A new polyoxygenated cyclohexane and other constituents from *Kaempferia rotunda* and their cytotoxic activity

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The isolation of secondary metabolites from a methanol extract of *Kaempferia rotunda* yielded 12 compounds (1–12), including a new polyoxygenated cyclohexane compound, (−)-3-acetyl-4-benzoyl-1-benzyloloxymethyl-1,6-diepoxy-cyclohexane-2,3,4,5-tetrol (1). The structures of the isolated compounds were determined based on their spectroscopic data and comparison with references. All of the isolated compounds were tested for their cytotoxic activity against pancreatic (PSN-1) and breast (MDA-MB231) cancer cell lines. Compound 12 showed moderate cytotoxic activity against PSN-1 and MDA-MB231 without showing any cytotoxicity against the normal cell line, TIG-3.

**Keywords:** *Kaempferia rotunda*; Zingiberaceae; polyoxygenated cyclohexane; PSN-1; MDA-MB-231

1. Introduction

Natural products play an important role in the discovery of compounds that are used in the development of drugs for the treatment of human diseases. Through the screening and isolation of the secondary metabolites of medicinal plants, a lead compound can be discovered for the treatment of certain diseases such as cancer. The identification of medicinal plants with significant cytotoxic potential that are useful in the development of cancer therapies has gained increasing importance over the past decade, and research in this field is expanding. Thus, a significant amount of cancer research has been performed to discover new therapeutic agents that lack the toxic effect associated with current therapeutic agents (Newman & Cragg 2007). Paclitaxel from *Taxus brevifolia* and vinblastine and vincristine from *Catharanthus roseus* are successful examples for clinical uses for the cancer therapy (Nobili et al. 2009).

*Kaempferia rotunda* is a medicinal and ornamental plant that exhibits wide range of pharmaceutical activities such as antibacterial, antiproliferative, antimutagenic, antioxidant and antiplatelet (Jantan et al. 2008; Priya et al. 2008; Atun et al. 2013; Kabir et al. 2013). This plant belongs to the Zingiberaceae family and is widely distributed in south-east Asia including Indonesia, Thailand, India and so on. Its rhizomes have been used as an Indonesian folk medicine for the treatment of abdominalgia, anorexia and cancer (Medicinal Herb Index 1995). Phytochemical studies have indicated the presence of volatile, lectin, flavanone and cyclohexane diolipoxide type of compounds and cetroxipoxide in the *K. rotunda* rhizome as main constituent.

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