Research Article

Prevalence of Ectoparasites in Pet Dog and Cat in Dhaka, Bangladesh

Asma Sadia Authoy[2], Aneek Chanda[2], Aparna Datta[3], Md Shohel Al Faruk[4], Towhida Kamal[1*]

[1]Department of Pathology and Parasitology, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram 4225, Bangladesh; [2]Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram 4225, Bangladesh; [3]Teaching and Training Pet Hospital and Research Center, Dhaka, Bangladesh; [4]Department of Physiology Biochemistry and Pharmacology, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram 4225, Bangladesh.

Abstract | The research focused on assessing the prevalence of ectoparasites among companion animals in the Dhaka Metropolitan area from January 2022 to August 2022. Data were gathered from Teaching and Training Pet Hospital and Research Center (TTPHRC), focusing on dogs and cats exhibiting skin lesions. A cross-sectional study was conducted, utilizing comprehensive questionnaires based on various risk factors such as age, sex, breed, vaccination history, deworming, etc. A total of 174 case sheets of dogs and cats with skin lesions were analyzed. The findings indicate a higher prevalence of ectoparasite infestation among dogs and cats in semi-urban areas, recording rates of 56.92% and 76.92%, respectively, in contrast to semi-urban areas. Female cats (76.92%) and dogs (71.43%) displayed increased susceptibility compared to their male counterparts, with male cats registering 53.70% and male dogs at 54.55%. Among the ectoparasites observed, mites affected 62.5% of the studied dogs and cats, while fleas infected 8.92% and ticks 3.57%. Notably, pets aged 0 to 1 year were the most vulnerable (statistically significant p = 0.002). Dogs with ash-colored coats (77.27%) and white-coated dogs (84.62%) showed higher susceptibility than black-coated (47.62%) and brown-coated (58.82%) dogs. Vaccination showed statistical significance for both dogs and cats, whereas deworming was significant only for cats. The study highlights the need for further investigation through structured surveillance to understand variations and formulate effective control measures

Keywords | Ectoparasite, Risk factor, Prevalence

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***Correspondence** | Towhida Kamal, Department of Pathology and Parasitology, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram 4225, Bangladesh; **Email:** towhidakamal@hotmail.com
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INTRODUCTION

Many creatures populate the world, but not all qualify as domesticated companions simply by being animals. What sets apart an animal as a pet is the presence of companionship and a personal connection. According to archaeology, human ownership of dogs as pets dates back at least 12,000 year (Serpell, 2016). Therefore, human-animal relationships have been going on for so long. A recent study found that there are around 470 million dogs maintained as pets worldwide and approximately 370 million pet cats (El, 2022). There are more than 900 million dogs around the world, and their numbers are growing. There are approximately 600 million cats on the planet. Only 17–24% of dogs live as pets in developed countries. Pets bring both physical and emotional advantages to their owners. Walking a dog may provide exercise, fresh air, and a social connection for both the owner and the dog. Pets can provide company to people who live alone or to elderly people who do not have enough social connections (Pet, 2022).

Pet dogs and cats are susceptible to several illnesses. Both

infectious and non-infectious conditions affect them. Infectious diseases can be viral (Rabies, Canine Parvovirus, Feline Panleukopenia, etc.), bacterial (Brucellosis, Leptospirosis, etc.), fungal, and parasitic as well. In parasitic diseases, there are ectoparasitic and endoparasitic diseases. According to various studies, dogs and cats are the most significant hosts of ectoparasites (Chukwu, 1985). They can lead to harmful consequences like life-threatening anaemia, itchy and non-itchy skin disorders for the hosts (Beck et al., 2006; Cathy F. Curtis, 2012; Wall, 2007). Despite the benefits of companion animals, they also host ectoparasites that are zoonotic to people, particularly youngsters, the elderly, and the immune compromised (Irwin, 2002). They can cause pain, irritation, skin infections, anemia, and tick fever, as well as act as vectors for a number of deadly diseases (Agu et al., 2020). Ticks, fleas, lice, and mites infest domestic dogs and produce significant pathological diseases such as severe allergic dermatitis and non-pruritic skin illnesses (Bahrami et al., 2012).

Throughout the world, extensive research has been conducted to investigate the prevalence of ectoparasites among domesticated pet animals (Abdulkareem et al., 2019; Chukwu, 1985; Irwin, 2002; Agu et al., 2020). Despite its significant importance, Bangladesh has conducted limited research on this subject, prompting my exclusive focus on it. The major focus of research in our country has been on examining the frequency of ectoparasitic infections among both large and small ruminants (Musa et al., 2018; Rony & Begum, 2010; Paul et al., 2012), among other sources. Given the prior conditions, this study aims to provide comprehensive information on the types and prevalence of ectoparasites discovered on dogs and cats, along with their associated risk factors in the Dhaka Metropolitan area of Bangladesh.

MATERIALS AND METHODS

Study population

The population for this study was dogs and cats with any type of skin lesion. A cross-sectional study was carried out in the Dhaka Metropolitan Area. A total of 174 data were collected from the registered case sheets of sick pet animals (dogs and cats) in the hospital.

Study area and Period

This study was carried out at the Teaching and Training Pet Hospital and Research Center, Purbachal, Dhaka. Patients came from two major areas of Dhaka Metropolitan Area. They are semi-urban and urban, respectively. Semi-urban areas include Vulta, Gazipur, Narayanganj, Kuril, Khilkhet, Kawla, Gawsia, Rupganj, Dumni and Purbacahal, while rural areas include Bashundhara, Gulshan, Mirpur, Badda, Baridhara, Uttara, Khilgaon, Ramna, Shantinagar, Dhanmondi, Banani (Figure-1). This study was conducted from January 2022 to August 20

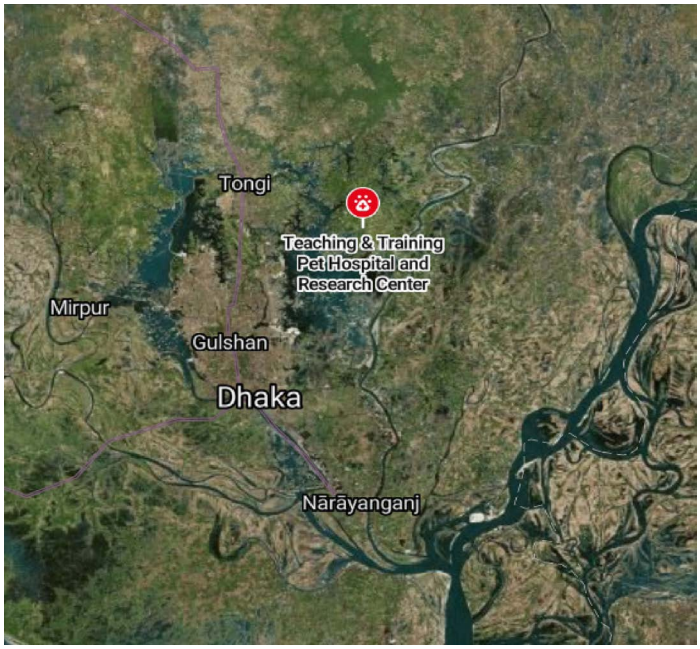

Figure 1: Location of this study

Data collection

A pre-structured questionnaire was used for data collection. All the relevant information based on age, sex, breed, vaccination, deworming, usual places for defecation, coat color, BCS, roaming and exposure to other animals during this time period were recorded.

Statistical analysis

To demonstrate the frequency and prevalence of ectoparasites, all collected data were imported into Microsoft Excel 2013 and transferred to STATA 13.0 for statistical analysis.

RESULTS

Overall Prevalence of Ectoparasites:

A comprehensive examination was conducted on a combined total of 94 dogs and 80 cats to identify the overall prevalence of ectoparasites. Findings indicated that 59.57% of the dogs (56 out of 94) and 61.25% of the cats (47 out of 80) were infested with ectoparasites (Table-1).

Ectoparasitic Infestation Frequency and Percentages in dogs and cats:

The study findings indicated that among the total infected population examined, mite infestation was observed in 62.5%, while fleas were found in 8.92%, and ticks in 3.57% (Table-2).

Table 1: Overall prevalence of ectoparasite in pet dogs and cats.

Species	Total number	Positive Number	Percentage (%)	P value
Cat	80	49	61.25	
Dog	94	56	59.57	0.822

Table 2: Frequency and percentage of different ectoparasites.

Ectoparasites	Positive number	Percentage (%)
Mite	35	62.5%
Flea	5	8.92%
Tick	2	3.57%

Table 3: Association of different variables with the prevalence of ectoparasite of pet cats (n=80).

Parameters		Total Number	Positive Number	Percentage (%)	P value
City	Semi Urban	13	10	76.92	0.205
	Urban	67	39	58.21	
Breed	Local	29	14	48.28	0.072
	Exotic	51	35	68.63	
Sex	Female	26	20	76.92	0.046
	Male	54	29	53.70	
Age(Y)	0-1Y	44	31	70.45	0.002*
	2-5Y	32	17	53.13	
	6-10Y	3	1	33.33	
	11-15Y	1	0	0	
BCS	Cachectic-1	2	2	100	0.195
	Poor-2	69	44	63.77	
	Fair-3	7	2	28.57	
	Good-4	2	1	50	
Coat color	Black	6	1	16.67	0.057
	Brown	14	8	57.14	
	Ash	22	17	77.27	
	White	38	23	60.53	
Roaming and exposing to other animals	Yes	67	45	67.16	0.014
	No	13	4	30.77	
Vaccination	Yes	49	22	44.90	<0.001*
	No	31	27	87.10	
Deworming	Yes	48	21	56.75	<0.001*
	No	32	28	87.50	

Prevalence of ectoparasitic diseases in cats based on their associated risk factors:

The prevalence of ectoparasites in semi-urban areas stands at 76.92%. Meanwhile, in urban locales, ectoparasite prevalence is noted at 58.21%, marking an 18.71% decrease compared to semi-urban areas (Table-3). Exotic breeds exhibit higher vulnerability at 68.63% compared to local breeds at 48.28%. Female cats (76.92%) display heightened vulnerability compared to male cats (53.70%). Age emerges as a significant risk factor (P value-0.002*), with cats aged one month to one year being the most susceptible (Frequency- 31, Percentage- 70.45%). The study underscores that all emaciated animals (100%) and a majority with poor body condition (63.77%) are prone to higher susceptibility. Ash-colored coats dominate the observations, representing 77.27% of the total. Cats that spend time outdoors (67.16%) demonstrate higher susceptibility than indoor (30.77%) or exclusively indoor cats. The investigation highlights the significant impact of vaccination and deworming (P value- <0.001*). Vaccinated cats exhibit

lower susceptibility (44.90%) compared to non-vaccinated cats (87.10%). Similarly, dewormed cats (56.75%) display a lower incidence of ectoparasitic infestation in contrast to cats that have not been dewormed (87.50%) (Table 3).

Prevalence of ectoparasitic diseases in dogs based on their associated risk factors:

The investigation highlights a heightened susceptibility to ectoparasites among semi-urban dogs (65.42%) compared to their urban counterparts (56.92%) (Table 4). Intriguingly, indigenous breeds (60.47%) exhibited a marginally higher infestation rate than exotic breeds (58.82%). Female dogs (71.43%) displayed a greater propensity for infestation than males (54.55%). Notably, the age group most susceptible to ectoparasites was 0 to 1 year, constituting 82.86% of affected dogs. Cachectic dogs exhibited a 100% susceptibility rate. White-coated dogs exhibited a higher susceptibility rate (84.62%) than black (47.62%) and brown (58.82%) coated dogs. Dogs allowed to roam outdoors demonstrated higher susceptibility (55.56%) compared to those confined indoors (62.07%). Vaccination significantly influenced susceptibility (<0.001%*), with non-vaccinated dogs (81.08%) being more susceptible than vaccinated ones (45.61%) (Table 4). Furthermore, dewormed dogs displayed greater resistance, with 54.90% testing positive for ectoparasites compared to 65.12% in non-dewormed dogs (Table 4).

DISCUSSION

The investigation unveiled compelling insights into ectoparasite infestations among the studied dogs and cats. The study in Dhaka Metropolitan area revealed a considerable prevalence of ectoparasites among companion animals, with rates of 59.57% in dogs and 61.25% in cats, reflecting a substantial burden on urban pets. These rates align with global concerns, mirroring high infestation rates reported in similar studies, such as Alho et al. (2018) in Qatar and Sharmin et al. (2018) in Bangladeshi cattle. Cats showed higher vulnerability than dogs, consistent with findings from other studies, including Sharmin et al. (2018), highlighting the broader issue of ectoparasite prevalence within the country.

Notably, mite infestation prevailed in 62.5% of the examined population, a significant finding aligning with similar prevalence rates found in other geographical locations (Sharmin et al., 2018; Palmer, 2003). Similarly, the recorded incidence of fleas at 8.92% and ticks at 3.57% in this study corroborates with prevalence rates reported in analogous studies conducted elsewhere (Alho et al., 2018). This study's identification of mites as the most prevalent ectoparasite aligns with their frequent occurrence in similar investigations, emphasizing the need for effective control measures tailored to mitigate mite infestations in dogs and cats (Bahrami et al., 2012).

In this study, a noteworthy contrast emerged between the susceptibility of semi-urban and urban dogs to ectoparasites. The prevalence of ectoparasites was notably higher among semi-urban dogs at 65.42% compared to urban dogs at 56.92% (Table 3) (Sharmin et al., 2018; Agu et al., 2020). Similarly, the infestation rates in cats exhibited a parallel pattern, with 76.92% of semi-urban cats affected compared to 58.21% in urban areas (Table 4) (Sharmin et al., 2018; Alho et al., 2018). The higher prevalence of ectoparasites among semi-urban pets indicates a potential association between the environment and infestation rate. Owners' awareness is also a crucial factor here. Urban people have more pet awareness than semi-urban dwellers. Because development and urbanization processes result in a complex web of human-animal interactions (Palmer, 2003).

The examination of breed-related susceptibility to ectoparasitic infestations revealed distinct patterns between dogs and cats in this study. Among dogs, the prevalence of ectoparasites was slightly higher in local breeds at 60.47% compared to exotic breeds at 58.82% (Table 4) (Agu et al., 2020). This finding aligns with a similar study conducted in Nigeria, showcasing analogous prevalence rates in local and exotic dog breeds (Agbolade et al., 2008; Ugbomoiko et al., 2008) and other endemic communities in tropical countries (Bahrami et al., 2012; Mosallanejad et al., 2012; Nuchjangreed & Somprasong, 2007). In contrast, among cats, a reverse trend emerged, indicating a higher susceptibility of exotic breeds (68.63%) compared to local breeds (48.28%) (Table 3) (Alho et al., 2018). Moreover, in terms of gender, female cats exhibited a higher susceptibility at 76.92% compared to male cats at 53.70% (Table 3) (Sharmin et al., 2018; Alho et al., 2018). Similar gender-associated trends were observed in dogs, with 71.43% of females (Table 4) and 54.55% of males exhibiting susceptibility to ectoparasitic infestations. Additionally, this study documented a common occurrence of multiple infestations among female dogs and cats, highlighting the potential for intensified health concerns in these groups (Agu et al., 2020). This is most likely owing to hormonal changes during reproduction and the sedentary behaviors that females frequently engage in when nursing, which favor re-infestation as previously reported by Dantas-Torres, 2010.

Age emerged as a pivotal risk factor influencing ectoparasitic infestations in this study, displaying statistical significance (P value = 0.002). The vulnerability of cats aged between 0 to 1 year was notably high, constituting 70.45% of the affected population (Table 3) (Abdulkareem et al., 2019). Similarly, in the canine population, the highest per

Table 4: Association of different variables with the prevalence of ectoparasite of pet dogs (n=94).

Parameters		Total Number	PositiveNumber	Percentage (%)	P value
City	Semi Urban	29	19	65.42	0.433
	Urban	65	37	56.92	
Breed	Local	43	26	60.47	0.872
	Exotic	51	30	58.82	
Sex	Female	28	20	71.43	0.046
	Male	66	36	54.55	
Age(Y)	0-1Y	35	29	82.86	0.002*
	2-5Y	41	18	43.90	
	6-10Y	16	7	43.75	
	11-15Y	2	2	100	
BCS	Cachectic-1	1	1	100	0.388
	Poor-2	8	3	37.50	
	Fair-3	84	51	60.71	
	Good-4	1	1	100	
Coat color	Black	42	20	47.62	0.026
	Brown	34	20	58.82	
	White	13	11	84.62	
Roaming andexposing to other animals	Yes	36	20	55.56	0.532
	No	58	36	62.07	
Vaccination	Yes	57	26	45.61	0.001*
	No	37	30	81.08	
Deworming	Yes	51	28	54.90	0.315
	No	4	28	65.12	

centage of ectoparasitic infestation occurred within the 0 to 1 year age range, recording an incidence of 82.86% (Table 4) (Mosallanejad et al., 2012). These findings unequivocally highlight the heightened susceptibility of younger animals, particularly those within the first year of life which may be due to the gradual acquisition of immunity and the proximity of the young dogs to the ground, have had limited exposure to parasites compared to older animals. Young animals typically have thinner skin and less dense fur or hair compared to adults. This makes it easier for ectoparasites to attach, feed, and reproduce on their bodies. However, Jittapalapong et al. (2008) and Mosallanejad et al. (2012) reported increased frequency in dogs and cats older than 3 years (Mosallanejad et al., 2012; Jittapalapong et al., 2008).

In this study, it was observed that cachectic animals exhibited a higher susceptibility rate (100%) in both dogs and cats (Table 3, 4). Following cachectic conditions, poor body condition scored at 63.77% for cats (Table-2), while fair body condition showed a susceptibility rate of 60.71% in dogs (Table 3). The prevalence of fair body condition in the sampled dogs aligns with Massei et al.'s 2017 study, reporting 80% prevalence in dogs with a similar body condition (Massei et al., 2017). Conversely, a study in Nepal noted that 69% of free-roaming dogs in Kathmandu maintained good health due to successful public education and sterilization programs, with only 9% experiencing skin problems (Kakati, 2012). Predominantly, ash-colored cats (77.27%) showed the highest susceptibility, followed by white-coated cats (60.53%) (Table 3). Similarly, white-coated dogs (84.62%) were more susceptible than black-coated (47.62%) and brown-coated (58.82%) dogs (Table 3). However, Abdulkareem et al. (2019) found varying ectoparasite occurrences concerning host coat color, with brown-coated hosts being more susceptible in their study (Abdulkareem et al., 2019). Cats that roamed outdoors demonstrated higher susceptibility (67.16%) compared to those that did not (30.77%). Conversely, dogs roaming outside exhibited lower susceptibility (55.56%) than those confined indoors (62.07%) (Table 3,4). Abdulkareem's research similarly highlighted that free-roaming pets were more exposed to parasitic illnesses, consistent with the findings in cats but differing from the observations in dogs in this study (Abdulkareem et al., 2019). Vaccination significantly influenced the susceptibility of both dogs and cats in this study (P value- <0.001) (Table 3,4). Vaccinated cats (44.90%) and dogs (45.61%) displayed lower susceptibility rates compared to their non-vaccinated counterparts (87.10% for cats, 81.08% for dogs) (Table 3,4). Moreo-

ver, dewormed cats (56.75%) and dogs (54.90%) exhibited lower ectoparasitic infestation rates than non-dewormed cats (87.50%) and dogs (65.12%) (Table 3,4). Alho et al. in 2018 presented findings similar to our study, supporting our observations (Alho et al., 2018).

Limitations of this study include the narrow focus on ectoparasite prevalence solely among pet dogs and cats in Dhaka. The small sample size limited result specificity, constraining the ability to draw comprehensive conclusions. Time constraints further restricted the study's scope, hindering a full portrayal of the broader situation in the country.

The completed research will delineate risk factors influencing ectoparasitic prevalence in dogs and cats. Implementing effective control measures, ensuring accurate diagnosis and treatment, is crucial to reduce prevalence rates. Recognizing the potential of pets to alleviate social stress emphasizes the need to create safe, disease-free environments for their well-being.

CONCLUSION

The pervasive prevalence of ectoparasites among companion animals in Dhaka Metropolitan's urban landscape necessitates effective control strategies, especially given the notably higher susceptibility of semi-urban pets, indicating a correlation with environmental factors. Future research should prioritize longitudinal and behavioral studies to monitor infestation trends, analyze pet behaviors affecting susceptibility, and conduct educational campaigns. Investigating resistance, treatment advancements, and tailored intervention programs for semi-urban areas are crucial to mitigate infestation rates.

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NOVELTY STATEMENT

The study identified age and vaccination as pivotal risk factors for pet dogs and cats. Female cats (76.92%) and dogs (71.43%) showed higher susceptibility than their male counterparts (53.70% for cats, 54.55% for dogs). Pets aged between 0 to 1 year exhibited the highest susceptibility in both dogs and cats, showing statistical significance (p-value* 0.002). Ash-colored coats (77.27%) were most susceptible in cats, while white-coated dogs (84.62%) exhibited higher susceptibility compared to black (47.62%) and brown (58.82%) coated dogs. Vaccination was statistically significant for both dogs and cats, whereas deworming showed significance only for cats.

AUTHOR'S CONTRIBUTION

All authors contributed to the experimental design, wrote down and examined the manuscript, and were confirmed liable for any aspect of the manuscript.

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