

**Anti-proliferative effects of Ziziphus spina-christi and Phlomis russeliana leaf extracts on HEK293 and MCF-7 cells and evaluation of Bax and Bcl-2 genes expression level in MCF-7 cells**  
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**Background**

This study was carried out to investigate the effects of Phlomis russeliana and Ziziphus spina-christi leaf extracts on apoptosis in breast cancer MCF-7 cells.

**Methods**

Cell lines were divided into a control group and the groups exposed to 0.001, 0.01, 0.1, 1, and 10 mg/ml of Ziziphus spina-christi and Phlomis russeliana leaf extracts. Cell viability was quantified by the MTT assay. The expression of Bax and Bcl-2 genes was evaluated by Real-time PCR analysis. Statistical analysis was performed using ANOVA.

**Results**

HEK293 cell viability significantly increased in the groups exposed to 0.001, 0.01, and 0.1 mg/ml of Z.christi leaf extract and decreased in the group exposed to 10 mg/ml of P.russeliana leaf extract. MCF-7 cells viability significantly decreased in the groups exposed to 0.001, 0.01, 0.1, 1 and 10 mg/ml of Z.christi leaf extract and increased in the groups exposed to 0.001 and 0.01 mg/ml of P.russeliana leaf extract. The exposure of MCF-7 cells to 1 and 10 mg/ml of P.russeliana leaf extract also led to a significant decrease in cell viability. The cytotoxic effect of Z.christi was higher than P.russeliana leaf extracts on MCF7 cells. 1 mg/ml of Z.christi leaf extracts also significantly increased the expression level of Bax and Bcl-2 genes in MCF7 cells. Bcl-2 gene expression significantly increased in the group exposed to 10 mg/ml of P.ruseliana leaf extract.

**Conclusion**

Despite P.russeliana leaf extract, lower Z.christi leaf extract concentrations inhibited MCF-7 cells proliferation. Ziziphus spina-christi and phlomis russeliana leaf extracts mechanism of action has occurred through the Bax-independent apoptotic pathway on MCF-7 cells.