Incidence of fur mite infestation in laboratory rodents

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Received: 6 April 2015 / Accepted: 22 June 2016 / Published online: 30 June 2016
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Abstract Incidence of fur mites in laboratory rodents is reported. Among mice, infestation was found to be highest in male Swiss Albino mice followed by female Swiss Albino mice, male Balb C mice and female Balb C mice. Infestation in Guinea pigs was 50 %. None of the rats screened were found to be positive for fur mites. Species of fur mites identified were *Myocoptes musculus* in mice and *Chirodiscoides caviae* in Guinea pigs. Clinical signs in affected animals are also reported.

Keywords Fur mites · Mice · Guinea pig ·
Myocoptes musculus · *Chirodiscoides caviae*

Introduction

Infestation with fur mites or acariosis is common in laboratory rodents. Among laboratory rodents, infestation is very common in mice compared to rats and guinea pigs. Mites are transmitted by direct contact with an infested animal or through environment of that animal (bedding,

incompletely cleaned cage). Fur mites live and breed on the fur, but descend to the skin for a meal of plasma or to feed on epidermal cells shed by the host. Mites are commonly found on the dorsum of the affected animals, specifically between the scapulae or on the head, neck or flank. Animals with fur mite infestations have varying clinical signs ranging from none to mild alopecia to severe pruritus and ulcerative dermatitis (Baker 2007). Animals with inapparent mite infestations may still have sequelae that interfere with research (Percy and Barthold 2007). Therefore control of fur mites in laboratory rodents by effective treatment methods and periodic monitoring is important. The present paper reports on the incidence of fur mite infestations in laboratory rodents maintained in a laboratory animal facility at Chennai.

Materials and methods

The study was conducted at the Laboratory Animal Medicine Unit, Centre for Animal Health Studies, Tamil Nadu Veterinary and Animal Sciences University, Madhavaram Milk Colony, Chennai, India. The animals (in groups of 5 per cage) were kept in an appropriate sized polycarbonate cages. Autoclaved corn cobs were used for bedding. The room was maintained at 22 ± 2 °C and 50 ± 5 % relative humidity, and at a 12/12 h light/dark cycle. The air was automatically ventilated 15–20 times per hour through HEPA filter in order to maintain the particle counts less than one lakh per cubic foot of size 5.0μ and larger. Pellet rodent food and autoclaved reverse osmosis purified water in drinking bottles were given ad libitum. Cages, bedding, steel wire tops and bottles were changed every third day. The animal room was cleaned twice daily with the disinfectant mop. Weaned male and female Wistar rats, Swiss

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Albino mice, Balb C mice and Dunkin-Hartley Guinea pigs were used in the study. All procedures were carried out with the approval of the Committee for the Purpose of Control and Supervision of Experiments on Animals (Approval No 1614/DFBS/B/2014).

Rats, mice and guinea pigs were screened by the cellophane tape test. Animals were restrained and cellophane tapes (1 cm width) were applied to the pelage and taken back several times until stickiness was lost. The tape was pasted to a clean grease free glass microscopic slide and screened for the presence of mites, nymphs and eggs of mites. Clinical signs in affected animals were also observed. Mites were identified morphologically as per Baker (2007) directly from the cellophane tapes pasted on glass slides without any processing.

Results and discussion

Among mice, the highest rate of fur mite infestation was found in male Swiss Albino mice (26.66 %) followed by female Swiss Albino mice (21.87 %), Male Balb C mice (15.15 %) and female Balb C mice (13.46 %). Infestation in Guinea pigs was found to be 50 %. None of the rats examined were found positive for fur mites (Table 1).

The species of fur mites found in Swiss Albino and Balb C mice were identified as the fur mite of mice, *Myocoptes musculus*, non-burrowing mites belonging to the Family Myocoptidae.

The female mites were oval in outline. Mean length was 267.7 μm and mean width was 110 μm . The body had numerous scale like dorsal striations and minute denticles ventrally. The legs were modified for clasping the hairs, enlarged and strongly chitinized. A pair of long terminal setae was found in the posterior end (Fig. 1). Male mites were smaller in size. Mean length was 198 μm and mean width was 92.77 μm . Male mites were less striated and more heavily sclerotized than the female. The fourth pair of legs was greatly enlarged and had five segments and is not modified for clasping the hairs. This greatly enlarged fourth pair of legs is for grasping the female during copulation. A

Fig. 1 Female *Myocoptes musculus* (40 $\times$)

Fig. 2 Male *Myocoptes musculus* (40 $\times$)

pair of long terminal setae was present. The aedeagus was located in a deltoid genital opening (Fig. 2).

Clinical signs observed in infested mites include severe scratching, alopecia, ulcerative dermatitis, erythema and bleeding in certain areas.

The species of fur mite observed in Dunkin-Hartley Guinea pigs was identified as *Chirodiscoides caviae* (Syn. *Campyochirus caviae*, *Indochirus utkalensis*), commonly known as the fur mite of Guinea pigs. It is commonly called as the fur mite of Guinea pigs. Both male and female mites were elongate. Males were smaller than females. Mean length was 303.7 μm and mean width was 115.4 μm . Mean length and width of female mites were 487 and 139 μm , respectively. The anterior portion was triangular

Table 1 Incidence of fur mite infestation in laboratory rodents

Sl. No	Species	Sex	No. screened	No. positive for fur mites	% of infection
1	Wistar rats	Male	30	0	0
2	Wistar rats	Female	27	0	0
3	Swiss Albino mice	Male	45	12	26.66
4	Swiss Albino mice	Female	32	7	21.87
5	Balb C mice	Male	33	5	15.15
6	Balb C mice	Female	52	7	13.46
7	Dunkin-Hartley Guinea pigs	Male and Female	10	5	50.0

Fig. 3 Male and Female *Chirodiscoides caviae* mites of Guinea pig (40×)

Male

Female

Fig. 4 *Chirodiscoides caviae* mites attached to the hair of Guinea pig (40×)

Fig. 6 Eggs of *Chirodiscoides caviae* attached to hair of Guinea pig (40×)

Fig. 5 Nymph of *Chirodiscoides caviae* (40×)

with striated sternal shield. All legs are modified for hair clasping with legs I and II more modified than legs III and IV (Fig. 3). These mites were found on the posterior back region and lateral sides of the posterior quarters.

Some mites were found attached to the hairs (Fig. 4). In addition nymphal stages (Fig. 5) and eggs (Fig. 6) were also found in some animals. Affected animals did not show any obvious clinical signs.

Acariosis or mite infestation is common in laboratory rodents like mice, rats, guinea pigs, hamsters and gerbils (Baker 2007). Species commonly found in mice are *Myocoptes musculus*, *Myobia musculi* and *Radfordia affinis* and that infesting rats are *Ornithonyssus bacoti* and *Radfordia ensifera*. Species commonly found in Guinea pigs

are *Chirodiscoides caviae* and *Trixacarus caviae*. Hamsters are infested by *Demodex aurati* and *Demodex criceti*. Infestation in gerbils is very rare.

Mite infestations are often asymptomatic, but severe infestations may lead to pruritus where animals may damage their skin by scratching. Damaged skin may become secondarily infected leading to ulcerative dermatitis. Transient infestations with rodent fur mites can also occur in human beings leading to formation of itchy, red, raised skin nodules. Fur mites are diagnosed by direct examination of the plucked tufts of fur under microscope or by performing a cellophane tape test. Rodents with severe fur mite infestation are not suitable for use in research and zoonotic nature of some mites may also be a health hazard to workers.

Fur mite found in mice in the present study was *Myocoptes musculus* which cause myocoptic mange in wild and laboratory mice. It is extremely widespread but is usually of little pathogenic significance. Problems may occur, however in crowded laboratory colonies or in animals maintained in poor conditions. Infestation causes inflammation, erythema and pruritis leading to scratching and alopecia. Signs that may be seen in the mouse can range from no signs, to mild signs such as ruffled fur, patchy hair loss, and pruritis, to severe cases with

generalized alopecia, ulcerations and self-mutilation. Mites are passed by direct contact and will infect neonates as soon as the pelage starts to grow at about 1 week of age. The mites seem to prefer the fur on the head, neck and shoulder regions, although in heavy infestations they can be found throughout the body and *Myocoptes* sp. tends to be found on the dorsal regions near the tail.

Mite infestations can cause general malaise condition such as weight loss, decreased fertility, and shortened lifespan. It can also lead to secondary bacterial infections and affect the immune system by causing elevated levels of IgE, IgG, IgA, inflammatory cytokines, and degranulation of mast cells, as well as lymphocytopenia. These effects may persist even after mite eradication. Additionally, infestations can compromise collaborations between facilities if one facility excludes these parasites from their colony (Fox et al. 2002; Percy and Barthold 2007; Lindstrom et al. 2011).

Similarly fur mites are also common in guinea pigs and the common fur mite of Guinea pigs is *Chirodiscoides caviae*. In the present observation 50 % of the guinea pigs were found to be infested with *Chirodiscoides caviae*. Nymphs and eggs were also found attached to the pelage. This mite is cosmopolitan in distribution Improvements in laboratory animal husbandry have rendered them less

common. These mites may be found attached to hairs anywhere on the body, but are more common in the posterior back region and lateral sides of the posterior quarters. In the present study the mites were found to be seen in the back region and perianal region of guinea pigs. Light infestations may be present for extended periods of time with no clinical signs. Pruritis, alopecia, increased grooming behavior leading to self-trauma, and ulcerative dermatitis has been reported due to this mite. However in the present study no apparent clinical signs were noticed in Guinea pigs due to the presence of mites.

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