

Polyphenol-Rich Aronia Melanocarpa Juice Consumption and Line-1 Dna Methylation in a Cohort at Cardiovascular Risk

Authors : Ljiljana Stojković, Manja Zec, Maja Zivkovic, Maja Bundalo, Marija Glibetić, Dragan Alavantić, Aleksandra Stankovic

Abstract : Cardiovascular disease (CVD) is associated with alterations in DNA methylation, the latter modulated by dietary polyphenols. The present pilot study (part of the original clinical study registered as NCT02800967 at www.clinicaltrials.gov) aimed to investigate the impact of 4-week daily consumption of polyphenol-rich Aronia melanocarpa juice on Long Interspersed Nucleotide Element-1 (LINE-1) methylation in peripheral blood leukocytes, in subjects (n=34, age of 41.1 ± 6.6 years) at moderate CVD risk, including an increased body mass index, central obesity, high normal blood pressure and/or dyslipidemia. The goal was also to examine whether factors known to affect DNA methylation, such as folate intake levels, MTHFR C677T gene variant, as well as the anthropometric and metabolic parameters, modulated the LINE-1 methylation levels upon consumption of polyphenol-rich Aronia juice. The experimental analysis of LINE-1 methylation was done by the MethyLight method. MTHFR C677T genotypes were determined by the polymerase chain reaction-restriction fragment length polymorphism method. Folate intake was assessed by processing the data from the food frequency questionnaire and repeated 24-hour dietary recalls. Serum lipid profile was determined by using Roche Diagnostics kits. The statistical analyses were performed using the Statistica software package. In women, after vs. before the treatment period, a significant decrease in LINE-1 methylation levels was observed ($97.54 \pm 1.50\%$ vs. $98.39 \pm 0.86\%$, respectively; $P=0.01$). The change (after vs. before treatment) in LINE-1 methylation correlated directly with MTHFR 677T allele presence, average daily folate intake and the change in serum low-density lipoprotein cholesterol, while inversely with the change in serum triacylglycerols ($R=0.72$, $R^2=0.52$, adjusted $R^2=0.36$, $P=0.03$). The current results imply potential cardioprotective effects of habitual polyphenol-rich Aronia juice consumption achieved through the modifications of DNA methylation pattern in subjects at CVD risk, which should be further confirmed. Hence, the precision nutrition-driven modulations of DNA methylation may become targets for new approaches in the prevention and treatment of CVD.

Keywords : Aronia melanocarpa, cardiovascular risk, LINE-1, methylation, peripheral blood leukocytes, polyphenol

Conference Title : ICNNPN 2021 : International Conference on Nutrigenetics, Nutrigenomics and Precision Nutrition

Conference Location : Barcelona, Spain

Conference Dates : December 16-17, 2021