

Characteristics of the course of acaroses in dogs caused by parasitism of acariform ticks

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Among the most common skin diseases in dogs are acaroses caused by acariform mites such as sarcoptosis, otodectosis and demodocosis. These are zoonotic diseases of dogs caused by ticks of the genus *Sarcoptes*, *Otodectes* and *Demodex*. The spectrum of clinical signs in these acaroses varies from itching and local skin lesions to intoxication and depression of the central nervous system. Animals can be carriers without clinical signs. The main transmission of causative agents of acaroses occurs more often during direct contact with sick animals. The purpose of the research was to establish the peculiarities of the course of sarcoptosis, otodectosis and demodocosis in dogs as part of mixtinvasions of the digestive tract. The conducted research established that on the territory of Poltava, the extensity of invasion of dogs by the causative agent of demodocosis is 18.6 %, sarcoptosis – 10.5 %, otodectosis – 24.4 %. It was found that in 53.5 % of patients with acaroses in dogs, their course took place in the form of mixtinvasions together with causative agents of nematodes and cestodes of the digestive tract of dogs. 55.6 % of dogs were diagnosed with otodectotic monoinvasion, 33.3 % with sarcoptotic monoinvasion, and 11.1 % with demodocotic monoinvasion. In dogs infested with sarcoptes, otodectes, and demodexes, mixtinvasions took place in the form of two-component (67.9 % of mixtinvasions) and three-component (32.1 % of mixtinvasions) associations of parasites. A total of 11 types of mixtinvasions were identified, of which 6 types were two-component and 5 types were three-component. Co-members of demodexes, otodectes and sarcoptes were causative agents of trichurosis (50.0 % of mixtinvasions), uncinariosis (39.3 % of mixtinvasions), toxocarosis (39.3 % of mixtinvasions), and dipylidiosis (3.6 %). Otodecto-toxocarous (31.6 % of mixtinvasions), otodecto-trichurous (21.1 % of mixtinvasions) and demodecto-uncinarious (21.1 % of mixtinvasions) were most often detected among the two-component mixtinvasions. Demodecto-uncinaria-trichurous (33.4 %), demodecto-uncinaria-toxocarous (22.2 %) and demodecto-trichurous-toxocarous (22.2 %) were most often found among three-component mixtinvasions. The obtained data make it possible to take into account the peculiarities of the course of acaroses of dogs caused by acariform mites, as part of helminthiasis of the digestive tract of dogs in order to increase the effectiveness of treatment and preventive measures.

Keywords: parasitology, dogs, sarcoptosis, otodectosis, demodocosis, mixtinvasions, features of the course.

Особливості перебігу акарозів у собак, викликаних паразитуванням акариформних кліщів

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Одними з найпоширеніших шкірних захворювань у собак є акарози, викликані акариформними кліщами, таким як саркоптоз, отодектоз та демодекоз. Це зоонозні захворювання собак, що викликається кліщами роду *Sarcoptes*, *Otodectes* та *Demodex*. Спектр клінічних ознак при цих акарозах варіює від свербіжів та локальних уражень шкіри до інтоксикації та пригнічення центральної нервової системи. Тварини можуть бути носіями без клінічних ознак. Основна передача збудників акарозів частіше відбувається при прямому контакті з хворими тваринами. Метою досліджень було встановити особливості перебігу саркоптозу, отодектозу та демодекозу собак у складі мікстинвазій травного тракту. Проведеними дослідженнями встановлено, що на території м. Полтава екстенсивність інвазії собак збудником демодекозу становить 18,6 %, саркоптозу – 10,5 %, отодектозу – 24,4 %. Виявлено, що у 53,5 % хворих на акарози собак їх перебіг відбувався у вигляді мікстинвазій разом зі збудниками нематодозів та цестодозів травного тракту собак. У 55,6 % собак встановлено отодектозну моноінвазію, у 33,3 % – саркоптозну моноінвазію, 11,1 % – демодекозну моноінвазію. У собак інвазованих саркоптесами, отодектесами та демодексами мікстинвазії перебігали у вигляді двокомпонентних (67,9 % від мікстинвазій) та трикомпонентних (32,1 % від мікстинвазій) асоціацій паразитів. Всього виявлено 11 різновидів мікстинвазій, з яких 6 різновидів були двокомпонентними та 5 різновидів – трикомпонентними. Співчленами демодексів, отодектесів та саркоптесів були збудники трихуриозу (50,0 % від мікстинвазій), унцинаріозу (39,3 % від мікстинвазій), токсозу (39,3 % від мікстинвазій) та дипілідіозу (3,6 %). Найчастіше з двокомпонентних мікстинвазій виявляли отодектозно-токсокарозну (31,6 % від мікстинвазій), отодектозно-трихуриозну (21,1 % від мікстинвазій) та демодекозно-унцинаріозну (21,1 % від мікстинвазій). Найчастіше з трикомпонентних мікстинвазій виявляли демодекозно-унцинаріозно-трихуриозну (33,4 %), демодекозно-унцинаріозно-токсокарозну (22,2 %) та демодекозно-трихуриозно-токсокарозну (22,2 %). Отримані дані дозволяють враховувати особливості перебігу акарозів собак, викликаних акариформними кліщами, у складі гельмінтозів травного тракту собак з метою підвищення ефективності проведення лікувальних та профілактичних заходів.

Ключові слова: паразитологія, собаки, саркоптоз, отодектоз, демодекоз, мікстинвазії, особливості перебігу.**Бібліографічний опис для цитування:** Євстаф'єва В. О., Плахотна Є. В., Мельничук В. В., Юськів І. Д., Корчан Л. М., Канівець Н. С., Слинко В. Г. Особливості перебігу акарозів у собак, викликаних паразитуванням акариформних кліщів. *Scientific Progress & Innovations*. 2024. № 27 (4). С. 115–119.

Introduction

Acaroses, caused by acariform mites, is distributed throughout the world and can parasitize many species of animals, as well as humans. More than 30,000 species of acariform mites causing dermatopathies have been described in the Canidae family, namely *Sarcoptes scabiei*, *Otodectes cynotis*, *Demodex canis* [1–4]. Dermatopathies of parasitic origin in small animals are the most common in most countries of the world, characterized by high contagiousness [5].

Since the skin is the most vulnerable organ, the clinical manifestations of acaroses can be moderate or severe and are characterized by inflammation, erythema, intense itching, the appearance of scabs, hair loss, and the formation of alopecia [6]. When parasitized by ticks of the genus *Demodex*, the pathogen can be transmitted after the birth of puppies through direct contact with the sick mother [7].

Scientists note that in order to achieve a better understanding of the epizootic process of acaroses caused by acariform mites, it is necessary to know the factors that can contribute to the transmission of parasites, their reproduction and preservation in the biotope [8].

Ticks of the species *Sarcoptes scabiei var canis* are the causative agent of sarcoptosis, which can infect humans and animals. The parasite penetrates deep into the epidermis, causing intense itching, inflammation, and in some cases a violation of the skin barrier, and in weakened young animals - to death. Sarcoptosis has been found in at least 12 orders, 39 families, and 148 species of domestic and wild mammals, making it one of the most important ectoparasites in recent decades [9–13].

The tick species *Otodectes cynotis* is distributed throughout the world, highly contagious among dogs, especially among young dogs, as older animals can become immune to this parasite. The cat is a natural reservoir of the tick and functions as a source of infestation for dogs and other animals. This parasite feeds on the remnants of the epithelium and tissue fluids on the surface of the external auditory canal and the adjacent skin, causing severe irritation and, as a result, otitis externa [14, 15].

Demodex canis mites are localized in hair follicles, sweat and sebaceous glands of a significant number of animals, as well as humans. Demodecosis is not

considered contagious between healthy animals after the neonatal period. This was proven when dogs with generalized demodiosis and healthy dogs were kept together. *D. canis* is present in small numbers as a commensal on the skin and in the ear canal of 30–80 % of healthy dogs, but only a few develop disease. Thus, demodiosis is the result of excessive reproduction of mites on the skin of dogs [16–20].

The aim of the study

The purpose of the research was to establish the peculiarities of the course of sarcoptosis, otodectosis and demodiosis in dogs as part of mixtinvasions of the digestive tract.

Materials and methods

The research was conducted during 2024 in the conditions of the veterinary clinic "VetHelp" (Poltava) and on the basis of the Laboratory of Parasitology of the Poltava State Agrarian University.

Acarological studies of skin scrapings were performed using a well-known method [21]. In order to identify co-members of mixtinvasions in dogs infected with the causative agent of acaroses, fecal helminthoscopy was performed using the flotation method [22].

A total of 86 dogs with clinical signs of skin lesions were examined. In the process of epizootic examination of animals, the main indicator of damage to dogs was the extent of infestation (EI, %).

Results and discussion

The conducted research established that on the territory of Poltava, the extensity of invasion of dogs by the causative agent of demodiosis is 18.6 %, sarcoptosis – 10.5 %, otodectosis – 24.4 %. It was found that in 53.5 % of patients with acaroses in dogs, their course took place in the form of mixtinvasions (**Fig. 1 a**) together with causative agents of nematodoses and cestodoses of the digestive tract of dogs. 55.6 % of dogs were diagnosed with otodectic monoinvasion, 33.3 % with sarcoptic monoinvasion, and 11.1 % with demodectic monoinvasion (**Fig. 1 b**).

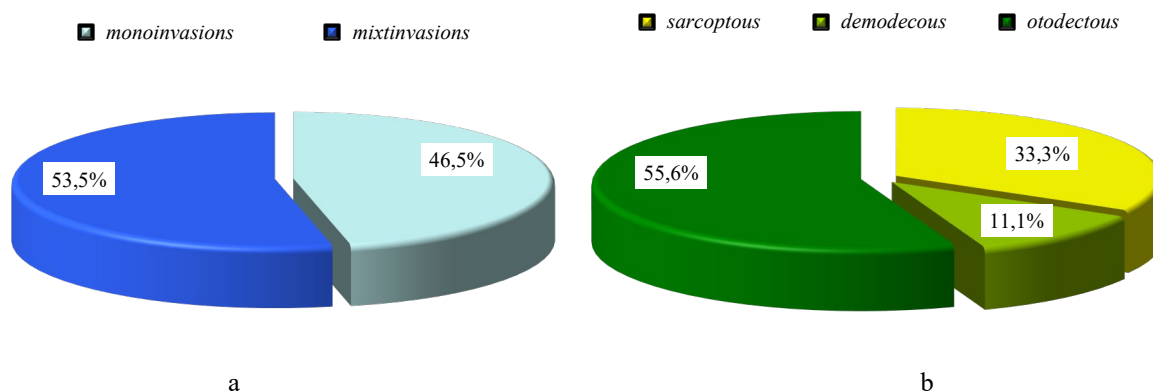


Fig. 1. Forms of the course of acarosis in dogs:

a – percentage ratio of mixtinvasions and acarous monoinvasions, *b* – percentage ratio of detected monoinvasions

In dogs, mixtinvasions were represented by two-component (67.9 % of mixed infestations) and three-component (32.1 %) associations of sarcoptes, otodectes and demodexes and helminths localized in the digestive tract of animals (Fig. 2).

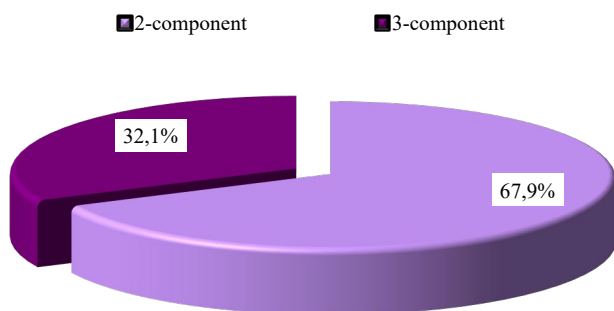


Fig. 2. Types of multicomponent mixtinvasions with acaroses

A total of 11 types of mixtinvasions were identified, of which 6 types were two-component and 5 types were three-component. Otodecto-toxocarous (31.6 % of mixtinvacions), otodecto-trichurous (21.1 %) and demodecto-uncinarious (21.1 %) were detected most often from two-component mixtinvasions. Sarcopto-uncinarious (10.5 %), demodecto-trichurous (10.5 %) and sarcopto-trichurous (5.2 %) mixtinvasions were detected less frequently (Fig. 3).

Demodecto-uncinario-trichurous (33.4 % of mixtinvasions), demodecto-uncinario-toxocarous (22.2 %) and demodecto-trichuro-toxocarous (22.2 %) were most often found among the three-component mixtinvasions. A smaller share was otodecto-trichuro-toxocarous (11.1 %) and demodecto-trichuro-dipylidiosis (11.1 %) mixtinvasions (Fig. 4).

Nematodes of the species *Trichuris vulpis* (50.0 % of mixtinvasions), *Uncinaria stenocephala* (39.3 % of mixtinvasions), *Toxocara canis* (39.3 % of mixtinvasions) and cestodes of the *Dypilidium caninum* species (3.6 % of mixtinvasions) (Fig. 5).

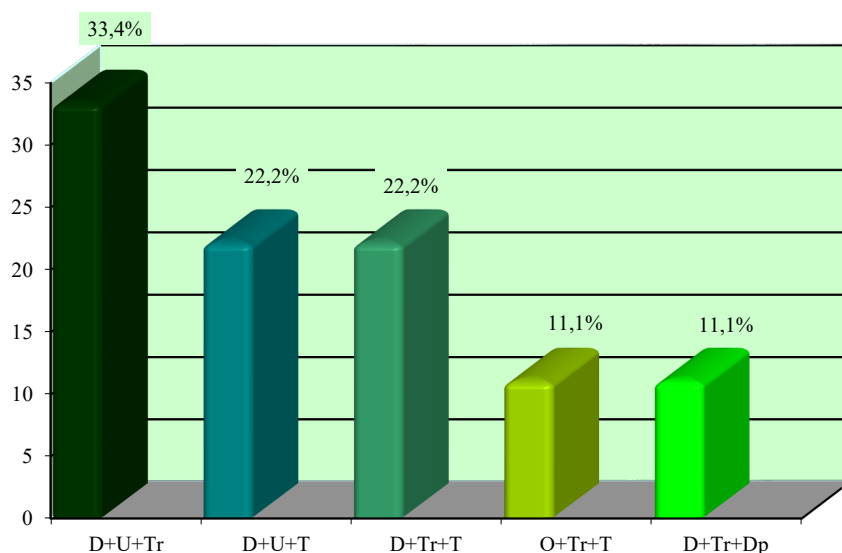


Fig. 4. Three-component mixtinvasions for acaroses of dogs:

S – sarcoptosis, O – otodectosis, D – demodectosis, Tr – trichurosis, T – toxocarosis, U – uncinariosis, Dp – dipylidiosis

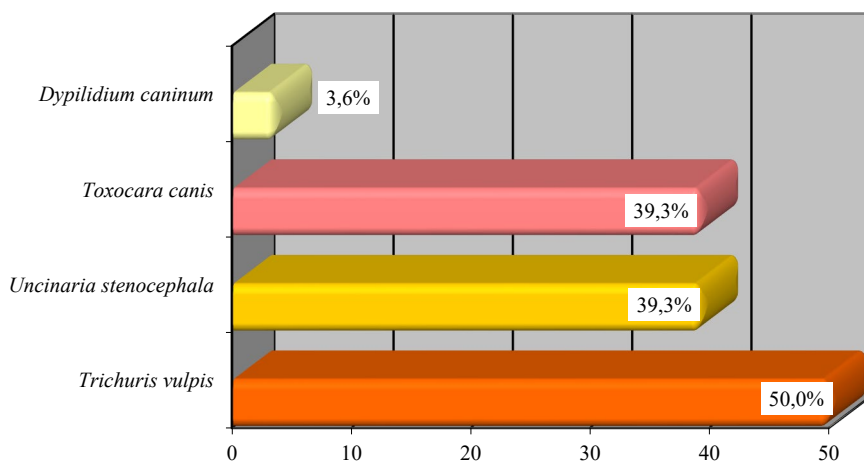


Fig. 5. Types of mixtinvasions due to acaroses of dogs

According to literature data, sarcoptosis, demodectosis, and otodectosis are common acarotic infestations in many countries of the world and are a frequent cause of dermatological diseases in many species of animals, as well as in humans [1–4]. The conducted studies established that in the territory of Poltava, the extent of infestation of dogs by the causative agent of demodectosis is 18.6 %, sarcoptosis – 10.5 %, otodectosis – 24.4 %. It was found that in 53.5 % of patients with acaroses in dogs, their course took place in the form of mixtinvasions together with causative agents of nematodes and cestodes of the digestive tract of dogs. 55.6 % of dogs were diagnosed with otodectous monoinvasion, 33.3 % with sarcoptous monoinvasion, and 11.1 % with demodectous monoinvasion. In dogs infested with sarcoptes, otodectes, and demodexes, mixtinvasions took place in the form of two-component (67.9 % of mixtinvasions) and three-component (32.1 % of mixtinvasions) parasite associations. A total of 11 types of mixtinvasions were identified, of which 6 types were two-component and 5 types were three-component. Co-members of demodexes, otodectes and sarcoptes were causative agents of trichuriasis (50.0 % of mixtinvasions), uncinariosis (39.3 % of mixtinvasions), toxocarosis (39.3 % of mixtinvasions), and dipylidiosis (3.6 %).

There are reports where sarcoptosis in dogs occurred as a mixtinvasions by two or three types of ectoparasites [23]. Scientists also note the associative course of the causative agent of otodectosis in cats together with the nematodes *Toxocara cati* (23.5 %) and cestodes *Dypilidium caninum* (17.6 %), and in dogs – together with the nematodes *Trichuris vulpis* (27.7 %) and *Toxocara canis* (21.3 %), *Uncinaria stenocephala* (12.8 %) and *Dypilidium caninum* cestodes (8.5 %) [24].

The obtained data make it possible to take into account the peculiarities of the course of acaroses of dogs caused by acariform mites, as part of helminthiasis of the digestive tract of dogs in order to increase the effectiveness of treatment and preventive measures.

Conclusions

It has been established that acaroses of dogs caused by acariform mites is a common infestation in the territory of the city Poltava, where the extent of demodectous invasion is 18.6 %, sarcoptous mange – 10.5 %, otodectous – 24.4%. Acaroses in dogs mainly occurred in the form of mixtinvasions (53.5 %) together with nematodes and cestodes parasitizing in the digestive tract of animals. A total of 11 types of mixtinvasions were identified, of which 6 types were two-component and 5 types were three-component. Co-members of *Sarcoptes scabiei*, *Otodectes cynotis*, *Demodex canis* were nematodes of the species *Trichuris vulpis* (50.0 %), *Uncinaria stenocephala* (39.3 %), *Toxocara canis* (39.3 %) and cestodes of the species *Dypilidium caninum* (3.6 %).

Conflict of interest








The authors state that there is no conflict of interest.

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