and Ghassan jabbar khalaf AL_Abedi³

¹ PhD Student of Parasitology, Department of Pathobiology, Faculty of Veterinary Medicine, Urmia University Urmia Iran

² Professor, Department of Pathobiology, Faculty of Veterinary Medicine Urmia University Urmia Iran

³ Assistant Professor, Department of Medical Laboratories Techniques, Faculty of Health and Medical Techniques, University of Kut, Wasit, 52001, Iraq

Received: 13.10.2025

Accepted: 07.12.2025

Abstract

Haemoparasitic infections are frequently observed in dogs from tropical regions, including Iraq. Numerous dogs become infected with several blood parasites. This investigation was designed in Wasit Province, Iraq, to conduct a comprehensive molecular detection and characterization of haemoparasites in ticks that infested dogs. This cross-sectional study was performed from the beginning of May 2024 to the end of December 2024. Totally, 280 stray dogs were examined in different areas in Wasit, Iraq. All animals were systematically examined for tick infestation; for this, the collected ticks were preserved in ethanol and were identified using standard taxonomic keys. The sample was obtained from the ticks infested dogs and was used for both microscopic and molecular analysis to detect piroplasms (*Babesia*, *Theileria*), and *Anaplasma*. The total DNA was extracted followed by nested PCR using primer targeting 16S rRNA gene to detect the *Anaplasma* spp., and 18SrRNA for *Babesia* spp. and *Theileria* spp. The PCR products were confirmed by agarose gel electrophoresis. Morphological examination revealed that the adult ticks identified belonged to the Ixodid family, with four species classified under the genus *Rhipicephalus* (*Rhipicephalus turanicus*, *Rhipicephalus sanguineus*, *Rhipicephalus pravus*, and *Rhipicephalus camicasi*). Nested PCR analysis further demonstrated the presence of *Anaplasma* spp. in 16 tick samples (16%), *Babesia* spp. in 14 dogs (14%), and *Theileria* spp. in 11 dogs (11%). These results highlight the role of ticks as potential reservoirs for *Anaplasma*, *Babesia*, and *Theileria* species, emphasizing their importance in the transmission dynamics of these blood parasites and their possible impact on livestock health and productivity.

Keywords: Iraq, Blood-Borne Parasites, Dog, Tick, Nested PCR assay

* **Corresponding Author:** Mousa Tavassoli, Professor, Department of Pathobiology Faculty of Veterinary Medicine Urmia University Urmia Iran
E-mail: m.tavassoli@urmia.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

- Alkathiri, B., Lee, S., Ahn, K., Youn, S. Y., Yoo, M.-S., Lee, H.-S., Cho, Y. S., Jung, J., Seo, K., & Kim, S. (2024). DNA Barcoding Using 18S rRNA Gene Fragments for Identification of Tick-Borne Protists in Ticks in the Republic of Korea. *Pathogens*, *13*(11), 941.
- Arsalan, S., Daham, E., Al-Obaidi, Q., & Sulaiman, E. (2006). Study on the percentage of infection with endo- and ectoparasites in dogs in Mosul/Iraq. *Iraqi Journal of Veterinary Sciences*, *20* (1), 125-137
- Aziz, K., & Al-Barwary, L. (2020). Molecular identification of *Theileria equi* and *Babesia caballi* from ixodid ticks infesting equids in Erbil province, northern of Iraq. *Advances in Animal and Veterinary Sciences*, *8*(12), 1286-1293.
- Aziz, K. J., & AL-barwary, L. T. O. (2019). Prevalence rate of ixodid ticks in equids and some nearby farm animals in erbil governorate, north of Iraq. *Basrah Journal of Veterinary Research*, *18*(1), 337-359.
- Chao, L.-L., Hsieh, C.-K., Ho, T.-Y., & Shih, C.-M. (2019). First zootiological survey of hard ticks (Acari: Ixodidae) infesting dogs in northern Taiwan. *Experimental and Applied Acarology*, *77*(1), 105-115.
- de la Fuente, J., Estrada-Peña, A., Rafael, M., Almazán, C., Bermúdez, S., Abdelbaset, A. E., Kasaija, P. D., Kabi, F., Akande, F. A., & Ajagbe, D. O. (2023). Perception of ticks and tick-borne diseases worldwide. *Pathogens*, *12*(10), 1258.
- de Oliveira, P. R., Bechara, G. H., Denardi, S. E., Nunes, É. T., & Mathias, M. I. C. (2005). Morphological characterization of the ovary and oocytes vitellogenesis of the tick *Rhipicephalus sanguineus* (Latreille, 1806) (Acari: Ixodidae). *Experimental parasitology*, *110*(2), 146-156.
- Estrada-Peña, A., Bouattour, A., Camicas, J., & Walker, A. (2004). Ticks of domestic animals in the Mediterranean region. *University of Zaragoza, Spain*, *131*(4).
- Gong, L., Diao, L., Lv, T., Liu, Y., Liu, J., Zhang, W., Xie, X., & Cao, Y. (2025). A comprehensive review of tick-borne disease epidemiology, clinical manifestations, pathogenesis, and prevention. *Animals and Zoonoses*. *1*(3), 254-265.
- Guglielmone, A. A., Robbins, R. G., Apanaskevich, D. A., Petney, T. N., Estrada Peña, A., Horak, I. G., Shao, R., & Barker, S. C. (2010). The Argasidae, Ixodidae and Nuttalliellidae (Acari: Ixodida) of the world: a list of valid species names. *Zootaxa*, (1) 6 , 1-28.
- Hassissen, L., Kebbi, R., Ayad, A., & Nait-Mouloud, M. (2019). Seasonal activity of ticks infesting domestic dogs in Bejaia province, Northern Algeria. *Onderstepoort Journal of Veterinary Research*, *86*(1), 1-6.
- Hatem, A. N. (2020). Prevalence and ecology of the brown dog tick *Rhipicephalus sanguineus* in domestic mammals in Basrah province, Iraq, with the acaricidal effect of *Quercus brantii* acorns extract in adults. *Iraqi Journal of Agricultural Sciences*, *51*(6), 1670-1677.
- Huggins, L. G., Koehler, A. V., Gasser, R. B., & Traub, R. J. (2023). Advanced approaches for the diagnosis and chemoprevention of canine vector-borne pathogens and parasites—Implications for the Asia-Pacific region and beyond. *Advances in parasitology*, *120*, 1-85.
- Huruma, G., Abdurhaman, M., Gebre, S., & Deresa, B. (2015). Identification of bovine tick species and their prevalence in and around Sebeta Town, Ethiopia. *Journal of parasitology and Vector Biology*, *7*(1), 1-8.
- Jongejan, F. (1998). Integrated control of ticks and tick-borne diseases (ICTTD). *Parasitology today*, *14*(5), 173-176.
- Khovand, H., FARD, S. R. N., Khalili, M., & Jajarmi, M. (2022). A survey of Ixodid ticks in stray dogs and molecular detection of *Ehrlichia canis* from ticks in central Iran. *Turkish Journal of Veterinary & Animal Sciences*, *46*(2), 209-217.
- Latrofa, M. S., Dantas-Torres, F., Annoscia, G., Cantacessi, C., & Otranto, D. (2013). Comparative analyses of mitochondrial and nuclear genetic markers for the molecular identification of *Rhipicephalus* spp. *Infection, Genetics and Evolution*, *20*, 422-427.
- Léger, E., Vourc'h, G., Vial, L., Chevillon, C., & McCoy, K. D. (2013). Changing distributions of ticks: causes and consequences. *Experimental and Applied Acarology*, *59*(1), 219-244.
- Mohammad, M. K. (2015). Distribution of ixodid ticks among domestic and wild animals in central Iraq. *Bulletin of the Iraq Natural History Museum*, *13*(3), 23-30.

- Nava, S., Mastropaolo, M., Venzal, J. M., Mangold, A. J., & Guglielmono, A. A. (2012). Mitochondrial DNA analysis of *Rhipicephalus sanguineus sensu lato* (Acari: Ixodidae) in the Southern Cone of South America. *Veterinary Parasitology*, *190*(3-4), 547-555.
- O'Neill, D., Komutrattananon, R., Church, D., Hartley, A., & Brodbelt, D. (2024). The epidemiology of tick infestation in dog breeds in the UK. *Journal of Small Animal Practice*, *65*(7), 569-581.
- Opeyemi, O. A., Babamale, O. A., Shittu, O., Mohammad, M. U., & Ugbomoiko, U. S. (2019). Seasonal distribution and common management practices of ectoparasites of domestic dogs in Ilorin, Nigeria. *Animal Research International*, *16*(1), 3265-3272.
- Robert, K., Van Gestel, M., Lathouwers, M., Fonville, M., Sprong, H., Matthysen, E., & Heylen, D. (2025). Abundance of ticks and tick-borne pathogens in domestic gardens in Belgium, 2020-2022: a citizen science approach. *BMC Public Health*, *25*(1), 2031.
- Salih, D., El Hussein, A., & Singla, L. (2015). Diagnostic approaches for tick-borne haemoparasitic diseases in livestock. *Journal of veterinary medicine and animal health*, *7*(2), 45-56.
- Sri-In, C., Thongmeesee, K., Wechtaisong, W., Yurayart, N., Rittisorntanoo, G., Akarapas, C., Bunphungbaramee, N., Sipraya, N., Riana, E., & Bui, T. T. H. (2024). Tick diversity and molecular detection of *Anaplasma*, *Babesia*, and *Theileria* from Khao Kheow open zoo, Chonburi Province, Thailand. *Frontiers in veterinary science*, *11*, 1430892.
- Stafford, KC. (2007). Tick Management Handbook. The Connecticut Agricultural Experiment Station. Bulletin. *10*(10): p.79.
- Takano, A., Toyomane, K., Konnai, S., Ohashi, K., Nakao, M., Ito, T., Andoh, M., Maeda, K., Watarai, M., & Sato, K. (2014). Tick surveillance for relapsing fever spirochete *Borrelia miyamotoi* in Hokkaido, Japan. *PLoS One*, *9*(8), e104532.
- Vilas-Boas, D. F., Nakasone, E. K. N., Gonçalves, A. A. M., Lair, D. F., Oliveira, D. S. d., Pereira, D. F. S., Silva, G. G., Conrado, I. d. S. S., Resende, L. A., & Zaldívar, M. F. (2024). Global distribution of canine visceral leishmaniasis and the role of the dog in the epidemiology of the disease. *Pathogens*, *13*(6), 455.
- Walker, A. R. (2003). *Ticks of domestic animals in Africa: a guide to identification of species* (Vol. 74). Bioscience Reports Edinburgh.
- Wall, R., & Shearer, D. (2008). *Veterinary ectoparasites: biology, pathology and control*. John Wiley & Sons.