

Effect of Monosodium Glutamate (MSG) On Embryonic Development and Deformities of Zebrafish (*Danio Rerio*)

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Structured Abstract

Background: Monosodium glutamate (MSG) is a common ingredient in many recipes. This powder, made from L-glutamic acid, is white or off-white in colour and has a faint, peptone-like odour. Chefs and home cook value MSG for its unique 'umami' flavor, which improves food taste. Some people prefer MSG over salt because it contains less sodium. The European Food Safety Authority (EFSA) established the Acceptable Daily Intake (ADI) for MSG based on research linking excessive consumption to health issues like Chinese restaurant syndrome. MSG can have a negative impact on infants' developing digestive systems. The study aimed to assess the impact of MSG brands A and B on the development, survival, and deformities of zebrafish embryos.

Methods: A toxicity test was performed on zebrafish embryos to see how different concentrations of MSG affected them. A zebrafish embryo toxicity test evaluated the impact of different MSG concentrations. These concentrations were prepared using serial dilution from a stock solution. Zebrafish embryos were observed in 24-well plates for five days, from 24 hpf to 120 hpf, using an inverted microscope and DinoEye attachment. Statistical analysis, including ANOVA and paired t-tests, determined the LC50 value and compared significant differences between treatment groups ($P < 0.05$).

Results: The embryotoxicity test showed a dose-dependent relationship, with higher concentrations leading to increased toxicity in zebrafish embryos. At 120 hpf, Brand B MSG had the highest cumulative mortality rate (40%), while Brand A had no cumulative mortality at all. Zebrafish embryos from both brands hatched earlier than expected, with no developmental defects observed from 24 to 120 hours post fertilisation (hpf).

Conclusion: Brand B may be more harmful to zebrafish embryos than brand A, according to these findings. Both brands resulted in earlier hatchability. Pregnant women should consider their MSG consumption. This study offers new insights for future research on the developmental defects and foetal toxicity linked to MSG exposure during pregnancy.

Keywords: *Danio rerio*, embryotoxicity, Monosodium glutamate

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