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Effects of aerobic exercise on the hemodynamics and structure of the common carotid artery in obese adolescents

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Objective With the population of obese adolescents increases dramatically, a series of cardiovascular diseases, especially atherosclerotic, are triggered by obese which seriously threatens the life and health of teenagers. The aim of this study is to investigate the effects of aerobic exercise intervention on the hemodynamics and structure of the common carotid artery in obese adolescents.

Methods Forty obese adolescents (18 ± 2 years) were randomly assigned into the experimental group (EG; $n = 20$) and control group (CG; $n = 20$). EG undertook 12 weeks of aerobic exercise training (AET), CG had not any exercise intervention. The carotid artery of both CG and EG were examined and compared. Carotid artery responses were assessed in both groups. Color doppler ultrasound was used to determine the tube diameter and axial flow of the common carotid before and after exercise intervention. The heart rate, systolic and diastolic blood pressure were simultaneously measured on the left brachial artery by a sphygmomanometer.

Results Compared with CG, there were improvements of EG in peripheral resistance (22.90 ± 6.70 VS 29.58 ± 8.71 , $p < 0.01$) and Systolic blood pressure (123.57 ± 7.36 VS 130.25 ± 6.79 , $p < 0.05$) were verified after AET, except diastolic blood pressure. Following AET, blood flow velocity (0.28 ± 0.05 VS 0.21 ± 0.05 , $p < 0.01$) and wall shear stress (6.25 ± 0.90 VS 4.97 ± 1.54 , $p < 0.05$) increased prominently, which were also significant differences only in EG. In contrast, the vascular diameter demonstrated consistently upper compared with CG, but no differences between EG and CG.

Conclusions Regular aerobic exercise lasting 12 weeks could effectively change the dynamic parameters of the common carotid artery in obese adolescents, but no changes in arterial diameter. These findings indicated that 12 weeks of aerobic exercise can induce some changes of the common carotid artery blood flow within the circulation function in a short time. But the changing in common carotid arteries structure is needed after a long-term blood flow to the stimulation.