

## Toxicity Assessment of *Lactococcus lactis* IO-1 Used in Coconut Beverages against *Artemia salina* using Brine Shrimp Lethality Test

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### Abstract

**Background and objective:** Plant-based fermented foods containing favorable microorganisms have been used to improve diets. Starter microorganisms may produce toxic compounds that are hazardous to consumers. Brine shrimp lethality test is a convenient and appropriate assay to check toxicity of samples. The aim of this study was to investigate toxicity of pasteurized coconut beverages at 70°C, 80°C and 90°C for 25, 15 and 5 min, respectively, and unpasteurized coconut beverages fermented by *Lactococcus lactis* against *Artemia salina* nauplii.

**Material and methods:** After extraction of coconut beverages fermented by *Lactococcus lactis* using methanol, cytotoxicity was assessed using (lethality concentration). Newly 10 hatched *Artemia salina* nauplii were transferred into various concentrations (in replicates) of the fermented sample extracts. After 24 h, survived *Artemia salina* nauplii were counted and lethality concentration was assessed. The brine shrimp lethality test was used to investigate sample toxicity at various doses from 1 to 500 µg ml<sup>-1</sup> at various time intervals.

**Results and conclusion:** The fermented extracts included low larvicidal potential against *Artemia salina* nauplii. Correlations were reported between the extract doses and percentage mortality of nauplii brine shrimp. The pasteurized fermented extracts were less toxic and cheaper. Interestingly, starter culture, fermentation, thermal treatment and time contributed to breaking down of hydrolysable tannins and larger polyphenolic compounds, producing smaller compounds with lower toxicity responses in brine shrimp lethality test. The four probiotics beverage extracts included non-cytotoxic activity as presented by low mortalities in brine shrimp lethality test. In conclusion, these extracts can be used to justify probiotic production of beverages.

**Conflict of interest:** The authors declare no conflict of interest.

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## 1. Introduction

Coconut (*Cocos nucifera* Linn.) is one of the perennial plants cultivated for their pharmacological benefits. It belongs to family of Arecaceae [1,2]. Scientific reports have revealed that coconut beverages include a wide range of pharmacological effects e.g. antithrombotic, anti-bacterial, antioxidant, immunostimulatory, hypolipidemic, cardioprotective, antidiabetic and antiviral effects [3,4]. Fermented

coconut beverages are famous in Asian countries, especially South-East Asian countries. People in these regions commonly believe that consumption of traditionally prepared fermented plant beverages includes potentials to cure most illnesses [5].

Fermented foods are rich in bioactive microorganisms, which offer health benefits to their consumers and enhance