

## Water extract of brewers rice induces antiproliferation of human colorectal cancer (HT-29) cell lines via the induction of apoptosis

### ABSTRACT

#### OBJECTIVE:

Brewers' rice, a mixture of broken rice, rice bran, and rice germ, is a rice by-product in the rice industry. The present study was designed to investigate the in vitro cytotoxicity of the water extract of brewers' rice (WBR) against colorectal cancer (HT-29) cells.

#### MATERIALS AND METHODS:

The cytotoxicity activity was determined using the lactate dehydrogenase (LDH) assay. The morphological changes of the HT-29 cells were observed using inverted light and fluorescence microscope. Cell cycle and apoptotic cell death analyses were performed using flow cytometer. Besides that, the selected polyphenolic compounds in WBR were also analyzed using ultra performance liquid chromatography (UPLC).

#### RESULTS:

The cytotoxicity results showed that WBR was more cytotoxic (but not significantly different) in HT-29 cells compared to the MBR, with IC<sub>50</sub> value of  $21.88 \pm 12.43$   $\mu\text{g/mL}$  and  $34.50 \pm 5.92$   $\mu\text{g/mL}$  for WBR and MBR, respectively ( $p > 0.05$ ). WBR-treated HT-29 cells displayed the typical characteristics of apoptosis, as visualized using inverted light and fluorescence microscope. WBR also significantly increased the number of early and late apoptotic HT-29 cells compared to control cells ( $p < 0.05$ ). Results from UPLC analysis demonstrated that ferulic acid ( $36.42 \pm 2.97$   $\mu\text{g/g}$ ) was found the highest level in WBR, followed by gallic acid ( $26.09 \pm 2.01$   $\mu\text{g/g}$ ) and p-coumaric acid ( $7.13 \pm 0.36$   $\mu\text{g/g}$ ). These phenolics are speculated to partially contribute to apoptotic cell death.

#### CONCLUSIONS:

Our results suggested that WBR derived from natural sources might represent a potential chemopreventive agent against colon cancer.

**Keyword:** Brewers' rice; Colon cancer; Cytotoxicity; Apoptosis; Polyphenolic compound