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Investigation of Estrogenic and Androgenic Activities of Tetramethrin in Vitro and in Vivo: Anti-estrogenic Activity of Tetramethrin

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Tetramethrin is one of the pyrethroid insecticides, is used worldwide for indoor pest control, which provides the potential for environmental exposure to tetramethrin and its attendant human exposure. Environmental chemicals that are hormonally active could adversely affect the reproductive and endocrine system. However, little is known about the hormonal activities (in particular, estrogenic and androgenic activities) of tetramethrin. Therefore, we examined the estrogenic and androgenic activities of tetramethrin by an uterine Calbindin-D9k (CaBP-9k) gene expression assay and an uterotrophic assay, and Hershberger assay respectively. And also, estrogen receptor (ER) protein levels were measured in tetramethrin-treated rat uteri. Northern blot analysis showed the reductions of uterine CaBP-9k mRNA levels in response to permethrin as well as co-treatment of tetramethrin with E2. In the uterotrophic assay using 18-day old female SD rats, subcutaneous treatment of tetramethrin (5 to 800 mg/kg/day) for 3 days led to statistically-significant reductions in absolute and relative uterine wet weights at all doses tested. Moreover, tetramethrin showed the inhibiting effect on E2-induced uterine weights, and statistical significance at certain doses. In addition, tetramethrin reduced absolute and relative vaginal wet weights, and also inhibited the increases of vaginal weights by E2. Meanwhile, tetramethrin showed no androgenic and anti-androgenic activities in the Hershberger assay. Based on our data, tetramethrin might disrupt the endocrine system in female rats but not male through anti-estrogenic activity.

Keyword : Tetramethrin, Anti-estrogenic activity, CaBP-9k, Uterotrohic assay, Hershberger assay