Efficacy of doramectin in *Trixacarus caviae* infestation in guinea pigs (*Cavia porcellus*)

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Abstract The present study was intended to evaluate the efficacy of doramectin against seven naturally *Trixacarus caviae* infested male guinea pigs. Multiple skin scrapings of all the seven guinea pigs were found microscopically positive for *T. caviae* mites. Clinically these animals revealed, more or less denuded, very red often thickened, and crustated cutaneous lesions restricted at the sacral region and back. Doramectin 1 % (w/v) was administered intramuscularly at a dose rate of 400 µg/kg once weekly, which resulted in profound improvements in clinical conditions within 14 days after the first doramectin application. It took almost 28 days for the cutaneous lesions to disappear and to witness partial hair coat regrowth. Two moderately infested guinea pigs required only single injection of doramectin to achieve complete parasitological cure, while remaining five (one moderately infested and four severely infested) guinea pigs required two injections of doramectin to achieve complete parasitological cure. No

adverse effects were revealed by any of the doramectin treated guinea pigs during the study period. Thus, it can be concluded from the present study that guinea pigs naturally infested by *T. caviae* mites can be cured safely using two doses of doramectin once in a week.

Keywords Doramectin · Guinea pigs ·
Trixacarus caviae · Mange

Introduction

Guinea pigs are one of the most used laboratory animals for experimental studies due to prolificacy, high adaptability to laboratory conditions, reduced maintenance costs, and its resemblance with human reactivity in contracting diseases (Baker 1998). These animals may be infested with various ectoparasites including *Trixacarus caviae* a sarcoptiform mite. Sarcoptiform mites have a very broad host range, which includes more than 100 mammalian species belonging to 27 families from 10 orders Bornstein et al. 2001) and afflicts 300 million people worldwide. Sarcoptic mange is a major global health problem in human and animal populations (McClain et al. 2009), including guinea pigs (*Cavia porcellus*), ferrets, rabbits, rats (*Rattus norvegicus*), mice (*Mus musculus*), and African pygmy hedgehogs (*Atelerix albiventris*). The mange mites burrow into the stratum corneum and transmitted by direct and indirect contact (Jones et al. 2008). The mite is not always easily observed in infested guinea pigs and the potential for human infestation exists where large numbers of children and adults have direct contact with the animals (Honda et al. 2011) The affected animals often develop severe, intense pruritus, scales, crusts, erythema, and alopecia. Guinea pigs infested with *T. caviae* mites are generally asymptomatic, however animals maintained in

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poor conditions or exposed to stressors may develop alopecia, intense pruritus, scales, crusts, and hyperkeratosis. Many untreated animal species clinically infested with sarcoptiform mites often succumb (Kemp et al. 2004; Giadinis et al. 2011). Considering the potential consequences of *Trixacarus* infestation on the health of guinea pigs, chemotherapeutic remedies are applied including avermectin drug group. The avermectin drug group includes ivermectin, abamectin, doramectin, eprinomectin and selamectin which can be used to treat the mangy laboratory animals (Voyvoda et al. 2005; Kurtdele et al. 2007; Singh et al. 2012). Sarcoptiform mites are generally sensitive to avermectins. Doramectin is naturally derived 16-membered macrocyclic lactones produced by the soil dwelling actinomycetes, *Streptomyces* spp. It is highly effective against nematode and various causative agents of mange in various host species (Voyvoda et al. 2005; Kanbur et al. 2008; Dimri et al. 2009; Kaya et al. 2010). The scientific reports of doramectin efficacy against *T. caviae* infestation of guinea pigs are meager. Thus, the present study was aimed to evaluate the efficacy of doramectin against *T. caviae* infested guinea pigs.

Case history and clinico-laboratory findings

Twenty-seven adult (18 females and 9 males) guinea pigs kept at laboratory animal resource section, SRMS, Institute of Medical Sciences, under the standard laboratory condition (27 ± 182 C temperature; 12:12 h light/dark and 50–60 % humidity). Standard chow and tap water was provided ad libitum. Of these, 7 male guinea pigs were presented with clinical manifestations of pruritus, alopecia and crusts formations and subjected for dermatological examination. All 7 guinea pigs were reported to be suffering from the clinical disease for at least 15 days before presentation for clinical dermatological examination. None of the guinea pig was treated with ecto-parasiticides or steroidal anti-inflammatory drugs in the last 30 days. The affected animal were treated with 1 % povidone iodine ointment (Betadine®; Win-Medicare) for 7 days, but no improvements in cutaneous lesions were witnessed after this therapy. Microscopic examination of multiple skin scrapings (1 cm² skin scrapped from three different cutaneous lesions), obtained from fresh skin lesions of all guinea pigs revealed the presence of several sarcoptiform mites, and they were identified as *T. caviae* by morphological examination. Mites were similar to *S. scabiei*, but a little smaller. All dorsal setae in the mites were long and hair-like, and the pedicels (stalks) of all suckers were a bit shorter than those typical of *Sarcoptes* mites.

All infested guinea pigs were in poor condition and appetite, albeit non-infested cage-mates were in good body condition and appetite. The affected areas of skin were more or less denuded, very red often thickened and crusted

(Fig. 1). The lesions were restricted at the sacral region and back of all infested animals (Fig. 1). Upon touching the affected areas, the guinea pigs revealed crying sound and muscular spasms, especially of the legs. Of these 7 infested guinea pigs, 3 animals were moderately affected while remaining 4 animals were severely affected. The clinical recovery was evaluated on the basis of improvement in cutaneous lesions, clinical manifestations and parasitological cure rate (proportion of guinea pigs free of *Trixacarus* mites and their developmental stage post-therapy) inspected once in a week. After complete clinical and parasitological cure (day 28 post-therapy), the guinea pigs were subjected for clinical and parasitological examination once in a month for 4 consecutive months. The current study was in full compliance with institutional animal ethics committee for the purpose of control and supervision of experiments on animals. These guinea pigs were also free from ecto-parasites apart from the *Trixacarus* mites.

Treatment and results

All infested guinea pigs were treated with a commercial formulation of doramectin 1 % (w/v) long acting solution (Dectomax®; Pfizer India Pvt. Ltd.) at a dose rate of 400 µg/kg intramuscularly once weekly. Doramectin treatment, applied successfully to all infested guinea pigs, resulted in profound decrease in pruritus and increased crust shedding rate within 7 days after first dose of the doramectin administration. By day 14 post-therapy cutaneous lesions of all infested guinea pigs were almost healed (Fig. 2) and upon palpating the affected areas no crying sound and muscular spasms were revealed by these animals. It took almost 28 days for the cutaneous lesions to disappear and to witness partial hair coat regrowth (Fig. 3). Parasitological cure was achieved in two moderately

Fig. 1 A 7-month-old male guinea pig with severe cutaneous lesions of *Trixacarus* mange at sacral region and back

Fig. 2 Same guinea pig with almost healed cutaneous lesions at day 14 post-therapy

Fig. 3 Same guinea pig with completely healed cutaneous lesions and partial hair coat regrowth at day 28 post-therapy

infested guinea pigs at day 7 post-therapy, and these guinea pigs required only single injection of doramectin for the complete parasitological recovery. While by day 14 post-therapy, remaining five (one moderately infested and four severely infested) guinea pigs were parasitologically cured and required two injections of doramectin for the complete parasitological recovery. In tandem, the appetite and body condition of the affected animal restored back to normal. A $9.85 \pm 4.4\%$ gain in body weight was revealed by the affected guinea pigs at day 28th post-therapy. Hair coat regrew completely 60 days after the beginning of doramectin trial. No adverse effects were revealed by any of the doramectin treated guinea pigs during the study period.

Moreover, clinical and parasitological examinations in subsequent 4 months revealed absence of *Trixacarus* mites in multiple skin scrapings examinations. Thus, it can be concluded from the present study that guinea pigs infested by the *T. caviae* can be cured safely using two doses of doramectin once in a week. Further, large scale studies are required to validate the safe miticidal potential of doramectin against clinical *Trixacarus* mange of guinea pigs.

References

- Baker DG (1998) Natural pathogens of laboratory mice, rats, and rabbits and their effects on research. *Clin Microbiol Rev* 11(2):231–266
- Bornstein S, Mörner T, Samuel WM (2001) *Sarcoptes scabiei* and sarcoptic mange. In: Samuel WM, Pybus MJ, Kocan AA (eds) *Parasitic diseases of wild mammals*, 2nd edn. Iowa State University Press, Ames, pp 107–119
- Dimri U, Singh SK, Sharma MC, Kumar P, Waila T, Kumar S, Ranjan R, Kumar N (2009) Efficacy of doramectin against canine demodicosis. *Indian Vet J* 86:1127–1128
- Giadinis ND, Farmaki R, Papaioannou N, Papadopoulos E, Karatzias H, Koutinas AF (2011) Moxidectin efficacy in a goat herd with chronic and generalized sarcoptic mange. *Vet Med Int*. doi: [10.4061/2011/476348](https://doi.org/10.4061/2011/476348)
- Honda M, Namikawa K, Hirata H, Neo S, Maruo T, Lynch J, Chida A, Morita T (2011) An outbreak of *Trixacarus caviae* infestation in guinea pigs at an animal petting facility and an evaluation of the safety and suitable dose of selamectin treatment. *J Parasitol* 97(4):731–734
- Jones J, Jenkins T, Webb L, Davies A, Bates P (2008) Psoroptic mange in cattle in south Wales. *Vet Rec* 162:460
- Kanbur M, Atalay O, Ica A, Eraslan G, Cam Y (2008) The curative and antioxidative efficiency of doramectin and doramectin+vitamin AD3E treatment on *Psoroptes cuniculi* infestation in rabbits. *Res Vet Sci* 85:291–293
- Kaya D, Inceboz T, Kolatan E, Güneli E, Yilmaz O (2010) Comparison of efficacy of ivermectin and doramectin against mange mite (*Sarcoptes scabiei*) in naturally infested rabbits in Turkey. *Vet Ital* 46(1):51–56
- Kemp DJ, Walton SF, Harumal P, Currie BJ (2004) The scourage of scabies. *Biologist* 49:19–24
- Kurtdede A, Karaer Z, Acar A, Guzel M, Cingi CC, Ural K, Ica A (2007) Use of selamectin for the treatment of psoroptic and sarcoptic mite infestation in rabbits. *Vet Dermatol* 18(1):18–22
- McClain D, Dana AN, Goldenberg G (2009) Mite infestations. *Dermatol Ther* 22(4):327–346
- Singh SK, Dimri U, Sharma MC, Swarup D, Kumar M, Tiwary R (2012) *Psoroptes cuniculi* induced oxidative imbalance in rabbits and its alleviation by using vitamins A, D3, E, and H as adjunctive remedial. *Trop Anim Health Prod* 44(1):43–48
- Voyvoda H, Ulutas B, Eren H, Karagenc T, Bayramli G (2005) Use of doramectin for treatment of sarcoptic mange in five Angora rabbits. *Vet Dermatol* 16(4):285–288