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Apoptosis stimulating effect of *Cladonia furcata* on breast cancer cells via PI3K/Akt/mTOR pathway

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Lichens are common and resistant organisms consisting of fungi and algae or cyanobacteria. Their components have shown antibacterial, antimutagenic, antiviral, antifungal, and anticancer properties. Therefore, this study aimed to determine the protective effects of *Cladonia furcata* on MDA-MB-231 breast cancer cells. The XTT assay, comet assay, and antioxidant assay were used. The protective effect of *C. furcata* on MDA-MB-231 cells was determined in control groups and treatment groups (10-200 µg/mL) with an LD_{50} value of 60 µg/mL. When treatment groups, *C. furcata* applied to MDA-MB-231 cells at increasing doses were compared with the control group, it was determined that there was a decrease in enzyme activity and an increase in the amount of MDA. DNA damage was revealed by the comet test. It was determined that the cells used PI3K/Akt/mTORmetabolic pathways while entering apoptosis. The anticancer effects of *C. furcata* were determined according to the dose-dependent deletion and expression on disappearing the band formation obtained from cell DNA. In our study, *C. furcata* extract showed beneficial effects on breast cancer cells by triggering apoptotic mechanisms at certain doses and led to the elimination of cells.

Keywords: MDA-MB-231, *Cladonia furcata,* XTT assay, Antioxidant test, TUNEL assay, Immunocytochemistry test, RAPD-PCR