Anticancer Activity of Dried-Pericarp Water Extracts of *Camellia japonica* L. Fermented with *Aspergillus oryzae* through Regulation of IGFBP-2/mTOR Pathway in Head and Neck Squamous Cell Carcinoma Cells

Eugene Cho, Da Hye Jeong, Hyo Eun Beak, Geon Ung Jo, Hyeon Seok Kim, Chan Jin Oh, Jae kwang Kim, Hyoun Woo Kim*

Jeollanamdo Forest Resources Research Institute

Abstract

This study aimed to investigate the anticancer activity of dried-pericarp water extract of fermented C. japonicus (CJ). The dried-pericarp water extracts of CJ were fermented using Aspergillus oryzae and Saccharomyces cerevisiae at 30°C and 35°C. The anticancer activities of both water extracts fermented at 30°C and 35°C using A. oryzae against FaDu cells were remarkably changed compared with unfermented dried-pericarp water extract of CJ, which has no anticancer activity. Cleaved-PARP, caspase 3, and apoptotic cells stained with annexin V/PI were significantly increased by treatment with A. oryzae extracts fermented at 30°C. The insulin-like growth factor-binding protein 2 (IGFBP-2) protein level and mTOR phosphorylation by A. oryzae fermented extracts (AOFE) were dramatically reduced, and the expression levels of IGFBP-2 and phosphorylated mTOR were significantly increased depending on the glucose concentrations in FaDu cells. These results suggested that the cell viability in AOFE were restored as the glucose concentrations increased. Based on these results, the anticancer effect of AOFE was achieved through inhibition of the IGFBP-2/mTOR signaling pathway. These results suggest that AOFE may be a potential treatment for head and neck cancer.

Result

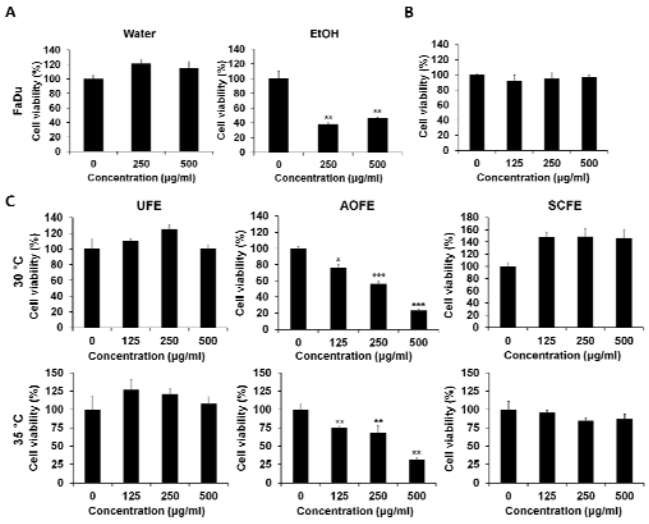

Figure 1. The effects of AOFE on the cell viability of head and neck cancer cells.

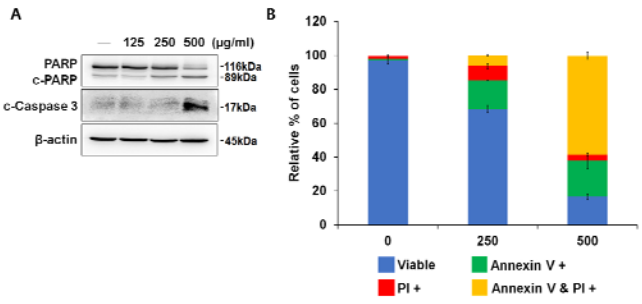

Figure 2. AOFE induces apoptosis in head and neck cancer cells.

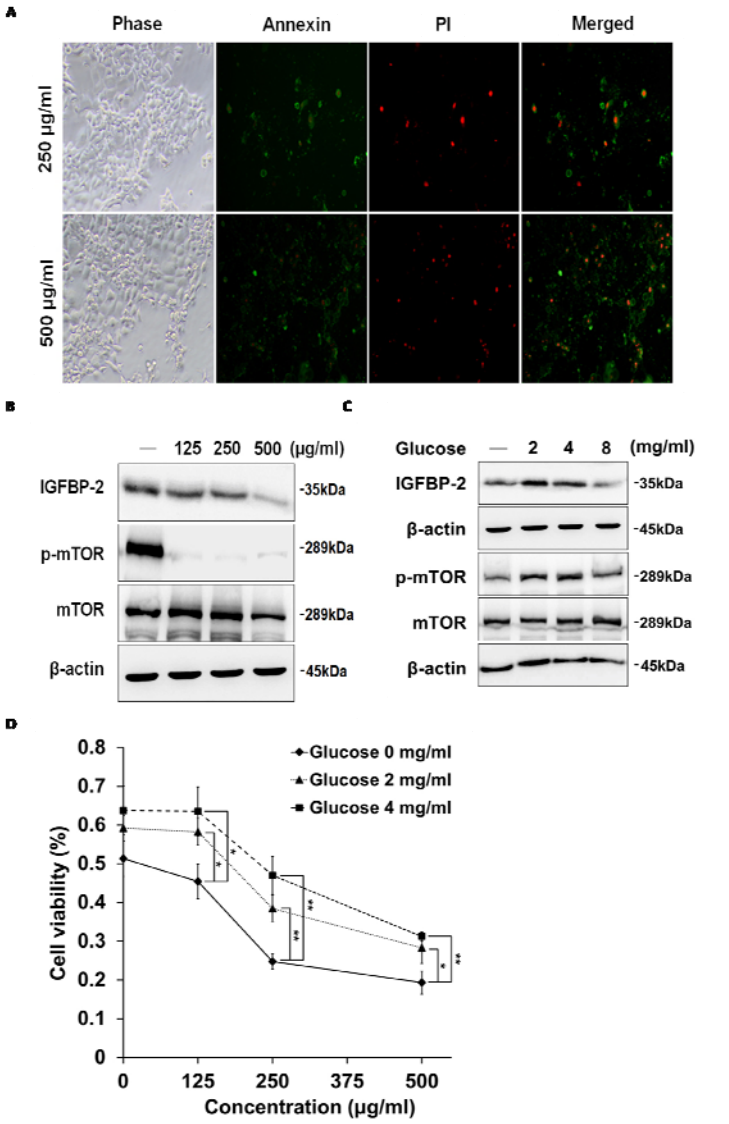

Figure 3. AOFE induces apoptosis through decreased expression of IGFBP-2.

Conclusion

IGFBP-2 acts as an oncogene, and the decrease in cell viability by AOFE treatment may be attributed to the possibility that the expression of IGFBP-2 may be regulated by AOFE treatment. IGFBP-2 is positively associated with tumor growth and progression, and AOFE exhibits anticancer effects by reducing the expression of IGFBP-2. Therefore, AOFE appears to be a promising candidate for the treatment of head and neck cancer.

Acknowledgement

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