

Dark Chocolate: A Therapeutic Food

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ABSTRACT

Cocoa or chocolate has been consumed by humans for centuries. Besides being a pleasant and pleasurable drink, its use was supposed to increase stamina and reduce fatigue. Recently, medical benefits with cocoa intake have been objectively studied and validated. The benefits are attributed to the strong anti-oxidant activity of its flavonoid content. Dark chocolate has the highest concentration of cocoa. Increasing evidence is indicating that dark chocolate is a therapeutic food, especially for cardiovascular health.

Keywords: cocoa, cacao, chocolate, cardiovascular disease, anti-oxidant, flavonoids, flavanols, diabetes mellitus, blood pressure

Abbreviations: NO: Nitric Oxide; LDL: Low density lipoprotein cholesterol; HDL: High density lipoprotein cholesterol

1. INTRODUCTION

Cocoa products have been enjoyed by humans for centuries. Chocolate is made from cocoa (cacao). Consumed world over for its pleasant taste and its pleasurable and stimulating effects, epidemiological and scientific studies have repeatedly demonstrated significant health benefits with its intake. Kuna Indians living on Panama's San Blas islands drink more than four cups of cocoa per week and rarely develop age related high blood pressure or heart disease. Cocoa is rich in flavonoids which protect against cardiovascular diseases through their antioxidant, antiplatelet, and anti-inflammatory effects. Flavonoids may also lower blood pressure, increase high-density lipoprotein cholesterol, positively modify insulin sensitivity and improve endothelial function. This article briefly reviews the cardiovascular benefits associated with chocolate consumption.

2. DISCUSSION

Theobroma cacao, grows in the subtropical areas of the world. Although it grows widely from the southeastern Mexico to the Amazon basin, two thirds of the world's production comes from four West African countries, the Ivory Coast, Ghana, Nigeria and Cameroon. Ivory Coast is the world's largest exporter of cocoa. The cacao tree produces 'cauliflory' flowers in clusters directly on the trunk and older branches. After pollination, 'cacao pod' fruits are produced. Each pod contains about 20 to 60 seeds, called "cacao beans", embedded in a white pulp. These cocoa beans were considered divine by the Mayans, as they were presumably discovered by the god Quetzalcoatl. They believed that cacao beans made one strong and invincible. Spaniards noted that cacao consumption allowed the Aztecs greater stamina and they could walk long distances without fatigue. The Olmec, Mayan and some Mexican tribes also recognized the medicinal value of these beans. The recent medicinal value

of cacao beans was noted by American researchers when they noticed that residents of the island Kuna in South America drank large amounts of home-prepared cocoa, rich in flavanoids, and remained hypertension free. The Kuna on the mainland however, consumed commercial flavonoid devoid of cocoa and developed hypertension and cardiovascular diseases (Fisher et al, 2005). On monitoring the renal hemodynamics, the Kuna island people demonstrated high NO levels, consistent with a favorable antioxidant effect of cocoa flavanoids on the endothelium (Fisher et al, 2005). The main flavonoids present in cacao beans are flavanols, especially catechins and epicatechins (Steinberg et al, 2003; Rice-Evans et al, 1996). These are strong anti-oxidants and beneficially modulate the cardiovascular system (Corti et al, 2009; Desch et al, 2010; Ding et al, 2006). The prophylactic and therapeutic cardiovascular claims associated with cocoa intake are growing (Ella et al, 2012; Corti et al, 2009). In a recent meta-analysis, higher levels of chocolate consumption were associated with a reduction of cardiovascular disease by 37%, diabetes by 31% and stroke by 29% (Andrana et al, 2011). Cocoa consumption is also associated with a reduction in cardiovascular and all cause mortality (Buijsse et al, 2006).

2.1. Cocoa and Blood Pressure

Epidemiologic studies indicate that cocoa consumption is inversely correlated with blood pressure (Buijsse et al, 2006). Recently large population-based study has confirmed the blood pressure protective effects of cocoa intake (Buijsse et al, 2010). This small but distinct blood pressure reduction has been seen in both healthy and in hypertensive populations (Taubert et al, 2007; Ried et al, 2010).

2.2. Cocoa and Lipids

Cocoa consumption demonstrates a beneficial effect on the lipids. Dark chocolate consumption increases HDL cholesterol concentration (Mursu et al, 2004). A daily

consumption of 100 gm of flavonoid rich chocolate for over 2 weeks was associated with a 12% reduction in total and LDL cholesterol levels in patients (Grassi et al, 2005). Cocoa intake also inhibits lipid peroxidation (Kondo et al, 1996; Mursu et al, 2004). Overall, dark chocolate consumption is associated with a decrease in total and low density lipoprotein cholesterol levels and increase in the high density lipoprotein cholesterol levels (Jia et al, 2010).

2.3. Cocoa and Vascular Effects

Flavanol-rich chocolate leads to peripheral vasodilatation due to increased NO availability and an improvement in endothelial function in healthy individuals (Heiss et al, 2003; Fisher et al, 2003) and in those with cardiovascular risk factors, including diabetes (Balzer et al, 2008). This vasodilatation is also beneficial in patients with heart failure (Andreas et al, 2012). The vasodilatation is also seen in the coronary arteries and is associated with an enhancement in platelet function (Flammer et al, 2007). There are also other related anti-inflammatory, anti-atherogenic and anti-thrombotic beneficial vascular effects (Steinberg et al, 2003; Katz et al, 2011; Balzer et al, 2006; Djousse et al, 2011; Faridi et al, 2008).

2.4. Cocoa and Stroke

A meta-analysis showed a 29% reduction in strokes in people with high chocolate consumption (Adriana Buitrago-Lopez et al, 2011). A more recent meta-analysis included in the study showed an overall 19% decrease in the risk for stroke for the highest consumers of chocolate - male and female - compared with those who ate the least (Susanna et al, 2012). The cocoa related stroke reduction is significant and appears to be real.

2.5. Cocoa and Diabetes Mellitus

Chocolate intake appears to be beneficial for diabetics (Oba et al, 2010). Several reports have indicated that dark chocolate or cocoa polyphenols are associated with increased insulin sensitivity, especially in hypertensives (Grassi et al, 2005; Grassi et al, 2008; Grassi et al, 2008). In one meta-analysis, higher levels of chocolate consumption were associated with a reduction of diabetes by about 31% (Adriana Buitrago-Lopez et al, 2011).

2.6. Cocoa and mental health

Cocoa contains small amounts of theobromine and caffeine, both mild stimulants. The small content of serotonin may help decrease depression. Cocoa ingestion is also associated with a reduction in stress (Field et al, 2011) and an improvement in mood (Macht et al, 2006). There is also an improvement in cognitive function in the elderly (Desideri et al 2013).

2.7. Dangers of chocolate

The only concern with chocolate intake is the potential for weight gain due to its high energy density (about 500 calories/100 g) (Steinberg et al, 2003). Excess weight is a risk factor for hypertension, dyslipidemia and diabetes - all risk factors for premature cardiovascular events (Corti et al, 2009). Dark chocolate may however also counteract this by increasing satiety (Katz et al, 2011). In any case, excessive intake should be avoided.

3. CONCLUSION

Epidemiological and scientific studies demonstrate that dark chocolate made out of cocoa beans is a sustainable treatment option in the prevention of cardiovascular disease. Raw cacao beans are bitter and virtually inedible. Chocolate is made by fermenting, roasting and grounding cacao beans and then separating them into cocoa powder and cocoa butter. "Dark chocolate", also called "black chocolate", is produced by adding fat and sugar to cocoa and contains much less milk than milk chocolate. Dark unsweetened chocolate contains up to 75% cocoa solids compared with only 20% found in milk chocolate. White chocolate is not made from cocoa beans, but from cocoa butter and is literally devoid of flavonoids. In Europe, dark chocolate needs to have a minimum of 35% cocoa solids (Directive 2000). It has been estimated that the benefits derived from blood pressure and cholesterol reduction with dark chocolate intake would prevent 70 non-fatal cardiovascular events and 15 cardiovascular deaths per 10,000 population treated over 10 years (Ella et al, 2012). These benefits accrue from 100 grams of dark chocolate with at least 60-70% cocoa, consumed several times a week.

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