

Blueberries, Cranberries and Strawberries: Heart Healthy Fruits

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ABSTRACT

The global burden of cardiovascular disease is on the rise. An improper diet is repeatedly incriminated in the pathogenesis of cardiovascular disease. Epidemiological, research and clinical data strongly validates a protective role of an adequate intake of fruits and vegetables in the development and progression of cardiovascular diseases. Fruits appear to be more protective than vegetables. Blueberries, cranberries and strawberries are naturally fortified with cardio-protective vitamins, minerals and micro-nutrients. This article evaluates their role in improving the cardiovascular risk profile and the benefits accrued by a reduction in cardiovascular morbidity and mortality.

Keywords: fruits, vegetables, cardiovascular diseases, stroke, ischemic heart disease, blueberry, cranberry, strawberry

Abbreviations: CVD: cardiovascular disease; B6: pyridoxine; B12: cobalamin; Gms: grams; LDL: low density lipoprotein cholesterol

1. INTRODUCTION

Cardiovascular disease (CVD) is the number one killer in the world. It has become a global epidemic (Murray et al, 1996). In the year 2005, almost 30% of the 58 million deaths that occurred worldwide, were due to CVD (WHO, 2009). This is three times more deaths than are caused by all infectious diseases including HIV/AIDS, tuberculosis, and malaria combined (Gaziano, 2008). CVD is no longer a disease of men or the developed countries. Nearly one half of the CVD related deaths occur in women and 80% of the CVD-related deaths occur in lower and middle income countries. It is projected that CVD will be responsible for 25 million deaths worldwide in year 2020. Although several genetic, social and environmental factors are involved in its etiology, diet remains an important modifiable factor (Willnett, 1990). Fruits and vegetable intake plays a major role in risk factor modification (Van Duyn et al, 2000; Bazzano et al, 2003). There is an inverse relationship between fruit and vegetable intake and the risk of cardiovascular disease (Ness et al, 1997). Recent data suggests that blueberries, cranberries and strawberries are rich in cardio-protective micro-nutrients. These help improve the metabolic syndrome and reduce the cardiac risk profile. A recent analysis showed that a diet rich in anthocyanins - abundant in blueberries and strawberries, is associated with a 32% drop in the risk of incident MI in a cohort of >93 000 women from the Nurses' Health Study 2 (Cassidy et al, 2013). Cranberry juice intake is associated with decreased oxidation of the LDL and diminished inflammation, (Basu et al, 2011) surrogate markers of a reduction in atherosclerosis.

2. DISCUSSION

Intake of at least five servings of fruits and vegetables per day is associated with 28% lower risk of cardiovascular disease than participants eating fewer than 1.5 servings per

day, (Joshipura et al, 1999; Joshipura et al, 2001). In another major study, consuming fruit and vegetables > or = 3 times/d compared with <1 time/d was associated with marked cardiovascular benefits. There was a 27% lower stroke incidence, a 42% lower stroke mortality 24% lower ischemic heart disease mortality, a 27% lower cardiovascular disease mortality, and a 15% lower all-cause mortality. These values were determined after adjustment for established cardiovascular disease risk factors (Bazzano et al, 2002). Fruits appear to have a more positive impact on reduction in cardiovascular disease than vegetables (Hsin-Chia et al, 2004).

2.1. Mechanisms of protection

The cardiovascular benefits accrue from the higher intake of multiple nutrients, including anti-oxidant vitamins (Rimm, 2001; Boushey et al, 1995) minerals (McCarron et al, 2001), and flavonoids (Knekt et al, 2002; Key et al, 1996). These nutrients act through a variety of mechanisms, such as reducing antioxidant stress (Jeanine et al, 2004), improving lipoprotein profile (Witztum et al, 1994), lowering blood pressure (Appel et al, 1997), increasing insulin sensitivity (Jose et al, 2012), modifying homocysteine levels (Boushey et al, 1995), and improving hemostasis regulation (Yamamoto et al, 2003). Further, people eating fruits regularly also practice other healthy behaviours, which are also protective (Serdula et al, 1996).

2.2 Berries

Recent reports have highlighted three berries with significant cardiovascular protective actions (Basu et al, 2010). These fruits are rich in a multitude of bioactive phytochemicals, including polyphenols (flavonoids, proanthocyanidins, ellagitannins, gallotannins, phenolic acids), stilbenoids, lignans and triterpenoids, which have protective actions against major chronic diseases, including cancer and cardiovascular diseases (Seeram, 2008).

2.2.1. Blueberries: (*Vaccinium spp.*)

These indigo colored berries are native to North America. 100 grams of blueberries contain approximately 57 calories, 14.5 gms of carbohydrates, 2.4 gms of dietary fiber and 0.3 gms of fat. They also contain several vitamins, minerals and micronutrients. They are rich in a variety of phytochemicals that contribute to cardio-protection, including flavonoids such as anthocyanins, flavonols, and proanthocyanidins; substituted cinnamic acids and stilbenes; and triterpenoids such as ursolic acid and its esters (Neto, 2007). There is a reduction in systolic and diastolic blood pressure, LDL oxidation and insulin resistance with their intake (Basu et al, 2011).

2.2.2. Cranberries: (*Vaccinium macrocarpon*)

Cranberries are commercially grown all over the northern United States. 100 gms of cranberries provide 46 calories and contain 12.2 gms of carbohydrates, 4.04 gms of sugars, 4.8 gms of dietary fiber, 0.13 gm of fat and 0.39 gm of protein. Besides vitamins and minerals, they are also rich in polyphenols, including phenolic acids (benzoic, hydroxycinnamic, and ellagic acids) and flavonoids, especially anthocyanins and proanthocyanidins (Ohnishi et al, 2006; Pappas et al, 2009). These have significant beneficial cardiovascular effects (Duthie et al, 2006), including resistance to LDL oxidation, inhibition of platelet aggregation, and a reduction in blood pressure. There is also an improvement in dysglycemia (McKay et al, 2007) and a reduction in inflammation (Basu et al, 2011).

2.2.3. Strawberries: (*Fragaria*)

Strawberries are not true berries but an aggregate accessory fruit. They are cultivated worldwide. One cup (236 gms) of strawberries provide 43 calories, 0.88gms of protein, 10.1 gm of carbohydrates, 3.3 gms of fiber, and many vitamins, minerals and micronutrients. The cardioprotective elements include fiber (Pereira et al, 2004), folate (Moat et al, 2004; He et al, 2004), vitamin C (Enstrom et al, 1992), potassium (Delgado, 2004), and flavonoids, such as quercetin and kaempferol (Sesso et al, 2003) and especially anthocyanin (Andersen et al, 2004). Strawberry intake is associated with a reduction in total and LDL cholesterol and other surrogate markers of atherosclerosis (Basu et al, 2011).

3. CONCLUSIONS

The American Heart Association recommends that we consume at least five servings of fruits and vegetables a day (Krauss et al, 2000). Data substantiating their cardio-protective benefits is compelling (Dauchet et al, 2006). Fruit and vegetable intake is also inversely associated with all cause mortality (Bazzano et al, 2002). Blueberries, cranberries and strawberries are exceptionally rich in cardio-protective agents. Other consumable berries with possible benefits include bilberries, lingonberries, black currants, strawberries, chokeberries, and raspberries.

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