

Health Promoting Potential Benefits of Vaccinium Macrocarpon

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ABSTRACT

Cranberry as a valued potential medicine to ward off a variety of conditions like infections and also for treatment and by Native Americans there is a prolonged history of use. Cranberry is grown in bogs in drenched forests and open ponds and is a small evergreen shrub. Uropathogens are causing the urinary tract infections that are mostly seen in women. Cranberries are being used as a treasured medicine for the treatment of urinary tract infections. Due to its huge content of the flavonoids and phenolic acids cranberry grades highly among fruit in both antioxidant quality and quantity. It is helpful in improving general health and giving protection against illness.

Cranberry extract contains greater amount of polyphenols and organic acids and due to these constituents it is a powerful antioxidant. Therapeutically it has low toxicity and high biocompatibility and potentially used for the treatment and prevention of infectious diseases.

Urinary tract infections are mostly seen in women and caused by Uropathogens, cranberries have been used traditionally and potentially for the treatment of urinary tract infections. Due to antioxidant effects of cranberry extract it has been used as protective potential agent for human beings.

Keywords: Cranberry, Antioxidant, Infectious diseases, Urinary tract infections.

INTRODUCTION

Botanical name: Vaccinium Macrocarpon, Family name: Ericaceae, Common name: American cranberry, large cranberry, History: fruit. Cranberries consist of almost 80% water and 10% carbohydrates. Cranberry extract contains greater amount of polyphenols and organic acids and due to these constituents it is a

powerful anti-oxidant. Therapeutically it has low toxicity and high biocompatibility and potentially used for the treatment and prevention of infectious diseases. Urinary tract infections are mostly seen in women and caused by Uropathogens, cranberries have been used traditionally and potentially for the treatment of urinary tract infections.

Due to anti-oxidant effects of cranberry extract it has been used as protective potential agent for human beings. Cranberry extract is a powerful and potential anti-oxidant, and significantly has decreased the cell growth and proliferation of oral squamous cell carcinomas¹.

Habitat

Cranberry as a valued potential medicine to ward off a variety of conditions like infections and also for treatment and by Native Americans there is a prolonged history of use. The pilgrims were introduced to the berry by Native Americans, and we've had the pleasure of enjoying and using them ever since.

Plant description

Cranberry is grown in bogs in drenched forests and open ponds and is a small evergreen shrub. It needs wet, soggy, acidic soil and is barely grown in home gardens. The pink flowers are followed by small reddish-black berries in June or July².

Traditional uses of Cranberry fruit

1) Long established medicinal use of cranberry fruit by Native Americans was basically for the treatment of bladder and kidney ailments³.

2) Cranberry extract can also be functioning in the colon. Metabolites of proanthocyanidins could bind to colonic receptors and prevent binding of bacteria to uroepithelium as well as keep from its multiplication⁴.

3) Uropathogens are causing the urinary tract infections that are mostly seen in women. Cranberries are being used as a treasured medicine for the treatment of urinary tract infections. Cranberry extract has antibacterial action against Uropathogens such as *Escherichia coli*, *Staphylococcus aureus*, *Enterobacter aerogenes*, and *Klebsiella pneumoniae*⁵. It

decreases biofilm formation on uroepithelium cells⁶. The extract also arrests bacterial adherence to uroepithelium cells,⁷ which is essential if bacteria is to cause infection. Quinic acid inhibits bacterial growth when present in urine⁸.

4) *Helicobacter pylori* is a microbe that lives in the stomach of humans. It is responsible for the inflammation of the stomach mucosa and is believed to be the cause for peptic ulcer, stomach cancer, idiopathic thrombocytopenic purpura and mucosa-associated lymphoid tissue lymphoma. Cranberry extract is shown to suppress *H. Pylori* growth. Combination of extract with other food products or probiotics is important for more effective eradication of *H. pylori*⁹. It has also been shown to prevent adherence of bacteria to gastric cells¹⁰. Cranberry extract is potentially active against *Bacillus cereus* and *Clostridium perfringens*.

5) An overgrowth of *Candida albicans* would cause a fungal infection called candidiasis. A-type Cranberry proanthocyanidins (AC-PAC) prevent biofilm formation and decreases adherence of *C. albicans* to oral epithelial cells. Prolonged disclosure of AC-PAC resulted in separation of biofilms. AC-PAC also reduced secretion of cytokines, hence decreased inflammation. AC-PAC could be used in the inhibition and treatment of oral candidiasis¹¹.

6) Given the identified safety of cranberry juice and its effectiveness in the treatment of urinary tract infections¹².

7) Cranberries is the main originator of quercetin. Quercetin was found to prevent tumor growth through assays and also found that it reduced the growth of human breast adenocarcinoma, colon adenocarcinoma and chronic myelogenous leukemia cell lines¹³. Quercetin have the capability to reduce the cancer cell lines proliferation of breast, colon, pancreas,

leukemia^{14,15}. Proanthocyanins also produces ornithine decarboxylase prevention in the epithelial cells by cranberry¹⁶.

8) Cranberry also helps to reduce gum disease, diabetes, stomach pain, diarrhea, atherosclerosis, cholesterol etc. Pregnant women are more decumbent to urinary tract infection. Cranberry juice is most approved and safe to use.

There has been no witness of transfer of the effects of cranberry from the mother who has absorbed cranberry during her pregnancy to her fetus¹⁷.

Cranberry Phytonutrients

Cranberries have a very affluent chemical composition, they include the following: Phenolic Acids: hydroxybenzoic acids including vanillic acids; hydroxyl cinnamic acids including caffeic, coumaric, cinnamic, and ferulic acids Proanthocyanidins: hydroxybenzoic acid sepicatechin Anthocyanin's: cyanidins, malvidins, and peonidins Flavonoids: quercetin, myricetin, kaempferol, Triterpenoids : ursolic acid¹⁸⁻²⁰.

The vast majority of phytonutrients cited above have been studied for their antioxidant²⁰, anti-cancer^[18] properties. The most important compounds within cranberries that provide it with medicinal properties are proanthocyanidins which are a powerful form of antioxidants. Cranberries also consist of huge amount of vitamin C, which is an antioxidant. When the potentially active compounds of cranberry are imported within the body they, instantly begin to seek out free radicals and fight them off.

Pharmacological Actions of Phenolic compounds in Cranberry

1) Antioxidant properties of Cranberry

Due to its huge content of the flavonoids and phenolic acids cranberry

grades highly among fruit in both antioxidant quality and quantity²¹.

Cranberry extracts reportedly prevent oxidative processes including oxidation of low-density Lipoproteins^{22,23}, oxidative damage to neurons during accelerated ischemia²⁴, and inflammatory damage to the vascular endothelium²⁵. These antioxidant properties are likely to contribute to cranberry's overall antitumor activity.

2) Antiproliferative activity of polyphenolic Extracts

The polyphenolic compounds in cranberry can be expected to play an important role in chemoprevention. Studies of polyphenolic cranberry extracts have given *in vitro* evidence.

Cranberry extracts containing PACs and other flavonoid reportedly prevented ODC activity linked to cell proliferation in mouse epithelial (ME-308) cells²⁶. Characterization of an active sub fraction showed the presence of dimers and oligomers of catechin/epicatechin, monomeric catechin, and quercetin glycosides. Water-soluble cranberry polyphenolic extracts prepared from commercial cranberry powder reportedly prevented multiplication of several human tumor cell lines²⁷ including two oral (CAL27 and KB), four colon (HT-29, HCT-116, SW480, and SW620), and three prostate (RWPE-1, RWPE-2, and 22Rv1) cancer cell lines. In this study, anthocyanin and PAC sub fractions stopped multiplication but were less effective than the total polyphenolic extract.

3) Helicobacter pylori inhibition

H. pylori infection is greatly associated with the prevalence of gastric cancer²⁸ thus, prevention of these infections may decrease cancer risk. Antibacterial adhesion studies demonstrated that in

addition to preventing *E. coli* adhesion, cranberry components also stop adhesion of *H. pylori* to human gastric mucus²⁹. A randomized, double-blind placebo-controlled trial has given some clinical support for this finding, with significantly lower levels of *H. pylori* infection observed in adults consuming cranberry juice³⁰.

4) Inhibition of matrix metalloproteinase

Phytochemicals from whole cranberry fruit may have active actions against cancers by limiting processes involved in tumor invasion and metastasis, especially the expression of the MMPs involved in remodeling of the extracellular matrix[31]. Both whole cranberry polyphenolic extract and a cranberry PAC fraction prevented the expression of MMPs MMP-2 and MMP-9 in the DU145 prostate tumor cell line in adose-dependent specified way³². The crude extract was more effective, suggesting that other flavonoids in the fruit also contribute to the activity along with the oligomers.

Importance of cranberry in human health

Oligomeric proanthocyanidins, naturally occurring antioxidants mostly available in fruits, vegetables, nuts, seeds, flowers and bark, have been reported to contain a broad spectrum of biological, pharmacological and therapeutic activities against free radicals and oxidative stress. GSPE is highly bio-available and gives significantly greater protection against free radicals and free radical-induced lipid peroxidation and DNA damage than vitamins C, E and β -carotene. GSPE was also shown to demonstrate cytotoxicity towards human breast, lung and gastric adenocarcinoma cells, while promoting the growth and viability of normal human gastric mucosal cells³³.

DISCUSSION

Nature is the healer of all diseases. Cranberry extract has the powerful anti-oxidant properties and used therapeutically for the treatment of infectious diseases. It has the phenolic photochemical and used traditionally for the treatment of urinary tract infections. Photochemical from whole cranberry fruit may have active actions against cancers by limiting processes involved in tumor invasion and metastasis. The whole cranberry fruit possess the potentially active phenolic photochemical that perform the biological activities and it is most powerful anti-oxidant.

CONCLUSIONS

Cranberry fruit is used traditionally for the treatment of infectious diseases and it has powerful anti-oxidant properties and used for the treatment of cancer. Cranberry can be taken regularly with medicinal values. Cranberry can inhibit infections and it is anti-bacterial, antifungal, anti-inflammatory and anti-carcinogenic. It is helpful in improving general health and giving protection against illness. Phenolic phytochemicals have the potential to perform the biological activities. The dietary intake of cranberry fruit has positive impact on the health of human beings³⁴. Fruits are the natural anti-oxidants and used traditionally for the treatment of various diseases³⁵. Phenolic phytochemicals are present in fruits and vegetables, which help to protect blood vessels and heart and polyphenols prevent inflammation and swelling³⁶.

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Figure 1: Cranberry Fruit

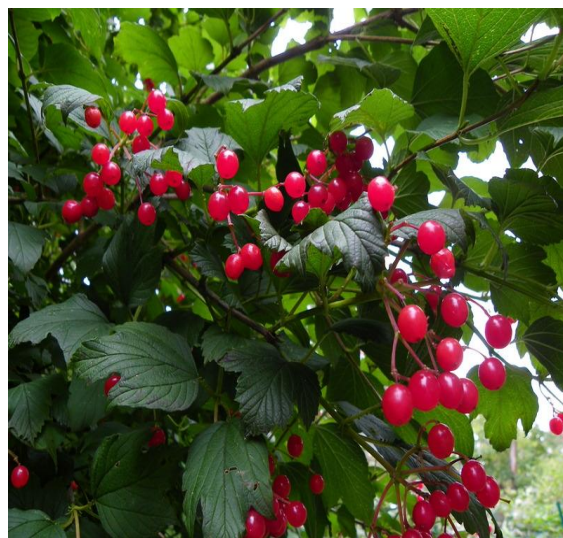


Figure 2: Cranberry Plant

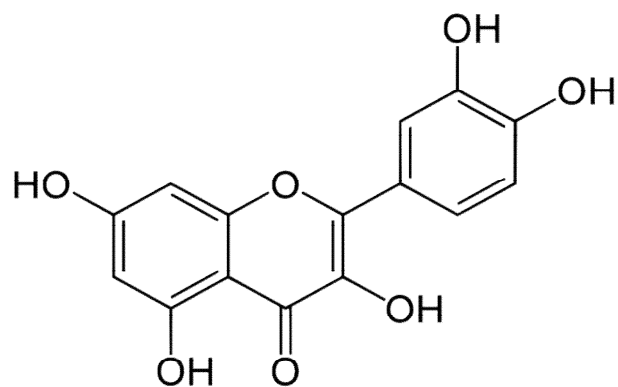


Figure 3: Quercetin

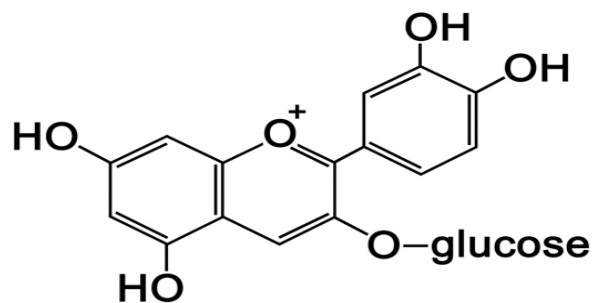


Figure 4: Anthocyanin's

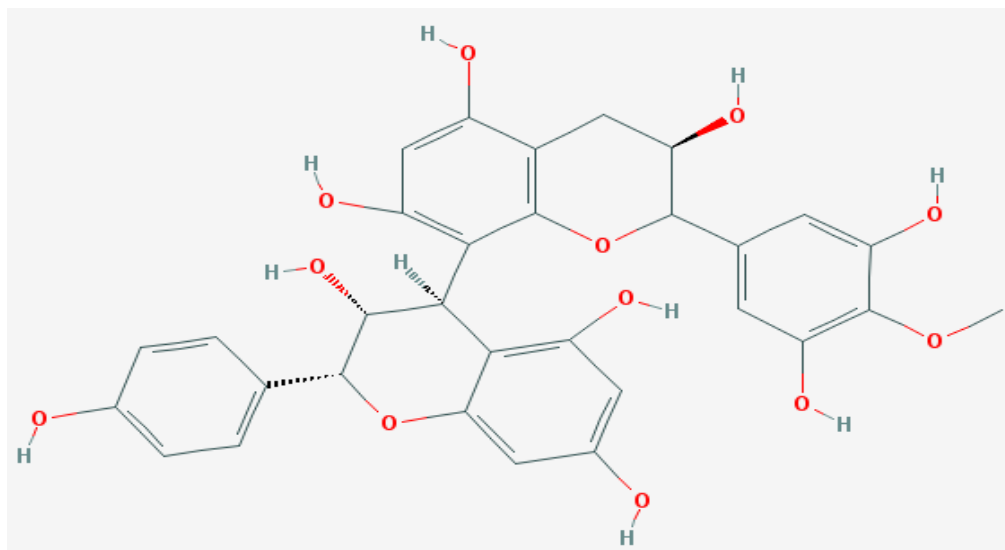


Figure 5: Proanthocyanidin