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## Review: Potential health benefit of broccoli

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### Abstract

Broccoli is an edible green plant that is classified in the Italica cultivar group of the species *Brassica oleracea*. Broccoli is an important vegetable among the Cole crops. It is a rich source of vitamins and minerals. Broccoli is an edible green plant that is classified in the *Italica* cultivar group of the species *Brassica oleracea*. They are rich in vitamin C, dietary fiber and also contain glucoraphin, sulforaphane, selenium and isothiocyanates. Broccoli is also an excellent source of indole-3-carbinol. These constituents present in broccoli are known to be very popular since they possess several anti-cancer properties and benefits. These anti-carcinogenic compounds have a wide variety of uses and benefits for the treatment of various diseases and disorders.

**Keywords:** Broccoli, health benefit, *Brassica oleracea*

### Introduction

Broccoli is classified as the italica cultivar group of the species *Brassica oleracea*. These vegetable are closely resembling cauliflower but usually green in color, introduced in India many years after cabbage and cauliflower and has gained popularity in short span of time. In fact, it contains more vitamin A than cabbage and cauliflower and the highest amount of proteins among the cole crops. It also contains anti-cancerous compounds and antioxidants. Broccoli is of two types: heading type and sprouting (green and purple) broccoli. Heading broccoli forms curd like cauliflower; while sprouting broccoli contains a group of green immature buds and thick fleshy flower stalk forming a head. Sprouting broccoli is more popular in India. They are rich in vitamin C, dietary fiber and also contain glucoraphin, selenium and isothiocyanates. Broccoli is also an excellent source of indole-3-carbinol. These constituents present in broccoli are known to be very popular since they possess several anti-cancer properties and benefits. These anti-carcinogenic compounds have a wide variety of uses and benefits for the treatment of various diseases and disorders. Broccoli is widely used in the treatment of several forms of cancer and also treats other neural disorders.

China is the top world producer of broccoli (FAOSTAT, 2009). Various types of vegetable crops are grown in Ethiopia under rain-fed and/or irrigation systems and this crop also included under major economically important vegetables produced and exported. (Alemayehu *et al.*, 2010). An optimum temperature requirement of broccoli is in the range of 18-24°C (Tindall, 1992; Grevsen, 1998) [11]. Growth processes show multiplicative relations with time and are thus more easily defined in terms of their relative rates (relative growth rate, net assimilation rate, etc. (Bjorkman and Pearson, 1998) [5]. Growth is a fundamental biological activity for broccoli. We can define the net growth rate of a plant as the difference between two opposing processes. One of these processes is the gross rate of gain in mass and the other the rate of loss in mass. The proportion of the new dry matter partitioned between the different plant parts and the duration of growth are important parameters to predict crop yield. The length of time for which a crop grows vegetative is an important determinant of the amount of vegetative material produced (Edwards *et al.*, 1981).

Broccoli is a rich source of sulphoraphane which is associated with reducing the risk of cancer (Guo *et al.*, 2001) [8]. The primary inflorescence was characterized by higher levels of dry matter, total nitrogen, vitamin-C, chlorophylls,  $\beta$ -carotene, carotenoids and by lower levels of nitrates. Broccoli is widely produced in many European and American countries. Broccoli is highly nutritious and has been considered as anti-cancerous food by the American Cancer society. It is a good source of vitamin A, calcium and Vitamin B<sub>2</sub> and it is a rich source of most minerals especially of potassium, phosphorus, sulphur and magnesium and micro elements.

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**Fig 1:** Broccoli

## Medicinal properties of broccoli

### 1. For heart disease

Broccoli was associated with a lower risk of having extensive abdominal aortic calcification, and linked with reduced calcium build-up in the heart and cardio protective effect such as inhibition of phase I enzymes and DNA adducts; induction of phase II antioxidant detoxifying enzyme, antioxidant function, induction of cell cycle arrest, inhibition of angiogenesis, and anti-inflammatory properties and thus considered as a potential functional food. Vasanthi *et al.*, (2011)

### 2. Cancer prevention

Broccoli contain lots of compound studied for their cancer fighting abilities. One of the top contenders is sulforaphane. Broccoli contain that depilates estrogens which usually cause cancer in the body research shows that broccoli is extremely suitable for preventing breast and uterus cancer

Broccoli sprouts are a rich source of several isothiocyanates (ITCs) that are well known class of cancer chemo preventive agents. They inhibit the size, multiplicity and progression of bladder cancer when the extracts are delivered selectively to the bladder epithelium through urinary excretion Munday R *et al.*, (2008) [9]. The sprouts of high Se-broccoli are protective against chemically induced mammary or colon cancer. The cancer-preventive effect of Se in high Se-broccoli extends to mammary cancer and the protective forms of broccoli against colon cancer include high Se-broccoli sprouts Finley *et al.* (2001) [6]. Selenium-enriched broccoli sprouts, when compared to the normal broccoli sprouts are found to be superior and induces apoptosis of prostate cancer cells, inhibits cell proliferation and decreases prostate-specific antigen secretion. The Se-enriched broccoli sprouts are used as an alternative selenium source for prostate cancer prevention and therapy Abdulah *et al.* (2009) [1]. Sulforaphane along with another phytochemicals such as indole-3-carbinol from broccoli have been useful for cancer chemoprevention. Considering their level of safety, expenditure and oral bioavailability, phytochemicals have great potential in cancer prevention T Shin DM, *et al.* (2010). They help protect cells from DNA damage, inactivate carcinogens, antiviral and antibacterial effects. They have anti-inflammatory effects, induce cell death (apoptosis), inhibit tumor blood vessel formation and tumor, cell migration NCI also mentioned that a concentrated form of sulforaphane found in broccoli has

been shown to reduce the number of acute lymphoblastic leukemia cells in the lab setting and have both preventive and therapeutic properties in solid tumors. Studies have shown that people who eat a diet rich in broccoli have a lower risk of some cancers our idea is that “Broccoli is unmatched in its anti-cancer effect”

### 3. Broccoli in the treatment of diabetes

Sulforaphane has the potential to induce some peroxisome proliferators-activated receptors that contributes to glucose homeostasis in hyperglycaemic and oxidative conditions. They also prevent nephropathy, diabetes-induced fibrosis and vascular complications. Sulforaphane is an excellent choice for supplementary treatment in type 2 diabetes Yanaka, A., *et al* 2009 [13] Broccoli sprouts are known to improve insulin resistance in type 2 diabetic patients and lessens its complications. This is one of the new approaches by the use of its antioxidant components. Bahadoran Z, *et al.* (2012) [3] Broccoli is rich in flavonoids that have anti-inflammatory and antioxidant effects that protect against diabetes. Flavonoids can result in reduced risk of incident diabetes. Galan, M. *et al.*, 2012. Consumption of antioxidants existing in broccoli leaves contributes to decrease damages to cells and, specially, accelerates restoration of pancreatic cells and subsequently increases insulin and decreases blood glucose. That was proved through treatment of streptozotocin induced diabetic rats with 100 mg/kg and 200 mg/kg body weight broccoli sprouts aqueous extract which leads to significant decrease in blood glucose and liver glycogen at 14th and 21st day Patel, *et al.*, (2013). Broccoli sprouts may improve IR in type 2 diabetic patients. It was proved through eighty-one patients-clinical study that consumption of fresh broccoli sprouts [10 g/day] for 4 week leads to significant decrease in serum insulin concentration and homeostasis model assessment of IR index Nazeri, P., *et al.*, (2012.) [3]

### 4. Cholesterol reduction

Broccoli help bind with bile acid in the digestive tract. This makes excreting cholesterol out of our body easy, and also reduced the blood LDL- cholesterol level.

### 5. Reduced Inflammation

Broccoli significant amount of omega 3 fatty acids, which are well known as inflammatory. Along this broccoli can also help people suffering from joint diseases like arthritis as broccoli contain sulforaphane, a chemical block that enzymes that can cause joint pain and destruction and led to inflammation

### 6. Bone health

Broccoli contain high level of both calcium and vitamin K, both of which important for bone health joint prevention of osteoporosis, broccoli is also full of other nutrient like magnesium, Zinc and phosphorus

### 7. Good for detoxification

Broccoli contain antioxidant properties that helps in overall detoxification of the body and also contain phytonutrient that helps in the body's detox process. That means that the body gets rids of unwanted contaminants. Broccoli also contain isothiocyanate, which helps in the detox process at the genetic level.

### 8. Good for skin diseases

Broccoli is a powerhouse of antioxidant and nutrient like vitamin C and minerals such as copper and zinc, broccoli helps in maintaining a healthy skin. This means it also protect the skin from getting infection as well as the neutral glow of your skin. Broccoli contain high amount of vitamin K, amino acid and folates, making it ideal for maintaining healthy skin immunity

### 9. Prevent pollution and toxin

When you eat broccoli, the phytochemical present in it, called glucoraphanin initiate a chemical reaction that attaches itself to the harmful benzene compound break it down and recharge the body to excrete it faster, before it gets the time to do damage on the cellular level.

### 10. Effect in neural disorders

Therefore, the several phytochemicals or compounds that are present in broccoli have been proved to reduce the risk of several major diseases including cancers, neurodegenerative disorders, diabetes etc.

### Conclusion

Among cruciferous vegetables broccoli is nutritious as well as medicinal properties because the have several phytochemicals or compounds are present in broccoli have been proved to reduce the risk of several not only major but effective against minor diseases.

### Reference

1. Abdulah R, Faried A, Kobayashi K, Yamazaki C, Suradji EW, *et al.* Selenium enrichment of broccoli sprout extract increases chemo sensitivity and apoptosis of LNCaP prostate cancer cells. *BMC Cancer*. 2009;9:414.
2. Alemayehu N, HoekstraD, Berheandm K Jaleta. Irrigated vegetable promotion and expansion: The case of Ada'a District, Oromia Region, Ethiopia. Improving productivity and market success of Ethiopian Farmers (IPMS) Case Study Report, International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia. Downloadable at: <http://cgspace.cgiar.org/handle/10568/1422>, accessed on February 11, 2014.
3. Bahadoran Z, Tohidi M, Nazeri P, Mehran M, Azizi F, *et al.* Effect of broccoli sprouts on insulin resistance in type 2 diabetic patients: a randomized double-blind clinical trial. *Int J Food Sci Nutr*. 2012;63:767-771.
4. Barati, S., Farahmandi, K., Khazdoozy, S., *Asian J. Biomed. Pharm. Sci*, 2013, 3(24).
5. Bjorkman T, Pearson KJ. High temperature arrest of inflorescence development in broccoli (*Brassica oleracea* var. *italica*) *journal of Experimental Botany*. 1998;49:101-106.
6. Finley JW, IP C, Lisk DJ, Davis CD, Hintze KJ, *et al.* Cancer-protective properties of high-selenium broccoli. *J Agric Food Chem*. 2001;49:2679-2683.
7. Galan MV, Kishan AA, Silverman AL. *Digest Dis. Sci*. 2004;49:1088-90.
8. Guo JH, Lee S, Chiang F, Chang C. Antioxidant properties of the extracts from different parts of broccoli in Taiwan. *Journal of food and Dry Analysis*. 2001;9:96-101.
9. Munday R, Mhaweche-Fauceglia P, Munday CM, Paonessa JD, Tang L, *et al.* Inhibition of Urinary bladder

carcinogenesis by broccoli sprouts. *Cancer Res*. 2008;68:1593-1600.

10. Patel V, Vimukta SJMPI. 2014;1:4-9.
11. Tindall HD. *Vegetables in the tropics*. The Macmillan Press Ltd. London, 1992.
12. Vasanthi HR, Shri Shri Mal N, Das KD. *Curr Med. Chem*. 2012;19:2242-51.
13. Yanaka A, Fahey JW, Fukumoto A, *et al.*, *Cancer Prev. Res*. 2009;2:353-60.