IN VITRO ANTI-CANCER ACTIVITIES OF Pinus merkusii JUNGH. ET DE VRIESE BARK EXTRACT NANOPARTICLES ON HELA CELL LINE

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ABSTRACT

This research aimed to investigate the anti-cancer activities of Pinus merkusii bark extract nanoparticles on human cervical cancer cell line (HeLa). Pinus merkusii bark extract nanoparticles were prepared using ionotropic gelation method, then were characterized using particle size analyzer and screened for the phytochemical contents. The anti-cancer activities of Pinus merkusii bark extract nanoparticles against HeLa cells were evaluated for the cytotoxicity effect based on MTT assay, the cell cycle arrest by flowcytometry, apoptosis induction using Annexin V/PI binding methods, and, further, the p53 and caspase-9 expression with the help of immunocytochemistry staining. The results showed that Pinus merkusii bark extract nanoparticles have a size of 394.3 nm and phytochemical contents in the form of alkaloids, terpenoids, steroids, and saponins. Meanwhile, the Pinus merkusii bark extract nanoparticles were found to be cytotoxic to Hela cells with an IC$_{50}$ of 384.10 µg/mL. Pinus merkusii bark extract nanoparticles also caused cell cycle arrest at the G0/G1 phase and induced early apoptosis in the HeLa cells. Moreover, increased expression of p53 and caspase-9 was also observed. The results displayed a significant anti-cancer effect through cell cycle arrest and apoptosis induction in HeLa cells, suggesting that Pinus merkusii bark extract nanoparticles might have therapeutic potential for cervical cancer.

Keywords: HeLa, Pinus merkusii, nanoparticles, cytotoxicity, apoptosis