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Oxygen Desaturation in Sleep Apnea is Inversely Associated with Vascular Changes Following Exercise Training

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Obstructive sleep apnea (OSA) is characterized by reductions in nocturnal mean O_2 saturation (meanSpO_2) that may increase cardiovascular disease morbidity. The extent to which exercise confers cardioprotection in overweight adults with different meanSpO_2 profiles is not known. **PURPOSE:** Examine the association of meanSpO_2 with vascular function changes following exercise training in adults with and without OSA. **METHODS:** At baseline, participants underwent overnight polysomnography to determine the presence and severity of OSA. Tertile-based cut-off points were used to categorize meanSpO_2 and apnea hypopnea index (AHI). Body fat was analyzed using dual energy X-ray absorptiometry. Vasoreactivity of the brachial artery was measured using flow-mediated dilation (FMD), while microcirculatory function was assessed via the total shear stress area under the curve (SSAUC) response during FMD. Body fat and vascular measures were repeated upon completion of a 6 week (3 sessions/wk; 1 hr/session) exercise training program. **RESULTS:** Thirty (age: 49$\pm$9 years; BMI: 32.0$\pm$3.8 kg/m^2; 18 men: 12 women) adults with and without OSA completed the study. At baseline, adults in the highest tertile of meanSpO_2 were younger than those in the lowest tertile (43$\pm$9 yrs vs. 53$\pm$7 yrs, p=0.017), yet no differences in vascular measures, AHI or total body fat percentage were observed across the tertiles. No changes in brachial artery diameter or FMD were observed across tertiles following exercise. However, the change in SSAUC in the highest tertile of meanSpO_2 was greater, compared to the lowest tertile (13,636$\pm$15898 A.U. vs. -186$\pm$10879 A.U., p=0.041). Forward stepwise linear regression revealed that the highest tertile of meanSpO_2 was a significant (F=5.15, p=0.036) determinant of the increased SSAUC with exercise, independent of age and baseline SSAUC. **CONCLUSION:** Severe oxygen desaturation during sleep was inversely associated with improvements in microcirculatory function following exercise training.

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