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## Extreme human annoyance caused by *Ctenocephalides felis felis* (cat flea)

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### PEER REVIEW

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#### Comments

This is a good report in which the authors try to describe a case of dermatitis, hypersensitivity and severe discomfort caused by flea bites. The report is interesting and informs our colleagues about the presence of flea and their probable public health concern.

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### ABSTRACT

The authors report a case of human dermal complications by *Ctenocephalides felis felis* (cat flea) in a 28 years old woman who dwell in rural area in Mazandaran province, Iran. Furthermore, in the current report clinical manifestations, etiology and different aspects of infestation were discussed elaborately. And the importance of controlling fleas was highlighted as well.

### KEYWORDS

Flea, Skin, Dermatitis, Human, Iran

## 1. Introduction

Fleas are hematophagous ectoparasites on warm-blooded hosts and they are a matter of high importance both in medical and veterinary field. Fleas are known as a vector of some important disease including plague, murine typhus, tularemia and dipylidiasis. This pest annually imposes a considerable economical losses and damages to humans and livestock industries. Furthermore, fleas bite is one of the causative agents of hypersensitivity responses, dermatitis, allergies and severe discomfort. Dermal complications annually have been reported in human and animal particularly in spring and summer owing to proper conditions of these seasons for these aggressive insects. In addition, in general, though fleas do not have exclusive

hosts but they have preferred hosts<sup>[1,2]</sup>.

*Ctenocephalides felis felis* (*C. felis*) (cat flea) has a worldwide distribution; despite of its name it can invade cats, dogs, humans and a wide variety of mammals. Moreover, *C. felis* and *Ctenocephalides canis* (dog flea) can be very harassing pest of humans due to their painful bites when they have a close association. Cat fleas and their feces are considered as allergens and they increase the allergenicity of house dust. At least 15 proteins from *C. felis* are proved as allergen<sup>[3]</sup>.

Despite of all above mentioned facts including transmission of diseases, economical damages and public health concerns, there is not enough information about flea and its complication in our country. Therefore, the current paper provides a commentary on human infestation by flea

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causing a severe dermatitis and allergic reactions.

## 2. Case report

A 28 years old woman who lives with her parents in Azizac, a rural residential area, Babol city, Mazandaran Province, Iran, referred to a dermatology department in Babol with complaining of multiple bites in different parts of body especially back and hips by very tiny insects which were collected by her in a small container. She complained about discomfort, itching and being anxious especially at night and having uncontrolled tendency for scratching of lesions. She noted that she had been suffering for 7 d.

Typical urticarial papules with erythema concentrated on her back and hips, with the size of 3–20 mm were observed in her primary examination. And also a red hemorrhagic punctum was seen in the center of some lesions. The bites were normally multiple, often with a tendency to clustering and sometimes dispersed in a linear form (Figure 1). The number of bites was approximately 150. After inquiring she mentioned that she lives in rural area and she just enjoys having hens and roosters as a pet but stray animals particularly cat can be seen in her vicinity.



**Figure 1.** Multiple popular urticaria lesions covering the back of a 28 year old woman.

The collected tiny insects were examined precisely, the causative agent of disturbance were recognized as *C. felis* in Department of Parasitology, Islamic Azad University, Babol Branch, Iran (Figure 2). Shortly thereafter, the patient received an effective treatment by using calamine ointment two times per day, and within a week all clinical manifestations disappeared and she was free from symptoms. In addition, fleas were eliminated by spraying Simetrin and fumigating of the home, the yard, mattress and all suspected locations. In addition, in her small family, just her father had similar lesions but he did not have complaint and he did not receive any treatment.



**Figure 2.** *C. felis* (cat flea).

## 3. Discussion

Fleas are considered as a highly specialized blood sucking pest and they are equipped with advanced and specific mouth parts which can pierce their host skin in order to prepare their vital requirements. The consequences of this invasion in vulnerable people may lead to erythema, dermatitis, allergies, delayed reactions and hypersensitivity. In addition, flea saliva has a low molecular weight anticoagulant that will be responsible for subsequent reactions. After abating initial wheal, a mild urticaria will be remained shortly and it is a trace of flea activity. Concerning age, younger subjects have more sensitivity in comparison with older groups to the stings with regard to the delayed reaction and males revealed more proportion of delayed reactions to flea bites compared to females[4].

According to our literature review, a family of three members shown severe dermatitis and allergic reactions to *C. felis* bites in Golestan Province, Iran[5]. In Switzerland a couple was attacked by pigeon fleas (*Ceratophyllus columbae*) and patients had allergic urticarial reaction to the bites[6]. In another similar report a young woman was invaded repeatedly by cat flea from suburban raccoons[7]. An outbreak of human flea (*Pulex irritans*) occurred in hospital staff in UK and 13 staffs were bitten. In some cases, fleas had been found by staff on their uniform and in two subjects, all family members had been bitten at home[8]. Totally 244 cases of human infestation by flea were recorded from sixteen provinces of Iran. The most involvement were observed in animal care—men and their relatives, and their reactions to flea's bites were variable from moderate to highly sensitized and the most of lesions were on legs and ankles[9]. Environmental circumstances can influence the survival and multiplication of ectoparasites. For example, the development of flea larvae requires moderate temperatures and high relative humidity in their protected habitations. In fact, all

proper and suitable conditions are prepared in tropical and subtropical areas. Hence, dermatologists in tropical and subtropical areas should pay more attention to flea bite and human infestation, particularly differential identification between fleas bite from similar cases such as cutaneous leishmaniasis and cercarial dermatitis particularly in the beginning of their manifestations<sup>[10]</sup>.

This is noteworthy to mention that nowadays there is a high tendency among people to maintain pet animals for a wide variety of reasons such as an entertainment, companion, breeding, *etc.* which can be considered as a main source of infestation. Considering aforementioned facts, in order to prevent from infestation, fleas should be removed from pets and habitation while our surrounding and environment are infested with fleas; we should bear in mind that only elimination of fleas from animal is insufficient. Because the house and the yard can also maintain all developmental stages of the fleas which are new source for re-infestation.

In conclusion, the authors deduced that being in close contact with animal either domesticated or stray without control of their ectoparasites, particularly flea, treats human life and imposes a considerable burden. And finally we highly suggest conducting further researches on transmitted disease and human infestation complications caused by flea.

### Conflict of interest statement

We declare that we have no conflict of interest.

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### Comments

#### Background

The importance of many ectoparasite species, especially fleas, ticks, mites, and lice to human welfare cannot be neglected. The roles of fleas in the transmission of plague and murine typhus are well known. Moreover, human may be exposed to painful bites resulting in direct pathological effects, both from wild animal ectoparasites or from others more directly associated with man and domestic animals. Human infestation to ectoparasites particularly flea causes an intense allergic itching, skin infection and severe discomfort.

#### Research frontiers

Studies are being performed in order to survey the flea saliva showed that there is at least 15 proteins which are allergen. Besides, a low molecular weight anticoagulant in flea saliva can also lead to a severe reaction.

### Related reports

The report indicated four similar studies which reported human severe dermatitis caused by flea bites. In Switzerland pigeon fleas (*Ceratophyllus columbae*) was the causative agent of disturbance, in UK *Pulex irritans* invaded to hospital staff, in Iran and Netherland *C. felis* caused erythema and hypersensitivity in human.

### Innovations and breakthroughs

Despite of large quantity of insects and ectoparasites in tropical and subtropical areas, reports and studies regarding human dermatitis and discomfort are rare. And this report has showed the importance of ectoparasites and pest to human life.

### Applications

It may be significant to know about flea bite complications and also other ectoparasite particularly for pet owners, veterinarians and dermatologists. Thus, it is important to prevent and control this pest owing to their remarkable socioeconomic burden.

### Peer review

This is a good report in which the authors try to describe a case of dermatitis, hypersensitivity and severe discomfort caused by flea bites. The report is interesting and informs our colleagues about the presence of flea and their probable public health concern.

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