

## **Satureja bachtiarica Bunge Induce Apoptosis via Mitochondrial Intrinsic Pathway and G1 Cell Cycle Arrest**

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**Abstract :** *Satureja bachtiarica* Bunge is a perennial medicinal plant belonging to the Lamiaceae family and endemic species in Iran. *Satureja bachtiarica* Bunge with the local name of Marzeh koochi is edible vegetable use as flavoring agent, anti-bacterial and to relieve cough and indigestion. In this study, the anti-cancer effect of *Satureja bachtiarica* Bunge on the MDA-MB-231 cell line as an Breast cancer cell model has been analyzed for the first time. *Satureja bachtiarica* Bunge was extracted using different solvents in the order of increasing polarity. Cytotoxicity activity of hexane extract of *Satureja bachtiarica* Bunge (SBHE) was observed using MTT assay. Acridine orange/Propidium iodide staining was used to detect early apoptosis; Annexin-V-FITC assay was carried out to observe the detection of cell-surface Phosphatidylserine (PS), with Annexin-V serving as a marker for apoptotic cells. Caspase 3/7, 8 and-9 assays showed significantly activation of caspase-9 where lead intrinsic mitochondrial pathway. Bcl-2/Bax expressions and cell cycle arrest were also investigated. SBHE had exhibited significantly higher cytotoxicity against MDA-MB-231 Cell line compare to other cell lines. A significant increase in chromatin condensation in the cell nucleus was observed by fluorescence analysis. Treatment of MDA-MB-231 cells with SBHE encouraged apoptosis, by down-regulating Bcl-2 and up-regulating Bax, which lead the activation of caspase 9. Moreover, SBHE treatment significantly arrested MDA-MB-231 cells in the G1 phase. Together, the results presented in this study demonstrated that SBHE inhibited the proliferation of MDA-MB-231 cells, leading cell cycle arrest and programmed cell death, which was confirmed to be through the mitochondrial pathway.

**Keywords :** *Satureja bachtiarica* Bunge, MDA-MB-231, apoptosis, annexin-V, cell cycle

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