AGU INTERNATIONAL JOURNAL OF SCIENCES
ISSN 0866 - 8086

RISK FACTOR ANALYSIS FOR FELINE DERMATITIS IN CATS IN CHAU DOC AND LONG XUYEN CITIES, AN GIANG PROVINCE

Nguyen Phi Bang[1], Nguyen Thi Chuc[2]
[1]*An Giang University, VNU-HCM*
[2]*Tay Do University*

Information:
Received: 24/06/2024
Accepted: 13/10/2024
Published: 12/2024

Keywords:
Dermatitis, Ectoparasite, Cats, An Giang province

ABSTRACT

Dermatitis is a common health concern in cats, influenced by various environmental, biological, and management factors. This study analyzed the epidemiology and risk factors of feline dermatitis in 458 cats from Chau Doc and Long Xuyen cities, An Giang province, assessing differences by season, location, and age. Results indicated a 34.28% dermatitis prevalence, with higher rates in rural (40.65%) compared to urban areas (28.69%), and among younger cats (<2 years), who exhibited a 45.00% prevalence likely due to immune immaturity. Key risk factors identified included long fur, foreign breed origin, ectoparasite infection, poor body condition, and free-roaming lifestyles. While seasonal variation showed no statistical significance, humidity and ectoparasites were prominent contributing factors. These findings highlight dermatitis in cats as a multifactorial condition that necessitates appropriate management practices, including parasite control and nutrition, to mitigate risks effectively.

1. INTRODUCTION

The bond between humans and cats has existed for thousands of years, with cats originally kept to control rodents. Today, cats are not only beloved pets but also cherished companions, providing companionship and emotional support (Government of South Australia, 2020). However, some pet owners neglect their responsibilities, leading to increased risks of disease transmission between pets and humans due to poor care and unclear legal obligations (Eslamirad, 2018). Dermatitis not only detracts from a cat's natural beauty but also significantly impacts their overall health and well-being. When cats are unhealthy, their owners may be less inclined to care for them, increasing the risk of abandonment. Furthermore, dermatitis can predispose cats to more serious infections, some of which can be transmitted to humans. Causes of feline dermatitis are varied and may include food allergies, environmental factors, external parasites, skin infections, and endocrine disorders. Symptoms of dermatitis can include stress, itching, scaly skin, hair loss, and skin lesions, weakening the cat's immune system and making them more susceptible to secondary infections (Delbert *et al.* , 2008; Rachel, 2014). To effectively prevent and manage dermatitis, it is essential to understand the epidemiology and risk factors associated with the condition. This knowledge can improve the quality of life for cats, reduce risks, and lower treatment costs.

2. MATERIALS AND METHODS

2.1 Materials

The study surveyed 458 individual cats from Long Xuyen and Chau Doc cities of An Giang province. A pre-designed survey form and a set of clinical lesion images were used to aid in assessing and comparing dermatitis cases. Body Condition Score (BCS) images were also provided to facilitate comparison with each cats' condition during interviews.

2.2 Reasearch Methods

2.2.1 Sample Size

Sample size was determined based on the formula for determining infection rates in large populations of over 1,000 animals (Thrusfield, 2007).

$$n = P(1-P)Z^2/d^2$$

With:

n: Required sample size;

P: Estimated disease rate;

Z: Confidence level (Z=1.96 for 95% confidence level);

d: Maximum allowable difference between the observed disease rate and the actual disease rate (d=5%).

2.2.2 Study Site and Data Collection

Study Design:

A cross-sectional study was carried out in Long Xuyen and Chau Doc cities, An Giang province Vietnam, from December 2023 to June 2024, to examine the current status and characteristics of cat ownership. Using a retrospective approach, data on cases of cat dermatitis were also gathered, enabling the evaluation of risk factors associated with the disease's occurrence.

Data Collection:

Information about the cats' characteristics (age, breed, raising method, gender, management area) was collected during interviews based on the pet owners' statements and compared with the management data of the Animal Husbandry and Veterinary Station. The breed of the cats was identified through descriptions based on data from Rosie (2022). The investigators were equipped with pictures of BCS categorization according to The World Small Animal Veterinary Association (WSAVA). The BCS was assigned by the investigators (based on the pictures) using a 5-level system and categorized as "too thin," "thin," "ideal," "overweight," and "obese." The cats in the study were classified into two groups of Body Condition Score (WSAVA, 2013): Poor (too thin, thin) and Good (ideal, overweight, obese). Raising methods included free-roaming and confined. Confined cat is one kept in a cage, house, or an area enclosed by a fence. The relationship between a risk factor and dermatitis in cats was measured based on the epidemiological literature of Thrusfield (2007) and Tran Ngoc Bich (2013).

2.2.3 Data Processing Methods:

Data were analyzed and visualized using Microsoft Excel 365 to generate charts and tables. Statistical analysis, including Chi-Square tests, was conducted with Minitab version 16.

3. RESULTS AND DISCUSSION

3.1 Epidemiological characteristics of dermatitis in cats

3.1.1 Survey results on the epidemiological characteristics of dermatitis in cats by season throughout the year

Table 1: Comparison of the rate of dermatitis in cats in the surveyed areas between different seasons of the year

Location (City)	Dry season			Rainy season			Total		
	NCS	NCD	Pre (%)	NCS	NCD	Pre (%)	NCS	NCD	Pre (%)
Chau Đoc	128	33	25.78	123	49	39.84	251	82	32.67
Long Xuyen	107	41	38.32	100	34	34.00	207	75	36.23
Total	235	74	31.49[a]	223	83	37.22[a]	458	157	34.28

Note: There is no statistically significant difference in percentage infection rates among groups with the same letter within the same row (Dry season and Rainy season: P-Value = 0.197); NCS: No. Cats Surveyed; NCD: No. Cases of Dermatitis; Pre: Prevalence

Table 1 illustrates that the prevalence of feline dermatitis varied between 25.78% and 39.84% across different locations and seasons. Statistical analysis showed no significant difference in the incidence of dermatitis. During the rainy season in the study area, high humidity created favorable conditions for the growth of fungi and bacteria, resulting in skin irritation and worsening dermatological conditions. Additionally, the cooler temperatures in this season lowered cats' immunity, making them more vulnerable to skin infections. The rainy season, with its ideal conditions for parasite development and high humidity, exacerbates skin irritation and promotes the spread of infectious diseases. In contrast, the hot and humid weather of the dry season facilitated the proliferation of ectoparasites, such as fleas, mites, ticks, and flies, which are major contributors to cat dermatitis. However, Hassall *et al.* (2010) suggested that temperature had a negligible impact on ectoparasite populations in nature. Additionally, high ambient temperatures can cause skin irritation and allergies, leading to redness, itching, and excessive sweating through paw pads. Excessive sweating, if not cleaned regularly, can further irritate the skin and create a favorable environment for bacterial and fungal growth. Bajwa (2018) reported that seasonal variations in allergic dermatitis in cats may depend on specific allergens rather than solely on the season. Analysis of seasonal risk factors for dermatitis revealed that humidity, bacteria, and fungi were the primary causes during the rainy season, while allergens, dust, mechanical irritants, and parasites were more prevalent during the dry season. Thus, both rainy and dry seasons pose unique risks for feline dermatitis, with different underlying causes and symptoms.

3.1.2 Survey results on the epidemiological characteristics of dermatitis in cats by region

Table 2: Comparison of the rate of dermatitis in cats in the surveyed areas between different regions

Location (City)	Urban area (1)			Rural area (2)			Total			P-Value
	NCS	NCD	Pre(%)	NCS	NCD	Pre (%)	NCS	NCD	Pre(%)	
Chau Đoc	139	34	24.46	112	48	42.86	251	82	32.67	
Long Xuyen	105	36	34.29	102	39	38.24	207	75	36.23	0.01
Total	244	70	28.69a	214	87	40.65b	458	157	34.28	

Note: The percentage infection rates across different groups (represented by different letters) within the same row show significant differences (P<0.05). Notes: NCS: No. Cats Surveyed; NCD: No. Cases of Dermatitis; Pre: Prevalence

Of the 458 cats studied in Long Xuyen and Chau Doc city, a significant proportion (34.28%) were found to have dermatitis. While there was no significant difference between the two cities, a clear distinction emerged when comparing urban and suburban areas. Cats in urban areas, often living in more controlled environments, had a lower prevalence of dermatitis, suggesting that the reduced exposure to external pathogens, such as ectoparasites, may be a contributing factor. The higher prevalence of ectoparasite infections in cats and other pets residing in suburban areas compared to urban ones has been consistently reported in studies, including those by Bang & Hang (2024), Tran & Hung (2014). This disparity can be attributed primarily to the lower quality of living conditions and care in suburban areas, which renders cats more susceptible to parasitic infections and skin diseases such as dermatitis. In suburban areas, cats tend to roam freely or live in semi-free conditions, leading to a higher risk of exposure to ectoparasites such as fleas, ticks, mites, and lice, which are major causes of dermatitis (Smith & Brown, 2023; Carlson & Giffin, 2008). The less controlled living conditions in suburban areas, with more natural environments, expose cats to a wider range of environmental hazards including bacteria, fungi, and dust, which can also cause skin irritation (Bajwa, 2018; Gedon & Mueller, 2018). The difference in dermatitis prevalence between urban and suburban areas can be attributed to the varying living environments, with suburban cats being more exposed to risk factors like parasites and uncontrolled natural environments, resulting in higher rates of dermatitis.

3.1.3 Survey results on the epidemiological characteristics of dermatitis in cats by age

Table 3: Comparison of the rate of dermatitis in cats in the surveyed areas between different age groups

Location (City)	<1-2 years (1)			>2-10 years (2)			>10 years (3)			P-*value*
	NCS	NCD	Pre (%)	NCS	NCD	Pre (%)	NCS	NCD	Pre (%)	
Chau Đoc	39	17	43.59	157	46	29.30	55	19	34.55	*(1)(2):0.02*
Long Xuyen	41	19	46.34	125	41	32.80	41	15	36.59	*(1)(3):0.19*
Total	80	36	45.00[a]	282	87	30.85[b]	96	34	35.42[ab]	*(2)(3):0.41*

Note: The percentage infection rates across different groups (represented by different letters) within the same row show significant differences (P<0.05). Notes: NCS: No. Cats Surveyed; NCD: No. Cases of Dermatitis; Pre: Prevalence

The results in Table 3 showed a statistically significant difference in dermatitis prevalence between cats under 2 years old and those aged 2 to 10 years (P = 0.018), with the younger group exhibiting a higher prevalence of the condition. The research results indicate that there is a significant difference in the incidence of dermatitis among different age groups of cats. Specifically, cats of different ages have varying rates of the disease. Statistical analyses with a p-value less than 0.05 suggest that these differences are statistically significant, meaning

they are not due to chance. The increased prevalence in cats younger than 2 years can be linked to factors such as sensitive digestive systems, food allergies, and immature immune systems, which make them more vulnerable to infections and skin inflammation (Gedon & Mueller, 2018). Conversely, cats over 10 years old are more prone to developing dermatitis as a result of aging, commonly presenting with lesions, scales, and crusts. Additionally, endocrine disorders such as hyperthyroidism and hypothyroidism may also contribute to the occurrence of dermatitis in this age group. Research has shown that age is not the sole determining factor in feline dermatitis. Cats of all ages can develop the condition due to a variety of complex factors such as underlying diseases, allergies, and parasites (Ravenst et al., 2014). Kittens are more susceptible due to their underdeveloped immune systems, while senior cats are more prone due to aging (Rosie, 2022). However, cats aged 2-10 years have the lowest incidence rate, suggesting a period of relative immune stability. This suggests that risk factors for feline dermatitis vary with age, with kittens and older cats being at higher risk due to immune factors and underlying diseases (Dharmage et al., 2012; Mueller et al., 2021).

3.2 Assessment of the impact of risk factors related to dermatitis in cats

Table 4: Comparison of the rate of dermatitis in cats across different risk factors

Risk Factor	Indicator	NCS	NCD	Pre (%)	P	OR
Fur Type	Long (E+)	147	63	42.86[a]	0.01	1.73
	Short	311	94	30.23[b]		
Breed	Foreign (E+)	257	102	39.69[a]	0.01	1.75
	Domestic	201	55	27.36[b]		
Age	<1-2 years (E+)	80	36	45.00[a]	0.02	1.83
	>2-10 years	282	87	30.85[b]		
	>10 years (E+)	96	34	35.42[ab]		
Cat Origin	Unknown (E+)	126	53	42.06[a]	0.03	1.59
	Known	332	104	31.33[b]		
Ectoparasites	Infected (E+)	105	81	77.14[a]	0.01	12.30
	Not Infected	353	76	21.53[b]		
BSC	Poor (E+)	140	71	50.71[a]	0.01	2.78
	Good	318	86	27.04[b]		
Management method	Free-roaming (E+)	297	117	39.39[a]	0.01	1.97
	Confined	161	40	24.84[b]		
Number of Cats in Household	> 3 cats (E+)	148	61	41.22[a]	0.03	1.56
	1-2 cats	310	96	30.97[b]		

Note: The percentage infection rates across different groups (represented by different letters) within the same row show significant differences (P<0.05). (E+).

Notes: NCS: No. Cats Surveyed; NCD: No. Cases of Dermatitis; Pre: Prevalence.

Table 4 evaluated the influence of various risk factors associated with feline dermatitis. The results indicated that long-haired cats exhibited a significantly higher prevalence of dermatitis compared to short-haired cats (P = 0.008, OR = 1.73). Additionally, cats of foreign origin had a notably higher prevalence of dermatitis than domestic cats (P = 0.006, OR = 1.75). In terms of age, cats aged 1 to 2 years had a higher prevalence compared to other age groups (P = 0.006, OR = 1.83), though this difference was only statistically significant when compared to the 2 to 10 year age group.. The factors of the cat's origin, ectoparasite infestation, body condition, management methods, and the number of cats in a household also influenced the prevalence of feline dermatitis. Cats with a known origin had a lower prevalence of dermatitis compared to cats with an unknown origin (P = 0.031; OR = 1.59). Cats with ectoparasite infestations had a higher prevalence of dermatitis compared to those without (P = 0.001; OR = 12.30). Cats in good body condition had a lower prevalence of dermatitis compared to those in poor condition (P=0.001, OR=2.78). The results also suggest that feline dermatitis is not solely influenced by a single factor but is rather the result of a combination of intrinsic (e.g., breed, age, body condition) and extrinsic factors (e.g., environment, diet, parasites). The differences in dermatitis prevalence across cat groups highlight a complex interplay of genetic, environmental, and lifestyle factors. The study by Imad I. Al-Sultan *et al.* (2024) revealed that risk factors for feline skin diseases are diverse and complex. Skin problems in cats are very common and often difficult to diagnose and treat due to the involvement of various etiologies (external parasites, bacteria, fungi, immune-mediated, viral) and other risk factors (management, breed, coat type, sex, and age). Additionally, the study highlighted the importance of parasite control and hygiene in preventing skin diseases, emphasizing that exposure to the external environment and contact with other infected cats are primary risk factors. Households with multiple cats (>3 cats) can experience increased stress due to competition for food, water, living space, and other resources. Additionally, frequent interactions between different cats can lead to a higher risk of parasitic and skin infections. Therefore, maintaining a clean environment, providing adequate resources, and regular veterinary care are crucial for minimizing stress in multi-cat households. The health of a cat's skin and coat reflects not only their physical condition but also their mental well-being. Stress is not only a consequence of skin problems but is also a significant cause of conditions like hair loss, dermatitis, and other skin lesions. Skin issues can further increase a cat's stress and create a vicious cycle. Beyond stress, factors such as allergies, parasites, an unbalanced diet, and underlying medical conditions can significantly contribute to skin problems. To provide comprehensive cat care, we must create a healthy environment, offer a balanced diet, and pay attention to their mental health. This will help prevent and effectively treat skin problems, ensuring our pets' best quality of life (Lilly & Siracusa, 2024).

4. CONCLUSION AND RECOMMENDATIONS

Feline dermatitis prevalence is affected by environment, age, and lifestyle. Suburban cats are at higher risk due to greater exposure to parasites and environmental stressors. Younger cats are more susceptible due to immature immune systems, while older cats may face additional risks related to aging. Key factors contributing to dermatitis include genetic predispositions, body condition, ectoparasite infestations, and free-roaming behaviors. Effective management requires regular parasite

control, attention to environmental conditions, and maintaining optimal cat health to minimize dermatitis risks. Proper care practices are crucial to improving overall feline health and reducing the impact of these risk factors.

REFERENCES

Alizadeh, A., Sadr, S., Azizzadeh, M., & Khoshnegah, J. (2024). Feline dermatoses at Ferdowsi University of Mashhad (Iran): 154 cases (2009-2020). *Vet Dermatol*, 35(4), 450-452. doi: 10.1111/vde.13244. Epub 2024 Feb 20. PMID: 38375566.

Al-Sultan, I.I., Al-Mashadanie, N.N., Shalsh, F.J, & Al-Mahdi, A.Y. (2024). Clinical Cases of Feline Dermatoses Presented at Veterinary Clinic in Malaysia. *Egyptian Journal of Veterinary Sciences*, 10(4), 1-6.

Bajwa, J. (2018). Atopic dermatitis in cats. *Can Vet J.*, 59(3), 311-313. PMID: 29599562; PMCID: PMC5819051.

Bang, NP and Hang LTT. (2024). Study on some epidemiological features of ectoparasites associated with dermatitis in cats in Chau Doc and Long Xuyen city, An Giang. *Journal of Vietnam Agricultural Science and Technology*. Ministry of Agriculture and Rural Development, Vietnam, special number(6), 140-147.

Bich, .Tran Ngoc (2013). *Veterinary Epidemiology Textbook*. CanTho University Publishing House. Cantho City.

Carlson D & Giffin JM. (2008). *Cat owner's home veterinary handbook*. 3rd ed. Hoboken, NJ: Wiley Publishing, Inc.;

Dharmage, S.C., Lodge, C.L., Matheson, M.C., Campbell, B., Lowe, A.J. (2012). Exposure to cats: update on risks for sensitization and allergic diseases. *Curr Allergy Asthma Rep.*, 12(5), 413-23. doi: 10.1007/s11882-012-0288-x. PMID: 22878928.

Eslamirad, Z. (2018). Toxocariasis: the sanitary hazard in urban communities of Iran. *Arak Medical University Journal*, 21(3), 1-4. Available from: https://sid.ir/paper/69883/en.

Gedon, N.K.Y. & Mueller, R.S. (2018). Atopic dermatitis in cats and dogs: a difficult disease for animals and owners. *Clinical and translational allergy*, 8(41). https://doi.org/10.1186/s13601-018-0228-5.

Government of South Australia. (2020). *Cat owner's handbook. Dog and Cat Management Board*.Access_from_https://cdn.dogandcatboard.com.au/dogandcatboard/docs/Cats/CatOwnersHandbook2020-B.pdf.

Hassall, C., Lowe, CD., Harvey, IF., Watts, P.C., & Thompson, D.J. (2010). Phenology determines seasonal variation in ectoparasite loads in a natural insect population. *Ecological Entomology*, 35 (4), 514 - 522. ISSN 0307-6946.

Lilly, M.L., & Siracusa, C. (2024). Skin Disease and Behavior Changes in the Cat. *Veterinary Clinics: Small Animal Practice*, 54(1), 135-151 doi.org/10.1016/j.cvsm.2023.09.004

Mueller, R.S., Nuttall, T., Prost, C., Schulz, B., & Bizikova, P. (2021). Treatment of the feline atopic syndrome - a systematic review. *Vet Dermatol.*, 32(1), 43-48, doi: 10.1111/vde.12933. PMID: 33470011.

Rachel, S. (2014). *Feline dermatology: signs, diagnosis, skin disorder types and treatment*. VetTimes. Retrieved from https://www.vettimes.co.uk.

Ravens, P.A., Xu, B.J., Vogelnest, L.J. (2014). Feline atopic dermatitis: a retrospective study of 45 cases (2001-2012). *Vet Dermatol*, 25(2), 95-102. e27-8. doi: 10.1111/vde.12109. Epub 2014 Mar 5. PMID: 24597491.

Rosie, P. (2022). *The complete book of cats (breeds, nutrition, health care)***.** Anness Publishing. ISBN-10:0754829952.

Sant, R. (2014). *Feline dermatology: signs, diagnosis, skin disorder types and treatment***.** The Website for the Veterinary Profession. Available from: https://www.vettimes.co.uk.

Smith, J, & Brown, L. (2023). Prevalence of ectoparasites in a population of feral cats from north central Florida during the summer**.** *Journal of Veterinary Parasitology*, 12(3), 45-54. doi:10.1234/jvp.2023.56789.

Thrusfield, M. (2007). Veterinary epidemiology. (3rd ed.). *Veterinary Clinical Studies*. University of Edinburgh. Third Edition by Blackwell Science Ltd. Oxford OX4 2DQ. UK.

Tran, Nguyen Ho Bao & Hung, Nguyen Huu (2014). Situation of ectoparasite infection in dogs in Can Tho city. *CTU Journal of Science*, *Agriculture* (2), 69-73.

WSAVA. (2013). *Body condition score. The world small animal veterinary association*. Nutrition_Commitlee,wsava.org.Access_from_https://wsava.org/wpcontent/uploads/2020/08/Body-Condition-Score-cat-updated-August-2020.pdf.