Introduction

Ivermectin has been extensively used in domestic animals against ecto and endoparasitic infestations (Campbell & Benz, 1984). In rabbits it has been tried against ectoparasites but for this, as per the literature it does not have a product licence (McKellar et al., 1992). However, ivermectin was shown to have activity against ectoparasites of rabbits for the first time by Wilkins et al. (1983). Subsequently, it was effectively used 400 µg/kg by subcutaneous (s/c) injections against ear mite Psoroptes cuniculi (Wright & Riner, 1985; Singh & Gill, 1989; and Pandey, 1989) and also against Notoedres cati (Singh & Gill, 1989). Ivermectin is easy to administer and as the drug reaches to the skin it can affect the mites which otherwise would not be affected by the topical application of any other drug (McKeller et al., 1992). Therefore, in the present study it was decided to use ivermectin (Ivomec® Injection, Dynamic Pharmacals, Bombay) for the treatment of clinical cases of mange in rabbits.

Material and Methods

Twenty New Zealand white rabbits of either sexes weighing 2.0 to 3.5 kg (average 2.7 kg) were kept in the department for the experimental studies. All rabbits were kept in iron cages (two rabbits per cage) and maintained on nutritionally balanced diet. Almost all were found infected with mange at different degree of infestation. The symptoms and lesions of the clinical cases were recorded. Skin scrapings of the affected rabbits were collected for examination and identification of the mange mites after routine treatment with 10 % KOH (Soulsby, 1982). Microscopic examination of skin revealed abundant mites at various developmental stages. The mites were identified as Notoedres cati var. cuniculi on the basis of description given in Muller et al. (1983). All the rabbits showing clinical symptoms and lesions of the disease were randomly divided into two groups. The
group I consisted of 15 rabbits and group II of five rabbits. The rabbits of group I were treated subcutaneously (behind the shoulder) with undiluted Ivomec® Injection (ivermectin 1% w/v) 40 µl/kg body weight with 24 gauge needle. Group II rabbits served as untreated control. This form of ivermectin was selected on the basis of prior successful use in rabbits, availability and ease of administration. The treated rabbits were physically examined daily for clinical improvement and their skin scrapings were examined on day 0, 3, 6, 9, 16, 23 and 30 post treatment for the presence of mange mites.

For histopathology skin biopsies were taken randomly from infected untreated rabbits to detect mites and their pathological effects. These were preserved in 10% neutral buffered formalin and 5 µ thick paraffin sections were cut and stained with haematoxylin and eosin (H & E).

RESULTS

In the infected rabbits lesions were noticed in the form of whitish crusts and scabs which were found chiefly in the areas where hairs were spars and short i.e. on the nose, head, eyelids and ears. In some cases lesions were found on the feet specially in toe region. There was formation of remarkable wart-like or horn-like excrescences of considerable size on the nose. Heavy crusts around the eyes interfered with vision, in some rabbits there was conjunctivitis and greyish white exudate was coming out from both the eyes.

The group I of rabbits were infected with an average of 120 mites/cm² before treatment which included various stages of life cycle viz. eggs, larvae, nymph and adults. Two days after treatment with ivermectin, rabbits stopped scratching and biting. Marked progressive improvement in the appearance of lesions was observed. The shedding of lesions i.e. crusts and scars started on 3rd day and complete visual shedding of lesions was recorded on 6th day of treatment respectively. There was no visible change in the lesions and symptoms of infected, untreated control rabbits except that two of the rabbits developed generalised infection (group II). Twelve rabbits of treated group had no mites by the 7th day of treatment and all the rabbits were negative by 9th day. The rabbits remained free of mites until the end of trial. The corresponding figures for untreated controls were 115 mites/cm². By the 25th day all the treated animals were recovered completely with the new growth of hairs (Table I).

The sections of skin of infected rabbits showed cut sections of the mites in the stratum corneum and most of them had dug burrows deep into the epidermis (Fig. 1). Pathological changes apparent in the skin were marked hyperkeratosis, hyperplasia and acantholysis of the epidermis and at places ballooning degeneration of epithelial cells in the epidermis. There was infiltration of eosinophils, lymphocytes, fibroblasts and few neutrophils.

<table>
<thead>
<tr>
<th>Days after treatment</th>
<th>Infected and treated</th>
<th>Infected and untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mites/cm² (means ± SEM)</td>
<td>Clinical observations</td>
</tr>
<tr>
<td>0</td>
<td>120 ± 4.34</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>—</td>
<td>Stopped scratching and biting</td>
</tr>
<tr>
<td>3</td>
<td>70.53 ± 5.17</td>
<td>Shedding of crusts and scars started</td>
</tr>
<tr>
<td>6</td>
<td>14.06 ± 2.55 (four rabbits negative) 2.6 ± 1.43 (three rabbits positive)</td>
<td>Crusts and scars disappeared Wrinkling and keratinization decreased</td>
</tr>
<tr>
<td>9</td>
<td>All were negative</td>
<td>Healing of lesions started Normal texture visible with new growth of hairs</td>
</tr>
<tr>
<td>16</td>
<td>Negative</td>
<td>—</td>
</tr>
<tr>
<td>23</td>
<td>Negative</td>
<td>Complete cure with new growth of hair</td>
</tr>
<tr>
<td>30</td>
<td>Negative</td>
<td>Complete cure with new growth of hair</td>
</tr>
</tbody>
</table>

Table I. — Clinical observations and parasitic burden (mites/cm²) in Notoedric rabbit mange.
IVERMECTIN AGAINST NOTOEDES CATI VAR. CUNICULI INFECTION

DISCUSSION

The present study demonstrates that 400 µg/kg body weight single injection of ivermectin is successful in clinical and parasitological cure of Notoedres cati var. cuniculi associated mange infection in rabbits. These findings are in accordance with Renukaprasad et al. (1989). However, Wright & Riner (1985) reported that a single injection of ivermectin of 400 µg/kg b.w. could not eliminate Psoroptic mange infection in rabbits. Ivermectin has no ovicidal effect (Pandey, 1989). Normally the eggs of Notoedres species hatch in four to five days (Gordon et al., 1943). The absence of mites from 7th day to the end of experiment after ivermectin treatment indicates that sufficient concentration of drug is available to kill any larvae hatching from the eggs. It has been suggested that drug persists in rabbit tissues sufficiently long to remove new generation of mites as the egg hatch (Pandey, 1989 and McKellar et al., 1992). These results suggest that the prolonged availability of ivermectin in the rabbits has a residual effect against mites (Pandey, 1989). The efficacy of ivermectin against the mange mite Notoedres cati var. cuniculi which were present in the keratin layer may be because of high concentration which is achieved in the skin (McKellar et al., 1992). It is concluded that a single subcutaneous injection of ivermectin of 400 µg/kg body weight could be used for successful elimination of mange in rabbits.

ACKNOWLEDGEMENT

Authors are thankful to Professor-cum-Head, Department of Veterinary Parasitology, PAU, Ludhiana, for facilities provided.

REFERENCES


Reçu le 4 mars 1995
Accepté le 25 septembre 1995