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Evaluation of Cytotoxic Effects in Aqueous Herbal Extracts Obtained from *Psidium guajava, Garcinia quaesita* and *Cinnamomum verum* Using Brine Shrimp Assay

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Background: World Health Organization indicates that 70-80% of the world's population rely on plant based traditional medicine but their toxicological properties have not been explored adequately. Brine shrimp lethality assay is used in preliminary assessment of toxicity. Clarkson's toxicity criterion classifies plant extracts with $LC_{50} \geq 1000$ ppm; non-toxic, LC_{50} 500–1000 ppm; low toxic, LC_{50} 100-500 ppm; medium-toxic, and extracts with $LC_{50} \leq 100$ ppm are very toxic. Leaves of *Psidium guajava* (Guava), *Garcinia quaesita* (Garcinia) and barks of *Cinnamomum verum* (Cinnamon) are selected as those plant extracts are known to have anti-diabetic properties and can be incorporated into functional food and nutraceuticals.

Objectives: To evaluate cytotoxicity of leaves of *Psidium guajava* (Guava), *Garcinia quaesita* (Garcinia) and barks of *Cinnamomum verum* (Cinnamon) using Brine shrimp assay.

Methods: Aqueous extracts of guava and garcinia leaves and cinnamon-barks were freeze-dried. Serial dilution of garcinia, cinnamon (10, 100, 250, 500, 750, and 1000 ppm) were prepared. In addition, dilutions of guava were prepared up to 5000 ppm with 1000 intervals. Brine shrimps were hatched in artificial sea water with dry *Artemia salina* cysts. After incubation, the nauplii were separated into petri-dishes with 4 mL of artificial seawater. Dimethyl sulfoxide (DMSO) and artificial sea water were used as positive and negative control, respectively. LC_{50} were calculated with the number of dead nauplii at 24-hours using probit regression analysis with SPSS software.

Results: None of the brine shrimp nauplii died with guava up to 1000 ppm. Average of 28.5 nauplii died from 2000 to 5000 ppm. The numbers of dead nauplii in ascending order of 10, 100, 250, 500, 750, and 1000 ppm garcinia concentrations were 22, 26, 30, 28, 30 and 30, respectively. In cinnamon, it was 03, 04, 09, 09, 12 and 16, respectively. All the nauplii died in the positive control and all nauplii alive in the negative control. LC_{50} of leaves of guava, garcinia and barks of cinnamon were 1660, 2.2, and 1642 ppm, respectively.

Conclusions: This study reveals that aqueous extracts of guava-leaves and cinnamon-bark are non-toxic, whereas garcinia-leaves demonstrated toxicity in brine shrimp assay.

Keywords: *Artemia, Cinnamomum, Garcinia, Lethal Dose 50, Toxicity tests*

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