

# The Effects of Co-administration of *Frangula alnus* and *Rhamnus frangula* Extract on Breast Cancer Cells in Cell Culture

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**Abstract:** The most common cause of death in the world is cancer due to its prevalence in the world, particularly breast cancer. The aim of this study was to investigate the cytotoxic effects of hydroalcoholic extract of *Frangula alnus* and *Rhamnus frangula* on MCF7 cells in selective medium. In this laboratory-experimental study, MCF7 cells were divided into control, and cells exposed to 0.001, 0.01, 0.1, 1 and 10 mg/ml of hydroalcoholic extract of *Frangula alnus miller* and of *Rhamnus frangula*. MTT assay was used to determine cytotoxic effects of the extract. Our results showed that coadministration of 10 mg/ml of hydroalcoholic extract of *Frangula alnus* and of *Rhamnus frangula* resulted in significant decrease in viability of MCF7 cells in cell culture. According to our finding, only coadministration of high dose of hydroalcoholic extract of *Frangula alnus* and *Rhamnus frangula* has cytotoxic effects on breast cancer cells in cell culture.

**Keywords:** *Frangula alnus*, *Rhamnus frangula*, MCF7, Viability

## 1. Introduction

*Frangula alnus*, commonly known as the alder buckthorn, glossy buckthorn, or breaking buckthorn is species of buckthorn, which are shrubs or trees that usually grow to a height of 1-10 meters, are widely spread in temperate and subtropical parts of the world. They are classified as belonging to the family Rhamnaceae but may be subclassified into either *Rhamnus* or *Frangula* genera [1] *Frangula alnus* for medicinal use is dried and stored for a year before. Traditionally, the berries and bark of buckthorn species have been used for stomach disorders. Buckthorn, especially its bark, is known to increase bowel movements in animals and people.[2] *Rhamnus frangula* is a plant which its common name is Alder Buckthorn, refers to the Rhamnaceae family. It grows in swamps and damp places, usually on moist heaths and damp open woods, preferring a peaty soil in Europe, including Britain, from Scandinavia south and east to N. Africa, the Urals and Siberia.[3] It is taken internally as a laxative for chronic atonic constipation and is also used to treat abdominal bloating, hepatitis, cirrhosis, jaundice, and liver and gall bladder complaint.[4]

MCF-7 is a breast cancer cell line isolated in 1970 from a 69-year-old Caucasian woman. [5] This cell line retained several characteristics of differentiated mammary epithelium, including the ability to process estradiol via cytoplasmic estrogen receptors and the capability of forming domes. [6], [7]

Researches show that some plant extracts have anticancer effects on cancer cells.[8] Researches show the effect of antioxidant from plants-based therapy and use in breast cancer.[9] Studies also suggest that the anticancer effects of black tea herbal extract on human cancer cell lines[10] and also ziziphus extract have been used in traditional Chinese medicine for treatment of cancer. [11] Plant-derived compounds have been an important source of several clinically useful anti-cancer agents.[12]

One research indicates plants from the family *Rhamnaceae* has cytotoxic effect on Hela and MDA-MB-468 tumor cells [13] and another study reported tumor-inhibitory activity of *Rhamnus frangula* extract against the P-388 lymphocytic leukemia in mice. [14]

Breast cancer is the most common invasive cancer in females worldwide. It accounts for 16% of all female cancers and 22.9% of invasive cancers in women. 18.2% of all cancer deaths worldwide, including both males and females, are from breast cancer. Complementary and alternative medicine use is common amongst cancer patients. In many surveys, herbal medicines are amongst the most commonly used group of treatments. Herbal remedies are believed by the general public to be safe, cause less side-effects and less likely to cause dependency. [15]

## 2. Materials and Methods

In this laboratory-experimental study, MCF7 cells were divided in to control, and cells exposed to 0.001, 0.01, 0.1, 1 and 10 mg/ml of hydroalcoholic extract of *Frangula alnus miller* and of *Rhamnus frangula*. MTT assay was used to determine cytotoxic effects of the extract. Data analysis was carried out using SPSS 20 and ANOVA.

## 3. Results

Our results showed that coadministration of 10 mg/ml of hydroalcoholic extract of *Frangula alnus* and of *Rhamnus frangula* resulted in significant decrease in viability of MCF7 cells in cell culture (Figure I).

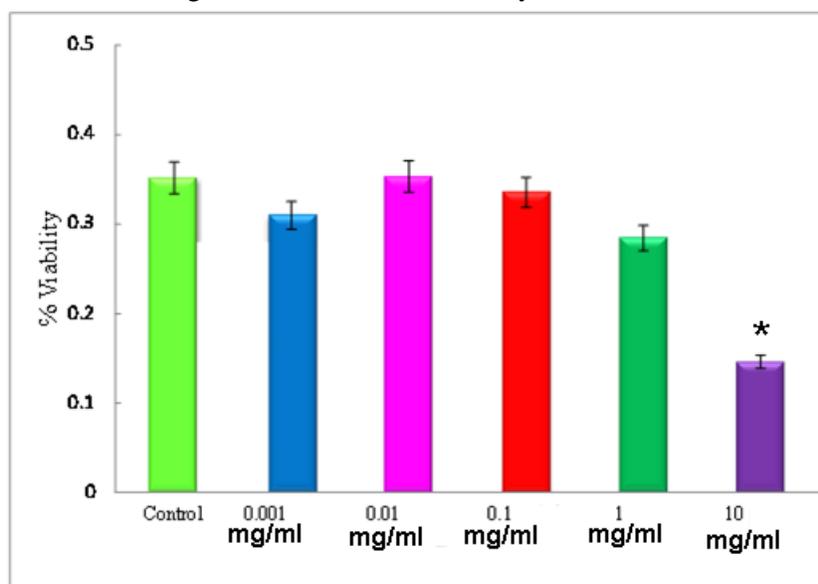


Fig. I. Viability of MCF7 cells exposed to different doses of hydroalcoholic extract of *Frangula alnus* and *Rhamnus frangula* compared to control group. \* indicates significant difference ( $P < 0.05$ ).

## 4. Discussion

In line with our findings, studies show that some plant extracts have anticancer effects on cancer cells.[8] Researches show the effect of antioxidant from plants -based therapy and use in breast cancer.[9] Studies also suggests that the anticancer effects of black tea herbal extract on human cancer cell lines[10] and also ziziphus extract have been used in traditional Chinese medicine for treatment of cancer. [11] Plant-derived compounds have been an important source of several clinically useful anti-cancer agents.[12]

The researches also indicate plants from the family *Rhamnaceae* have cytotoxic effect on Hela and MDA-MB-468 tumor cells. [13] Despite considerable reports on inhibitory effects of plants in *Rhamnus* genus on cancer cells, there is not considerable report on the effects of *Rhamnus frangula* growing in East-Iran on cancer cells, especially MCF7 cells. [14]

## 5. Conclusion

According to our finding, only co-administration of high dose of hydroalcoholic extract of *Frangula alnus* and *Rhamnus frangula* has cytotoxic effects on breast cancer cells in cell culture.

## 6. Acknowledgements

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