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A Meta-Analysis on the Influence of Aerobic Exercise on Blood Pressure in Chronic Kidney Disease

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Chronic kidney disease (CKD) is a major public health issue in the United States (US). Hypertension (HTN) is a primary risk factor for CKD that affects 31.0% of US adults. Aerobic exercise (AE) is a lifestyle therapy recommended by the American College of Sports Medicine to prevent and manage hypertension due to the immediate post-exercise hypotensive effects that persist for 9 to 14 hours. However, despite these recommendations, efficacy of AE for managing HTN remain unclear as studies to date have included small sample sizes, been subjected to sample selection bias, and employed exercise interventions that have varied in frequency, intensity, time, and type. **PURPOSE:** To metaanalyze studies examining the effects of AE on systolic and diastolic blood pressure (BP) in samples living with CKD. **METHODS:** A systematic search was conducted in MEDLINE, CINAHL, SportsDiscus, PeDro, and Cochrane with keywords and MeSH descriptors from 1961-present. Studies retrieved included those involving an AE intervention, pre-and-post exercise blood pressure measurement, and samples with CKD and/or end-stage renal disease (ESRD). Effect sizes were generated using Cohen's $d+$ for each intervention arm of each study, study quality was assessed with the Downs and Black methodological quality checklist, and alphas were set *a priori* to $p < .05$. **RESULTS:** Sixteen studies ($n=866$) qualified for the meta-analysis. On average, participants were middle-aged (50.9 ± 13.0 yr.), overweight (25.4 ± 2.1), men ($n=526$, 60.7%), and women ($n=340$, 39.3%), with pre-hypertension ($130.3 \pm 10.2 / 78.6 \pm 6.6$ mmHg). AE interventions were performed on average at $58.6 \pm 10.8\%$ peak oxygen consumption for 33.5 ± 9.7 min \times session⁻¹, 4.0 ± 1.5 d \times wk⁻¹ for 27.0 ± 20.5 wk. The weighted mean effect size on the change in pre-and-post-exercise BP was statistically significant for systolic ($d+ = -.244$, $p < .001$) and diastolic ($d+ = -.296$) BP. The average study quality score was 18.4 ± 3.6 out of a possible 26 points, indicating good study quality, and effects lacked heterogeneity across studies. **CONCLUSION:** We found small but significant antihypertensive effects of AE on systolic and diastolic BP from samples with CKD and ESRD. **SIGNIFICANCE/NOVELTY:** Our findings indicate that AE may provide important clinical benefits for those with CKD as BP regulation is implicated in the pathogenesis of kidney disease. Future studies should expand upon our findings and include larger samples of men and women with different stages of CKD and ESRD to better refine the exercise prescription and identify those who do and do not respond to AE as a therapeutic modality for managing CKD.