WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

EFFECT OF CYPERMETHRINE ON DIFFERENT ORGANS OF MUS MUSCULUS (LINNAEUS, 1758)

Rayan Das

Research Scholar, Department of Zoology
RKDF University, Ranchi

ABSTRACT:

Cyper-methrin, a synthetic parathyroid insecticide, finds use in a variety of fields, including agricultural, household pest control, and public health. This study has monitored the oestrus cycle of experimental and control rats Mus musculus (L.) using vaginal cytology for a period of three months. When comparing the various concentrations, there are noticeable variations in the weights of the adrenal glands, thymus, liver, and body. The high concentration group has the leanest body mass index (BMI), while the control group has the highest. In summary, investigating the dose-dependent response of cypermethrin on the oestrus cycle of Mus musculus provides valuable insights into the pesticide's reproductive toxicity and helps elucidate its risk to wildlife populations.

Introduction :

The reproductive cycle, or oestrus cycle, is a set of physiological changes that most animals' female reproductive organs go through. A lot of things may affect the oestrus cycle. Harmful medication effects on development and reproduction are a major concern for many. Environmental chemicals include things like pesticides, endocrine disruptors, organic solvents, heavy metals, and cigarettes. The danger that chemicals pose to women, both at work and in their daily lives, is on the rise. Cyper-methrin, a synthetic parathyroid insecticide, finds use in a variety of fields, including agricultural, household pest control, and public health. Mammals and rodents like rats have reproductive physiology that includes the reproductive cycle, also called the oestrus cycle. Many physiological and hormonal changes occur over this phase, which typically lasts around four or five days. According to Das et al. (2016), cypermethrin reduces female reproductive activity in rats by interfering with the ooestrous cycle and ovarian biomarkers via increased oxidative stress. Objective of this study is to investigate the specific effects of CYP marker on primary, secondary and accessory sex organs. The study analysed the pre- and post-disease conditions of these organs, including changes in size, structure, function, and hormonal sensitivity and will also identify early dose of CYP marker of organ damage for preventative measures.

Materials and methods:

Mus musculus (L.) animal model was selected, commonly called rats or mice, for this study. Kept animals under typical laboratory settings with regulated lighting, humidity, and temperature (12-hour light-dark cycle). Given water and normal laboratory chow as needed. Divided the animals into different experimental groups i.e. control group and experimental group with 60 females and 10 male rats in five cages which were selected randomly to minimize bias. Administered cypermethrin orally to the experimental group(s) using an appropriate vehicle (e.g., corn oil) to dissolve the compound. Monitored the oestrus cycle of experimental and control animals using vaginal cytology for a period of three months. Interpreted the findings in the context of existing literature and drew conclusions regarding the effect of oral cypermethrin administration on the oestrus cycle. The uterus, fallopian tube, and ovary were washed with normal saline to remove connective tissue and blood, and then kept in Bouin's solution for potential future histological study. In this study, the pesticide doses were determined by taking the mouse oral LD50 value of technical grade cypermethrin (650 mg/kg body weight) and applying it as an aqueous suspension. To achieve the necessary concentrations of 1.38, 2.76, and 5.52 mg/kg body weight (bw), or 1/476th, 1/238th, and 1/119th of the LD50 value of the aqueous suspension of CYP, respectively, an emulsifiable concentrate of CYP (10%) were bought and diluted in distilled water. In addition, the doses were modified based on the mice's body weight during the trial. The adult female mice were splited into four groups at random: one control group, and three treatment groups, each with ten mice. Before treatment begins, each mouse's body weight were noted. Each mouse in the 2nd, 3rd, and 4th groups got 1.38 (low dosage), 2.76 (medium dose), and 5.52 (high dose) mg CYP /kg bw in 0.1 ml distilled water, respectively. The control group received 0.1 ml distilled water per mouse.

Results and discussion:

Organismal weights of mice subjected to varying doses of a chemical are summarized in Table 1. When comparing the various concentrations, there are noticeable variations in the weights of the adrenal glands, thymus, liver, and body. The high concentration group has the leanest body mass index (BMI), while the control group has the highest. Brain weight does not vary much between the categories. The adrenal gland weight is much greater in

the high concentration group when contrasted with the other groups. When comparing the two groups, the liver weights in the medium concentration group are significantly higher than those in the high concentration group. In terms of heart weight, there is little variation between the categories. In terms of lung weight, there is little variation between the categories. In terms of kidney weight, there is little variation between the categories. A lower thymus weight was observed in the high concentration group compared to the low concentration group. In terms of spleen weight, the groups with medium concentrations have the greatest and the groups with high concentrations the lowest, respectively. The weight of the testes does not vary much between the categories.

Table 1. Effect of Cypermethrin on different parts of the mice body

Weight (gm)	**Control**	**Low concentration**	**Medium concentration**	**High concentration**
Body weight	471.1 ± 15.4	413.9 ± 19.8	422.8 ± 28.7	411.2 ± 23.3
Brain	0.48 ± 0.03	0.51 ± 0.03	0.46 ± 0.04	0.49 ± 0.02
Adrenal glands	0.006 ± 0.002	0.009 ± 0.002	0.009 ± 0.001	0.110 ± 0.002
Liver	2.65 ± 0.17	2.66 ± 0.05	3.11 ± 0.29	2.41 ± 0.27
Heart	0.33 ± 0.02	0.32 ± 0.01	0.32 ± 0.04	0.31 ± 0.04
Lung	0.17 ± 0.07	0.16 ± 0.03	0.16 ± 0.03	0.13 ± 0.05
Kidneys	0.28 ± 0.02	0.29 ± 0.03	0.27 ± 0.04	0.29 ± 0.04
Thymus	0.13 ± 0.03	0.19 ± 0.04	0.15 ± 0.03	0.11 ± 0.06
Spleen	0.19 ± 0.06	0.14 ± 0.03	0.21 ± 0.02	0.12 ± 0.01
Testes	0.35 ± 0.02	0.36 ± 0.02	0.32 ± 0.02	0.37 ± 0.03

- *Body Weight*:
  - The body weight of mice decreases as the cypermethrin concentration increases.
  - Control: 471.1 grams ± 15.4
  - High concentration: 411.2 grams ± 23.3
- *Brain Weight*:
  - Brain weight shows slight variations but no clear trend with cypermethrin concentration.
  - Control: 0.48 grams ± 0.03
  - High concentration: 0.49 grams ± 0.02
- *Adrenal Glands Weight*:
  - Adrenal glands weight increases significantly at high cypermethrin concentration.
  - Control: 0.006 grams ± 0.002
  - High concentration: 0.110 grams ± 0.002
- *Liver Weight*:
  - Liver weight increases at moderate cypermethrin concentration.
  - Control: 2.65 grams ± 0.17
  - Moderate concentration: 3.11 grams ± 0.29
  - High concentration: 2.41 grams ± 0.27
- *Heart Weight*:
  - Heart weight remains relatively stable across different concentrations.
  - Control: 0.33 grams ± 0.02
  - High concentration: 0.31 grams ± 0.04
- *Lung Weight*:
  - Lung weight decreases slightly at high cypermethrin concentration.
  - Control: 0.17 grams ± 0.07
  - High concentration: 0.13 grams ± 0.05
- *Kidneys Weight*:

- Kidney's weight shows minor fluctuations but no clear trend.
- Control: 0.28 grams ± 0.02
- High concentration: 0.29 grams ± 0.04

➢ *Thymus Weight*:

- Thymus weight decreases significantly at high cypermethrin concentration.
- Control: 0.13 grams ± 0.03
- High concentration: 0.11 grams ± 0.06

➢ *Spleen Weight*:

- Spleen weight varies, but there is no consistent trend.
- Control: 0.19 grams ± 0.06
- High concentration: 0.12 grams ± 0.01

➢ *Testes Weight*:

- Testes weight remains relatively stable across different concentrations.
- Control: 0.35 grams ± 0.02
- High concentration: 0.37 grams ± 0.03

Ding et al. (2017) found that in female offspring, controlled ovarian hyperstimulation (COH) may cause aberrant follicle growth and maturation, which may result in irregular oestrus cycles, delayed pubertal transition, and poor pregnancy outcomes.

Conclusion

Following cypermethrin exposure, immediate disruptions in the oestrus cycle, such as alterations in vaginal smear patterns or hormone levels, may occur. These acute effects provide initial insights into the pesticide's impact on reproductive function but may only represent transient changes. In summary, investigating the dose-dependent response of cypermethrin on the oestrus cycle of *Mus musculus* provides valuable insights into the pesticide's reproductive toxicity and helps elucidate its risk to wildlife populations. Understanding how varying doses of cypermethrin influence reproductive parameters is essential for safeguarding ecosystem health and informing sustainable pesticide management practices.

REFERENCES :

1. Das, T., Pradhan, A., Paramanik, A. and Choudhury, S.M. (2016). Ameliorative role of zinc on cypermethrin-induced changes in haematological parameters and oxidative stress biomarkers in rat erythrocytes. *Toxicol. Environ. Health Sci*. 8: 234–246.
2. Ding, J., Tan, X., Song, K., Ma, W., Xiao, J., and Zhang, M. (2017). Effect of controlled ovarian hyperstimulation on puberty and estrus in mice offspring. *Reproduction*.154(4):433-444.