



## Alcohol Consumption and Nutrition Facts in Breast Cancer: From a Case

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### Keywords

Breast neoplasms, Diet, Alcohol drinking

### Introduction

Current scientific evidence questions the efficacy of population screening for breast cancer. According to several authors, selective screening must be made in women with an increased risk of breast cancer [1]. Some of the factors associated with this increased risk are alcohol consumption and inadequate *dietary* habits [2]. The relationship between alcohol consumption and cancer risk has been demonstrated in several studies, even in breast cancer [3]. A clinical case study/report that will help us to discuss the available scientific evidence supporting this relationship is presented. Other daily habits that might influence the evolution of this disease, so in addition to alcohol intake and diet habits might be useful in selecting women with higher breast cancer risk.

### Case Report

One month ago, a 53-year-old female reported a painful nodule in the right breast's external inferior quadrant, fixed in the subcutaneous tissue. No lymphadenopathy is present in the armpit. She has a personal history of chronic alcohol consumption of 100 mg per week in addition to regular weekend alcohol consumption. Her Body Mass Index is 33, and she follows a poor [poor diet], rich in fast food and scarce in vegetables. There is no family history of breast cancer, previous rheumatic diseases, early menopause or other risk factors for breast cancer.

A mammography is performed and a breast tumor is diagnosed. The biopsy confirms a moderately differentiated intraductal carcinoma. The extension study confirms a T2N0M0 tumor. Conservative surgery is performed. Treatment with selective estrogen receptor modulators is considered not necessary.

As a result of the psychological stress derived from the breast cancer process, the patient intensifies alcohol consumption, and this fact worsens the oncological follow-up including successive absences to scheduled appointments both in the hospital and in primary care. Her diet is uncontrolled, and she gains 15 kg. Five years after surgery, the tumor reappears in patient. She consults her GP when she presents an ulcerated nodule in the upper outer quadrant of the right breast. Complementary tests confirm the presence of tumor recurrence with metastases in the armpit chains. At the moment the patient is receiving neoadjuvant chemotherapy before a more aggressive surgery. The patient has agreed to receive psychological and medical help to eliminate dependence on alcohol and improve her diet.

### Discussion

In 1954, the Tecumseh Community Health Study investigated the relationship between alcohol consumption and the presence of breast cancer and no statistically significant relationship was found. However, further studies suggested a modestly positive association between these entities [4].

Din, et al. found an increase in breast cancer mortality among women who consumed alcohol (0.75-36.00 alcoholic drinks per week during the previous to diag-

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nosis year), although these women had lower mortality secondary to other causes [2]. This relationship has been described by more authors, evidencing a decrease in cardiovascular mortality in women who present breast cancer and consume one or more alcoholic beverages per day. On the contrary, this population group presents not only a higher mortality rate from breast cancer, but also a higher incidence of this disease [5].

Women who maintain alcohol consumption after treatment also have an increased risk of recurrence of breast cancer and/or the appearance of a second tumor [6]. The established relationship between alcohol consumption and breast cancer cells apoptosis has been demonstrated in at-risk women, as those carriers of BRCA1/2 gene mutation [7]. Alcohol consumption is behind 15% of breast cancer deaths among women [3], and increases its incidence in 11 per 1000 women up to the age of 75 years [8]. Although alcohol is the cause of 4% of breast tumors, its consumption might be beneficial in small quantities in some cases, as it can decrease cardiovascular mortality [9].

This relationship between alcohol consumption and the appearance, recurrence and aggressiveness of breast cancer can be explained through several pathophysiological mechanisms. First, alcohol alters the extracellular matrix and increases the mobility of tumor cells through modifications in its cytoskeleton. Alcohol allows an increase in endothelium permeability, facilitating the dissemination of the tumor. Alcohol enhances angiogenesis, and contributes to the production of oxygen radicals in tumor tissue, producing oxidative stress. Recent studies have pointed out that the ErbB2 receptor (belonging to the family of epithelial growth factor receptors) could be involved in the effects of alcohol on breast cancer. Patients who over express this gene have a greater sensitivity to the negative effects of alcohol on cancer, which establishes a possible therapeutic pathway [10]. Exposure to alcohol hyperstimulates the phosphorylation of a cascade of kinases that allows activation of the ErbB2 receptor, increasing the effects of alcohol. Another potential form of treatment of this type of tumors could be in the inhibition of this pathway [11].

The relationship between alcohol consumption and breast cancer is not common knowledge in society, and is not usually addressed in consultations to prevent this pathology. In a survey conducted in England, only 18% of the population identified alcohol consumption as a risk factor of breast cancer [12]. It has been shown that awareness through campaigns by the mass media is effective in improving this knowledge [13].

There might be a relationship between genetic susceptibility and response to alcohol, as functional variants in genes involved in alcohol metabolism carry different

exposure to carcinogenic acetaldehyde. Some studied examples are: polymorphisms in genes for alcohol dehydrogenase (*ADH*), aldehyde dehydrogenase (*ALDH*), cytochrome P450 2E1, and methylene-tetrahydrofolate reductase [14].

It is estimated that up to 1/3 of breast tumors in postmenopausal women could be avoided if lifestyle habits are modified. As already stated, alcohol consumption should be moderated, but there are other modifiable risk factors related to diet that need to be addressed [15]. Some other nutritional parameters have been associated with the appearance and/or recurrence of breast cancer.

For example, high red meat consumption is associated with an increased likelihood of breast cancer in postmenopausal women, especially if it is high in nitrite and heme iron [16]. However, the reduction in total protein intake has not been linked to a better prognosis in this disease. It will be necessary to add vegetable origin proteins in the diet to combine reduction in meat consumption with maintenance in the intake of proteins [17].

A lower risk of recurrence of breast cancer has been observed in women who follow a low-fat diet, especially if the menopause has already passed. The increase in dietary fat is related to the generation of a proinflammatory state with increased levels of IGF-I. The increase in IGF-I activity has been linked to the progression of breast cancer in several models. Other mechanisms by which fat accumulation favors tumor development include the production of other proinflammatory interleukins such as IL6 and a higher concentration of leptin, a molecule involved in tumor growth and the onset of metastases. The higher the concentration of adipose tissue, the greater the action of aromatase, also in the mammary fat tissue. This generates a higher concentration of estrogen that facilitates tumor expansion [18].

It could be interpreted that a diet rich in vegetables and fruits and low in fat could be related to a lesser recurrence of breast cancer. Dieli-Conwright, et al. claimed that women who have a higher consumption of vegetables after having experienced a breast cancer episode have a lower recurrence of it [18]. This may be because this type of diet produces a lower concentration of estrogen and because of the possible anticancer properties of vegetables.

No clinical trials have been found to support the efficacy of soy products or isoflavones in reducing the incidence and/or recurrence of breast cancer. The few studies available indicate that there is no risk for the consumption of these products, which may generate a reduction in the probability of presenting this type of tumor. Further research on this topic is needed to develop better recommendations [19].

Although theoretically calcitriol decreases the proliferation of tumor cells, observational studies have shown no association between vitamin D levels and events related to breast cancer [20].

The diet recommended as primary or tertiary prevention of breast cancer must have 45-65% of energy derived from carbohydrates, 10-35% of proteins (preferably of vegetable origin) and 20-35% of fats. Foods with high caloric density should be limited, and consumption of unprocessed and natural fiber should be encouraged. Alcohol consumption is not recommended [18].

Overweight or cyclic weight changes, alternating episodes of normal weight with others of overweight, are also related to the appearance of breast cancer [21]. This is why the combination of diet and physical exercise to maintain an adequate body mass index contributes to decrease the incidence of breast cancer and its recurrence. Patients should be encouraged to include in their routine at least 150 minutes of moderate exercise per week, or 75 minutes of vigorous physical exercise. This routine should include not only aerobic exercises, but also those that allow the development of muscle strength [22].

## Conclusions

The knowledge of risk factors associated with breast cancer is fundamental, since latest recommendations try to *focus* the screening in women at greater risk. Dietary factors and alcohol consumption may contribute to the onset of this type of tumors, so counseling in this field has to be provided to all women, especially if they have some other risk factor for breast cancer. A varied diet rich in fruits and vegetables and combined with physical exercise has been shown to reduce the incidence, recurrence and aggressiveness of breast cancer.

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