

Abstract

The rising incidence of colon carcinoma worldwide poses a significant challenge to public health due to its high morbidity and mortality rates. Conventional treatments such as chemotherapy and radiation often cause severe side effects and lead to resistance, underscoring the urgent need for novel, effective, and safer therapeutic agents. Bajakah (*Spatholobus littoralis* Hassk), a traditional medicinal plant native to Southeast Asia, has gained attention for its rich composition of bioactive compounds with potential anti-cancer properties. Despite its historical use in folk medicine, scientific validation of Bajakah's effects on colon cancer cells remains limited. This study aims to investigate the biomolecular effects of Bajakah extracts on colon carcinoma cell models. The methodology involves extraction of Bajakah, followed by in vitro treatment of colon cancer cells to assess cytotoxicity, apoptosis induction, and modulation of key oncogenic pathways using molecular assays while comparing the bajakah treatment with a standard chemotherapy agent (Cisplatin). Bajakah (*Spatholobus littoralis* Hassk.) extract exhibited a high total phenolic content (68.49–91.70 mg GAE/g) and demonstrated dose-dependent cytotoxic effects against HT29 colorectal cancer cells, with an IC₅₀ of 0.5 mg/mL. Cell viability and scratch assays revealed significant inhibition of cell proliferation and migration following treatment with Bajakah extract, with greater effects observed at higher concentrations. Quantitative RT-qPCR analysis showed downregulation of the anti-apoptotic Bcl-2 gene in Bajakah-treated cells, while Bax expression showed minimal changes. In contrast, cisplatin treatment, particularly at 50 µM, markedly increased Bax expression while suppressing Bcl-2, resulting in the highest Bax/Bcl-2 ratio and indicating strong activation of the mitochondrial apoptotic pathway. In conclusion, the bajakah extract shows a significant dose dependent manner as the extract concentration increases. The extract successfully increases the bax/bcl-2 ratio, proofing its potential as an antioncogenic drug due to its phenolic content ability to induce apoptosis by increasing the bax genes. Similarly, the cisplatin also shows a dose dependent manner in both viability and % wound closure analysis yet still a stronger effect compared to the crude bajakah extract.

Keywords: Bajakah, *Spatholobus littoralis* Hassk, colon carcinoma, phytopharmaceutical, anti-oncogenic.