

## **Antioxidant activity, nutritional and physicochemical characteristics, and toxicity of minimally refined brown sugar and other sugars**

### **ABSTRACT**

Minimally refined brown sugar (MRBS) is a brown sugar derived from sugarcane that has a low glycemic index. This study aimed to determine and compare the antioxidant contents and nutritional and physicochemical properties of MRBS, refined sugar (RS), and brown sugar (BS). In addition, the toxicity of these sugars was evaluated via in vitro cytotoxicity method and by using a zebrafish model. Results showed that MRBS was better than the two other sugars because it has a lower moisture content and higher ash content. The contents of potassium and manganese of MRBS were higher than those of the two other sugars. Surprisingly, MRBS also contained selenium, which was not detected in RS and BS. The major phenolics in MRBS are 4-hydroxybenzoic acid, chlorogenic acid, protocatechuic acid, trans-Ferulic acid, and apigenin. All sugar solutions and their antioxidant-containing extracts were not cytotoxic to 3T3-L1 adipocytes.

**Keyword:** Antioxidant properties; Bioactive compounds; Food safety; Health; Phenolic compounds; Sugar