Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 43 2025

Colloquium on Applied Sciences 2 2024
8-14 July 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Effects of Coconut Water (*Cocos nucifera*) On Embryonic Development and Deformities of Zebrafish (*Danio rerio*)

Nurfaqihah Imamah Abd Rahim[a], Razif Dasiman[b*]

Structured Abstract

Background: Coconut water is a popular drink among locals, including pregnant women, due to its many health benefits. While coconut has been shown to benefit expectant mothers by reducing morning sickness symptoms and increasing hemoglobin levels, its impact on fetal development, including potential toxicity, is still unknown. This study examines the impact of tender coconut water (TCW) and mature coconut water (MCW) on zebrafish embryonic development, survival, morphology, and potential developmental deformities.

Methods: Zebrafish embryos were exposed to TCW and MCW concentrations ranging from 31.25 to 500 µg/mL for approximately 5 days. Embryos were observed and recorded at 24-hour intervals until 120 hours using a DinoEye camera attached to an inverted microscope. The study measured survivability, cumulative mortality, hatchability, morphology, and developmental defects. Statistical analysis, including ANOVA, paired t-tests, unpaired t-tests, and probit linear regression, were used to determine the LC50 value and significant differences between treatment groups (P value < 0.05).

Results: The embryo-toxicity test revealed a concentration-dependent relationship, with higher concentrations being more toxic to zebrafish embryos. TCW had a higher cumulative mortality rate than MCW after 120 hours of observation. The calculated LC50 probit values for TCW and MCW are 176.81 µg/mL and 839.99 µg/mL, indicating higher toxicity in TCW. At highest concentration, both samples cause developmental defects, including yolk sac edema and pericardial edema. However, TCW showed more abnormalities than MCW. The hatchability rate was unaffected by sample concentration, with most embryos were hatched during normal hours (72 hpf).

Conclusion: These findings indicate that TCW may contain compounds that are harmful to zebrafish embryos. Therefore, pregnant women should exercise caution when consuming TCW. This study establishes a baseline for pre-clinical toxicity studies on coconut water, highlighting the increased risk of developmental defects and reduced fetal survival when exposed to TCW.

Keywords: Coconut water, *Cocos nucifera*, Zebrafish embryo-toxicity test

*Correspondence: razifdasiman@uitm.edu.my

[a] School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

[b] Department of Basic Sciences, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam, Selangor