Biodiversity and Epidemiology of Tick Infestation in Pet Dogs in Baghdad, Iraq

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SUMMARY

This study is aimed at investigating the species composition, richness, diversity indices, evenness, spread, prevalence, and risk factors associated with tick infestation among pet dogs in Baghdad, Iraq. Six hundred and sixty-five pet dogs were subjected to systematic integumentary examinations; the ticks were collected in 70% ethanol and transported to the Laboratory, where they were morphologically identified using standard entomological keys. The biodiversity and species richness indices, the prevalence and risk factors of the infestation patterns, and the degree of tick infestation were determined. Of the 665 pet dogs sampled, 313 were infested with ticks, representing a prevalence of 47.07% with a 95% confidence interval of 43.30–50.87. A total of 759 ticks were collected belonging to four different species (*Hyalomma anatolicum*, *Rhipicephalus linnaei*, *Rhipicephalus pravus*, and *Rhipicephalus turanicus*), with *R. linnaei* being the most prevalent. The biodiversity and species richness indices of ticks infesting pet dogs in Baghdad, Iraq, showed a low diversity and richness of tick species among the dogs, with fewer species (*R. linnaei*) dominating the ecosystem, and with the dogs being evenly distributed across the tick species. Breed, sex, age, season, and degree of infestation were significantly associated with the infestation of ticks among pet dogs in the study. This appears to be the first study in Iraq to assess the biodiversity of tick infestation in dogs. Findings from this study emphasize the need for owners of pet dogs to adopt regular, proper, and adequate tick control programs to prevent possible zoonotic transmissions of pathogens.

Keywords: Baghdad, Biodiversity, Epidemiology, Pet dogs, Ticks.

Article History

***Submitted: 15 May* 2026**
Revised: 11 June 2026
Accepted: 2 July 2026
Published: 22 July 2026

Tanzania Veterinary Journal Vol. 41(2)2026
https://doi.org/10.4314/tvj.v41i2.3
ISSN: 0856 - 1451 (Print)
ISSN: 2714-206X (Online)
https://tvj.sua.ac.tz

INTRODUCTION

Ticks are obligate blood-feeding parasites that are found on the bodies of mammals (including humans) and birds in every climatic zone of the world (Elelu *et al*., 2022; Abbas *et al*., 2025). They are classified in the kingdom Animalia, phylum Arthropoda, class Arachnida, subclass Acari, and order Ixodida (Taylor *et al*., 2016). Ticks are about the most economically important and most prevalent ectoparasites found on different vertebrates in the tropics and other parts of the world, where they are known to be of great veterinary and medical importance (Lorusso *et al*., 2013; Elelu *et al*., 2022). Ticks symbolize one of the most important threats to domestic and wild animals worldwide due to blood depletion and inoculation of toxins and allergens, and importantly, they serve as vectors for pathogen transmission such as bacterial, mycoplasmal, protozoal, rickettsial, spirochaetal, and viral organisms (Latrofa *et al*., 2017; Kebzai *et al*., 2024;

Ola-Fadunsin *et al*., 2025). Tick infestation results in countless economic losses due to its global impact on the health and productivity of animals (Ola-Fadunsin *et al*., 2021).

Dogs (*Canis lupus familiaris*) are among the first animals to be domesticated and kept as pet animals throughout the world, with genetic fossil, and DNA studies confirming that dogs were domesticated as early as over 100,000 years ago (Ola-Fadunsin *et al*., 2019; Abbas *et al*., 2025). Dogs are one of the most important domestic animals seen in virtually every human settlement all over the world, as they are kept to perform numerous valuable roles in the society (Ola-Fadunsin, 2018). Dogs serve the role of being companions (pets) and are used for hunting, income generation through breeding and sale, life-saving actions, scientific research, security, sports, and therapeutic programs (Curi *et al*., 2017; Ola-Fadunsin *et al*., 2023a). As pets, dogs contribute to their owners' emotional, mental, physical, and social wellbeing, particularly children and aged people (Gouin *et al*., 2021; Ola-Fadunsin *et al*., 2023b).

Ticks have been incriminated in the transmission of pathogens such as *Babesia gibsoni*, *Borrelia burgdorferi*, and *Hepatozoon canis* among dogs in Iraq (Otranto *et al*., 2019; Ajaj and Al-Jumaa, 2023; Essa *et al*., 2024). Among the tick-borne pathogens detected among dogs in Iraq, *Borrelia burgdorferi* is zoonotic and it causes Lyme disease that is associated with fever, rash, loss of appetite, dullness, lymphadenopathy, pain or stiffness, and lameness (Bajer *et al.*, 2022; Ajaj and Al-Jumaa, 2023).

Species diversity is a fundamental theme in the ecology of living organisms, and it comprises two separate components, which are species richness (S) and evenness (E). Richness and evenness have been combined mathematically in various ways to estimate diversity indices based on proportional abundances of arthropod (ticks, mites, fleas, etc.) and insect species (Magurran, 2013; Arzamani *et al*., 2018). Epidemiological studies include the spread, prevalence, and risk factor analysis for the occurrence of an infection in a population over a period of time (Abdullah *et al*., 2019b; Ola-Fadunsin *et al*., 2020). Considering the importance of ticks to animal health and productivity, it is imperative to study the biodiversity and epidemiology of tick infestation among dogs in Iraq.

There are very limited taxonomic, ecological, and epidemiological information's about ticks infesting animals including dogs of Iraq (Banafshi et al., 2018; Hatem, 2020) with no available report about the biodiversity of ticks infestation in dogs in the country. This study is therefore aimed at determining the species composition, richness, diversity indices, evenness, spread, prevalence, and risk factors associated with tick infestation among pet dogs in Baghdad, Iraq.

MATERIAL AND METHODS

Study area

The study was conducted in Baghdad, the largest city and capital of Iraq (Fig. 1). Baghdad is located on the banks of the Tigris in central Iraq, and it sits at 33°18′55″North and 44°21′58″East of the equator. There are four climatic seasons in Baghdad which are spring (March to May, with temperatures ranging from 10 to 36 °C, and minimum rainfall), summer (June to September, with temperatures between 44 and 45 °C, and with extreme hot and dry conditions), autumn (October to November, with temperatures between 16 and 33 °C, and occasional rainfall), and winter (December to February, with temperatures ranging from 4 to 17 °C, and the presence of cold) (World Weather Information Service, 2016; Younis *et al*., 2024).

Study population and design

The design of this study was a cross-sectional, multicenter design. A total of 665 pet dogs were sampled for this study (this is based on the availability of pet dogs). The study was conducted between August 2024 and July 2025. Pet dogs were recruited for the study based on the willingness of the owners. Information about the sex and age was obtained, while the season was determined based on the month of sampling.

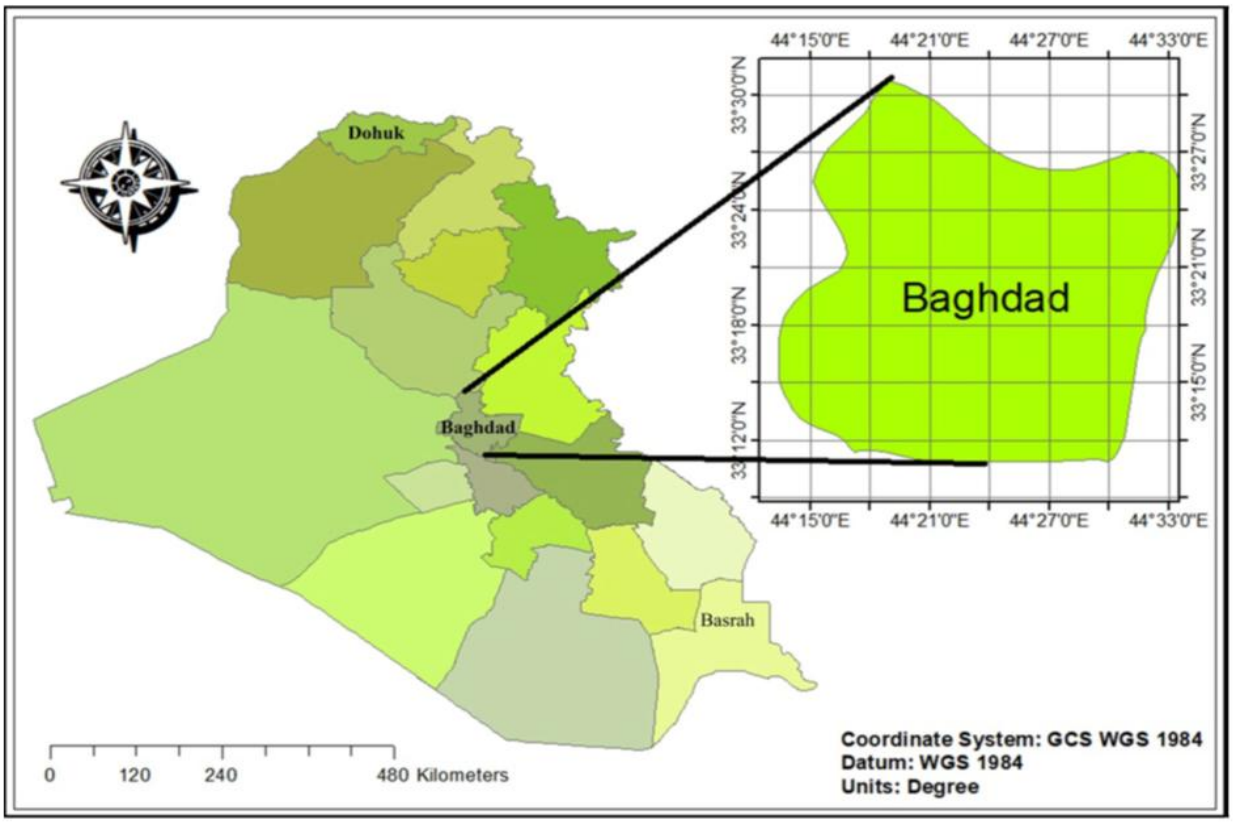

Figure 1. Map of Bagdad (the study area) within Iraq (Dibs *et al*., 2021).

Collection of ticks

Following the proper restraint of each pet dog, the entire body of the dog was properly examined for the presence of ticks. On the bodies of dogs that were infested, ticks were carefully and thoroughly collected (hand-picked) with the use of forceps (avoiding the destruction of the mouthparts) and placed in labeled plain sterile sample bottles containing 70% alcohol. The collected ticks were then transported to the Parasitology laboratory, College of Veterinary Medicine, University of Diyala, Iraq, for further entomological studies.

Identification of ticks species

The collected ticks were morphologically identified under the stereo microscope using previously documented standard keys (based on size, shape of basis capituli, length of mouthparts, colour of scutum (ornate or inornate), presence or absence of pale rings on legs, presence or absence of eyes, presence or absence of festoons, etc.) as documented by Estrada-Peña (2004), Walker *et al*. (2014), and Hadi (2024).

Determination of biodiversity and degree of tick infestations

The species diversity and richness based on specimen number, species richness, Shannon-Wiener index, Simpson's index, Simpson's index of diversity, Simpson's reciprocal index, Shannon Evenness index, Buzas and Gibson's Evenness index, Berger-Parker Dominance index, Menhinick Richness index, and Margalef index were calculated using the appropriate formulas as documented by Ricotta (2003) and Arzamani *et al*. (2018) to estimate species biodiversity of ticks in the study area. The computation of these indices is shown in Table 1. The degree of tick infestations was determined as described by Hadi and Rusli (2006) and Hadi *et al*. (2016).

Table 1. Biodiversity and species richness indices of ticks infesting pet dogs in Baghdad, Iraq.

Index	Computation	Amount
Specimen number (N)	Total number of tick species	759
Species richness (S)	The number of tick species	4
Shannon-Wiener index (Shannon Diversity Index) (H)	$-\Sigma(p_i * \ln(p_i))$	1.2076
Simpson's index (D)	$\Sigma n_i(n_i-1) / N(N-1)$	0.3290
Simpson's index of diversity	1 – D	0.6710
Simpson's reciprocal index	1 / D	3.0399
Shannon Evenness index (Equitability index)	H/ln(S)	0.8711
Buzas and Gibson's Evenness index	Exp(H) / S	0.8364
Berger-Parker Dominance index	n(max) / N	0.4321
Menhinick Richness index	S / √N	0.1452
Margalef index	(S - 1) / ln(N)	0.4524

Statistical analysis

All data collected from this study were initially recorded in a Microsoft Excel spreadsheet, where the bar chart was drawn. The data was then exported to the Statistical Package for the Social Sciences (SPSS, Chicago, Illinois, USA), Windows version 22.0, for statistical analysis. Descriptive statistics were conducted to estimate the prevalence using percentages and its corresponding 95% confidence intervals (CI) as presented in tables. The univariate analysis (chi-square) test and odds ratios (ORs) with 95% CI were calculated accordingly. The ORs were calculated with respect to a reference category as indicated in the table. Statistical significance was set at $p<0.05$.

RESULTS

Occurrence and Identification of Ticks

The total prevalence of tick infestation among pet dogs in this study was 47.07% (313/665) with a 95% confidence interval of 43.30–50.87.

Four species of ticks were detected to infest pet dogs, with these species being *R. linnaei* (formerly classified as *Rhipicephalus sanguineus*), *R. turanicus*, *R. pravus*, and *H. anatolicum* (Fig. 2), with *R. linnaei* (n = 328; 43.21% (95% CI = 39.73–46.76)) and *H. anatolicum* (n = 47; 6.19% (95% CI = 4.69–8.14)) being the most and least prevalent species, respectively (Fig. 3).

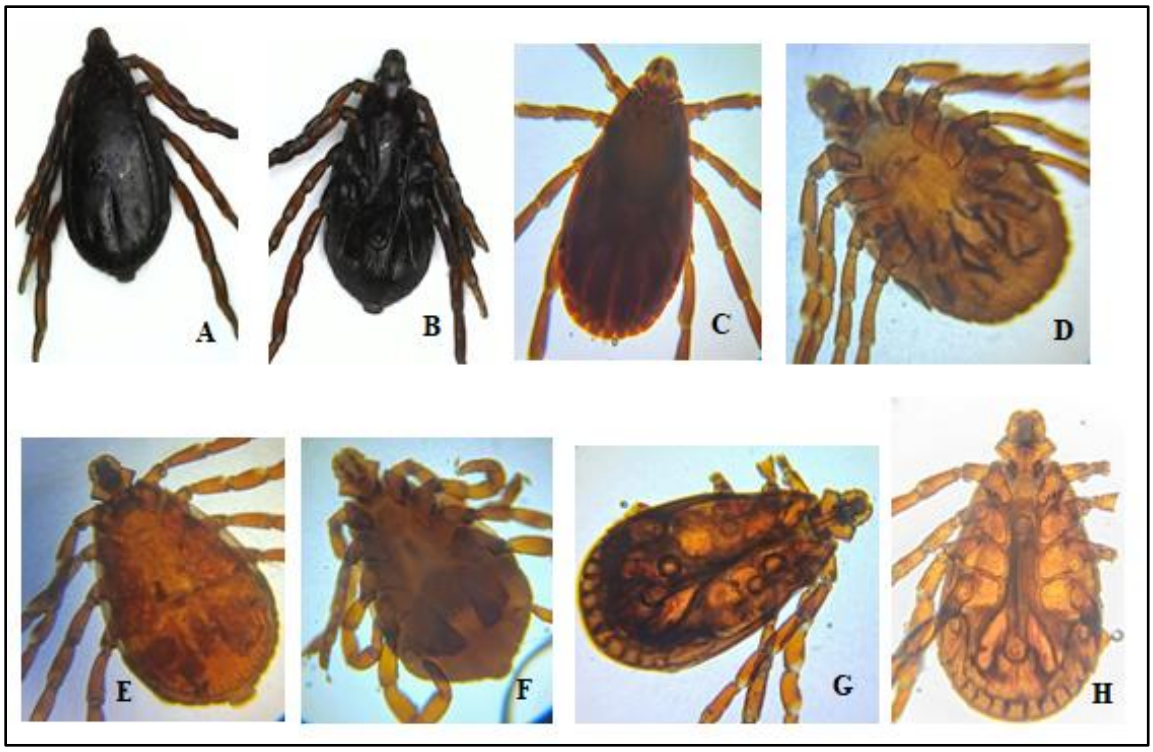

Figure 2. Tick species collected from pet dogs in Baghdad, Iraq.
A and B = dorsal and ventral views of *Hyalomma anatolicum*; C and D = dorsal and ventral views of *Rhipicephalus linnaei*; E and F = dorsal and ventral views of *Rhipicephalus pravus*; G and H = dorsal and ventral views of *Rhipicephalus turanicus*.

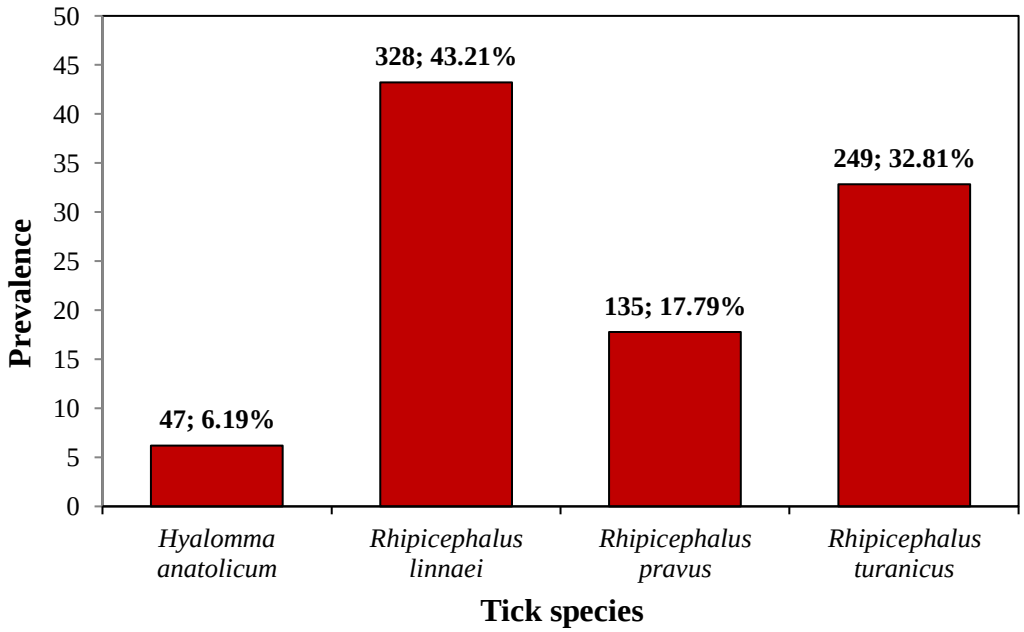

Figure 3. Abundance and prevalence of tick species infesting pet dogs in in Baghdad, Iraq (N= 759).

Tick Biodiversity

The biodiversity and species richness indices of ticks infesting pet dogs in Baghdad, Iraq (Table 1) showed that the total number of ticks collected from the 313 infested pet dogs was 759. The index counts ranged between 0.1452 (Menhinick Richness index) and 3.0399 (Simpson's reciprocal index).

The prevalence of tick infestation was most prevalent in the Siberian Husky (76.56%; 95% CI = 68.52–83.06) and German Shepherd (64.96%; 95% CI = 55.96–73.00) breeds of dogs. The prevalence was lowest in the Boxer and Poodle breeds of dogs, with a prevalence of 14.29% (95% CI = 2.57–51.31) for the both of them. In general, there was a statistically significant difference in the association of tick infestations and the different breeds of pet dogs (χ^2 value = 99.20; *p*- value = <0.01) (Table 2).

Of the 759 ticks collected, 248 (32.67%) were collected from the Terrier breed of dogs (most infested breed), while 2 (0.26%) were collected from the Poodle breed of dogs (least infested breed). The association between the abundance of ticks and different dog breeds was statistically significant with χ^2 and *p*- values of 146.40 and <0.01 (Table 3).

Table 2. Univariate analysis of dog breeds on the prevalence of tick infestation on pet dogs in Baghdad, Iraq.

Breeds	**N**	**n**	**Prevalence**	**95% CI**	**χ^2 value**	***p*- value**
Terrier	347	115	33.14	28.40 – 38.25		
Siberian Husky	128	98	76.56	68.52 – 83.06		
Alaskan Malamute	16	9	56.25	33.18 – 76.90		
German Shepherd	117	76	64.96	55.96 – 73.00		
Bulldog	8	2	25.00	7.18 – 59.07		
Boxer	7	1	14.29	2.57 – 51.31		
Poodle	7	1	14.29	2.57 – 51.31	99.20	<0.01¥
Beagle	4	1	25.00	4.56 – 69.93		
Rottweiler	5	1	20.00	3.62 – 62.44		
Pomeranian	22	7	31.82	16.36 – 52.68		
Chihuahua	2	1	50.00	9.45 – 90.55		
Yorkshire	2	1	50.00	9.45 – 90.55		
Total	**665**	**313**	**47.07**	**43.30 – 50.87**		

N = Number of dogs examined
n = Number of dogs infested
CI = Confidence interval
χ^2 = Chi square
¥ = Significant at *p* <0.05
Degrees of Freedom = 11

Table 3. Abundance of ticks collected from the different breeds of pet dogs in Baghdad, Iraq (N=759).

Breeds	n	Prevalence	95% CI	χ^2 value	*p*- value
Terrier	248	32.67	29.43 – 36.09		
Siberian Husky	191	25.16	22.21 – 28.37		
Alaskan Malamute	116	15.28	12.90 – 18.02		
German Shepherd	144	18.97	16.34 – 21.92		
Bulldog	16	2.11	1.30 – 3.40		
Boxer	3	0.40	0.13 – 1.16		
Poodle	2	0.26	0.07 – 0.96	146.40	<0.01
Beagle	7	0.92	0.45 – 1.89		
Rottweiler	9	1.19	0.63 – 2.24		
Pomeranian	17	2.24	1.40 – 3.56		
Chihuahua	3	0.40	0.13 – 1.16		
Yorkshire	3	0.40	0.13 – 1.16		
Total	**759**	**100**			

N = Total number of ticks collected
n = Number of ticks collected from each breed of dog
CI = Confidence interval
χ^2 = Chi square
¥ = Significant at p <0.05
Degrees of Freedom = 11

Factors associated with tick prevalence

Female dogs were 4.02 times more likely to be infested with ticks compared to male dogs, and the difference was statistically significant (χ^2 value = 72.36; *p*- value = <0.01). The prevalence of tick infestation decreased with the increase in the age of dogs, as dogs less than a year old were the most infested (57.01%), while dogs above 5 years old were the least infested (43.70%). Dogs below a year old were 1.70 times more likely to be infested with ticks compared to those above 5 years of age, and this difference was statistically significant (p = 0.04). Dogs between ages 1–<3 years and 3–<5 years were 1.10 and 1.05 more likely to be infested with ticks compared to dogs above 5 years of age, although this was not statistically significant (p = >0.05). There was a statistically significant difference (p = <0.01) in the prevalence of tick infestation on dogs within the climatic seasons, as dogs were 16.36, 4.34, and 4.27 times more likely to be infested with ticks during summer, autumn, and spring seasons, respectively, compared to the winter season (Table 4).

On the degrees of tick infestation among pet dogs, 352, 263, 37, 4, and 9 dogs, representing 52.93%, 39.55%, 5.56%, 0.60%, and 1.35% prevalence, had no infestation, mild, moderate, high, and very high degrees of tick infestation. The association between the degrees of tick infestation among the pet dogs was statistically significant at p = <0.01 and χ^2 value = 99.71 (Table 5).

Table 4. Univariate analysis of sex, age, and season on the prevalence of tick infestation on pet dogs in Baghdad, Iraq.

Risk Factors	N	n	Prevalence	OR (95% CI)	χ^2 value	*p*- value
Sex						
Female	371	229	61.73	4.02 (2.90 – 5.60)	72.36	<0.01¥
Male β	294	84	28.57	1.00		
Age						
< 1 year	107	61	57.01	1.70 (1.02 – 2.86)	4.23	0.04¥
1–<3 years	247	114	46.15	1.10 (0.72 – 1.69)	0.21	0.65
3–<5 years	176	79	44.89	1.05 (0.67 – 1.65)	0.04	0.84
> 5 years β	135	59	43.70	1.00		
Season						
Spring	141	58	41.13	4.27 (2.24 – 8.47)	20.56	<0.01¥
Summer	207	151	72.95	16.36 (8.77 – 32.12)	94.24	<0.01¥
Autumn	217	90	41.47	4.34 (2.35 – 8.36)	23.44	<0.01¥
Winter β	100	14	14.00	1.00		

N = Number of dogs examined
n = Number of dogs infested
OR = Odds ratio
CI = Confidence interval
χ^2 = Chi square
β = Reference category
¥ = Significant at p <0.05
Degrees of Freedom = 11

Table 5. Degree of tick infestation among pet dogs in Baghdad, Iraq (N=665).

Degrees of tick infestation	n	Prevalence	95% CI	χ^2 value	*p*- value
No infestation (no tick on the dog)	352	52.93	49.30 – 56.70		
Mild (1–5 ticks on the dog)	263	39.55	35.90 – 43.31		
Moderate (6–10 ticks on the dog	37	5.56	4.06 – 7.58	99.71	<0.01¥
High (11–20 ticks on the dog)	4	0.60	0.23 – 1.54		
Very high (>20 ticks on the dog)	9	1.35	0.71 – 2.55		

N = Number of dogs examined
n = Number of dogs infested
CI = Confidence interval
χ^2 = Chi square
¥ = Significant at p <0.05
Degrees of Freedom = 4

DISCUSSION

This appears to be the first study in Iraq to assess the biodiversity of tick infestation in dogs. It is the first to examine tick biodiversity on pet dogs in Baghdad and Iraq at large.

The total prevalence of tick infestation among pet dogs in this study is of concern, as much lower prevalences of 2.03%, 28.95%, and 29.20% were reported among pet dogs in the United Kingdom; Antalya, Turkey; and Bhubaneswar, India; by O'Neill *et al*. (2024), Yılmaz *et al*. (2024), and Sahu *et al*. (2013), respectively. This prevalence is of concern because it is expected that pet dogs are supposed to be frequently groomed, and as such, they should be free of ticks. Also, the living environment of pet dogs and regular application of acaricides by pet owners (Sahu *et al*., 2013) should have resulted in a lower prevalence of tick infestation as opposed to what was observed in this study. This significant prevalence recorded in this study may indicate that pet owners are not well aware of the presence of ticks on their dogs and in their surroundings or that the acaricides used by the pet owners are not effective.

In line with the number of tick species (four) observed in this study, four species of ticks were reported to infest pet dogs in Ireland (Waal *et al*.,

2020), and *Ixodes ricinus* was reported to be the most prevalent (which differed from that of this study, where *R. linnaei* was the most prevalent). Sahu *et al*. (2013) and Zhang *et al*. (2017) detected three tick species among pet dogs in Bhubaneswar, India, and south-eastern China, respectively, with *Rhipicephalus* species being the most prevalent in both locations. A single species of tick (*R. sanguineus*) was reported among pet dogs in Antalya, Turkey (Yılmaz *et al*., 2024).

Rhipicephalus linnaei, *R. turanicus*, *R. pravus*, and *H. anatolicum* the tick species collected from pet dogs in this study had been reported to infest free-roaming (stray), owned (pet), and hunting dogs in different parts of the world (Abbas *et al*., 2025; Bilal *et al*., 2025; Ola-Fadunsin *et al*., 2025), with the exception of *R. pravus*. *Rhipicephalus linnaei* (the brown dog tick, the kennel tick, or the pan-tropical dog tick) is the major and most prevalent tick species that infest dogs in the tropical and sub-tropical areas of the world (Kebbi *et al*., 2019; Yan *et al*., 2024; Yılmaz *et al*., 2024; Abbas *et al*., 2025; Ola-Fadunsin *et al*., 2025). *Rhipicephalus turanicus* (a three-host tick) is a typical tick species that infest cattle, sheep, and dogs. It sometimes infests horses, camels, water buffalo, goats, zebras, and warthogs (Lorusso *et al*., 2013; Walker *et al*., 2014). *Rhipicephalus pravus* is a three-host tick with cattle, sheep, goats, and camels being the preferred hosts (Walker *et al*., 2014; Hadi, 2024). *Hyalomma anatolicum* is a tick species with a strict three-host cycle, and it is reported to infest cattle, sheep, dogs, goats, camels, horses, and donkeys (Walker *et al*., 2014; Bilal *et al*., 2025). The collection of *Rhipicephalus pravus* among pet dogs in this study may not be easily explained, although it may be that these pet dogs had close association with cattle, sheep, and goats.

The biodiversity and species richness indices of ticks infesting pet dogs in Baghdad, Iraq, showed a low diversity and richness of tick species among the dogs, with fewer species (*R. linnaei*) dominating the ecosystem, and with the dogs being evenly distributed across the tick species. The level of diversity of ticks over a population is greatly influenced by human activities, including habitat changes; international animal movements; urbanization; climate change; deforestation; and globalization of the economy (Mrljak *et al*., 2017; Krˇcmar, 2019). These factors, on the other hand, affect the abundance and number of tick species in a given population.

It has been documented that dog breeds have a direct influence on tick infestation rate (Silveira *et al*., 2009; Kebbi *et al*., 2019; O'Neill *et al*., 2024), as studies had reported that the German Shepherd was the most tick-infested dog breed compared to other breeds (Kebbi *et al*., 2019; Adetayo *et al*., 2021). Smith *et al*. (2011) and O'Neill *et al*. (2024) documented that dogs with medium hair length were twice more likely to be infested with ticks than dogs with short hair, and the difference was statistically significant. Dogs characterized by long and medium hair could provide a more conducive environment for tick survival compared to short-haired dogs. Also, it is easier to detect and remove the ticks in the short-haired dogs than those with long and medium hair. Furthermore, short-haired dogs may be more effective in self-grooming and thus remove ticks themselves (Kebbi *et al*., 2019). The above reasons support our findings, where high prevalence and abundance of tick infestations were recorded among the Siberian Husky, German Shepherd, Alaskan Malamute, and Terrier breeds of dogs, as these breeds have relatively longer hair than the other dog breeds.

More ticks were collected from female pet dogs compared to male in this study. This finding is consistent with reports by Adetayo *et al*. (2021), Kamran (2021), Zeb *et al*. (2023), and Abbas *et al*. (2025). Hormonal fluctuation during pregnancy and lactation, grooming habits (females may spend less time grooming outdoors), and the sedentary habits of females while nursing their offspring may have resulted in the higher prevalence of tick infestation detected in female pet dogs (Adetayo *et al*., 2021; Abbas *et al*., 2025).

Age is a significant risk factor associated with tick infestation in dogs, as researchers had reported a higher tick infestation rate in young dogs compared to older dogs (Abdullah *et al*., 2016; Zeb *et al*., 2023; Abbas *et al*., 2025). In line with previous reports, we observed a higher prevalence of tick infestation in younger dogs compared to older dogs. This observation could be attributed to the gradual acquisition of immunity and close proximity to the ground by younger dogs (Abdulkareem *et al*., 2018). The soft skin and short hairs of young dogs could also be attributed to this observation.

The significant difference in the seasonal prevalence of tick infestation on pet dogs, where the highest prevalence of tick infestation was observed during the summer season and the lowest during the winter season, is consistent with the report of Kebbi *et al*. (2019), who conducted a similar study in

Bejaia province, Northern Algeria. Generally, environmental conditions, such as humidity and temperature, have been shown to influence tick abundance, availability of hosts, and their survival (Dumic and Severnini, 2018). Temperature favors the increase of ticks' population in the environment (Tokarevich *et al*., 2017; Abdullah *et al*., 2019a). Temperature regulates the duration of the different stages of the tick life cycle. The ability of ticks to lay eggs and hatch in a season depends greatly on the sum of effective temperatures (Abdullah *et al*., 2019a). The effect of temperature explains the reason for our findings (tick infestation in pet dogs decreased from summer to autumn to spring and to winter), which also follows the trend of temperature decrease within the seasons in Baghdad, Iraq.

The prevalence of tick infestation among pet dogs decreased with the increase in the degree of infestation, and this was statistically significant. Similarly, Adetayo *et al.* (2021) and Ola-Fadunsin *et al.* (2025) reported a significant difference in the degree of tick infestation among dogs in Nigeria. This observation can be influenced by numerous factors, which include the gender, breed, and age of the host, level of tick control, diversity of tick species and their infestation rate, environmental seasons, and the type of environment the dogs are kept in (Adetayo *et al*., 2021; Khan *et al*., 2022).

The limitations associated with this study are (a) A high risk of sampling bias since the study was based on the availability of pet dogs. (b) Inability to precisely identify damaged tick samples and difficult tick species complexes as molecular tools were not used for the identification of ticks. (c) Inaccurate risk assessment, omission of emerging infections pathogens, and failure to detect co-infections since the study did not include the detection of pathogens in ticks. (d) Since this study is a cross-sectional study, the causal inferences among risk factors may not be properly determined. (e) Inability to distinguish between acquired chemical resistance in ticks and natural tick traits as the history of acaricide usage on pet dogs was not collected.

CONCLUSION

This present body of evidence provides valuable and comprehensive insights into the species composition, richness, diversity indices, prevalence, and risk factors associated with tick infestation among pet dogs in Baghdad, Iraq. The total prevalence of tick infestation among pet dogs in this study is of concern, as 47.07% of the studied dogs were infested with ticks. Four species of ticks were collected, with *R. linnaei* being the most prevalent. The Siberian Husky, German Shepherd, Alaskan Malamute, and Terrier breeds of dogs recorded the highest prevalence and abundance of tick infestations. Sex and age of pet dogs as well as the seasons of tick collections were significantly associated with the infestation of ticks. The prevalence of tick infestation among pet dogs decreased with the increase in the degree of tick infestation. Findings from this study emphasize the need for owners of pet dogs to adopt regular, proper, and adequate tick control programs, as this will prevent the possible spread of tick-borne pathogens to pet dogs and their owners.

Ethical statement

This study protocol was approved by the Research and Ethical Committee of the College of Veterinary Medicine, University of Diyala, Iraq. International, national, and/or institutional guidelines for the humane use and handling of animals were adequately followed. Verbal and or written consent was given by the owners of the pet dogs before the dogs were sampled.

Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the findings reported in this paper.

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