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EMBRYONIC DEVELOPMENT IN MICE FOLLOWING CYHALOFOP-BUTYL EXPOSURE DURING GAMETOGENESIS: A DOSE-RESPONSE STUDY

Ana Carolina Nogueira Martinhago[1*], Andriele Regina Dultra[1], Rafael Alonso Salvador[1], Ozana Kethilen Fernandes[1], Bruna de Araujo[1], Beatriz Zen Schlindwein[1], Maria Eduarda Vieira[1], Fernanda Goldoni[1], Larissa Benvenutti[1], Carlos Vaz[1], José Roberto Santin[1]

[1]*Universidade do Vale do Itajaí, Brasil.* * carolina-tn@hotmail.com

INTRODUCTION

Cyhalofop-butyl (Cia-b) is a selective post-emergence herbicide widely used in rice production. Despite its environmental prevalence, little is known about its reproductive toxicity in mammals. Most toxicological data derive from aquatic species. This study aimed to evaluate the impact of Cia-b exposure during gametogenesis on embryonic development in B6D2F1 mice.

MATERIAL AND METHODS

Sixty female B6D2F1 mice were randomly assigned to four groups (n = 15/group): control (Naive), and three experimental groups receiving oral gavage of Cia-b at 0.1 mg/L, 1.0 mg/L, or 10.0 mg/L for 19 consecutive days. After superovulation and mating, two-cell embryos were collected on Day 2 and cultured in vitro until Day 5. The blastocyst formation rate was calculated for each group. A chi-square test was used for global comparison, and pairwise comparisons were analyzed using three correction methods for multiple testing: Bonferroni, Holm-Bonferroni, and Benjamini-Hochberg False Discovery Rate (FDR). The study was approved by the Animal Research Ethics Committee of Univali (Protocol 009/2024).

RESULTS

Blastocyst formation rates on Day 5 were 100.0% (Naive), 94.9% (0.1 mg), 96.4% (1.0 mg), and 94.1% (10.0 mg). The global chi-square test did not reveal a statistically significant difference ($p = 0.124$). Pairwise comparisons suggested a trend toward reduced blastocyst development in the 0.1 mg and 10.0 mg groups versus control ($p = 0.070$ and $p = 0.038$, respectively), but these did not remain significant after correction for multiple comparisons. The lowest adjusted p-values were observed with the Benjamini-Hochberg method (adjusted $p = 0.210$), while the Bonferroni and Holm-Bonferroni corrections yielded more conservative results (adjusted $p \geq 0.229$). No comparison reached statistical significance under any of the correction methods.

CONCLUSIONS

Oral exposure to Cyhalofop-butyl during gametogenesis in female B6D2F1 mice did not significantly impair in vitro blastocyst formation under the tested conditions. While minor decreases in blastocyst rates were observed in treated groups, especially at the lowest dose, these differences were not statistically robust after applying multiple testing corrections. These findings suggest that Cia-b has limited embryotoxic effects on early murine development; however, further molecular analyses are needed to evaluate potential subclinical or gene expression changes related to oxidative stress, apoptosis, and immunotoxicity.

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