The effect of all trans retinoic acid and hydroalcoholic extract of dandelion on the survival of breast cancer cell lines and expression of tumor suppressor genes p53, KAI1 and NM23 and metastatic enzymes MMP-2 and MMP-9 and IL1β gene in them

Abstract

Background: Breast cancer is one of the most common cancers in women around the world and in Iran, which is associated with many deaths each year. One of the leading causes of death in this cancer is the invasion of cancer cells into other tissues and its rapid proliferation. Therefore, it seems necessary to find a way to deal with the rapid proliferation and tissue invasion of this cancer

Aim: In this study, we investigated the effect of dandelion or its combination with ATRA on the expression of genes involved in the proliferation and metastasis of breast cancer cells.

Materials and Methods: In this study, we used two breast cancer cell lines MCF-7 and MDA-MB-231. The experimental groups included: control, ATRA, dandelion and the combination of atra and dandelion. IC50 values of ATRA, dandelion or combination of Atra and dandelion was determined by MTT assay. Expression of p53, KAI1, NM23, MMP-2, MMP-9 and IL1β genes was assessed by real-time PCR.

Results: IC50 values for ATRA in MCF-7 and MDA-MB231 cell lines were 48 and 149 μM, respectively, and for dandelion were 1.69 and 5.9 mg / ml, respectively. The expression level of MMP-2 in ATRA, dandelion and combination with ATRA in MCF-7 cell line increased compared to control and decreased in MDA-MB231 cell line ($P<0.001$). In both cell lines treated with ATRA, dandelion and in combination, the expression of MMP-9 and IL1β was decreased compared to the control ($P<0.001$). In both cell lines treated with ATRA, dandelion and in combination, the expression of KAI1 was increased compared to the control ($P<0.001$). In MCF-7 cell line, NM23 expression was

decreased in all three groups of ATRA, dandelion and combination with ATRA compared to control ($P<0.001$). In MDA-MB231 cell line, NM23 expression decreased in ATRA and combination with dandelion groups compared to control, but increased in dandelion group ($P<0.001$). In MCF-7 cell line, p53 expression increased in all three groups of ATRA, dandelion and combination compared to control, but in MDA-MB231 cell line, p53 expression increased only in dandelion group ($P<0.001$).

Conclusion: According to the data of this study, for the first time it was found that dandelion or its combination with ATRA increased the expression of p53 and KAI1 and simultaneously decreased the expression of IL1β and MMP-9 in malignant breast cancer cells MCF-7 and MDA- MB231 can affect proliferative and metastatic processes in these malignant cell lines.

Key words: Breast cancer, ATRA, Dandelion, Metastasis, Tumor suppressor genes