

EFFECT OF IVERMECTIN AGAINST EAR MANGE MITE (*Psoroptes cuniculi*) IN NATURALLY INFESTED RABBITS

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ABSTRACT : Thirty one New Zealand White rabbits, naturally infested with ear mange, were divided into mild, moderate, severely infested and infested-control groups, based on their mean lesion score. Three animals were maintained as clean-control group. Ivermectin was given subcutaneously to infested rabbits of the 3 first groups, four times at weekly interval, at a dose level of 200µg/kg body weight. The rabbits with mild infestation showed complete recovery with two injections. One rabbit each from moderately and severely infested groups, showed

persistence of mild infestation in the form of presence of parasitic eggs till 40th day post treatment. The untreated infested-control animals showed persistence of infestation and clean-control animals remained normal throughout the period of study. It was concluded that ivermectin can be used safely, as repeated subcutaneous injections at weekly interval at a dose of 200µg/kg body weight, for effective control of ear mange in rabbits. The importance of repeated injections of ivermectin to control ear mange in severely infested rabbits has been discussed.

RÉSUMÉ : Effet de l'ivermectine sur la gale de l'oreille chez des lapins naturellement infestés.

Trente et un lapins Néo Zélandais Blancs naturellement infestés par la gale de l'oreille ont été répartis en groupes dits légèrement, modérément, sévèrement infestés ainsi qu'un groupe-contrôle infesté établi à partir de la moyenne des lésions. Un groupe contrôle de trois animaux a été maintenu sans infection. L'ivermectine a été administré en sous-cutané aux lapins infestés des trois premiers groupes, 4 fois à intervalles d'une semaine, à la dose de 200µg/kg poids vif. Les lapins légèrement infestés ont été totalement guéris après 2 injections. Un lapin de chacun des groupes

modérément et sévèrement infestés a gardé un infestation légère sous forme de présence d'oeufs du parasite persistant encore au 40ème jour de traitement. Le groupe contrôle de lapins infestés non traités montre une persistance de l'infestation et le groupe contrôle non infesté est resté normal durant toute la période expérimentale. On peut en conclure que l'ivermectine peut être utilisée sans risques en injections sous cutanées administrées à une semaine d'intervalle à la dose de 200µg/kg de poids vif pour un contrôle effectif de la gale des oreilles. L'utilité des injections répétées d'ivermectine à des lapins sévèrement infestés est discutée.

INTRODUCTION

Ear mange caused by *Psoroptes cuniculi* infestation is a very common and widespread problem in rabbit colonies. It may lead to further complications like infection of middle or inner ear, wry neck and death (JONES and HUNT 1983) resulting in considerable economic losses. Ivermectin, one of the avermectin family compounds, is used as a broad-spectrum parasiticide in domestic animals and is also recommended for treatment of ear mange in rabbits. There is ambiguity among workers regarding the dose level and regimen of administration. PANDEY (1989) reported that a single subcutaneous injection of ivermectin at the dose of 200µg/kg body weight was effective to eliminate the parasites from ear of rabbits. However, CURTIS *et al.* (1990) claimed that repeated injections at 18 days interval at dose of 400-440µg/kg body weight were unable to eradicate the mites. The present study was aimed to investigate in detail the effect of ivermectin, at the dose level of 200µg/kg body weight, given subcutaneously four times at weekly interval, on rabbits naturally infested with *Psoroptes cuniculi*.

MATERIALS AND METHODS

Thirty one New Zealand White rabbits 1.5 to 2 years old and naturally infested with *Psoroptes cuniculi* were divided into four groups. Three animals were maintained as clean-control group. The rabbits were housed individually in all-wire cage (60 x 40 x 40 cm). The groupings were based on microscopic examination and mean lesion score. The definition of lesion score is given in Table 1. The

Table 1 : Lesion score

| Gross lesions | Score |
|---|-------|
| Clear ear canal and inside pinna | 0 |
| Lesions confined to the bottom of ear canal | 1 |
| Lesions extending from bottom of ear to the lower third of inner surface of pinna | 2 |
| Lesions extending from bottom of ear to the lower two-third of inner surface of pinna | 3 |
| Lesions covering more than two-third of inner surface of pinna | 4 |

Table 2 : Experimental plan and lesion score

| Group | No. of animals | Lesion score | Degree of infestation |
|-------|----------------|--------------|-----------------------|
| I | 14* | <1 | Mild |
| II | 11* | 1 to <3 | Moderate |
| III | 3* | 3 to >3 | Severe |
| IV | 3** | <1 to >3 | Mild to severe |
| V | 3 | 0 | - |

* Animals were treated with ivermectin @ 200 µg/kg body weight

** One animal each from the three infested groups was kept as infested-control

details of the experimental design are given in Table 2. The lesions were scored with the help of an auroscope. The lesions of both right and left ear of each rabbit were observed and a mean individual score was given.

Standard techniques were used for collection and examination of skin scrapings (SOULSBY, 1982) at weekly interval just before each injection and at the 40th day at the end of experiment. Each animal in group I, II and III was subcutaneously administered with ivermectin (Ivomec, Glaxo India Ltd., Bombay) at a dose rate of 200 µg/kg body weight on day 0 and subsequently at weekly interval. The animals in group IV served as infested-untreated control and group V rabbits were kept as clean-control. Lesions from individual animal were scored before the first treatment and subsequently at the interval of 5 days till 40th day of experiment.

The statistical analysis was performed using the one way analysis of variance (ANOVA) with least square difference at 95% confidence level.

RESULTS

The mean lesion score of the ear lesions of different groups of rabbits (Gr. I to Gr. V), recorded before and after treatment, is shown in Table 3.

Pre-treatment

The group mean lesion score of the group I, II, III, IV and V was 0.46 ± 0.04 , 1.59 ± 0.17 , 3.00 ± 0.00 , 1.00 ± 0.50 and 0 respectively. The mean lesion score

of the infested control-group (IV) was not significantly different from moderate infestation group. Microscopic examination of the skin scrapings of all infested animals revealed presence of adult mites, nymphs and eggs along with tissue debris.

Post-treatment

Mild infestation (group I)

In this group mean, lesion score was significantly reduced from 0.46 ± 0.04 to 0.18 ± 0.06 on the 25th day post-treatment. Microscopic examination of scrapings showed absence of adult parasites, nymphs, larvae and eggs on day 14 post-treatment. On day 7 post-treatment, scrapings of two out of 14 rabbits were positive for eggs and parasites.

Moderate infestation (group II)

Group mean lesion score of rabbits with moderate infection showed significant reduction from 1.59 ± 0.17 to 1.18 ± 0.17 on 10th day post-treatment. Mean lesion score was further reduced to 0.41 ± 0.09 on 35th day post-treatment. At this stage, out of 11 animals in this group, individual mean lesion score of three animals was 0. Seven animals had an individual mean lesion score of 0.5 and one animal had lesion score 1.0. Microscopic examination of skin scrapings showed presence of adult parasites, nymphs and eggs with tissue debris till 21st day post-treatment in this group. On 28th day, skin scraping of the animal with lesion score of 1.0 was positive which showed presence of eggs along with tissue debris till 40th day.

Severe infestation (group III)

Group mean lesion score of severely infested animals was significantly reduced from 3.00 ± 0.00 to 1.66 ± 0.33 on 5th day post-treatment, which got further reduced to 0.50 ± 0.29 on 40th day post-treatment. At this stage mean lesion score of one of the animals was 1.0. Microscopic examination of the skin scrapings revealed presence of adult mites, nymphs and eggs along with tissue debris till 14th day post-treatment in all the three rabbits. On 21st and 28th day, one of the animals which was having lesion score two, was positive for adult mites, nymphs and eggs along with tissue debris, while other two animals showed presence of eggs along with tissue debris. On 40th day the animal with lesion score of 1.0 showed presence of

Table 3 : Pre-treatment and post-treatment mean lesion score of different groups of the rabbits

| Group | Pre treatment (Day) 0 | Post treatment (Days) | | | | | | | |
|-------|-----------------------------|-----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
| I | 0.46 ± 0.04 | 0.43 ± 0.09 | 0.43 ± 0.09 | 0.39 ± 0.11 | 0.36 ± 0.06 | 0.18 ± 0.06 | 0.11 ± 0.06 | 0.00 ± 0.00 | 0.04 ± 0.04 |
| II | 1.59 ± 0.17 | 1.23 ± 0.18 | 1.18 ± 0.17 | 1.00 ± 0.09 | 0.95 ± 0.12 | 0.77 ± 0.10 | 0.64 ± 0.12 | 0.41 ± 0.09 | 0.45 ± 0.10 |
| III | 3.00 ± 0.00 | 1.66 ± 0.33 | 1.66 ± 0.33 | 1.83 ± 0.17 | 1.83 ± 0.17 | 1.33 ± 0.33 | 1.00 ± 0.58 | 0.66 ± 0.33 | 0.50 ± 0.29 |
| IV | 1.00 ± 0.50 | 1.17 ± 0.44 | 1.17 ± 0.44 | 1.17 ± 0.66 | 1.17 ± 0.66 | 1.17 ± 0.66 | 1.17 ± 0.66 | 1.17 ± 0.66 | 1.17 ± 0.66 |
| V | - | - | - | - | - | - | - | - | - |

The treatments were given on day 0, 7, 14 and 21 of the study.

eggs along with tissue debris while other two animals were negative.

Untreated control (group IV)

Mean lesion score of this group did not show any significant alteration throughout the experimental period. One of the animals showed a slight increase in mean lesion score. Microscopic examination of the skin scrapings revealed presence of adult mites, nymphs and eggs of parasites with tissue debris throughout the experimental period.

Untreated uninfested control (group V)

All the three animals in this group remained normal throughout period of study.

DISCUSSION

The previous studies on effect of ivermectin on ear mange in rabbits recommended use of different dose levels and regimen of administration. PANDEY (1989) and SRIVASTAVA *et al.* (1991) reported that rabbits naturally infested with *Psoroptes cuniculi* mite showed complete recovery with single subcutaneous injection of 200 µg/kg body weight of ivermectin. According to WRIGHT and RINER (1985) a single dose of 200 µg/kg body weight of ivermectin was not sufficient to eliminate mites from ear of rabbits, and recommended 400 µg/kg body weight of ivermectin for effective recovery. A single subcutaneous injection of ivermectin at the dose of 200 µg/kg and 400 µg/kg body weight was unable to eliminate ear mites completely from the rabbit colony (PROSL and KANOUT, 1985). The treatment recommended by these workers was two injections of 400 µg/kg body weight of ivermectin, 4-6 days apart.

In the present study, the rabbits having mild infestation of ear mange showed complete recovery with just two injections. Infestation persisted in the ear of two rabbits, one each from moderately and severely infested groups, which were having a pre-treatment lesion score of 2.5 and 3.0. The animal with a lesion score of 2.5 had severe infestation in the right ear, which persisted till the end of experiment. The presence of excessive tissue debris in the ears of these rabbits might be responsible for persistence of infestation in these rabbits. The severity of lesions and accumulation of excessive tissue debris could be one of the possible reasons for the variation in the results of previous studies reported by different authors regarding effect of ivermectin on control of ear mange in rabbits. WRIGHT and RINER (1985) attributed these differences in the results on efficacy of ivermectin, to the differences in the susceptibility of strains of parasites from different localities.

The microscopic examination carried out in the last stages of present study showed that presence of mild lesions in the ears do not necessarily indicate the presence of infestation and the absence of lesions in the

ears of rabbits from an infested colony do not rule out possibility of presence of infestation. A similar type of observation has been reported by BOWMAN *et al.* (1992).

A significant reduction in the group mean lesion score was observed on 25th, 10th and 5th day in group I, II and III respectively. In severely infested animals, the effect of ivermectin was more pronounced. However, the infestation was persistent in the severely infested animals after first injection of ivermectin. *Psoroptes cuniculi* mite requires 4 days to hatch out of eggs and 21 days to complete life cycle. Use of ivermectin at repeated interval helps in maintaining the optimum drug concentration in plasma which is required to act against the parasites hatched out of eggs after the effect of the first injection diminishes (BOWMAN *et al.*, 1992).

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