



Epidemiological Analysis Of Sarcoptic Mange: A Review Of Sarcoptic Mange As A Threat To The Existence Of Desert Fox *Vulpes Vulpes Pusilla* In The Thar Desert.

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Abstract

Sarcoptic Mange is a highly contagious dermatological disease that affects a variety of animal species on earth. It is caused by an ectoparasite mite *Sarcoptes scabiei* that burrows into the skin of the mammals and lays its eggs. This causes itching and irritation in the animal, often leading to secondary bacterial infection. *Sarcoptes scabiei* Var. *canis* affects dogs and other canids including foxes on parts of the body which are devoid of hair, such as the head, chest, abdomen, neck, face, ears, elbow, and the hocks. This further leads to papular lesions which are associated with marked scaling, oozing, crusting and scab formation, causing alopecia and weight loss. These conditions result in very high mortality. Indian desert fox *Vulpes vulpes pusilla* is an endemic survivalist of the Thar desert. It withstands the extremes of the desert, yet it has been struggling against the malice of Sarcoptic Mange. This disease has been known to be detrimental to the survival of many canid species throughout the world and Indian desert fox is no exception. It is widely believed that desert foxes have been contracting Sarcoptic Mange from feral dogs as well as their mite-infested carcasses. This deadly disease may send the population of desert fox toward extinction in near future. This disease can be treated quite conveniently with the help of anti-mite topical medicines, but this method is impractical in terms of wildlife management. The long-term solution would be the development of a vaccine for the fox and other mammals to prevent their extinction.

Keywords: Sarcoptic Mange, Desert fox, Mite, Thar desert, Canids

Introduction

Sarcoptic Mange is an extremely contagious disease that affects a variety of mammals, such as canids, cats, ungulates etc. It is a dermatological ailment caused by an ectoparasitic mite *Sarcoptes scabiei*. Out of several of its varieties, *Sarcoptes scabiei* var. *canis* is the one that affects canids throughout the world. This parasite burrows into the skin and lays eggs, which then causes itch and irritation, which may lead to secondary bacterial infections (Smith and Claypoole, 1967). It has many varieties and one such variety *Sarcoptes scabiei* var. *hominis* is an ectoparasite to humans and causes scabies.

Sarcoptes scabiei var. *canis* affects parts of the bodies of dogs which are devoid of hair, such as the head, chest, abdomen, neck, face, ears, elbow, and the hocks. This further leads to papular lesions which are associated with marked scaling, oozing, crusting and scab formation, which are sites for secondary infections. This causes alopecia and weight loss. These conditions result in very high morbidity in canids

(**Bandi and Saikumar, 2013**). Canids in wild have been known to contract Sarcoptic Mange and the present study observes its incidence in desert fox *Vulpes vulpes pusilla*. This is a highly contagious disease with high morbidity, and it is an important factor that affects the demography of the Indian desert fox.

Case Study

Sarcopetes scabiei var. *canis* is a mite that belongs to the phylum-Arthropoda Class-Arachnida; Order-Acarina; Family-Sarcoptidae Genus-Sarcoptes. Its developmental stages include the egg, larva, protonymph, tritonymph and the mite. Its body is roughly circular, convex dorsally and flattened ventrally. It has 4 pairs of legs and the 1st and the 2nd pairs bear suckers, while the 2 rear pairs have long trailing bristles. They have spur like claws and spine like projections on their dorsal surfaces. The surface of the female mite is covered with fine transverse striations and scales, which are of taxonomic value (**Peh, 2003**).

Indian desert fox *Vulpes vulpes pusilla* is subspecies of the red fox *Vulpes vulpes*. It is an elusive canid species endemic to the Thar desert or Great Indian desert (**Menon, 2014**). Like most desert species, it is an opportunist species and stays active throughout the year. Thar desert, on the other hand, is the most densely populated desert by humans in the world (**Bhandari, 1995**), i.e., despite the climatic extremes, humans have thrived here, and the region is showing rapid economic growth. Rapid economic growth has led to an ever-increasing conflict between wildlife and humans. This interaction has been affecting desert fox demography as well. One of the imminent results of this conflict is an increase in the road-kill incidents of desert fox in its habitat. In this sequence of aftermaths of anthropogenic activities is an overall rise in the outbreak and spread of Sarcoptic Mange in desert fox populations. Sarcoptic Mange has been recorded in desert fox populations throughout western Rajasthan and its cases have been on the rise. The reason of this spread is believed to be the foxes' increased interaction with stray dogs, which is a direct result of encroachment of humans into the habitat of the fox (**Dookia and Wilson, 2015**).

The mite makes burrows into the skin of the canine and lays its eggs there. The eggs require incubation of about 2 days and six-legged larval stage begins which lasts for about 4 days. After larval stage, the nymph stage begins which lasts for about 6 days, after this period the nymph becomes an adult (**Burroughs and Elston, 2003**). Symptoms of Sarcoptic Mange are itching, pruritic lesions, scab formation, weight-loss, and alopecia. Secondary infections by bacteria increase the overall morbidity of the species. Intense itching leads to localized hair loss at the sites of itching. The lesions are typically found on the ventral portion of the abdomen, chest, legs, ears, and elbows. Without treatment, the infestation can cover the entire body (**Diwakar and Diwakar, 2017**). With time, the animal becomes weak and eventually dies.

In recent past, many other canids have suffered the wrath of *S. scabiei* all over the world. For instance, Sweden recorded its first case of mange in red fox *Vulpes vulpes* in 1972 and within next 8 years, sarcoptic mange had spread throughout the mainland of the country killing over 50% of the red fox population (**Danell and Hörnfeldt, 1987; Lindström and Mörner, 1985**). In southern parts of North America, evaluation of effects of mange on coyotes was conducted by **Pence and Windberg (1994)**. They observed that coyote *Canis latrans* population had declined significantly in recent years, and selection had been at work for mange-resistant coyotes in the overall population. **Henriksen et al. (1993)** observed the most likely cause of extinction of red fox at the island of Bornholm, Denmark to be sarcoptic mange.

Unlike, red fox or coyotes, Indian desert fox is an understudied animal, and the impact of sarcoptic mange on its population dynamics is yet to be known. Knowing the history of sarcoptic mange on other mammals, it is safe to assume that the Indian desert fox faces an imminent danger from this dermatological mayhem.



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Fig.1, 2. Desert fox *Vulpes vulpes pusilla* in the arid landscape of Thar desert.



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Fig 3,4,5. Pictures depicting Sarcoptic Mange stricken Desert foxes, with marked alopecia.

Discussion

Indian desert fox *Vulpes vulpes pusilla* is an endemic survivalist species of the Thar desert. It withstands the environmental extremes that the desert has to offer, yet it has been struggling to survive the spread and malice of Sarcoptic Mange. This disease has been known to be detrimental to the survival of many canid species throughout the world and Indian desert fox is no exception. Although it is a wild species, but Thar desert is a human-dominated landscape, resulting in the loss of its habitat and habitat encroachment by humans. This issue has been prominent for decades (for centuries even), rendering the fox to encounter human settlements and their livestock and feral dogs more often. It is widely believed that Indian desert foxes have been contracting Sarcoptic Mange from feral dogs or their mite-infested carcasses. This deadly disease might send the population of desert fox toward abyssal depths or even extinction in near future.

In dogs, the disease is treated quite conveniently with the help of anti-mite topical medicines, but the long-term solution would be development of a vaccine for the fox and other mammals to prevent their extinction by Sarcoptic Mange. If the matter is not brought to light sooner, there will be no more foxes left to think about.

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