

MEDICINAL VALUE OF *VACCINIUM MACROCARPON* (CRANBERRY): A MINI REVIEW

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ABSTRACT

This article goes over the medicinal value of cranberry extract. Which has a long history of use by Native Americans. Historically, cranberry (*Vaccinium macrocarpon*) has been used for the treatment of many diseases like urinary tract infection. It is a rich source of bioactive compounds with broad spectrum activities. It is being extensively studied for their anti-aging activities and to improve cardiovascular health and enhance the ability to inhibition or retarded the growth of cancer cell in the body. The phytochemical constituent present in cranberries includes vitamin C, anthocyanidins, catechins and proanthocyanidins (PACs). This peculiar combination of

phytochemicals present in cranberry may produce synergistic health effects and serve as a potential promising source against many diseases.

KEY WORDS: vitamin C, anthocyanidins, catechins.

INTRODUCTION

Cranberry, which is scientifically known as, *Vaccinium macrocarpon* (DerMarderosian *et al.*, 2008), is a native of American. For thousands of years, it can be used as a food source. Native Americans used them in the preservation of meat and also as a medicine (Foo *et al.*, 2000; Guay, 2009). It contains water 80% and carbohydrates 10% (Lenter, 1991). The extract of Cranberry has been used in formulation of capsules and dietary supplement (Guay, 2009;

Jepson and Craig, 2007, Raz *et al* 2004) due of the presence of many bioactive compounds like organic acids, vitamin C, anthocyanidins, catechins, proanthocyanidins (PACs), flavonoids, and triterpenoids (Guay, 2009, Howell 2007, Krenn *et al* 2007). These bioactive compound have antimutagenic, antioxidant, antihypercholesterolemic activities (Cunningham *et al.*, 2004; Vattem *et al.*, 2005, Neto, 2007) and has been used since many years in the prevention of gastrointestinal (GI) infection like diarrhea, urinary tract infections, and blood poisoning (Papas *et al* 1966, Howell 2002, Harkins 2002). It is also as effective and promising natural agent for preventing food borne illness (Wu *et al.* 2009). The studies of many past years help to explain that this little berry contains many health benefits. Hence, the primary focal point of this mini review to provide highlights of the medical importance of cranberry extract.

Cranberry and Urinary tract infection

Urinary tract infections (UTIs) are the second most common infection in the human body after respiratory infection. This infection is critically occurring when a certain threshold number of bacteria are present in the urine (normally 10^4 to 10^5 CFU per ml) (Bacheller & Bernstein 1997). An epidemiologically survey reported that 80% of UTIs are caused by *Escherichia coli*, and in 10-15% cases it is caused by *Staphylococcus saprophyticus*. Some time Other pathogens include *Enterococci*, *Enterobacter*, *Klebsiella* and *Proteus* species are also contributing in the occurrence of infection (Kahlmeter & Brown 2002). Among the human population Urinary tract infections are more usual in adult females than male. Approximately more than One fourth of women population experiences this infection once or more in their lives, the probabilities of UTIs increases with age (Harkins, 2000; Lynch, 2004).

Since 1900s the juice of Cranberry has long been used for the treatment of urinary tract infections (Blatherwickz 1914). In 1966 first research was reported which shows the effect of cranberry on urinary tract (Papas *et al* 1966). The working mechanism of cranberry is to maintain the health of Urinary tract by lowering its pH by secretion of hippuric acid, which is a bacteriostatic in nature and has the ability to acidify urine (Moen 1962). The other manner of action of cranberry extract for the prevention of urinary tract infection is a presence of important compound know as (PAC), influence the adherence ability of pathogenic *Escherichia coli* (Howell 2002, Sobota, 1984, Avon 1969, Fleet 1994, Ahuja *et al* 1998, Pinzon *et al* 2009, DI Martino 2006, Lavigne *et al* 2008) on the epithelium of the bladder,

which thereby effect *E. coli* to infect the urinary mucous (Howell *et al* 2010, Howell & Foxman 2008, Jepson 2008).

Antimicrobial activity of Cranberry

As the cranberry contain high amount of phenolic and phytochemical such as essential oils, alkaloids, phenols, glycosides, coumarins and tannins, thereby it have strong antimicrobial activity against human pathogens (Eschenbecher and Josh 1977). Antimicrobial properties of cranberry is more promising due to the presence of organic compound like citric acid, quinic acid and malic acid (Chen *et al* 2001). According to Aref *et al.*, (1986) the prevalence of proanthocyanidins and flavonols in cranberry confirmed its major antimicrobial effect than benzoic acids. The extract of cranberry shows significant antimicrobial activity against *Saccharomyces bayanus* and *Pseudomonas Fluorescen* (Aref & Nagel, 2006).

Wen *et al.* (2003) demonstrated that the antibacterial potential of cranberry on *L.monocytogenes* is due to phenolic acids. The ellagitannins extracted from cranberries strongly inhibited *Saureus* but fail to inhibit *Styphimurium* (Puupponen *et al.*2005). The research of Wu *et al.* (2008) reported that cranberry showed significant antimicrobial power on *Styphimurium* and *Ecoli* 0 157:H7 than *L. monocytogenes* and *S aureus*.

According to the clinical studies of many scientists, the extract of cranberry juice significantly effective to the strains of *H. pylor*, which is one of the contributing causes of gastric cancer and peptic ulcer disease (Gotteland *et al* 2008, Zhang *et al* 2005). The bioactive compounds of cranberry juice protect the gastric cancer and peptic ulcer by means of reducing the adhesion ability of *H. pylori* to human gastric epithelial cells (Burger *et al* 2002).

The oral health benefits of cranberries cannot be neglected by anyone. The extract of berries found effective against oral bacteria like *Streptococcus mutans* which is the important acidogenic bacteria in the mouth and responsible for teeth decay (Loesche, 1986; Bowen, 2002; Beighton, 2005). Cranberry may also suggest reducing gingival or gumming tissues infections, which could protect against periodontitis (Bodet *et al* 2007).

Anticancer activity of cranberry

Numerous works are ongoing to determine the anticancer effect of cranberries .Many scientists suggest that the extracts of cranberry juice have anticancer activity (Bomser *et al.*,

1996; Kresty *et al.*, 2011; Neto, 2011). There are many cell culture and animal modular studies have been done on anticancer effect of cranberry. In vitro studies show that cranberry extract decrease the proliferation of many forms of cancer including, breast, colon, prostate and lung (Neto 2007,2008, Roy *et al* 2002, Katsube *et al.* , 2003; Sun *et al.*, 2002; Yan *et al.* , 2002). The Cranberry fight against cancer cell through different mechanisms, such as by retarded or inhibits the enzymes that actively take part in the tumor formation and also suppress the inflammation and cancer propagation enzyme, it's also inducing programmed apoptosis (Neto *et al* 2008).

Antioxidant properties of Cranberry

The compounds which posses antioxidant activities are more promising to oppose the free radicals, which have ability to intrude with the lipid metabolism process, damage the DNA or gene structure of beings, and hike up the inflammation mechanism, thus enhance the danger of chronic illness and many types of cancer (Neto *et al* 2008, Basu *et al* 2010, Bean *et al* 2010, Wolfe & Liu 2007).Cranberries have a high profile of phytochemical compounds and have a highest position among all the fruit in both antioxidant quality and quantity analysis (Vinson *et al* 2001). It is a plentiful source of many flavonoids and phenolic acid (Yan *et al.* 2002),includes 3 classes of flavonoids (flavonols, proanthocyanidins and anthocyanins,), hydroxycinnamic catechins, and other phenolic acids, and triterpenoids (Neto 2007).According to the study report of Yan et al. (2002) the antioxidant activity of cranberry extract was majorly associated with flavonols glycosides then the Vitamin E.This antioxidant activity devoted to the antitumor activity of cranberry (Neto 2007).

Cardiovascular health and Cranberry

There are many research supports that the consumption food containing flavonoid can lower the risk cardiovascular disease (CVD) (Erdman *et al* 2007, Dohadwala & Vita 2009).Investigation of many scientists reveals that the cranberries are a significant source of dietary fiber, contain flavonoids, polyphenolics and anthocyanins (Milbury *et al* 2010, Vinson et al 2001,McKay & Blumbery 2007),hence its consumption are beneficial for the heart health and reduce the chances of cardiovascular disease by reducing inflammation and serum lipids (Vattem *et al* 2005,Ruel & Couillard 2007). Granting to the study of Krueger *et al* (2000), Reed (2002), Ruel *et al* (2008), Erlund *et al* (2008), T, Porari (1998) flavonoids and constituted significantly inhibit low density lipoprotein (LDL) oxidation, affect the

function of platelets, increase reverse cholesterol transport and decrease total LDL-cholesterol and thereby, reduce the risk of coronary artery disease.

CONCLUSION

The cranberries have many biological actions and deliberate as a most important medical fruit. These activities, particularly due to the various phenolic compounds. It can be recommended that the chronic use of cranberry reduced UTIs, Cardiovascular disease chance, inhibits breast, colon, prostate cancer and other type of cancer.

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