

EFFICACY OF WHEATGRASS JUICE AND SIDE EFFECTS OF CHEMOTHERAPY IN BREAST CANCER: A SYSTEMIC REVIEW

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Article Received on
15 Nov 2014,

Revised on 10 Dec 2014,
Accepted on 04 Jan 2015

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ABSTRACT

Breast cancer is dreaded disease which is most common in women after cervical cancer. The treatments of this malignancy have several side effects which can be worse some times during chemotherapy and some other treatment. Oxidative stress of the body increases during disease and the chemotherapeutic drugs also get its level high. To maintain the oxidative stress antioxidants are required in diet. Wheat grass juice is very rich in antioxidants, vitamins, amino acids and many trace minerals so its daily consumption in diet during chemotherapy to reduce the side effects.

KEYWORDS : Breast cancer, chemotherapy side effects, wheat grass juice.

INTRODUCTION

Breast cancer is frequently getting common female cancer in the world with an age-standardized incidence rate (ASR) of 39.0 per 100,000, which is more than double that of the second ranked cervical cancer (ASR=15.2 per 100,000).^[1] Male breast cancer is rare compared to female breast cancer, and has a different etiology and epidemiology.^[2]

Breast cancer for women in metropolitan cities is very common (Delhi, Mumbai, Chennai, Kolkata and Bangalore). A recent report predicted by the Indian Council of Medical Research that the number of breast cancer cases in India to rise to 106,124 in 2015 and to 123,634 in 2020. Breast cancer accounts for 22.2% of all new cancer diagnoses and 17.2% of all cancer deaths among women in India. Breast cancer in urban areas is three times higher than in rural parts of the India.^[3] The possibility of disease may be associated with lifestyle

factors such as westernization of diet and physical activity patterns, later age at marriage, age at first birth, reduced breastfeeding.

After detection of cancer cells there are several treatment options for women diagnosed with breast cancer that include surgery, chemotherapy, radiation therapy, hormonal therapy and targeted therapies. The most appropriate treatment depends on the woman's risk profile, stage of disease and effect of medicine.^[4]

CHEMOTHERAPY

Chemotherapy refers to the use of anti-cancer drugs to kill breast cancer cells. It is a most promising systemic therapy used to treat cancer. Chemotherapy treatment uses medicine to weaken and destroy cancer cells in the body, including cells at the original cancer site and any cancer cells that may have spread to another part of the body.^[5] Chemotherapy can be administered either before surgery (to shrink the tumor) or afterwards (to reduce the risk of recurrence). For breast cancer treatment, chemotherapy is given either by mouth or injected into a vein daily, weekly, or every 2-4 week cycles, but some may be used on a weekly basis.

In adjuvant and neo-adjuvant settings, they are usually given in combinations of two or more drugs. The plan of the therapy depends upon the particular condition. Single agent (one drug at a time) may be an option in treating breast cancer that has already spread to other areas.^[6]

Although responses to combination of chemotherapy are higher; but toxicity is also greater as compared to single agent chemotherapy treatment. In early-stage breast cancer, standard chemotherapy regimens lower the risk of the cancer coming back. In advanced breast cancer, chemotherapy regimens make the cancer shrink or disappear in about 30-60% of people treated.^[7]

CHEMOTHERAPY AND ITS SIDE EFFECTS

Cancer cells tend to grow and divide very quickly with no order or control. Because they're growing so fast, sometimes cancer cells break away from the original tumor and travel to other places in the body. Chemotherapeutic drugs used in treatment weaken and destroys cancer cells at the original tumor site and throughout the body. Most normal cells grow and divide in a precise, orderly way. Still, some normal cells do divide quickly, including cells in hair follicles, nails, the mouth, digestive tract, and bone marrow.^[8]

Chemotherapy also can unintentionally harm these other types of rapidly dividing cells, possibly causing chemotherapy side effects. While chemotherapy treatment shows several

side effects like myelotoxicity, hair loss, fatigue, vomiting, nausea, mouth and throat sores, low haemoglobin/low red blood cell counts/anemia, diarrhea, fertility issue, infection, memory loss, menopause and menopausal symptoms, nail changes, neuropathy (problems with hands and feet), taste and smell changes, vaginal dryness, weight changes. Chemotherapy also may cause other side effects that are less common, but more serious like bone loss/osteoporosis, heart problems and vision/eye problems.^[9]

CANCER TREATMENT AND OXIDATIVE STRESS

Oxidative stress is a phase where there is a disturbance in the balance between the reactive oxygen species (ROS) production and antioxidant defenses. Interestingly, early findings of the studies suggest that environmental factors, such as high psychological stress and poor nutritional profile (eg, low antioxidant and high fat intake), increase ROS production.^[10]

Oxidative stress plays a key role in the pathogenesis of many diseases, inflammation, kwashiorkor, seizure, Alzheimer's disease, Parkinson's disease, sickle-cell anemia, liver disease, cystic fibrosis, HIV, AIDS, infection, heart attack, stroke, diabetes and most importantly cancer.

Free radicals can cause toxicity and damage many components of cells including proteins, DNA and lipids by the production of peroxides. Various drugs are used during chemotherapy of different cancer. Chemotherapy drugs that cause high levels of "oxidative stress" are thought to rely in part on oxidative stress to kill cancer cells, but other effects of that oxidative stress may also be getting in the way of the effectiveness of the chemotherapy. This is because oxidative stress slows cell replication and chemotherapy relies on fast cancer cell replication to be effective because it is during replication that chemotherapy destroys cancer cells.^[11]

It has been shown by many studies that many of the chemotherapy drugs such as cisplatin, carboplatin doxorubicin, adriamycin etc can produce reactive oxygen species during their activity on the cancerous cell, which ultimately needs to increase levels of oxidative stress during chemotherapy.^[12]

WHEAT GRASS JUICE AND CANCER TREATMENT

Wheat grass belongs to poaceae family; wheatgrass juice (WGJ) is aqueous form of young shoot of common wheatgrass *Triticum aestivum* L. It also referred as green blood due to

containing high chlorophyll content. Wheat shoot contain more than 60% chlorophyll also known as the basis of plant life. While haemoglobin is the basis of blood.^[13]

Both chlorophyll and haemoglobin share a similar atom structure to create their respective molecules. Human blood and haemoglobin consist of iron, while in chlorophyll the metallic atom is magnesium. Magnesium found in the proton of chlorophyll is also essential and beneficial for about 30 enzymes of our body. Chlorophyll has demonstrated anti-cancer effects in animals and, in a recent study, proved valuable in preventing gastrointestinal absorption of a particular aflatoxin, a carcinogenic chemical produced by molds that grow on seeds, nuts and legumes.^[14] Wheatgrass contains all of the essential amino acids, mainly tyrosine, phenylalanine, alanine, aspartic acid, glutamic acid, arginine, serine which are helpful in providing a sufficient amount of protein in the body.

Wheatgrass juice is comparable in protein, vitamins and minerals to green vegetables such as broccoli and spinach, and also contains large amounts of chlorophyll.^[15] Wheat grass has a reputation for benefiting abnormal bleeding, and scientific data suggest validity of this notion. It has been shown to reduce rectal bleeding with ulcerative colitis.^[16] the requirement for transfusions to cure anemia in patients with thalassemia and myelodysplastic syndrome, and even the need for bone marrow stimulating drugs to counter the negative effects of chemotherapy on white and red blood cell production.^[17]

A study shows that breast cancer patients who take wheat grass juice during their chemotherapy reduced the side effects of chemotherapeutic drugs and they got better quality of life. These have been well documented for their ability to not only prevent cancer, but also treat the disease. Wheatgrass juice therapy is recommended for patients suffering from chronic diseases like Asthma, Atherosclerosis, Parkinson's disease, Joint pains, TB, Constipation, Hypertension, Diabetes, Bronchitis, Insomnia, Eczema, Sterility, Haemorrhage, Obesity and Flatulence.^[18]

CONCLUSION

Breast cancer is becoming number one killer in females. Therefore it has become an increasingly important problem of research all over the world. The implications for ROS regulation are highly significant for cancer therapy because commonly used chemotherapeutic drugs influence outcome of tumor through ROS modulation. Wheatgrass juice contains some extremely potent anti-cancer chemicals, including abscisic acid and laetrile. Recently discovered proteins, P4-D1 and D1-G1 are known to protect our cells from

radiation and carcinogen damage. Wheatgrass is full of vitamins, minerals and amino acids. The juice has many health benefits due to the high concentration of chlorophyll, Vitamins B-12, B-6, K & C, beta-carotene and anti oxidant enzymes. Moreover, the discovery of natural dietary substance that are able to predict the clinical response to pro-oxidant therapies is a crucial challenge to overcome to allow for the personalization of cancer therapies.

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