

Effect of Aronia Juice on Cellular Redox Status in Women with Aerobic Training Activity

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Abstract : Physical activity is well known for its beneficial health implications, however, excess oxygen consumption may impair oxidative status of the cell and affect membrane fatty acid (FA) composition. Polyphenols are well-established antioxidants, which can incorporate in cell membranes and protect them from oxidation. Therefore, our aim was to investigate how an 8-week aerobic training alters erythrocyte FA composition and activities of enzymes (superoxide dismutase, glutathione peroxidase and catalase), and to what extent polyphenol-rich Aronia juice (AJ) counteracts these potential alterations. We included 28 healthy women aged 19-29, with mean body mass index (BMI) of $21.2 \pm 2.7 \text{ kg/m}^2$ and assigned them into three groups. The first group performed 1 hour of aerobic training three times per week (T); the second group trained in the same way and received 100 ml/day AJ as a part of their regular diet (TAJ), while the third group was the control one (C). Study analyses were performed at baseline and at the end of the intervention and included: anthropometric and biochemical measurements, determination of erythrocyte FA profile with gas-liquid chromatography and determination of enzymes' activity with spectrophotometry. Statistical analyses were carried out with SPSS 20.0, with $p < 0.05$ considered as significant. The paired t-test revealed a significant decrease in the saturated FA content and in $\omega 6/\omega 3$ ratio in TAJ group. Furthermore, $\omega 3$ and docosahexaenoic acid (DHA) content increased, as well as the percentage of polyunsaturated FA and unsaturation index, which clearly pointed out that AJ supplementation with aerobic training protected cellular membranes from lipid peroxidation. No significant changes were observed in the two other groups. The between-group comparisons (ANCOVA) confirmed the synergistic effect of AJ supplementation and physical activity: DHA and $\omega 3$ contents were much higher, while $\omega 6/\omega 3$ ratio was significantly lower in the TAJ group compared with C. We also found that after the 8 weeks period, participants in TAJ group had a higher unsaturation index and lower saturated FA concentration than subjects from T group, suggesting that AJ polyphenols might be involved in that particular pathway. We found no significant changes in enzymes' activities apart from a significantly higher superoxide dismutase activity in T group compared with the other two groups. Our results imply that supplementation with polyphenol-rich AJ may prevent membrane lipids from peroxidation in healthy subjects with regular aerobic activity.

Keywords : Aronia juice, aerobic training, fatty acids, oxidative status

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