

Research on the Etiology of Skin Diseases in Laboratory Animals
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Abstract. The objective of this study was to establish dermatological diseases etiology in laboratory animals. Were examined clinically and dermatologically a number of 403 rodents of different ages and sexes, respectively 173 guinea pigs (*Cavia porcellus*), 120 rabbits (*Orytolagus cuniculus*), 80 rats (*Rattus norvegicus*) and 30 mice (*Mus musculus*). Dermatological diseases identified in guinea pigs were represented by malophagosis (*Gliricola porcelli* in 111/173 - 64,16%), listrophorosis (*Chirodiscoides caviae* in 111/173 - 64,16%), demodicosis (*Demodex caviae* in 2/173 - 1,15%) and trichophytosis (*Trichophyton mentagrophytes* in 3/173 - 1,73%). Rats were infected only with *Notoedres muris* (56/80 respectively 70%). In rabbits was diagnosed (*Psoroptes cuniculi* in 7/120 - 5,83%), listrophorosis (*Listrophorus gibbus* in 2/120 - 1,66%) and cheyletiellosis (*Cheyletiella parasitovorax* in 2/120 - 1,66%). In mice have evolved associated infestations with *Mycoptes musculinus* (20/30 - 66,66%), *Myobia musculi* (12/30 - 40%) and *Chirodiscoides caviae* (3/30 - 10%). *Chirodiscoides caviae*, mite with specific parasitism in guinea pig, has been isolated from mice with skin lesions. Were recorded two zoonotic diseases: trichophytosis and cheyletiellosis.

Keywords: laboratory animals, ectoparasites, dermatophytes, prevalence

INTRODUCTION

Of laboratory animals, most used for experimental studies are rodents. This is due to prolificity and high adaptability to laboratory conditions, reduced maintained costs, to the easyness through which the guinea pigs can be approach and due to the resemblance with human reactivity in contracting diseases (Baker, 1998).

These animals may be infected or infested with various ectoparasites or mycetes. The importance of their knowledge, lies primarily of economic losses due mortality and because the results of experiments performed on these animals depend largely on their health. Further, some of these ectoparasitosis (sarcoptic mange, cheyletiellosis, *Ornithonyssus bursa* mite, infestations with fleas) and dermatophytosis are zoonotic diseases and some ectoparasites are vectors for different bacteria or viruses (for example, rats flea *Xenopsylla cheopsis*, is usually vector for pest virus in Asia, Africa and both american continents, transmitting in the same time both murine typhus and wildfire).

The objectiv of this study was to establish the prevalence of dermatological diseases with parasitic or mycotic etiology in laboratory rodents from biobasis.

MATERIALS AND METHODS

The study was conducted on a number of 403 rodents of different ages and sexes, respectively 173 guinea pigs, 120 rabbits, 30 mice and 80 rats, belonging to some biobasis.

Dermatological examination of all rodents was made, recording macroscopic skin lesions and their topography.

Animals without lesions were examined by inspection, and for those who had only pruritus was used scotch tape technique. From animals that had skin lesions (alopecia, scales, crusts) were performed deep scrappings with a scalpel blade. Pathological material collected by skin scraping was spread onto a slide and clarified with lactofenol. The etiological diagnosis was based on the morphological characteristics of the identified parasites, after Cosoroabă (2000).

Dermatophytosis diagnosis was based on highlighting of arthrospores or hyphae in crusts or hairs. To identify the dermatophytes species involved, pathological material (crusts, scales, hairs) was sown on Sabouraud agar with addition of chloramphenicol (0,5g/l). Their incubation was made at 27°C, for three weeks. Developed colonies were macroscopic and microscopic assessed.

To determine statistical differences regarding the prevalence of diseases depending on the age and sex recorded data were processed by the test Chi-square with the program EpiInfo.

RESULTS AND DISCUSSION

Dermatological diseases identified in the four species of laboratory animals and their prevalence are presented in Tab. 1. Most diseases reported had parasitic etiology, only exception has been made in guinea pigs where in a small number established diagnosis was by mycotic nature. Parasitic etiology is represented in Fig. 1.

Cavia porcellus (guinea pig)

Of the 173 guinea pigs examined, 69.9% (121/173) had dermatological problems, expressed in skin lesions (28/173- 16.2%) or by pruritus. In guinea pigs pruritus and/or skin lesions presence indicates most frequently the evolution of dermatophytosis or ectoparasites infestations (Baker, 1998).

In laboratory examinations performed in guinea pigs we identified three species of ectoparasites (*Gliricola porcelli*, *Chirodiscoides caviae*, *Demodex caviae*) and the dermatophyte

T. mentagrophytes. The prevalence of these diseases according to age and sex is showed in Tab. 2.

In 111 guinea pigs (64,16%) microscopic examination of collected samples revealed an associated infestation with *Gliricola porcelli* (Mallophaga: Gyropidae) and with *Chirodiscoides caviae* mite (Astigmata: Atopomelidae).

On inspection, these animals showed anxiety, pruritus and lack of appetite. On dermatological examination were easily identified yellowish-white lice and we observed the presence of large areas of alopecia, crusts and erosions located in dorso-lumbar region.

Tab. 1

Etiology and prevalence of skin diseases in studied laboratory animals

Species	Identified parasite	No. examined	No. positive (%)	No. of animals with lesions n (%)
<i>Cavia porcellus</i> (Guinea pig)	<i>Gliricola porcelli</i> ***	173	111 (64,16%)	28 (16,2%)
	<i>Chirodiscoides caviae</i> ***		111 (64,16%)	
	<i>Demodex caviae</i>		2 (1,15%)	
	<i>Trichophyton mentagrophytes</i>		3 (1,73%)	
<i>Rattus norvegicus</i> (White rat)	<i>Notoedres muris</i>	80	56 (70%)	56 (70%)
<i>Orytolagus cuniculus</i> (Rabbit)	<i>Psoroptes cuniculi</i> ***	120	7 (5,83%)	7 (5,83%)
	<i>Listrophorus gibbus</i>		2 (1,66%)	2 (1,66%)
	<i>Cheiletiella parasitovorax</i>		2 (1,66%)	2 (1,66%)
<i>Mus musculus</i> (White mouse)	<i>Myobia musculi</i>	30	12 (40%)	22 (73,33%)
	<i>Myocoptes musculinus</i> ***		20 (66,66%)	
	<i>Chirodiscoides caviae</i>		3 (10%)	

Legend: *** $p < 0,0001$

Tab. 2

The prevalence of skin diseases in guinea pigs (*Cavia porcellus*) according to age and sex

Identified etiological agent	Age group			
	Youth (n=67)	Adults		
		F n=49	M (n=57)	Total adults (n=106)
<i>Gliricola porcelli</i> n (%)	60 (89.6)***	39 (79.6)***	12 (21.1)	51 (48.1)
<i>Chirodiscoides caviae</i> n (%)	60 (89.6)***	39 (79.6)***	12 (21.1)	51 (48.1)
<i>Demodex caviae</i> n (%)	2 (3)	0	0	0
<i>T. mentagrophytes</i> n (%)	0	0	3 (5.3)	3 (2.8)
Total infected guinea pigs n (%)	62 (92.5)***	39 (79.6)	15 (26.3)	54 (50.9)

Legend: n-number of guinea pigs; M-males; F- females; *** $p < 0,0001$

Gliricola porcelli and *Gyropus ovalis* are lice frequently isolated from guinea pigs. These ectoparasites tend to settle preferentially in the dorsal region and behind the ears. In close inspection can be identified lice as well as their eggs attached to hairs or may appeal to microscopic examination of crusts and hairs (Harvey, 1995). Most frequently infestations with lice in guinea pigs evolve asymptomatic or clinical signs are not relevant, but pruritus is always present (Harvey, 1995; Fremont and Bowman, 2003).

Chirodiscoides caviae mite is considered to have reduced pathogenity for guinea pigs, being located in the superficial layers of skin and on the hairs, mostly on their free part (Harvey, 1995). Mild infestations may develop asymptomatic but heavy infestations are always accompanied by pruritus, alopecia, erythema, crusts and itch followed by deep pyodermitis (Saleh and Ho, 1989; Fisher *et al.*, 2007).

Demodicosis is rare in guinea pigs (Scott *et al.*, 2001). In our study infestation with *Demodex caviae* was reported in two young animals. Lesions were located in the dorsal region and consisted in diffuse alopecia, erythema, papules and crusts. Pruritus was present, however with moderate intensity and probably due to secondary bacterial infections..

These three species of ectoparasites are not important for public health (Saleh and Ho, 1989).

Tricophytosis was diagnosed in 3 guinea pigs, all males. In these guinea pigs at dermatological examination were identified non-pruritic, circular, erythematous and scaly lesions, accompanied by broken hairs, located around the eyes, mouth and ears. Based on recorded results at direct and cultural examination dermatophyte identified species was *Trichophyton mentagrophytes*.

Among the species with high sensitivity to infection with dermatophytes there are guinea pigs too. In this species skin mycosis are caused by *T. mentagrophytes* and rarely by *Microsporum canis* (Van Custem and Rochette, 1992). In guinea pigs maintained in large groups infection with *T. mentagrophytes* usually evolves chronically affecting 20-30% of effective (Mircean, 2002).

T. mentagrophytes is a zoophilic dermatophyte with zoonotic character.

Ratus norvegicus (white rat)

In rats was diagnosed only one ectoparasitosis respectively notoedric mange. The prevalence of infestation with *Notedres muris* (Astigmata: Sarcoptidae) according to age and sex is shown in Tab. 3.

Tab. 3

The prevalence of infestation with *Notedres muris* in (*Rattus norvegicus*) according to age and sex

Identified parasite	Age group			
	Youth (n=40)	Adults		
		F (n=30)	M (n =10)	Total adults (n=40)
<i>Notoedres muris</i> n (%)	16 (40)	30 (100)	10 (100)	40 (100)***

Legend: n-number of rats; M-males; F- females; *** $p < 0,0001$

In 40 adult rats, (representing the entire lot) and in 16/40, from category of youth was noted pruritus and itching. Skin lesions observed at dermatological examination were represented by erythema, erosions and thick crusts located on the free margins of the pinna and on the back side of the nose. In youth lesions were extended in the dorsal region having the appearance of areas with broken hairs and at the tail presented multiple small ulcerations. In a few rats lesions from the back side of the nose were represented by cutaneous horns. Youth mortality was 100% and in adults 20% due to secondary complications.

Notoedres muris is a common ectoparasite in some rats populations from Europe, Australia, South Africa, New Zealand and U.S. and it was isolated from other species of murine and microtid rodents from Europe and South Africa and from marsupials from Australia. (Klopen and Nachman, 1990).

Şuteu and Dulceanu (2001) believes that proliferative lesions, so-called „cutaneous horns” represent one of the most frequent complication reported in rats with notoedric mange..

Orytolagus cuniculus (rabbit)

In rabbits was diagnosed auricular mange (*Psoroptes cuniculi* - 5,83%), listrophorosis (*Listrophorus gibbus* – 1,66%) and cheyletiellosis (*Cheiletiella parasitovorax* – 1,66%). The prevalence of these infections according to age and gender is presented in Tab. 4.

Tab. 4

The prevalence of skin diseases in rabbits (*Orytolagus cuniculus*) according to age and sex

Identified parasite	Age group		Sex	
	Youth (n=85)	Adults (n=35)	F (n=27)	M (n=8)
<i>Psoroptes cuniculi</i> n (%)	0	7 (20)***	0	7 (87.5)***
<i>Listrophorus gibbus</i> n (%)	0	2 (5.7)	2 (7.4)	0
<i>Cheiletiella parasitovorax</i> n (%)	0	2 (5.7)	1 (3.7)	1 (12.5)
Total infected rabbits n (%)	0	11 (31.4)***	3 (11.1)	8 (100)***

Legend: n-number of rats; M-males; F- females; *** $p < 0.0001$

The 7 rabbits (males) diagnosed with psoroptic mange presented at the level of the external auditory canals (unilaterally) reduced quantities of brown crusts adherent to the epidermis. The given clinical diagnosis was external crusted otitis..

The ear mite *Psoroptes cuniculi* is a common parasite in rabbits worldwide. Rabbits manifest this disease in a usual form of external crusted otitis, more rarely than medium otitis with nervous signs. Lesions may extend even to the neck and front limbs, to ventral abdominal region and at the basis of the tail (Harvey, 1995; Fisher *et al.*, 2007).

Listrophosis and cheyletiellosis were registered in the case of two adult animals however the lesional aspects and the topography lesions were identical. These animals presented pruritus, diffuse alopecia, erythema and crusts in the dorsal area and on the ventral part of the abdomen.

From the ectoparasites registered in rabbits, only cheyletiellosis presents a zoonotic character.

***Mus musculus* (white mouse)**

In mice evolved associated infestations with *Mycoptes musculus* (20/30 - 66,66%), *Myobia musculi* (12/30 - 40%) and *Chirodiscoides caviae* (3/30 - 10%). All mice from the studied group were adults and were not identified according to sex.

At the dermatological exams, performed at 22 from 30 mice there were observed areas of alopecia, erythema, scales with favorite location in the dorso-lumbar region. Lesions were also visible at chest and abdominal region as well as on limbs and head, (around ocular and oral regions). Pruritus and anxiety were obvious signs presented by the entire group.

Mycoptes musculus is the most frequently identified ectoparasite in mice. Mix infestations with *Myobia musculi* currently evolve, the identification of the two species being very easy to make. In mix infestations, the adults populate with predilection the skin around the neck, inguinal and ventro-abdominal areas and dorsal regions as well (Luyon and Salibay 2007). Frequently these infestations evolve asymptomatic, only occasionally can be observed the appearance of irregular areas of alopecia covered with scales and rarely with crusts, erythema, grazes (Harvey, 1995; Beck, 2007).

Chirodiscoides caviae is an ectoparasite described by literature as prevalent only in guinea pigs. No source of the studied made any reference to the parasitism of this mite in mice. Due to this fact we consider that the diagnosis of listrophosis in mice constitutes a fact as curious as interesting and deserves to be remembered for future studies of ectoparasites in mice.

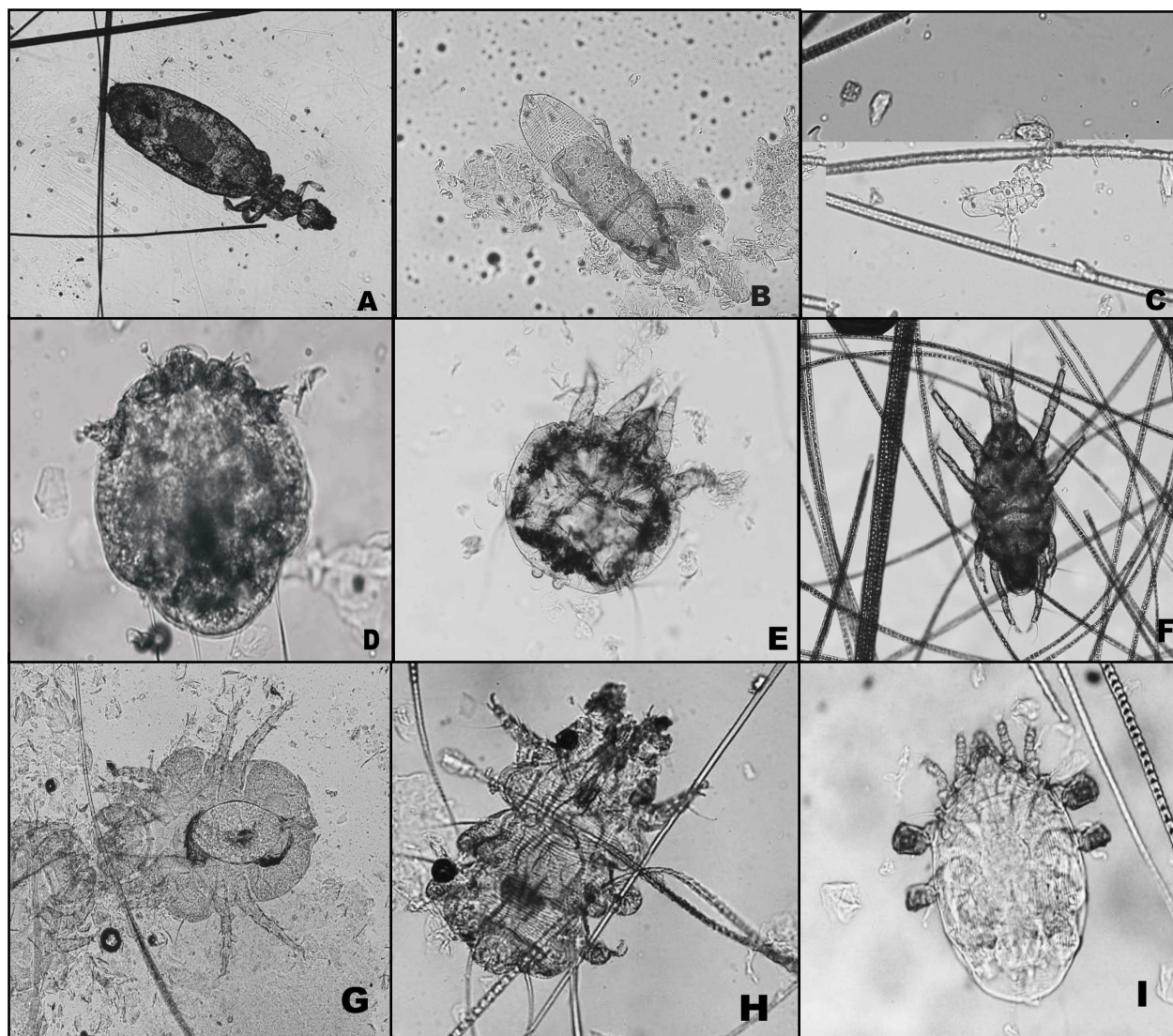


Fig.1. The species of ectoparasites identified in laboratory animals: **A.** *Gliricolla porcelli*, **B.** *Chirodiscoides caviae*, **C.** *Demodex caviae*, **D.** *Notoedres muris*, **E.** *Psoroptes cuniculi*, **F.** *Listrophorus gibbus*, **G.** *Cheiletiella parasitivorax*, **H.** *Myobia musculi*, **I.** *Mycoptesc musculus*

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