운동 강도의 차이가 고밀도 지단백 콜레스테롤의 구성성분 및 동맥경화지표에 미치는 영향

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Abstract

Sung, K. W., Lee, Y. S., Kim, S. Y. Effects of exercise intensity on HDL-C subparticles and atherogenic index. *Exercise Science*. 20(3): 309-318, 2011. The present study examined the effects of exercise intensity and time on high-density lipoprotein (HDL)-C subparticles and atherogenic index. Ten adults over 25 percentage of body fat were submitted to single session of aerobic exercise. The subjects (23.1 ± 3.9 yrs) participated in two random trials: in maximum fat oxidation exercise intensity (MFOEI) ($40 \sim 60\%$ $\text{VO}_{2\text{max}}$) and high intensity (80% $\text{VO}_{2\text{max}}$) exercise tests. For each trial, blood samples were collected at pre-exercise, post-exercise, 30 min, 1 and 2 h after exercise. Samples were analyzed for total cholesterol (TC), triglyceride (TG), HDL-C, HDL₂-C, HDL₃-C, apolipoprotein (Apo) A-I, Apo B, Apo B/Apo A-I, and paraoxonase (PON1) activity. Data were analyzed using 2x5 two-way repeated ANOVA. Transient increase in TC, HDL-C, LDL-C, Apo A-I, and Apo B concentrations were significant at post-exercise with 80% $\text{VO}_{2\text{max}}$. With MFOEI, no differences in TC, HDL-C, Apo A-I, and Apo B were found. LDL-C was significantly increased after 1 and 2 h post-exercise at MFOEI. TG significantly reduced with MFOEI and 80% $\text{VO}_{2\text{max}}$ trials. HDL₃-C measurement after MFOEI trial was higher compared with it measured after high intensity exercise with 80% $\text{VO}_{2\text{max}}$ trial. However, there was no difference in HDL₂-C between MFOEI and 80% $\text{VO}_{2\text{max}}$ trials. PON1 activity was significantly increased after 1 and 2 h post-exercise at MFOEI. On the other hand, in 80% $\text{VO}_{2\text{max}}$ trial, the activity was significantly decreased 1 h after exercise. Apo B/Apo A-I ratio was not different between or within trials. These results indicate that MFOEI appear to be promoting more benefits on HDL-C subparticles and atherogenic index than high intensity.

Key words : HDL-C, Apolipoprotein, Paraoxonase, Exercise intensity, Blood lipid

초 록

성기운, 이용수, 김시영. 운동 강도의 차이가 고밀도 지단백 콜레스테롤의 구성성분과 동맥경화지표에 미치는 영향. *운동과학* 제20권 제3호. 309-318, 2011. 본 연구의 목적은 비만인의 high-density lipoprotein(HDL)-C 구성성분과 동맥경화지표에 있어 운동 강도와 시기에 따른 영향을 알아보는 데 있다. 이를 위해 체지방율 25% 이상의 성인 남성 10명을 대상으로 최대지방연소 운동 강도(MFOEI, $\text{VO}_{2\text{max}}$ 의 $40 \sim 60\%$)와 고강도 운동($\text{VO}_{2\text{max}}$ 의 80%)을 각각 무선 배정하여 트레드밀 운동을 실시하였다. 운동 전, 직후, 회복기 30분, 1시간, 2시간에 혈액을 채취하여 total cholesterol(TC), triglyceride(TG), HDL-C, HDL₂-C, HDL₃-C, apolipoprotein(Apo) A-I, Apo B, Apo B/Apo A-I 및 paraoxonase(PON1) 활성도를 알아보았으며, 결과는 2x5 반복측정 이원변량분석을 통해 분석하였다. 그 결과, $\text{VO}_{2\text{max}}$ 의 80% 에서는 TC, TG, LDL-C, HDL-C, Apo A-I 및 Apo B가 운동 전에 비해 운동 직후 일시적으로 증가하였으며($p < .05$, $p < .01$, $p < .001$), PON1은 회복기 1시간에 유의하게 감소하였다($p < .01$). 반면, MFOEI에서 회복기 2시간까지 TG에 유의한 감소가 나타났으며($p < .05$), HDL₃-C와 PON1 활성은 $\text{VO}_{2\text{max}}$ 의 80% 운동에 비해 유의하게 증가하였다($p < .05$). 이상의 결과를 종합하였을 때, 비교적 낮은 강도에 해당하는 MFOEI 경우 TG의 지속적인 감소는 물론 HDL₃-C의 농도와 PON1의 활성에 증가를 가져오는 것으로 나타나 항 동맥경화에 효과적인 운동 강도로 보인다.

주요어 : 동맥경화지표, HDL-C, Apolipoprotein, Paraoxonase, 운동 강도

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