

Effect of dietary supplementation of concentrated pomegranate juice on blood lipids in type 2 diabetic patients with hyperlipidemia

F Tahbaz, A Esmail-Zadeh, I Gaeini

National Nutrition and Food Technology Research Institute, S Beheshti University of Medical Sciences,
PO Box 19395/4741, Tehran, Iran

Previous epidemiologic studies suggest that a high intake of fruits and vegetables is associated with a reduced risk of coronary heart disease (1). The beneficial effect could be related to minor components, especially flavonoids, which are proposed to exert their action by inhibiting LDL oxidation and platelet aggregation (2). Pomegranate is native to Iran and it is a rich source of flavonoids. The potential cardio protective effects of pomegranate juice have rarely been investigated in humans. In healthy men, intake of 50 ml pomegranate juice/d for 2 weeks decreased LDL susceptibility to aggregation and retention and increased the activity of serum paroxonase by 20% but didn't have any significant effect on the plasma lipid profile (3).

The present study was undertaken to determine whether concentrated pomegranate juice (CPJ) beneficially alters plasma lipid concentrations in type 2 diabetic patients with hyperlipidemia (cholesterol or triglyceride >200 mg/dl). For this reason 22 patients with type 2 diabetes without any other chronic diseases, were recruited from Iranian Diabetes Society and signed the consent form to participate in this study. These patients were instructed to follow the American Heart Association step I lipid-lowering diet for 8 weeks before CPJ consumption. In this pre-study period a 24-hour food recall and a food record (containing flavonoids-rich foodstuffs) were completed every 10 days. At the end of week 8 (baseline), anthropometric measurements were performed by standard methods and biochemical indices including total cholesterol, HDL cholesterol and triglyceride were measured (Zist-Chem, Tehran, Iran). LDL cholesterol was found using the Friedwald equation, and total cholesterol/LDL cholesterol and LDL cholesterol/HDL cholesterol were calculated. Thereafter the patients consumed 40gr CPJ for next 8 weeks. CPJ was provided from Nariran Inc and was free from added sugar and any other additive. Similarly during this period, dietary intake was assessed on a regular basis every 10 days. At the end of this period anthropometric measurements and blood indices were re-evaluated. These results were compared with the baseline by Wilcoxon-signed test. P-value was considered significant at $P < 0.05$.

There were 14 women (63.6%) and 8 men (36.4%) in this study. Mean (\pm SD) age, weight and duration of diabetes were 52.5 (\pm 5.2) years, 71.5 (\pm 10.3) kg and 7.9 (\pm 6.6) years, respectively. After consumption of PJC significant reductions were seen in total cholesterol ($P < 0.006$), LDL-c ($P < 0.006$), LDL-c/HDL-c ($P < 0.001$) and Total-c /HDL-c ($P < 0.001$). But there were no significant changes in triacylglycerol and HDL-c. Weight, level of physical activity and the intake of nutrients and flavonoid-rich foodstuffs did not change during CPJ supplementation period. This study showed that CPJ supplementation could modify heart disease risk factors in this group of type 2 diabetic patients. Therefore, its inclusion in their diets might be beneficial.

Variable	Baseline*	After CPJ supplementation*
Total cholesterol (mg/dl)	202.4 \pm 27.7	191.4 \pm 21**
LDL cholesterol (mg/dl)	124.4 \pm 31.9	112.9 \pm 25.9**
HDL cholesterol (mg/dl)	38.2 \pm 8.1	38.7 \pm 7.7
Total-c /HDL-c	5.5 \pm 1.3	5.09 \pm 1.1**
LDL-c/HDL-c	3.4 \pm 1.2	3 \pm 0.9**
Triacylglycerol (mg/dl)	198.5 \pm 57.5	195.4 \pm 52.8

* $\bar{X} \pm SD$ ** Significantly different from baseline, $P < 0.05$ (Wilcoxon-Signed test).

References

1. Bors W, Heller W, Micheal C, Saran M. Flavonoids as antioxidants: determination of radical scavenging efficiencies. *Methods Enzymol* 1990; 186: 343–55.
2. Cook NC, Samman S. Flavonoids-chemistry,metabolism,cardioprotective effects and dietary sources. *J Nutr Biochem* 1996; 7: 66–76.
3. Aviram M, Dornfeld L, Roseblat M, Volkova N, Kapan M, Coleman R, Hayek T, Fuhrman B. Pomegranate juice consumption reduces oxidative stress, atherogenic modifications to low density lipoprotein and platelet aggregation: studies in human and in atherosclerotic apolipoprotein E-deficient mice. *Am J Clin Nutr* 2000; 71: 1062–76.

Key words: concentrated pomegranate juice, type 2 diabetes, hyperlipidemia