

Nutritional composition, phytochemicals and acute toxicity of herbal mixture (lemon, apple cider, garlic, ginger and honey) in Zebrafish embryo and Wistar rat

ABSTRACT

This study was aimed to provide the reference frame for the safe dose design of polyphenol-rich herbal mixture, which consist of lemon, apple cider, garlic, ginger and honey (PRM) for the future efficacy study. Prior to this, the nutritional composition was first conducted and the identification of metabolites that present in PRM was determined using proton nuclear magnetic resonance (¹H-NMR) spectroscopy. The acute toxicity of the PRM was then evaluated in zebrafish embryo and Wistar rats following The Organisation for Economic Co-operation and Development (OECD) guidelines. The PRM nutritional composition and sugar profile showed it was high in carbohydrate, ash and protein and the main sugar is fructose. It also contains metabolites such as fructosefuranose, lactic acid, ascorbic acid, acetic acid, cycloalliin, pyruvate, 5- hydroxymethylfurane, α- and β-glucose. From the zebrafish embryo acute toxicity result, the lethal concentration, LC₅₀ of PRM was at 487.50 µg/mL. Meanwhile, in Wistar rats' model, no lethality was observed in the group treated with PRM at the end of the study (14 days). No changes were also observed from the behavioural and appetite as well as the biochemical parameters (AST, ALT, total cholesterol, triglyceride, LDL, HDL, total protein and creatinine) of the treated group. Therefore, the safe dose for PRM can be up to 2000 mg/kg b.w. in Wistar rats and below 487.50 µg/mL in zebrafish embryo model.

Keyword: Toxicity; Nuclear magnetic resonance; Animal model; Proximate analysis