Case Report

Tick Paralysis Caused by *Argas persicus* Infestation in Domestic Chickens: A Case Report

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ABSTRACT

Toxicosis induced by ticks primarily causes tick paralysis. Affected animals develop ascending flaccid paralysis due to the paralytic neurotoxin's effect on the synaptic space of the neuromuscular junction. This condition, if left untreated for a longer period, may lead to death due to paralysis of the respiratory muscles. In a one-year-old domestic chicken with good general condition and respiration, symptoms of complete flaccid paralysis of legs and wings were observed. Eight ticks were removed from the bird's body and referred to the parasitology laboratory. The ectoparasite treatment was performed with ivermectin. Within a week after treatment, the clinical symptoms had completely disappeared. By analyzing the morphological characteristics of the tick, the larval stage of *Argas persicus* ticks was identified. Additionally, to complete the differential diagnosis, conventional polymerase chain reaction (PCR) determined that the blood spirochete *Borrelia anserina* was not present in the completely homogeneous extract of the ticks. Since the presence of a small number of external parasites can have serious consequences, like paralysis and death, this study highlights the importance of precise clinical examination in addition to parasitological and paraclinical investigations, for the successful diagnosis and treatment of this disease. While this complication receives significantly more attention in veterinary medicine, it is also important from the perspective of zoonotic diseases, as it can occur in a similar manner in humans. Therefore, professionals in human medicine should also be aware of this complication.

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Case History

Tick paralysis is one of the most common forms of tick-induced toxicosis (Pienaar et al., 2018). The salivary neurotoxin affects the efferent neuromuscular junction more than the afferent and sensory pathways, thus inhibiting the release of the neurotransmitter from the presynaptic terminal and causing ascending flaccid paralysis. Clinical signs begin suddenly with ascending flaccid tetraplegia, which mainly coincides with the rapid feeding phase of the tick (3-7 days after it begins feeding) (Nosek et al., 1980; Kwak & Madden, 2017; Pienaar et al., 2018). When paralysis reaches the thoracic muscles, death occurs within hours to days (Gregson, 1936). Timely removal of ticks from the animal's body leads to alleviation of the symptoms and complete recovery (Viljoen et al., 1990).

It should be noted that paresis and paralysis in chickens may be caused by factors other than tick toxicosis. These include Marek's disease, Newcastle disease, botulism, blood spirochetosis, spinal cord injury, organophosphates toxicity, and heavy metal poisoning (Rosenstein, 1976; Hill et al., 2021). The presence of tick larvae attached to the birds' body, evidence of tick bites, or the presence of ticks in the bird's environment makes spirochetosis (caused by *Borrelia anserine*, an Argas symbionts), a priority in the differential diagnosis (Swayne et al., 2019).

Argas persicus, known as the fowl tick or poultry tick, is a soft tick in the Argasidae family. This species, like other soft ticks (except *Ornithonhysus lahorensis*), only causes paralysis in the larval stage, perhaps because the larvae have a feeding period of several days, but the nymph and adult stages feed for a short period (Viljoen et al., 1990; Pienaar et al., 2018).

Humans are mostly affected by hard ticks (Ixodid), but there are reports of toxicosis due to Argasidae as well. The clinical presentation in humans is an acute, symmetrical, and ascending flaccid paralysis that begins in the legs and progresses to the arms within 12 to 24 hours. If the tick continues to feed without intervention, the patient will likely die of respiratory failure; therefore, early identification and intervention are crucial (Abdigoudarzi et al., 2006; James et al., 2021).

Clinical Presentation

A one-year-old domestic chicken with symptoms of complete paralysis and decreased muscle tone in both legs and wings was referred to the Avian Clinic of the Faculty of Veterinary Medicine, University of Tehran. Due to this condition, the owner had been hand-feeding the bird for one day. Aside from the inability to move its limbs, the bird's general condition, weight, mucus color, respiration, and appetite were normal. During the clinical examination, eight ticks were observed on the bird's abdomen and back (Figure 1).

For diagnostic purposes, the ticks were removed and sent to the parasitology laboratory. The chicken was then treated with a single subcutaneous dose of 0.2 mg/kg ivermectin (Rooyan Darou, Iran). It was recommended to continue manual feeding until complete recovery. Within a day, muscle tone began to recover, and within a week, the bird was able to move its limbs again.

Diagnostic Testing

The detached ticks were first examined under a dissecting microscope (Figure 2). Some of them were clarified with a 10% KOH solution and then examined by a light microscope (Figure 3). The ticks had six legs, a relatively circular and wrinkled body, and lacked the hard plate (Scutum). Based on these observations, along with the presence of 26 pairs of dorsal setae and 14 pairs of ventral setae, as well as other details described by Abdel-Shafy (2005), the larval stage of *A. persicus* was diagnosed (Abdel-Shafy, 2005).

Regarding the tick species and the possibility of blood spirochetosis in such cases, the presence of *Borrelia anserina* for differential diagnosis was investigated molecularly. Five ticks were homogenized using a mortar and pestle, and after centrifuging the resulting mixture, the supernatant was collected. The DNA from the supernatant was extracted using the DNA extraction kit (MBST, Iran) and a conventional polymerase chain reaction (PCR) test was performed using a forward primer (5′- CTC AAA TTA GAG GAT TAT CTC AAG C -3′), and a reverse primer (5′- TGC TAC AAT TTC ATC TGT CAT TG -3′). The primer sequences and thermal cycling protocol, which included an initial denaturation step (5 min at 95 °C), 30 cycles of denaturation (60 sec at 95 °C), annealing (60 sec at 55 °C), extension (50 sec at 72 °C), and a final extension step (5 min at 72 °C), were designed to amplify a 725 base pair PCR product, as comprehensively described by Chegini et al. (2017). Agarose gel electrophoresis of the PCR product revealed no DNA, indicating that the ticks were not infested with blood spirochetes.

Figure 1. Ticks were hidden on the abdomen surface between the feathers

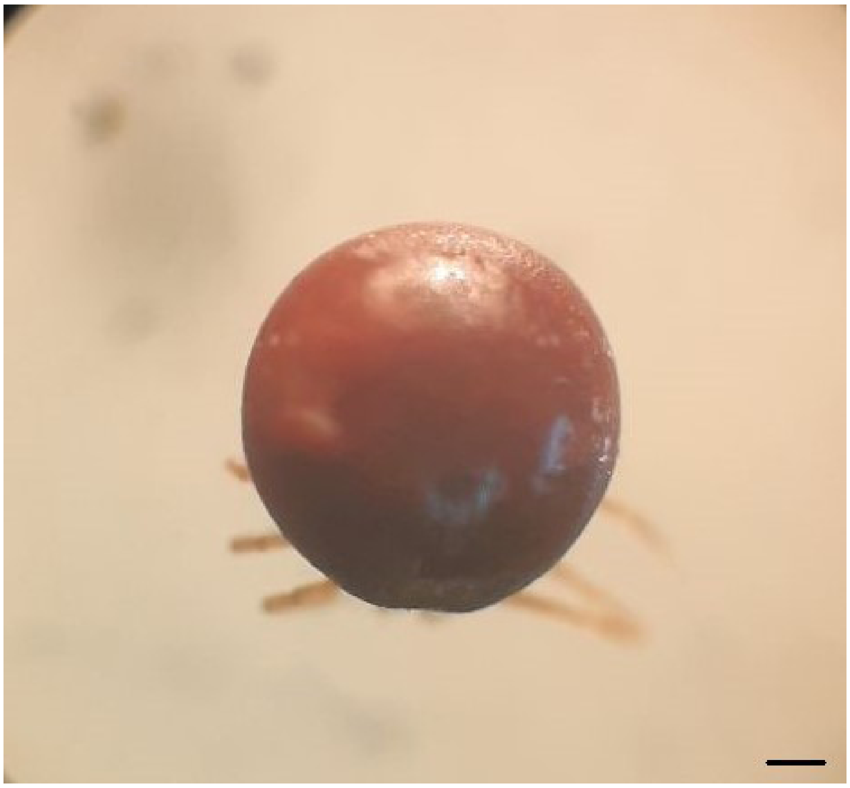

Figure 2. Non-clarified tick larva under the brightfield dissecting microscope (scale bar: 100 µm)

Figure 3. Clarified tick larva using a 10% KOH solution under the light microscope (scale bar: 100 μm)

Assessment

Tick paralysis is considered a potential threat to animal husbandry health and economics. Although external parasites are less problematic in industrial poultry production today, the increasing trend of keeping birds as backyard poultry and companion animals has led to a rise in tick infestations in birds. Tick toxicosis continues to be reported worldwide in various human-animal populations (Hill et al., 2021; Pontiff et al., 2021; Teo et al., 2023). Of approximately 900 known tick species, 59 hard ticks and 14 soft ticks are responsible for causing tick paralysis in birds, humans, and other mammals, as described by Pienaar et al. (2018).

In some studies, conducted by Rosenstein (1976) and Nosek et al. (1980) tick paralysis was reported in chickens due to infestations with *A. persicus* larvae. In contrast to the present study, paralysis was the result of heavy infestation with a large number of larvae (Rosenstein, 1976; Nosek et al., 1980). Also, Radfar et al. (2012) observed paralysis in some backyard chickens in the Sistan region, Iran, with infections ranging from 1 to 14 *A. persicus* larvae (Radfar et al., 2012).

Since *A. persicus* is the main vector of *B. anserina*, it is conceivable that if the bird is infected with this tick, paralysis of the limbs could occur due to blood spirochetosis, rather than solely due to the neurotoxins of the ticks (Chegeni et al., 2017; Cepeda et al., 2021).

The bird's ability to groom an area affects the number of ticks present there. Ticks are often found in regions that are beyond the bird's reach for proper grooming and out of sight of the clinician during the initial examination. Therefore, careful palpation and examination around the eyes, head, under the beak, and along the abdomen should be a priority for birds that exhibit weakness (Hill et al., 2021).

While methods such as utilizing toxin vaccines and tick antiserum have previously been used to manage and treat tick paralysis, controlling tick populations, providing supportive care, and removing the parasites still remain the most effective approaches (Padula, 2016). Studies on tick species and fauna in different regions can identify high-risk areas (Kwak & Madden, 2017). Cases of tick-born paralysis in the human population are limited, but there are documented reports of the disease and even deaths in humans (Gregson, 1936). Because this disease is potentially fatal and yet easily treatable in some cases, healthcare providers should also be informed about the issue (Pontiff et al., 2021). Human tick paralysis is not commonly found in Iran; however, some cases may be misdiagnosed or overlooked (Abdigoudarzi et al., 2006; James et al., 2021).

The present report confirmed the ability of the larval stage of *A. persicus* to cause tick paralysis in poultry, even when there are only a few of these small larval organisms, which can only be noted with a precise clinical examination. This is consistent with previous studies and emphasizes the importance of laboratory tests to rule out similar causes of disease.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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References

Abdel-Shafy, S. (2005). Scanning electron microscopy and comparative morphology of argasid larvae (Acari: Ixodida: Argasidae) infesting birds in Egypt. *Acarologia, 45*(1), 3-12. [Link]

Abdigoudarzi, M., Belgheiszadeh, H., & Shariati, N. (2006). Tick paralysis in human; a case report. *Iranian Journal of Clinical Infectious Diseases, 1*(3), 159-160. [Link]

Cepeda, M. B., Cordeiro, M. D., de Azevedo Baêta, B., & da Fonseca, A. H. (2021). Experimental infection by Borrelia anserina strain PL in Gallus gallus. *Semina: Ciências Agrárias, 42*(4), 2429-2438. [DOI:10.5433/1679-0359.2021v42n4p2429]

Gregson, J. (1936). Studies on the rate of tick feeding in relation to disease. *Journal of the Entomological Society of British Columbia, 33,* 15-21. [Link]

Hill, A. G., Clark, N. J., & Tokonami, F. (2021). Tick paralysis in Australian birds caused by Ixodes holocyclus. *Australian Veterinary Journal, 99*(12), 522-528. [DOI:10.1111/avj.13119] [PMID]

Chegeni, A. H., Telmadarraiy, Z., Tavakoli, M., & Faghihi, F. (2017). Molecular detection of Borrelia anserina in Argas persicus (Acari: Argasidae) ticks collected from Lorestan province, west of Iran. *Persian Journal of Acarology, 6*(4). [DOI:10.22073/pja.v6i4.28372]

James, V., Rajan, J., & Rajan, S. (2021). Acute flaccid paralysis in a neonate: Tick bite a differential? *Oxford Medical Case Reports, 2021*(7), omab037. [DOI:10.1093/omcr/omab037] [PMID]

Kwak, M. L., & Madden, C. (2017). The first record of infestation by a native tick (Acari: Ixodidae) on the Australian emu (Dromaius novaehollandiae) and a review of tick paralysis in Australian birds. *Experimental & Applied Acarology, 73*(1), 103–107. [DOI:10.1007/s10493-017-0168-0] [PMID]

Nosek, J., Hoogstraal, H., Labuda, M., & Cyprich, D. (1980). Bionomics and health importance of fowl tick Argas (Persicargas) persicus (Oken, 1818) (Ixodoidea: ARgasidae). *Zeitschrift fur Parasitenkunde (Berlin, Germany), 63*(3), 209–212. [DOI:10.1007/BF00931982] [PMID]

Padula, A. M. (2016). Tick paralysis of animals in Australia. *Clinical Toxinology in Asia Pacific and Africa,* 1-20. [Link]

Pienaar, R., Neitz, A. W. H., & Mans, B. J. (2018). Tick Paralysis: Solving an Enigma. *Veterinary Sciences, 5*(2), 53. [DOI:10.3390/vetsci5020053] [PMID]

Pontiff, K., Woodward, C., & McMahon, P. (2021). Tick Paralysis Case Series: An 11-Year Institutional Case Series. *Pediatric Emergency Care, 37*(12), 589–592. [DOI:10.1097/PEC.0000000000002572] [PMID]

Radfar, M. H., Khedri, J., Adinehbeigi, K., Nabavi, R., & Rahmani, K. (2012). Prevalence of parasites and associated risk factors in domestic pigeons (Columba livia domestica) and free-range backyard chickens of Sistan region, east of Iran. *Journal of Parasitic Diseases: Official Organ of the Indian Society for Parasitology, 36*(2), 220–225. [DOI:10.1007/s12639-012-0112-5] [PMID]

Rosenstein M. (1976). Paralysis in chickens caused by larvae of the poultry tick, Argas persicus. *Avian Diseases, 20*(2), 407–409. [PMID]

Swayne, D. E., Boulianne, M., Logue, C. M., McDougald, L. R., Nair, V., & Suarez, D. L. (2019). *Diseases of Poultry* (14th ed.). New Jersey: Wiley. [DOI:10.1002/9781119371199]

Teo, E., Russell, H., Lambert, T., Webster, R., Yappa, A., & McDonagh, P., et al. (2023). The weather determines the number of cases of tick paralysis in dogs and cats in eastern Australia, caused by Ixodes holocyclus, the eastern paralysis tick. *Australian Veterinary Journal, 101*(12), 479–489. [DOI:10.1111/avj.13289] [PMID]

Viljoen, G. J., Van Wyngaardt, S., Gothe, R., Visser, L., Bezuidenhout, J. D., & Neitz, A. W. (1990). The detection and isolation of a paralysis toxin present in Argas (Persicargas) walkerae. *The Onderstepoort Journal of Veterinary Research, 57*(3), 163–168. [PMID]