

Analyse the interaction of Combined-pesticide

Xiaoxiao SONG

School of Public Health, Kunming Medical College. Yunnan 650031. P. R. China

Abstract

Objective: To identify the interaction of reproductive hormone, thyroid hormone and immunological function in rats after exposure to combined pesticides of cypermethrin and methylparathion. Its purpose is to provide scientific evidence to identify, evaluate and control the sub-risk and risk assessment of pesticides.

Method: In this study, 2-month-old Wistar rats are divided randomly into 8 groups according to the factorial design (3 factors and 2 levels). Each group is force-fed the 1/30LD₅₀ of cypermethrin equivalent dose of methyl-parathion (cypermethrin is 0.23mg/kg and methyl-parathion is 8mg/kg) once two days for 30 days. The control group is force-fed vegetable seed oil. Pesticides are dissolved in vegetable seed oil. The rats are killed after the one month treatment and the viscera relative weights are measured. The serum genital hormones that are Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH), Estradiol (E₂) and Testosterone (T), the serum thyroid hormone including Triiodothyronine (T₃), Tetraiodothyronine (T₄) and Thyroid stimulating hormone (TSH), IgG and IgA level are measured by using Radioimmunoassay (RIA). Lymphocyte translation rates and antibody grainy cell phagocytosis rates, phagocytosis index and composite index are measured by the mid-stream blood. The change of rats' weight is analyzed via generalized estimating equations (GEE) and mixed linear model and the order is sex > cypermethrin > methylparathion.

Results:

- a) Regarding immunological function, we find the interaction of combined pesticides is antagonistic effect in Lymphocyte translation rates and IgA. Using of cypermethrin and methylparathion separately can decrease Lymphocyte translation rates and the serum level of IgG.
- b) Regarding thyroid hormone, the level of T₃ can decrease and that of T₄ can show the trend of increasing on exposure to methylparathion.
- c) Regarding the reproductive hormone, the effect of E₂ in female rats is synergism effect. The pesticides of cypermethrin can increase the level of E₂ reaching 1.44 times on the

condition of using methylparathion, while the pesticides of methylparathion can increase the level of E2 amount to 1.21 times on condition of cypermethrin. The level of FSH can go up on exposure to methylparathion. The level of serum E2 in male can increase on exposure to pesticides of cypermethrin.

- d) The interaction of combined pesticides is antagonistic effect in the relative weight of kidney ovary and the pesticide of cypermethrin can reduce the relative weight of epididymis. The interaction of combined pesticides is additive-effect in other signs.
- e) The correlation coefficient of thyroid hormone and reproductive hormone is 0.53363. The correlation coefficient of thyroid hormone and immunological function is 0.589456. The correlation coefficient of reproductive hormone and immunological function is 0.841428.
- f) It is sex, using pesticides of cypermethrin alone and combined pesticides that have effect on the development weight of rats.

Conclusion: From data in the experimentation, we can infer that E2 is a sensitive sign in the reproductive hormone, especially in female rats. The combined pesticides make it increase and the interaction is synergistic effect. The serum FSH level on the exposure to methylparathion can be affected. All results indicate that these two pesticides perhaps belong to EDCs and have estrogen-like effect. The female rats are sensitive to combined pesticides. In the thyroid hormone, the level of T3 can decrease and that of T4 can show the trend of increasing on exposure to methylparathion. We find that the immunological function of rats is suspended by combined pesticides. Especially the effect of lymphocyte translation rates and IgG level in serum are synergism. It indicates that these three systems have partial independency and stabilization. The relationship between them only is represented in active bio-substance(such as E2、FSH and T3). Our results suggest that the weight of rats can be affected by exposure to combined pesticides of cypermethrin and methylparathion.

Key word Combined-pesticides; Cypermethrin; Methylparathion; Hormone; Immunological Function; Interaction