Antiproliferation and Apoptosis of the Crude Extract of *Andrographis paniculata* Nees, on Human Oropharyngeal Cancer Cells (KB) *In Vitro*

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**ABSTRACT**  *Andrographis paniculata* Nees. has a surprisingly broad range of pharmacological effects for centuries and has not been associated with any major side effects. The *Andrographis paniculata* extract (APE) and its main diterpenoid components have been found to be able to inhibit cancer cell proliferation, induce cell cycle arrest and promote apoptosis in different types of human cancer cell lines. However, there have been very limited studies on the anti-proliferative activities and the underlying mechanisms of APE in oropharyngeal cancer. The aim of this study is to evaluate the effects of APE on the molecular mechanisms for antiproliferative activity and induction of apoptosis in human oropharyngeal cancer cells (KB).

The antiproliferative effect of APE against KB cancer cells was determined by colorimetric assay. The morphology of apoptotic nuclei was quantified using double fluorescent staining: DAPI and propidium iodide (PI). Cells were then visualized with fluorescence microscope. For each treatment group, 200-400 nuclei were counted. Data were expressed as percentages of fragment nuclei in viable cells. The degree of fragmentation was analyzed using a 1.5% agarose gel electrophoresis followed by an SYBER gold staining.

APE inhibited cell proliferation in a dose-dependent manner. Further, APE-induced cell death was associated with round cells, loss of cell-to-cell contact and fewer adherent cells when compared with control group. The IC₅₀ values for APE was 80 ± 3.7 μg/ml. Nuclear morphology in APE-treated cells exhibited chromatin condensation, and nuclear fragmentation as compared to control. Quantitative estimation of apoptotic nuclei in APE-treated cells dose 80 μg/ml for 48 hr. was 7.85 ± 0.9% (normal cell), 82.15 ± 7.5% (viable cells with apoptotic nuclei) and 10.0 ± 1.5% (necrosis or late apoptotic nuclei). The oligonucleosomal DNA fragmentation in agarose gel was observed in a dose-dependent manner when cells were treated with AP extract 40. 80 and 180 μg/ml for 48 hr.

These findings indicated that the APE exhibited the anti-proliferative effects via morphological changes typical of apoptosis including membrane blebbing, chromatin condensation, nuclear and DNA fragmentation. As apoptosis has become a therapeutic target in cancer research, the potential of APE may act as natural remedies combined with synthetic chemotherapeutic compounds that might improve efficacy and decrease side effects in oropharyngeal cancer.

**Key words:** *Andrographis paniculata* Nees., KB cells, Antiproliferation, Apoptosis, DNA fragmentation

**INTRODUCTION**

Since medicinal plants contain some good sources of bioactive compounds, recent research has also focused on natural products which possess anti-cancer properties. Such compounds are candidates for chemotherapeutic or chemopreventive agents against cancer which...