TOXIC EFFECTS OF CYPERMETHRIN IN FEMALE RABBITS

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ABSTRACT

The aim of the present study was to explore the fetotoxic effects of cypermethrin (CY) in female rabbits with low and high doses. For this purpose, 32 adult female rabbits were divided into four equal groups A, B, C and D. Rabbits of groups A, B and C were treated with different levels of CY at the dose rate of 25, 50 and 75 mg/kg body weight intraperitoneally, while the group D served as a control and was given equal volume of normal saline intraperitoneally. The clinical signs exhibited by the rabbits treated with CY included salivation, licking of different body parts, muscular tremors, ataxia and convulsions. There was a significant difference in the numbers of CL and number of fetuses which mean the early embryonic death and post implantation losses at the high dose. There were microscopic changes in the ovaries and uteri of animals treated with CY.

Key words: Toxicity, cypermethrin, rabbits.

INTRODUCTION

Cypermethrin is commonly used to control various pests, including moth pests of cotton, fruit and vegetable crops (Meister, 1992). It is also used for crack, crevice and spot treatment to control insect pests in stores, warehouses, industrial buildings, houses and apartments, greenhouses, laboratories, ships, railcars, buses, trucks and aircrafts. It may also be used in non-food areas in schools, nursing homes, hospitals, restaurants, hotels and food processing plants (Anonymous, 1989). It is being used in veterinary practice against ectoparasites.

Cypermethrin is toxic not only for insects but also for mammals (He, 2000; Barlow et al., 2001). The signs like muscular tremors, ataxia, weakness of limbs, convulsions, coma and death from respiratory depression have been reported in animals after ingesting high doses of cypermethrin, while its dermal contact in facial area may cause a subjective sensation of tingling or numbness (Sandhu and Brar, 2000). Cypermethrin is also a skin and eye irritant. Slight to severe skin irritation, decreased food consumption, body weight and absolute and relative gonad weights have been observed in rabbits treated with cypermethrin (Handerson and Parkinson, 1981).

Besides generalized toxic effects of cypermethrin, decreased number of implantation sites, number of viable fetuses and weight gain of fetuses in rabbits treated with cypermethrin have been reported (Elbetieha et al., 2001). Exposure of pregnant laboratory animals to cypermethrin can affect their offspring. Few abnormalities of organs and skeletal muscles have also been observed in offsprings of pregnant rabbits fed cypermethrin (Anonymous, 1989).

Although enough information is available about cypermethrin toxicity from different regions of the world, yet little work has been accomplished on cypermethrin toxicity especially related to fetotoxicity under local conditions. Therefore, to protect the innocent farmers and their animals from the toxic effects of cypermethrin on reproduction, this project was designed with the objectives to investigate clinical signs/symptoms of cypermethrin toxicity and gross and histopathological lesions related to fetotoxicity in rabbits as a model.

MATERIALS AND METHODS

Experimental rabbits

A total of 32 adult female and 8 male rabbits of about the same age and free from any apparent clinical ailment were procured from local market. Their age was approximately one year and body weight was about 1 kg per animal. Female and male rabbits were kept separately in wire cages. Female rabbits were randomly divided into four groups i.e. A, B, C and D with eight rabbits in each group. These rabbits were maintained in cages with equal interval of light and dark i.e. 12 hrs each. The temperature for all these groups was maintained at 30°C. Fresh grass and green fodder was offered in the morning and evening, whereas fresh drinking water was provided around the clock. Experimental animals were acclimatized for five days.
Treatments

Estrous cycle of female animals was synchronized by injecting prostaglandin (Dalmazine, FATRO Pharma, Italy) intramuscularly 72 hrs before mating. Five days after mating rabbits of groups A, B and C were subjected to different levels of the cypermethrin (CY) @ 25, 50, and 75 mg/kg b. wt intraperitoneally, while the group D served as control to which equal volume of normal saline was injected intraperitoneally. Each group received four injections of respective treatment with 5 days interval i.e. the treatment was given on day 5th, 10th, 15th and 20th after mating. The experiment continued for 24 days.

Post treatment monitoring

The animals in each group were monitored for clinical signs and behavioral alterations twice daily. Body weight of all animals was recorded twice weekly. Four animals from each group were slaughtered on 12th day and the remaining animals were slaughtered on 24th day. After slaughtering of rabbits, the visceral organs, ovaries and uteri were examined for gross lesions. Ovaries of each animal were examined for the presence of corpus luteum (CL). Number of implantation sites and number of viable fetuses in the uterus were recorded. Tissue samples taken from ovaries and uteri were fixed in 10% buffered formalin and processed for the histopathological studies using routine method of dehydration and embedding in paraffin. Section of 5 micro meter thickness were cut, stained with hematoxiline and eosin (Lille and Fulmer, 1976) and examined for histopathological investigations.

Statistical analysis

Mean values (± SE) of various parameters for rabbits of four groups were computed. In order to ascertain the magnitude of difference among different groups, the data were analyzed statistically using two-way analysis of variance (Steel and Torrie, 1980). Duncan’s multiple range test was applied for multiple means comparison, where necessary.

RESULTS AND DISCUSSION

Pesticide exposure posses a serious risk to all domestic animals, environment and public health (Oheme and Mannala, 2001). In the present study, skin irritation and reduced feed intake, salivation and semisolid faeces were observed in cypermethrin (CY) treated rabbits in a dose dependent manner. Skin irritation has also been reported earlier (Handerson and Parkinson, 1981).

As observed in the present study, other researchers have reported indicators of digestive system disturb-
by the results of Rustamov and Abbasov (1994), who administered CY at 8 and 34 mg/kg body weight once daily for two months to immature male and female rats and observed that embryonic resorption in these rats was 20% at high dose and normal (10%) at low dose. Biernacki et al. (1995) have also reported embryonic resorption in CY treated rabbits. Shukla and Taneja (2002) found high rate of pre and post implantation losses in dose dependent manner in CY treated mice. In the present study, 8, 22.2 and 41% fetuses were found to be dead in group A, B and C, respectively, whereas no foetus was observed to be dead in group D. The possible reason for these embryonic or fetal losses may be the presence of increased connective tissue in the endometrium revealed in the microscopic study of uterine sections of the treated animals, which can interrupt ample blood supply to the fetus, resulting in low body weight gain or increased death rate in the fetuses.

Histologically, changes were observed in ovary and uterine tissue which were more pronounced at higher dose (Group C). Ovaries of rabbits of group C showed connective tissue proliferation in the cortex. There was glandular atrophy, congestion and sloughing of epithelium along with connective tissue proliferation in the uterine tissue, probably due to interference of CY with adenosine triphosphate (ATP) pathway. Inhibition of ATP leads to impaired energy utilization, leading to the damage of cells and reduction in their size, interruption of energy utilization pathway can lead to cell death and sloughing of epithelium (El-Toukhy and Girgis, 1993).

### REFERENCES


### Table 1: Effects of different levels of cypermethrin on number of corpora lutea on the ovaries and number of fetuses in the corresponding uterine horns

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of CL</th>
<th>No. of fetuses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right ovary</td>
<td>Left ovary</td>
</tr>
<tr>
<td>Day 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3.33 ± 0.99</td>
<td>5.33 ± 0.36</td>
</tr>
<tr>
<td>B</td>
<td>5.00 ± 0.39</td>
<td>5.00 ± 0.19</td>
</tr>
<tr>
<td>C</td>
<td>4.33 ± 0.88</td>
<td>5.33 ± 0.31</td>
</tr>
<tr>
<td>D</td>
<td>3.00 ± 1.30</td>
<td>4.00 ± 0.36</td>
</tr>
<tr>
<td>Day 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3.67 ± 0.76</td>
<td>4.33 ± 0.48</td>
</tr>
<tr>
<td>B</td>
<td>4.67 ± 1.33</td>
<td>5.00 ± 0.48</td>
</tr>
<tr>
<td>C</td>
<td>4.33 ± 0.52</td>
<td>4.33 ± 0.20</td>
</tr>
<tr>
<td>D</td>
<td>4.33 ± 0.82</td>
<td>4.33 ± 0.40</td>
</tr>
</tbody>
</table>

Values with different letters within a column differ significantly (P<0.05).