

Original Article



# A Comparative Study on the Prevalence of *Demodex* Mites in Cats with Dermatitis and Healthy Cats with an Emphasis on Blood Testing in AL-Diwaniyah Province

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## Abstract

**Introduction:** Cat infestation with ectoparasites is one of the medical and veterinary importance worldwide due to transmission of pathogen agent's. The aim of this study was to compare the prevalence of *Demodex* mite in the cats with dermatitis and healthy cats.

**Methods:** This study was conducted in 100 cats during the year 2024 in the small animals Clinics, veterinary hospital and some cats that were captured with dermatitis and the type of parasitic or non-parasitic dermatitis. The collected mites were clarified in 10% potassium hydroxide (KOH) for 24 hours and Examination of the mounted specimens was done by aid of a microscope. Also Blood-test (C.B.C test) was done in all the samples.

**Results:** According to the results of the frequency of contamination with non-contaminated and parasitic *Demodex* dermatitis in the positive of this study in 2024, 8% was parasitic dermatitis and 92% was non parasitic dermatitis. In the study of C.B.C in healthy cats, the average percentage of Neutrophils was 48%, lymphocytes 46%, eosinophils 2%, monocyte 3% and Basophil 1%. In the study of C.B.C in cats with nonparasitic dermatitis Neutrophils were 44%, lymphocytes 40%, eosinophils 9%, monocytes 3% and Basophil 4%. In the study of C.B.C in cats with *Demodex* parasitic dermatitis, Neutrophils were 39%, lymphocytes 43%, eosinophils 14%, monocytes 3% and Basophil 1%. In blood tests of healthy cats and cats with non-parasitic and parasitic dermatitis, the number of red blood cells counted did not show any significant difference.

**Conclusion:** The significant relationship was observed between the percentage of eosinophils in parasitic and non-parasitic dermatitis, so that the percentage of eosinophils increased with the prevalence of parasitic and non-parasitic dermatitis. This study provides new data and information on the infection that may help in developing methods of controlling these parasites. Further investigations of external parasites in cats in Iraq are strongly recommended.

**Keywords:** Cats, *Demodex*, Mites, Dermatitis, Blood-test

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## Introduction

The most important role of arthropods is in transmitting various diseases such as bacterial, viral, rickettsial, protozoan, and helminthic diseases. Mites are organisms less than 3 mm in size, while ticks are larger than 3 mm. Mites are more numerous than ticks and have more superficial hairs than ticks (1, 2). *Demodex* mites are small mites that have specialized in living in the hair follicles and sebaceous glands of many types of mammals and have a distinctive appearance. The adult mite has four pairs of very short legs, which have small, blunt claws. The body of this mite is elongated, with fine grooves around the back of the body (Figure 1). The body of this mite has no hairs or very few (3, 4). *Demodex* mites, unlike sarcoptic mange, attack hair follicles and sebaceous and sweat glands. *Demodex* mites are usually transmitted to kittens by infected female cats, causing them to become infected (5). *Demodex* infestations may heal on their own in mild

and localized cases, but in severe cases and if there is an infection, they will require appropriate treatment. Timely treatment of mange reduces the risk of secondary infections and severe complications, but if left untreated, it can lead to the death of the cat in some cases (6, 7). To treat secondary infections, the cat's immune system can be strengthened. To strengthen and increase the strength of the immune system, it will be beneficial to administer vitamins C and E and zinc compounds (8). It is better to provide these items separately and exclusively to the cat. The amount of their consumption will be at the discretion and prescription of the veterinarian, which depends on the specific conditions of each cat. In some cases, the veterinarian will also prescribe essential fatty acid compounds as necessary (9, 10). Two species of *Demodex* mites are known to infest cats. *Demodex cati*, which is similar in appearance to *Demodex canis* and lives in the hair follicles (11, 12). This species of mite can also be found naturally on the body of



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Figure 1. *Demodex* mites under a microscope

a healthy cat. Another species, *Demodex gato* (*D. gato*), lives in the upper layers of the skin like *Demodex cornei* and is about half the size of *Demodex cati*. *Demodex gato* can be transmitted from one cat to another (13-16). Demodicosis is more common in cats than previously thought. The clinical signs of this disease are similar to those caused by *Demodex canis* in dogs. Dandruff, redness, scaling of the skin, and discharge from the ears can be seen with *Demodex cati* infection in cats. Demodicosis in cats can be itchy or non-itchy (17, 18).

### Materials and Methods

This study was conducted as a descriptive and case-control study on cats referred to veterinary clinics, veterinary hospital and some cats that were captured in Diwaniyah, Iraq in 2024. In this study, cats were divided into two groups of 50 (50 cats with dermatitis and 50 healthy cats). Samples were taken through skin scrapings.

### Sample Collection Method

Initially, different parts of the body surface of the cats under study (head, neck, ears, and groin, under the shoulder blades, between the toes, abdomen, and tail) were examined for contamination with external parasites. To isolate mange and other external parasites from the body surface (back, sides, hand and foot, paws, chest and abdomen) and ears of the cats under study, external parasites were first inactivated by spraying insecticide and then collected by combing and hand-catching with gloves. Mites and other external parasites present in the cat enclosure were also collected and poured into tubes containing 70% ethanol, and the characteristics of the collected samples and the number of cats were recorded.

### Laboratory Examination

In the parasitology laboratory, the collected mites were clarified in 10% potassium hydroxide (KOH) for 24 hours at room temperature. Dehydration of the mites was carried out in different concentrations of ethanol (30%,

50%, 70%, 80%, and 95%) for 15-20 minutes. The mites were then transferred to Ethanol-Xylol for one hour, Xylol overnight, and lactophenol for 24 hours. The mites were identified using a recognition key and a microscope. In the laboratory, these samples were first clarified and then examined.

Examination of the mounted specimens was done by aid of a microscope. The available literatures were used to assist in the identification of the collected ectoparasites (19, 20).

All cats also underwent blood tests and a CBC blood cell count, and the results were analyzed based on these tests.

### Statistical Analysis

The inclusion criteria for the study were all cats referring to the clinic and veterinary hospital with symptoms of dermatitis and were healthy. Demographic information of cats was collected by a designed questionnaire. Data were reported as Mean and standard deviation. The results were analyzed using SPSS software.

### Results

Based on this study, which was conducted on 50 healthy cats without symptoms of the disease and 50 cats with dermatitis referred to veterinary clinics in Diwaniyah, Iraq in 2024 and according to the results of the frequency of contamination with non-contaminated and parasitic *Demodex* dermatitis in the positive of this study, 8% was parasitic dermatitis and 92% was non parasitic dermatitis. In the study of C.B.C in healthy cats, the average percentage of Neutrophils was 48%, lymphocytes 46%, eosinophils 2%, monocyte 3% and Basophil 1%. In the study of C.B.C in cats with nonparasitic dermatitis Neutrophils were 44%, lymphocytes 40%, eosinophils 9%, monocytes 3% and Basophil 4%.

In the study of C.B.C in cats with *Demodex* parasitic dermatitis, Neutrophils were 39%, lymphocytes 43%, eosinophils 14%, monocytes 3% and Basophil 1%.

In blood tests of healthy cats and cats with non-parasitic and parasitic dermatitis, the number of red blood cells counted did not show any significant difference (Tables 1-4).

### Discussion

External parasites use cats as a place to feed and reproduce. Fleas, ticks, lice, and mites depend on the host for survival and to complete their life cycle. Demodicosis is more common in dogs than in cats, but the species that causes the disease is different in dogs and cats. There have not been many studies on *Demodex* mange in cats, and most research has been done on dogs (21). The prevalence of parasitic infections in animals, including dogs and cats, depends on various factors, including climatic conditions, regional climate, temperature, and amount of sunlight, soil conditions and amount of rainfall, the relationship of

**Table 1.** Frequency of non-parasitic and parasitic dermatitis (*Demodex*) infection in cats in Diwaniyah, Iraq in 2024

Sick cat with dermatitis	Positive non-parasitic (dermatitis)	Parasitic positive ( <i>Demodex</i> )	Total
Number	46	4	50
Percentage	92%	8%	100%

**Table 2.** Blood tests and complete blood cell count in healthy cats in Diwaniyah, Iraq, in 2024

Healthy cats	Neutrophil	Lymphocyte	Eosinophil	Monocyte	Basophil
Average	48	46	2	3	1
Percentage	48%	46%	2%	3%	1%

dogs and cats with other livestock, and the importance of dogs and cats to the owner. Feline demodicosis, caused by the parasite *Demodex cati*, is a rare skin disease that is often associated with other diseases and a weakened immune system (22). According to other findings in Iran and Iraq, dogs and cats and other carnivores (such as golden jackals, red foxes and cats) can be reservoirs for ectoparasites, helminths and protozoan parasites (1, 23). The present study showed that mites were the most abundant ectoparasites. There are two species of mites that have been recognized including *Demodex cati*, *Demodex gatoi* that is in agreement with study on other carnivores, Iraq (1, 24). This study found that female ectoparasite was predominant than male, the reason for this discrepancy is unclear but may be in part related to the fact that females have longer life than males and that males are spending more time off the host or they are more prone to predation or grooming by the host, or due to starvation (25). Female abundant infestation has also been reported by other researchers (26). Clinical symptoms: deficiency of the hair or wool coat (alopecia), itching, scratches (pruritus) and mite allergic dermatitis found in this study are also consistent with recent report in other countries (27). This parasite was first identified at the molecular level by Ilie and colleagues in Romania in a 10-year-old mixed-breed cat. This cat showed clinical signs in the head area, and confirmation by deep skin scraping and PCR testing revealed the presence of *Demodex cati* (19, 28). Bernstein et al identified a rare morphological form of *Demodex cati* in cats using PCR testing (20, 29). Frank et al developed a novel PCR test to distinguish *Demodex gatoi* from *Demodex cati*, which is important for the diagnosis of skin diseases in cats. This test, which is effective in identifying *Demodex gatoi* infections, promises to be a valuable diagnostic tool after optimization (21, 30). Using PCR techniques, Ferreira and colleagues discovered three species of *Demodex* parasites in cats: *Demodex cati*, *Demodex gatoi*, and an unnamed species that was genetically distinct from *Demodex cati* and *Demodex gatoi*. Additionally, DNA related to dog-associated mite was also found, indicating potential

**Table 3.** Blood tests and complete blood cell count in cats with non-parasitic dermatitis in Diwaniyah, Iraq, in 2024

Sick cat with non-parasitic dermatitis	Neutrophil	Lymphocyte	Eosinophil	Monocyte	Basophil
Average	44	40	9	3	4
Percentage	44%	40%	9%	3%	4%

**Table 4.** Blood tests and complete blood count in cats with *Demodex* dermatitis in Diwaniyah, Iraq, in 2024

Sick cat with <i>Demodex</i> dermatitis	Neutrophil	Lymphocyte	Eosinophil	Monocyte	Basophil
Average	39	43	14	3	1
Percentage	39%	43%	14%	3%	1%

interspecies transmission (31, 32).

According to the results of the frequency of contamination with non-contaminated and parasitic *Demodex* dermatitis in the positive of this study in Diwaniyah, Iraq in 2024, 8% was parasitic dermatitis and 92% was non-parasitic dermatitis. In our study of blood-test in cats with *Demodex* parasitic dermatitis, Neutrophils were 39%, lymphocytes 43%, eosinophils 14%, monocytes 3% and Basophil 1%. The significant relationship was observed between the percentage of eosinophils in parasitic and non-parasitic dermatitis, so that the percentage of eosinophils increased with the prevalence of parasitic and non-parasitic dermatitis. In blood tests of healthy cats and cats with non-parasitic and parasitic dermatitis, the number of red blood cells counted did not show any significant difference.

Ultimately, feline demodicosis, when properly diagnosed and managed, has a favorable prognosis, highlighting the importance of addressing underlying conditions that weaken the cat's immune system.

## Conclusion

The significant relationship was observed between the percentage of eosinophils in parasitic and non-parasitic dermatitis, so that the percentage of eosinophils increased with the prevalence of parasitic and non-parasitic dermatitis.

This study provides new data and information on the infection that may help in developing methods of controlling these parasites. Further investigations of external parasites in cats in Iraq are strongly recommended.

## Authors' Contribution

**Conceptualization:** Asifa Matrood Almaeahi.

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**Formal analysis:** Saad Aziz Anah.

**Investigation:** Asifa Matrood Almaeahi.

**Methodology:** Saad Aziz Anah.

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**Supervision:** Asifa Matrood Almaeahi.

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### Competing Interests

The authors declare no conflict of interest.

### Ethical Approval

Not applicable.

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