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PREVALENCE AND INTENSITY OF HELMINTH PARASITES IN HOUSE GECKOS (*HEMIDACTYLUS FRENATUS*) OF DHAKA CITY, BANGLADESH

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ABSTRACT: The Asian house gecko (*Hemidactylus frenatus*) is a unique species among lizards, commonly found in human habitats and often regarded as a pest. Like all vertebrates, these geckos are susceptible to parasites. In this investigation, a total of 54 *H. frenatus* specimens were collected from randomly selected households in various locations throughout Dhaka city to examine parasitic infections. The study's results revealed that 61.11% of the geckos were infected with endoparasites. The infection rate for female geckos (63.64%) was higher than that for males (59.38%). A total of 61 parasites were collected from different organs including the body cavity, stomach, intestine, and lungs of the house geckos. Four species of parasites were identified, belonging to the groups trematode (*Ganeo kumaonensis*), nematoda (*Strongyloides cruzi* and *Neopharyngodon gecko*), and pentastomida (*Raillietiella frenatus*). Notably, the pentastomid *Raillietiella frenatus* had not been previously recorded in *H. frenatus* in Bangladesh. The prevalence of the identified parasites was as follows: *Ganeo kumaonensis* (9.26%), *Strongyloides cruzi* (7.41%), *Neopharyngodon gecko* (37.04%), and *Raillietiella frenatus* (18.52%). Among these, the nematode exhibited the highest prevalence at 44.44%, while the trematode showed the lowest at 9.26%. A significant number of parasites were also collected from the stomach, accounting for 27.78% of the total. Additionally, when examining various length groups, those geckos measuring 9.5-10.49 cm in length showed a higher susceptibility to parasitic infections (88.23%) compared to other length groups. Similarly, in different weight groups, geckos weighting 2.5-3.49 grams were found to have a higher susceptibility to parasitic infections (78.12%). Furthermore, a positive correlation was observed between the host's weight and the parasite burden. The significance of the current study lies in identifying the parasites that infect this unique species within the study area.

Key words: Parasites, prevalence, intensity, trematoda, nematoda and pentastomida.

INTRODUCTION

The Asian house gecko, *Hemidactylus frenatus*, is found in subtropical and

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tropical regions around the world, with some populations located outside of Asia (Goldberg *et al.* 1998). This species is highly adaptable to its surroundings and often prefers rocky areas, forests, and human habitats (Chakma 2009, Mahagedara and Rajakaruna 2012). These geckos reside in close proximity to human habitation, where they primarily subsist on a diet comprising insects, worms, and spiders. During the daytime, they are typically found in ceilings, crevices, and behind calendars; however, they exhibit increased activity during the night (Telford 1979). The presence of geckos in human dwellings suggests a potential risk of transmission to humans through contaminated food and water, either by exposure to the reptiles' feces and saliva or through the accidental ingestion of their eggs (Kotangale 2011, Jiménez *et al.* 2015).

Hemidactylus frenatus is an invasive species that spreads rapidly and threatens native gecko populations in their natural habitats (Hoskin 2011). As a generalist predator, it can consume nearly any insect or spider that it can catch and ingest (Wilson 2006). This gecko has the potential to spread disease, harm local species, and invade the habitats of native fauna (Vanderduys and Kutt 2013). Geckos are easily dispersed across the globe through the transport of ships and cargo, often carrying their associated parasites with them (Mahagedara and Rajakaruna 2012). These reptiles are known hosts for a variety of parasites, including ticks, mites, and helminths. Both direct and indirect interactions with geckos can pose significant health risks to humans. Notably, some tick species that infest geckos are capable of transmitting pathogens to humans, thereby identifying the house gecko as a potential vector for zoonotic diseases (Djomnang *et al.* 2016). While wall geckos play a valuable ecological role in controlling insect pest populations, their close association with human environments raises concerns due to their susceptibility to parasitic infections and their potential role in zoonotic disease transmission (Abbas and Habeeb 2022).

There are few studies on the parasitic infection of the Asian house gecko, *Hemidactylus frenatus*, from various parts of the world (Barton 2007, Csurhes and Markula 2009, Mahagedara and Rajakaruna 2012, Obi *et al.* 2013, Babatunde *et al.* 2025). In Bangladesh, an endoparasitic helminth infection has been recorded in *Hemidactylus flaviviridis* (Khanum *et al.* 2002); however, research on the parasitic infection of the Asian house gecko (*H. frenatus*) is limited. Little is known about the prevalence, intensity of parasites, pathogenic effects, and organ-specific distribution of parasites in geckos in Bangladesh. Studies conducted in various countries have identified numerous helminth parasites present in *H. frenatus*, including nematodes, pentastomes, and trematodes (Greer 2006). In Australia, pentastomid parasites have been found on *H. frenatus*, which feed on the host's blood and may impede the host's

reproductive capacity and competitiveness (Barton 2007). However, there is no record of pentastomid infection in *H. frenatus* in Bangladesh.

This study is important as it aims to investigate the different parasite communities, assess the prevalence and intensity of infection in Asian house geckos (*Hemidactylus frenatus*), and examine variations in infection based on factors such as length, weight, sex, and specific organs of the hosts.

MATERIAL AND METHODS

A total of 54 wall geckos were collected from randomly selected households in the town at various locations between July and September. The geckos were found under bright electric bulbs and behind picture frames and calendars on the walls during the daytime. They were placed in a transparent plastic bucket lined with an old newspaper at the bottom to create a nearly similar environment for the geckos. The lid of the bucket was finely perforated to allow for ventilation. The geckos were then transported to the laboratory at Jagannath University for parasitological examination.

In the lab, the lizards were identified by species, categorized based on length and weight, and separated into males and females. The lengths ranged from 7.6 cm to 12.8 cm and were divided into six groups (Group1: 7.5cm- 8.49 cm, Group2: 8.5cm-9.49 cm, Group3: 9.5cm-10.49cm, Group4: 10.5cm-11.49cm, Group5: 11.5cm-12.49cm and Group6: 12.5cm-13.49cm). The weights of the geckos ranged from 1.83 gm to 4.00 gm and were divided into three groups (Group1: 1.50gm-2.49gm, Group2: 2.50gm-3.49gm and Group3: 3.50gm-4.49gm).

The hosts were euthanized and dissected, and the body cavity, lungs, stomach, intestines, rectum, urinary bladder, and liver were examined for helminth infections. The parasites found were placed in separate petri dishes containing a 0.9% NaCl solution, and live helminths were washed 2-3 times in normal saline. The parasites (including nematodes, trematodes, and pentastomids) were then fixed in either 70% alcohol or glacial acetic acid.

For identification, the worms were dehydrated in an ethanol series (70%-100% Gl) and the helminths were cleared in lactophenol, stained in borax carmine, and mounted in DPX (Cable 1963). Identification was performed following the keys provided by Yamaguti (1959 and 1961). Prevalence, defined as the percentage of infected hosts out of those examined, and intensity, defined as the number of worms per infected host (Margolis *et al.* 1982), were calculated accordingly.

Statistical Analysis: Statistical analyses were performed using a Correlation test with IBM® SPSS® Statistics software (version 23). Correlation (r) was calculated to find out the relationship between the weight of the host and

parasites' burden and between the length of the host and parasites' burden. The correlation was significant at the 0.05 level.

RESULTS AND DISCUSSION

In this experiment, a total of 61 helminth parasites were collected from 54 hosts, specifically the Asian house gecko (*Hemidactylus frenatus*). Each parasite was examined for taxonomic identification, leading to the identification of four species: the nematodes *Neopharyngodon gecko* and *Strongyloides cruzi*, the pentastomid *Raillietiella frenatus*, and the *trematode Ganeo kumaonensis*. These parasites were found in various organs, including the body cavity, stomach, intestine, and lungs of the house geckos. Notably, the pentastomid *Raillietiella frenatus* had not previously been recorded in Asian house geckos (*H. frenatus*) in Bangladesh.

In the study of 54 lizards, 32 were males and 22 were females. The highest prevalence (63.64%) and intensity (1.86) of parasites were observed in females. In contrast, males had a lower prevalence (59.38%) and intensity (1.84). (Table-1).

Table 1. Sex-wise prevalence and intensity of helminth infestation of the hosts

Host	Sex of the host	No. of host examined	No. of host infected	Prevalence (%)	Total no. of parasites collected	Intensity
Hemidactylus frenatus	Male	32	19	59.38	35	1.84
	Female	22	14	63.64	26	1.86
	Total	54	33	61.11	61	1.85

Table 2 presents the prevalence and intensity of parasite availability categorized by length. The highest prevalence was observed at 88.23% in the length group of 9.5-10.49 cm, while the lowest prevalence was recorded at 40% in the 11.5-12.49 cm length group. The highest intensity was 2.06 for the 9.5-10.49 cm length group, whereas the lowest intensity was 1.00, which was found in both the 7.5-8.49 cm and 12.5-13.49 cm length groups. The correlation between the length of the host and the parasite burden was found to be statistically insignificant. The p-value for this correlation was 0.200, with r = -0.177, at the 0.05 level of significance.

Table 3 illustrates the prevalence and intensity of parasite availability across different weight groups. The highest prevalence was recorded at 78.12%, with an intensity of 2.04, both found within the weight group of 2.5-3.49 gm. In contrast, the lowest prevalence and intensity, at 33.33% and 1.00 respectively, were observed in the 1.50-2.49 gm weight group. Statistical analysis revealed a significant correlation between the weight of the host and the parasite burden. The p-value of this correlation was 0.022 at the 0.05 level of significance, with a

correlation coefficient (r) of 0.312. This indicates a positive correlation between the weight of the host and the number of parasites.

Table 2. Length-wise prevalence and intensity of helminth parasites of Lizard

Length groups (cm)	No. of host examined	No. of host infected	Prevalence (%)	Total no. of parasites collected	Intensity
7.5-8.49	4	2	50	2	1.00
8.5-9.49	10	6	60	12	2.00
9.5-10.49	17	15	88.23	31	2.06
10.5-11.49	11	05	45.45	08	1.60
11.5-12.49	10	4	40	7	1.75
12.5-13.49	2	1	50	1	1.00

Table 3. Weight-wise prevalence and intensity of different helminth parasites of Lizard

Weight groups (gm)	No. of host examined	No. of host infected	Prevalence (%)	Total no. of parasites collected	Intensity
1.50-2.49	18	6	33.33	6	1.00
2.50-3.49	32	25	78.12	51	2.04
3.50-4.49	4	2	50	4	2.00

Table 4. Month-wise prevalence and intensity of helminth parasites in *Hemidactylus frenatus*

Months	Total no of host examined	Infected Host	Prevalence (%)	Parasites collected	Intensity
July	20	10	50	19	1.90
August	29	19	65.52	34	1.78
September	5	4	80	8	2.00

The highest prevalence (80%) and intensity (2.00) of parasites were recorded in September, while the lowest prevalence (50%) was noted in July and the lowest intensity (1.78) was observed in August (Table-4).

Table 5. Prevalence and intensity of helminth parasites in *Hemidactylus frenatus* (N=54)

Parasites	Infected host	Prevalence (%)	Parasites collected	Intensity
Trematode				
Ganeo kumaonensis	5	9.26	6	1.20
Nematode				
Strongyloides cruzi	4	7.41	4	1.00
Neopharyngodon gecko	20	37.04	28	1.40
Pentastomida				
Raillietiella frenatus	10	18.52	23	2.30

N = No. of host examined

During the study period, a total of 32 nematodes (with a prevalence of 44.44%) were collected from infected geckos, while only 6 trematodes (with a prevalence of 9.26%) were found. The most frequently observed parasite was *Neopharyngodon gecko* (n=28), whereas *Strongyloides cruzi* was less common (n=4). The highest prevalence of a parasite was 37.04% for *Neopharyngodon*

gecko, while *Strongyloides cruzi* had the lowest prevalence at 7.41%. The highest intensity (2.30) was recorded for *Raillietiella frenatus*, and the lowest intensity (1.00) was observed for *Strongyloides cruzi* (Table 5).

Parasites were found in various organs of the host, including the body cavity, stomach, intestine, and lungs of the geckos. The stomach was the most preferred habitat for the parasites, with the highest prevalence recorded at 27.78%. In comparison, the lungs had the lowest prevalence at 9.26%. However, it is interesting to note that the lungs had the highest intensity of parasites recorded at 2.6, while the stomach recorded the lowest intensity at 1.2 (Table-6).

Parasite distribution varied by organ, with the stomach containing the highest number (n=18) of parasites, and the lungs carrying the lowest number (n=13). *Neopharyngodon gecko* was found in both the stomach (n=18) and intestine (n=10), while *Strongyloides cruzi* was only present in the intestine (n=4). The trematode *Ganeo kumaonensis* was exclusively found in the body cavity (n=6). *Raillietiella frenatus*, a pentastomida parasite, was observed in both the body cavity (n=10) and lungs (n=13) of *Hemidactylus frenatus* (Table 6).

Table 6. Organ-wise prevalence, intensity and distribution of different parasites in *Hemidactylus frenatus* (N=54)

Organs name	Total no of host infected	Prevalence (%)	Total number of parasites collected	Intensity	Number of parasites collected (n)			
					Ganeo kumaonensis	***Neopharyngodon gecko***	***Strongyloides cruzi***	***Raillietiella frenatus***
Body cavity	9	16.67	16	1.78	6	0	0	10
Stomach	15	27.78	18	1.2	0	18	0	0
Intestine	10	18.52	14	1.4	0	10	4	0
Lungs	5	9.26	13	2.6	0	0	0	13

N = No. of host examined, n= Number of parasites collected

Research on parasitic infections in geckos in Bangladesh is limited. However, endoparasites were identified in *Hemidactylus flaviviridis* by Khanum *et al.* (2002). In this study, the parasite burden was more among females (63.64%) than the males (59.38%), this supports the work of (Obi *et al.* 2013) who reported that the prevalence of infection was higher in females (51.3%) than in males (46.2%) in *H. frenatus*. This observation was in contrast to the findings of Oluwafemi *et al.* (2017) who noted that the prevalence of parasitic infections was higher in adult males than females in both *H. frenatus* and *Mabuya quinquetaeniata.*

Results from this study indicated a significant positive correlation between parasite burden and the body weight of the Asian house gecko (*Hemidactylus frenatus*). Similar findings were reported by Robert *et al.* (2020) and Adeoye and Ogunbanwo (2007), who observed that parasite burden in agamid lizards was also positively correlated with host body weight.

In the current study, we noted the presence of the following parasites in *Hemidactylus frenatus*: the trematode *Ganeo kumaonensis*, the nematodes *Strongyloides cruzi* and *Neopharyngodon gecko*, as well as the pentastomid *Raillietiella frenatus*. *Ganeo kumaonensis*, *Strongyloides cruzi*, and *Neopharyngodon gecko* were also reported in *Hemidactylus flaviviridis* by Khanum *et al.* (2002). *Neopharyngodon gecko* has been documented in the Indian lizard *Gekko gecko* (Chakravorty and Bhaduri 1948), and *Strongyloides cruzi* was first reported by Rodrigus (1968) in *Hemidactylus mabouia* in Brazil. Therefore, *Strongyloides cruzi* and *Neopharyngodon gecko* seem to be common across various gecko species.

In this investigation, *Raillietiella frenatus*, the remaining pentastome, was found, which has not been recorded in *Hemidactylus frenatus* or any *Hemidactylus* species in Bangladesh before. Geckos are easily dispersed worldwide via ships and cargo, and the parasites they harbor are transported along with them (Mahagedara and Rajakaruna 2012). Oluwafemi *et al.* (2017) reported *Raillietiella sp.* from the lungs of *Hemidactylus frenatus* and *Mabuya quinquetaeniata* in two cities in southwest Nigeria. Additionally, Barton (2007) found pentastomid parasites in *Hemidactylus frenatus* in Australia, where *Hemidactylus frenatus* was also noted as a host for *Raillietiella frenatus*. Therefore, until further studies are conducted, *Raillietiella frenatus* appears to be specific to *Hemidactylus frenatus* in Bangladesh.

This investigation revealed that Cestode and Acanthocephala parasites were not found in *Hemidactylus frenatus* in Bangladesh, likely due to a lack of observation and reporting. However, Cestode (*Oochoristica truncate*) and Acanthocephala (*Acanthocephalus serendibensis*) were noted in *Hemidactylus frenatus* by Mahagedara and Rajakaruna (2012) in Central Sri Lanka, as well as by Oluwafemi *et al.* (2017) in Southwest Nigeria.

Additionally, the Penostomida parasite *Raillietiella frenatus* was observed in the lungs and body cavity of *Hemidactylus frenatus*. *Raillietiella frenatus* was also detected in the lungs of *Hemidactylus frenatus* and *Mabuya quinquetaeniata* in two cities in Southwest Nigeria, according to Oluwafemi *et al.* (2017). However, this parasite has not been recorded in Asian house geckos (*H. frenatus*) in Bangladesh.

The overall prevalence of helminth species in *Hemidactylus frenatus* was found to be 61.11% in this study. Similarly, Oluwafemi *et al.* (2017) reported a

prevalence of 64.0% in the same lizard species, *H. frenatus*. A higher prevalence of 81.67% was noted for *Hemidactylus flaviviridis* by Khanum *et al.* (2002). Factors such as feeding habits and environmental conditions may contribute to the high worm burden in *Hemidactylus frenatus*.

Parasites were detected in multiple organs of the geckos, including the body cavity, stomach, intestines, and lungs. Among these, the stomach exhibited the highest prevalence, suggesting it as the primary site of parasitic infestation. In contrast, Babatunde *et al.* (2025) reported that endoparasites in *Hemidactylus frenatus* were primarily found in the intestines, with the highest abundance in the large intestine. The variation in parasite distribution may be influenced by factors such as parasite species, feeding behavior of the host, and the parasites' life cycles. Some parasites may favor the acidic environment of the stomach, while others thrive in the nutrient-rich conditions of the intestines, depending on their mode of transmission and the host's diet.

In our study, the highest prevalence recorded was for *Neopharyngodon gecko* at 37%, while the lowest prevalence was found for *Strongyloides cruzi* at 7%. Comparable results were observed in *Hemidactylus flaviviridis*, where Khanum *et al.* (2002) reported a highest prevalence of 34% for *Neopharyngodon gecko* and a lowest of 6% for *Strongyloides cruzi*. Since the Asian house gecko (*Hemidactylus frenatus*) can carry diseases (Vanderduys and Kutt 2012), there is a pressing need to study parasitic infections in *H. frenatus* in Bangladesh.

CONCLUSION

This study represents the first documented investigation of helminths associated with the Asian house gecko (*Hemidactylus frenatus*) in Bangladesh, underscoring the need for further research to fully characterize the parasitic fauna of this species. The findings reveal a high prevalence of gastrointestinal infections in *H. frenatus*, with female geckos exhibiting higher parasite loads than males. The stomach emerged as the primary site of parasite localization, influenced by factors such as parasite species, the host's feeding behavior, and the life cycles of the parasites. During this investigation, pentastomid *Raillietiella frenatus*, was identified; however, no pentastomes were detected in the *Hemidactylus* specimens examined in Bangladesh. This highlights the need for a more comprehensive survey of *H. frenatus* populations across the country to accurately determine the prevalence and intensity of parasitic infections in this species. Overall, effective environmental management and continued research are crucial for better understanding and mitigating the transmission of parasites within *H. frenatus* populations, particularly in areas where they coexist closely with humans.

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