ABSTRACT

Sales AR1, Fernandes IA, Rocha NG, Costa LS, Rocha HM, Mattos JD, Vianna LC, Silva BM, Nóbrega AC.

Aerobic exercise acutely prevents the endothelial dysfunction induced by mental stress among subjects with metabolic syndrome: the role of shear rate. ***Am J Physiol Heart Circ Physiol. 2014 Feb 14. [Epub ahead of print]***

Mental stress induces transient endothelial dysfunction, which is an important finding for subjects at cardiometabolic risk. Thus, we tested whether aerobic exercise prevents this dysfunction among subjects with metabolic syndrome (MetS) and whether an increase in shear rate (SR) during exercise plays a role in this phenomenon. Subjects with MetS participated in two protocols. In Protocol 1 (n=16), endothelial function was assessed using brachial artery flow-mediated dilation (FMD). Then, subjects underwent a mental stress test, followed by either 40 min of leg cycling or rest across two randomized sessions. FMD was assessed again at 30 and 60 min after exercise or rest, with a second mental stress test in between. Mental stress reduced FMD at 30 and 60 min following the rest session (baseline: 7.7±0.4%; 30 min: 5.4±0.5% and 60 min: 3.9±0.5%; $P<0.05$ vs. baseline), whereas exercise prevented this reduction (baseline: 7.5±0.4%; 30 min: 7.2±0.7% and 60 min: 8.7±0.8%; $P>0.05$ vs. baseline). Protocol 2 (n=5) was similar to Protocol 1, but the first period of mental stress was followed by either exercise in which the brachial artery SR was attenuated via forearm cuff inflation or exercise without a cuff. Non-cuffed exercise prevented the reduction in FMD (baseline: 7.5±0.7%, 30 min: 7.0±0.7% and 60 min: 8.7±0.8%; $P>0.05$ vs. baseline), whereas cuffed exercise failed to prevent this reduction (baseline: 7.5±0.6%; 30 min: 5.4±0.8% and 60 min: 4.1±0.9%; $P<0.05$ vs. baseline). In conclusion, exercise prevented mental stress-induced endothelial dysfunction among subjects with MetS, and an increase in SR during exercise mediated this effect.