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File: ■ Chocolate (*Theobroma cacao*, Malvaceae)
■ Vascular Function

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RE: Dark Chocolate Consumption for One Month Improves Vascular Function in Young, Healthy Subjects

Pereira T, Maldonado J, Laranjeiro M, et al. Central arterial hemodynamic effects of dark chocolate ingestion in young healthy people: a randomized and controlled trial. *Cardiol Res Pract*. 2014;2014:945951. doi: 10.1155/2014/945951.

Ischaemic heart disease and stroke are the most important causes of mortality worldwide. Studies have shown that the severity of endothelial dysfunction relates to the risk for an initial or recurrent cardiovascular event.[1] Endothelial dysfunction plays a critical role in the development of atherosclerosis, leading to decreased arterial compliance. Nutrition is thought to affect endothelial function. Foods rich in flavanols have been investigated for their role in preventing cardiovascular disease. Cocoa (*Theobroma cacao*, Malvaceae) and chocolate products have a high flavanol concentration and antioxidant capacity. The authors conducted a randomized, controlled trial to determine whether daily ingestion of a small amount of cocoa-rich chocolate (>70%) improves the vascular function in young, healthy subjects.

Between November 2012 and February 2013, 60 clinically healthy subjects (20 men and 40 women), all undergraduate students at the Superior Polytechnic Institute of Coimbra, Portugal, were enrolled in the study. They were randomly allocated to the control group (CG) or the intervention group (IG). The 30 subjects in the CG were aged between 18 and 24 years; those in the IG, between 18 and 23 years.

The first study evaluation was done at baseline, after which the subjects in the IG ingested 10 g daily of dark chocolate with more than 75% cocoa for 1 month. [Note: Source of chocolate and other information regarding chocolate contents were not provided.] The CG had no intervention. A second evaluation was conducted 1 week after the end of the 1-month intervention period.

Among the clinical evaluations conducted were aortic pulse wave velocity (PWV), central pulse wave analysis (PWA), brachial artery flow-mediated dilation (FMD), augmentation index (AiX), distensibility index (ASI), blood pressure (BP), heart rate (HR), and clinical observation.

Baseline group characteristics were similar. The authors report no significant changes during the trial in body mass index, HR, or brachial BP in either group, although a consistent trend for reduced BP was seen in the IG.

Statistically significant decreases in PWV ($P=0.02$) and ASI ($P<0.01$) were seen in the IG, but not in the CG. A similar finding was also observed for the AiX, an indirect measure of arterial stiffness. At baseline, no significant differences in FMD were noted between the 2 groups; however, the FMD improved considerably after 1 month in the IG ($P<0.001$), with no significant changes in the CG. When pooling the mean within-group individual differences for each group, the authors reported a reduction in all variables after the 1-month intervention in the IG, with statistically significant effects for ASI ($P<0.001$) and PWV ($P=0.010$). Brachial and central BP levels also decreased in the IG.

To summarize, vascular function significantly improved in young, healthy subjects who consumed 10 g dark chocolate for 1 month.

The probable mechanism for improved PWV, ASI, and AiX after cocoa consumption may be the parietal relaxation of the large arteries, as well as a dilation of small- and medium-sized peripheral arteries and arterioles, say the authors. The "finding of improved FMD strongly suggests endothelium-dependent vascular relaxation as the motive for the vasomotor benefit found," leading to lower PWV, ASI, and AiX, and a trend toward reduced BP, write the authors.

"We can suggest flavanol-containing cocoa as a promising and powerful option for cardiovascular primary prevention."

—*Shari Henson*

Reference

[1]Widlansky ME, Gokce N, Keaney JF Jr, Vita JA. The clinical implications of endothelial dysfunction. *J Am Coll Cardiol*. 2003;42(7):1149-1160.

Referenced article can be accessed at http://www.hindawi.com/journals/crp/2014/945951/.