In vitro cytotoxicity assay of Sauropsis androgynus on human mesenchymal stem cells

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\textit{Sauropsis androgynus} is a well-known Indonesian medicinal herb that is used extensively to increase human breast-milk production. However, many studies have also revealed side effects associated with bronchiolitis obliterans in Taiwan and Japan. The present study evaluated the \textit{in vitro} toxic effects of \textit{S. androgynus} on human mesenchymal stem cell culture derived from bone marrow (hMSCs-BM). This is the first report of a cytotoxicity assay of \textit{S. androgynus} extracts from Indonesia. After 72 hours of incubating cell cultures with varying concentrations of extracts (250–2500 mg L\textsuperscript{-1}), cytotoxicity was assayed by the reduction of 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) and reported in terms of cell viability. The apoptotic effects of the extract were determined by a terminal deoxynucleotidyl transferase-mediated dUTP-biotin nick end labeling (TUNEL) colorimetric assay. The \textit{S. androgynus} methanol extract from East Java, Indonesia, was less cytotoxic to hMSCs-BM with an IC\textsubscript{50} of 2450 mg L\textsuperscript{-1}, but it could inhibit cell viability via the apoptosis pathway. A sample extract of plants collected near Purwosari had the lowest hMSCs-BM viability percentage (37%), while the extract from plants collected near Surabaya Pusat had a cell viability of 75%. Further studies are required to investigate the metabolites in \textit{S. androgynus} that are highly correlated with its toxic effects.

**Keywords:** \textit{in vitro} cytotoxicity; \textit{Sauropsis androgynus}; human mesenchymal stem cells; apoptosis; safety assessment

\section*{Introduction}

\textit{Sauropsis androgynus} (L.) Merr. (family: Euphorbiaceae), commonly known as “katuk,” “sweet shoot leaves,” “star gooseberry,” or “pak wanban,” is a small perennial shrub between 0.7 and 1.3 m tall that is often found growing wild in many areas of Southeast Asia. The dark green leaves are between 2–6 cm long and 1.5–3 cm wide, have nutritive value, and contain biologically active constituents such as vitamins (e.g., $\alpha$-carotene, $\beta$-carotene, vitamin C, and vitamin E), phytosteroids, phenolic compounds, quercetin, and kaempferol (Agil 2000; Ching and Mohamed 2001; Miean and Mohamed 2001; Sripanidkulchai, Homhual, and Pocknapo 2005; Yu et al. 2006; Benjapak, Swatsitang, and Tanpanich 2008; Yang, Lin, and Kuo 2008; Andarwulan et al. 2010). The leaves of \textit{S. androgynus} have traditionally been used in Malaysia, Thailand, and Indonesia as food (Benjapak, Swatsitang, and Tanpanich 2008) and as an herbal supplement for increasing human breast-milk production (Bermawie 2004). The leaves of \textit{S. androgynus} also possess medicinal properties, containing antioxidants, antiobesity, and antibacterial agents.

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