Epidemiology and clinical presentation of dogs infected with sarcoptic mange

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Abstract

Sarcoptic mange in dog is a common parasitic dermatitis, especially in non-controlled, stray dogs that develop evocative clinical signs. The present study includes 48 dogs, with different backgrounds, both privately owned and dogs from shelters. We searched for predisposing factors for contacting sarcoptic mange, such as: age, sex, breed, source of contamination. Their age ranged from 1.15 months to 12 years (with more than a half being under 1 year old), they were mostly common or cross-breed dogs, and the sex ratio was almost equal, with 25 females and 23 males. All dogs were naturally infected with Sarcoptes scabiei, as confirmed by identification on the microscope of skin scrapings from different body areas. Furthermore, we aimed to have a general idea concerning the severity of infection with Sarcoptes scabiei in the dogs we studied. The dogs received a clinical score based on the evaluation of typical signs that appear in sarcoptic mange such as alopecia, erythema, scales/crusts and the extent of mange on the cutaneous surface on different body parts (head, trunk, legs, tail). The most affected body part was the head, followed by the trunk and the most scored sign was the extent of affected skin and alopecia. The treatment consisted in the administration of either afoxolaner (Nexgard®), twice at a monthly interval (2.7-6.9 mg/kg), either sarolaner (Simparica®), twice at a monthly interval (2-4 mg/kg), or doramectin (Dectomax®) 0.2 mg/kg, twice at 14 days interval.

***Key words**: clinical signs of mange, predisposing factors of mange, Sarcoptes scabiei*

Introduction

Canine sarcoptic mange is an unseasonal, highly contagious and pruritic dermatitis that affects domestic and wild canids, and rarely cats (Scott et al., 1995).

The disease is caused by the burrowing mite *Sarcoptes scabiei var. canis*. The zoonotic aspect is quite important, as direct contact with an infected dog can cause a mild irritation of the skin in humans, accompanied by pruritus. However, the disease is self-limiting, which means that the mites cannot reproduce in human skin and would eventually die (Mounsey and Walton, 2001). Mange is often a problem in shelters or in big communities of animals, where dogs are closely in contact with each other and disinfection is not done properly. However, there are cases of infection with *S. scabiei* mites in privately-owned dogs, the contamination occurring by direct contact with an infected animal (dog or fox) or through fomites. Young dogs, of less than 2 years, are usually more affected, with no predisposition of sex (Bourdeau et al., 2004; Feather et al., 2010).

The clinical presentation of scabies in dogs includes intense pruritus, alopecia, erythema, yellowish crusts and papules on the skin. The typical affected regions of the body are the periocular area, the ear pinnae, the hooks, the elbows, but it can easily take over all the body (Arlian et al., 1995).

The diagnosis is established based on the microscopic identification of adults, larvae, eggs or feces of *S. scabiei* in skin scrapings from multiple areas that present lesions. However, the number of mites found is usually very low, which makes diagnosis difficult (Griffin, 1993).

Treatment for sarcoptic mange in dogs includes the following molecules, authorized in the European Union: imidacloprid/moxidectin (spot-on), selamectin (spot-on), sarolaner (tablet) and the newly approved afoxolaner and afoxolaner/milbemycin oxime (tablet). However, other systemic molecules can be used off-label, as proven effective against *S. scabiei*, such as: ivermectin (Paradis, 1998), doramectin, milbemycin oxime (Miller et al., 1996), moxidectin (Wagner et al., 2000) or fluralaner (Romero et al., 2016; Taenzler et al., 2016).

The aim of our study was to identify the predisposing factors that make some dogs contact the disease more easily, as little is known regarding this topic. These factors include age, sex, breed, source of contamination with mange, background of the animal. Furthermore, we aimed to make a general evaluation of the degree of intensity of the clinical signs caused by sarcoptic mange in dogs.

Materials and methods

The dogs included in the study presented typical clinical signs of mange (pruritus, crusts, alopecia), confirmed by positive skin scrapings (identification of *S. scabiei*).

The history of the dog was recorded through a questionnaire addressed to the owner. The fields included the presentation of the animal, the breed, the sex, the age, if there were other in contact animals (especially dogs), if cutaneous problems appeared in the owner or in other members of the house.

For the direct examination and identification of *S. scabiei,* samples were collected through deep skin scrapings from different body sites presenting lesions evocative of sarcoptic mange (alopecia, crusts and scales). An area of approximately 4 cm^2, from different body sites was scraped with a scalpel until capillary bleeding appeared. The skin scrapings were then put on a slide with lactophenol or mineral oil, macerated and spread in the liquid, then covered with a coverslip and examined with the 10X objective of the microscope.

Adults and nymphs of *S. scabiei* were identified based on morphological aspects (size, oval shaped, short legs, dorsal part with thorns and spines and ventral part with epimers). Larvae were identified based on their number of 6 legs and resemblance to adult mites, and eggs were identified by size and shape.

As far as the clinical examination is concerned, at the beginning of the study, all dogs received a general health evaluation.

Furthermore, for the dermatological examination, an original clinical score adapted for dogs, but initially designed for pigs infected with *S.scabiei* was used (Bernigaud et al., 2016). The score included the evaluation of the skin areas affected by mange, alopecia degree, intensity of the skin erythema and crusting/scales intensity, on different parts of the body (head, trunk, legs and tail). The grades per sign were from 0 to 4, with 4 being the most severe, which resulted in a total clinical score between 0 and 60. The score was assessed at the first visit.

The treatment protocol for the dogs included in this study was made with three specific acaricid product demonstrated to be efficient against *S. scabiei* infection.

Three acaricid molecules were used: afoxolaner (Nexgard®) administered twice at a monthly interval (2.7-6.9 mg/kg), or sarolaner (Simparica®) administered twice at a monthly interval (2-4 mg/kg), or doramectin (Dectomax®) 0.2 mg/kg administered twice at 14 days interval. The only authorized product in the E.U. (from the products mentioned above) for the treatment of

sarcoptic mange in dogs at that period of time, was sarolaner (Simparica®). The owners were informed and agreed to the treatment protocol. The follow up of the dog was scheduled every two weeks for the doramectin treated dogs, over a period of one month. For the dogs treated with sarolaner or afoxolaner it was scheduled every month for a period of two months.

Results

This study included 48 dogs (A1-A48), which were examined between 2016 and 2019-27 were examined during consultation in the Parasitology Clinic of the Faculty of Veterinary Medicine of Iaşi and 21 were examined in private households (14 from Vaslui County) or shelters (7).

They were mostly common or crossbreed dogs (n=39, 81.25%). Few were from the following breeds: Boxer (a mother with her 7 puppies), Bull Terrier (1) and Poodle (1). Their age ranged between 1.15 month old and 12 years old, with more than half of them (n=28, 58.33%) being under 1 year. Finally, the individuals included represented almost equally both sexes, with 23 males (48% of the total) and 25 females (52% of the total).

Concerning the history of the dogs, a great number were stray dogs which were in shelters or in foster families (n=21, 43.7%), resulting in the fact that the information we had about them was limited. We also studied households that had multiple dogs.

Regarding the source of scabies, it is largely unknown, since a big number of animals were former stray dogs. However, in one case, the owner noticed the lesions on the dog's skin soon after a fox with skin lesions had wandered through their yard.

We also included 7 dogs (14.5% from the total number) that belonged to the shelters.

The zoonotic transmission of the disease was reported in only one dog, that had the most severe lesions and that was hospitalized in our clinic. The infection occurred in one of the clinical staff that manipulated the dog during the treatment, and manifested through pruritus and papules on the arm and forearm.

The skin scrapings examined through direct examination were positive for *S. scabiei* adults, larvae or eggs. However, we observed very few parasitic elements in the samples collected.

The clinical sign observed more frequently was the extent of scabies affected skin, followed closely by alopecia (Figure 1), then scales/crusts (Figure 2&3) and finally, the least observed, erythema (Figure 4).

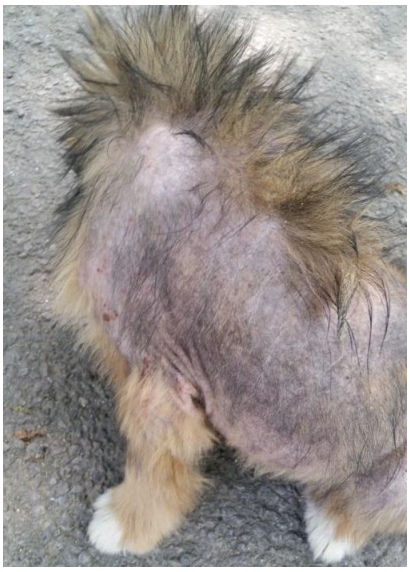

Figure 1- Clinical picture-alopecia in dog

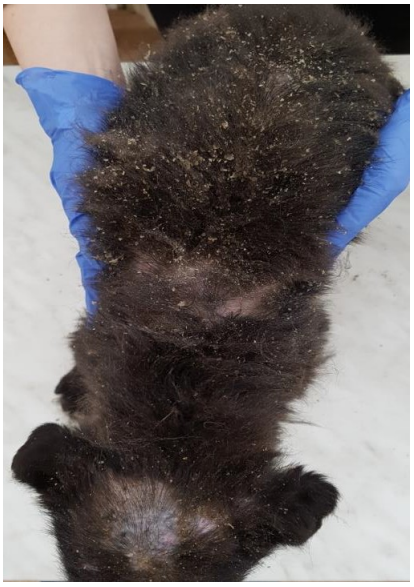

Figure 2- Clinical picture-scales in dog

Figure 3- Clinical picture-thick crusts in dog

Figure 4-Clinical picture- extent of scabies affected skin and erythema

The clinical scores of the 48 dogs varied between a minimum of 4 and a maximum of 58, taking into consideration that the maximum score which could be obtained was 60 (Figure 5). This is a clear illustration of the fact that the dogs we studied had from very discrete lesions to serious, extended lesions all over the body (Figure 7).

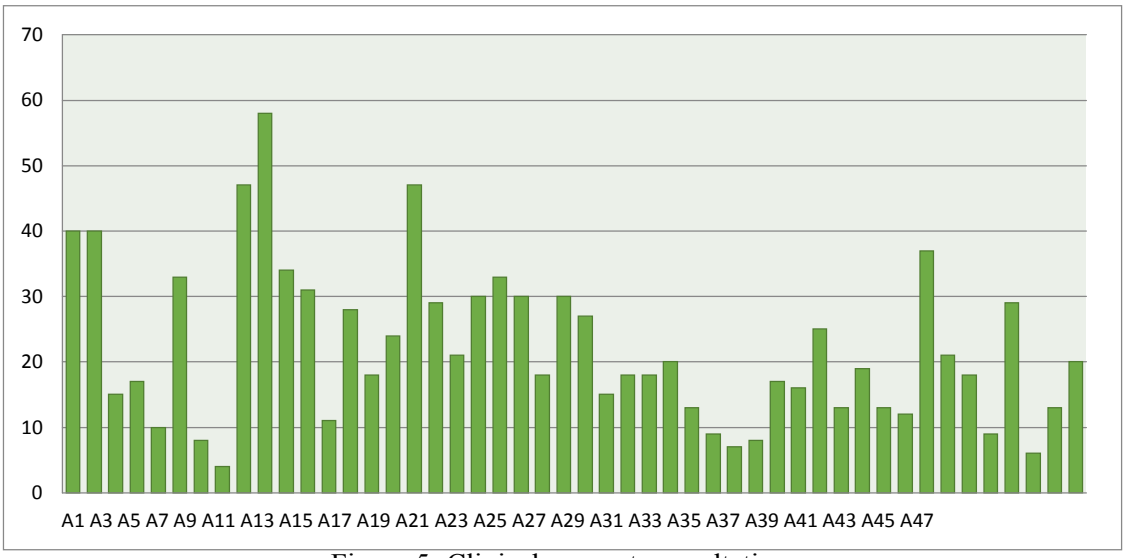

Figure 5- Clinical score at consultation

Another representation of the clinical score range is showed in Figure 6. We can observe that the males studied reached a higher clinical score, mainly because of the dog A10. Also, the females start from a lower score than the males.

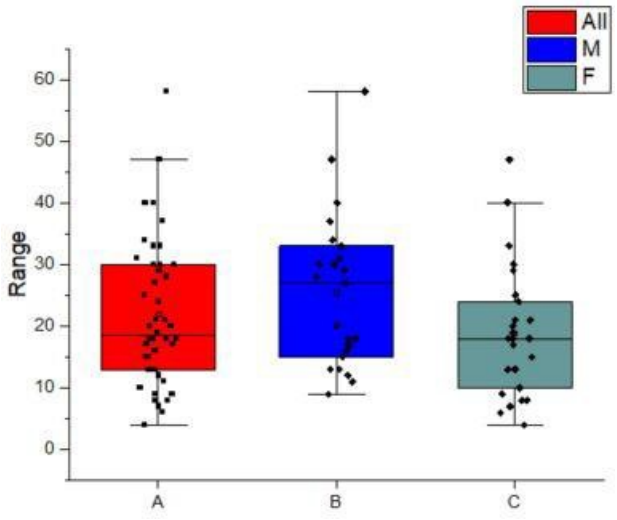

Figure 6-General clinical score representation, and representation per sex

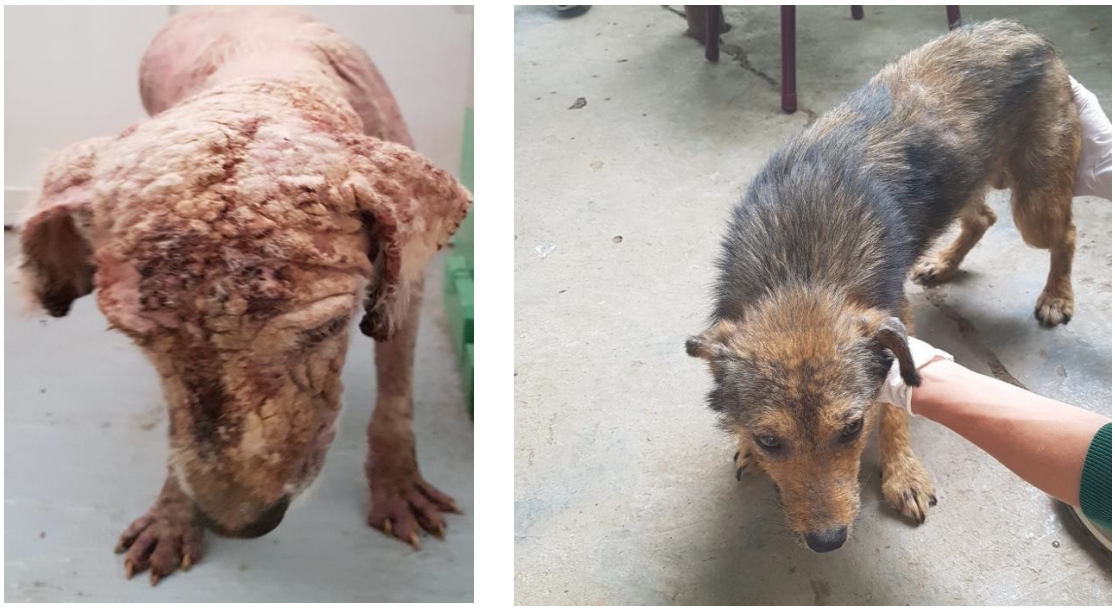

Figure 7 - Different clinical presentation of sarcoptic mange: left severely affected dog, right mild lesions on the ears

Regarding correct administration and follow-up of the treatment, only 16 dogs respected the requirements stated

Discussion

The number of dogs included in this study was 48, which is similar to the epidemiological study Feather et al. conducted in dogs in 2010, where they investigated retrospectively 42 dogs.

Regarding the diagnosis of *S. scabiei* infection, the confirmation resides in the positivity of the skin scraping, which shows different life stages of the mite, or its feces. However, the problem resides in the low number of mites generally observed in the samples (Miller et al., 2012). Different types of PCR tests can be performed to confirm the mite infection (Angelone-Alasaad et al., 2015), but their cost are high.

The techniques used to evaluate the clinical score, were similar to those used in other studies, and included evaluation of alopecia, inflammation (erythema), crusts and scales. The score we used in the study had, however, an original feature in evaluating the extent of the scabies affected skin. A negative aspect of our study was that we could not include a pruritus score, pruritus being a constant clinical sign in the evolution of sarcoptic mange in dog (Becskei et al., 2016; Beugnet et al., 2016; Romero et al., 2016; Taenzler et al., 2016; Hampel et al., 2018).

As far as the treatment protocol is concerned, it included only one authorized molecule at that time for the treatment of sarcoptic mange in dogs, sarolaner. The reason why we did not choose this treatment for all animals and decided to use also doramectin was mainly because of economic reasons. Since most dogs were stray dogs, the persons taking care of them could only afford a limited sum of money for the treatment. As for the afoxolaner, we could offer some of the tablets for free.

Contacting sarcoptic mange is influenced by predisposing factors, which are important for the diagnosis and control of the disease. In our study we analyzed age and sex.

Firstly, we observed that age is the most recurrent variable that seems to group around young dogs. The percentage of dogs less than one year examined was 58.3%, which is similar to the findings published in other studies (Feather et al., 2010; Chen et al., 2014).

The gender distribution had no particular value, since males represented 48% of the studied population and females slightly more with 52% of the population. This finding is consistent to other studies that state that sex was not a predisposing factor for contacting sarcoptic mange (Curtis and Paradis., 2003; Feather et al., 2010).

Breed could not be interpreted in our study, since most dogs were common or crossbreeds.

Regarding the source of contamination, we observed that contact with foxes could explain infection with *S. scabiei* mites, as we reported in the Boxer household, aspect observed also in 2010 by Feather et al.

On the frequency of the signs observed, alopecia, crusts and scales had the highest values, aspect that we also observed (Feather et. al., 2010; Becskei et al., 2016; Beugnet et al., 2016; Taenzler et al., 2016).

Regarding the most affected body site of the dog, we found it was the head, especially the ears, which corresponds to the classic clinical signs which define the infection with *S. scabiei* (Kennis, 2004; Feather et al., 2010; Miller et al., 2012)

In conclusion, our study supports the findings of previous research papers in the field, including predisposing factors of contacting mange, the source of contamination, and ads an original clinical score by evaluating the different characteristic signs that appear in mange, offering a general image of the situation of dogs with sarcoptic mange from Moldova region.

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