

# Review: Aerobic exercise reduces systolic and diastolic blood pressure in adults

Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. *Ann Intern Med.* 2002 Apr 2;136:493-503.

## QUESTION

In persons  $\geq 18$  years of age, are interventions that include aerobic exercise more effective than interventions without aerobic exercise for reducing blood pressure?

## DATA SOURCES

Studies were identified by searching MEDLINE (1966 to September 2001) and SPORTDiscus and by reviewing bibliographies of relevant articles.

## STUDY SELECTION

Studies published in English were included if they were randomized controlled trials (RCTs) comparing interventions that included aerobic exercise (treatment group) with interventions without aerobic exercise (control group), lasted  $\geq 2$  weeks, reported changes in blood pressure (systolic, diastolic, or both) from baseline to follow-up with the corresponding variances or data to estimate them, and participants were  $\geq 18$  years of age. All frequencies, intensities, and types of aerobic exercise were considered.

## DATA EXTRACTION

3 reviewers independently extracted data on sample size, participant characteristics, study

design, details of the intervention, study duration, and outcomes. Outcomes included changes in blood pressure (systolic, diastolic, or both) from baseline to follow-up.

## MAIN RESULTS

54 RCTs (2419 participants) met the selection criteria. Data from the RCTs were pooled in a random-effects model, with each study weighted by the reciprocal of the total variance for blood pressure change. Both overall and subgroup analysis showed that

reduction in systolic and diastolic blood pressure was greater in the treatment group than in the control group (Table).

## CONCLUSION

In adults, aerobic exercise is effective for lowering systolic and diastolic blood pressure.

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## Interventions with aerobic exercise vs interventions without aerobic exercise for reducing blood pressure\*

Outcomes	Participant group	Number of trials	Weighted mean difference (95% CI)†
Systolic blood pressure (mm Hg)	Overall	53	-3.84 (-4.97 to -2.72)
	Hypertensive	15	-4.94 (-7.17 to -2.70)
	Normotensive	27	-4.04 (-5.32 to -2.75)
	BMI (kg/m <sup>2</sup> ) < 24.5	11	-3.90 (-6.82 to -0.97)
	24.5 to 26.4	12	-4.54 (-7.19 to -1.89)
	> 26.4	12	-2.17 (-3.30 to -1.03)
Diastolic blood pressure (mm Hg)	Overall	50	-2.58 (-3.35 to -1.81)
	Hypertensive	13	-3.73 (-5.69 to -1.77)
	Normotensive	26	-2.33 (-3.14 to -1.51)
	BMI (kg/m <sup>2</sup> ) < 24.5	11	-2.38 (-3.69 to -1.06)
	24.5 to 26.4	9	-3.62 (-6.45 to -0.76)
	> 26.4	12	-1.75 (-2.31 to -1.18)

\*BMI = baseline body mass index. CI defined in Glossary.

†All differences favor aerobic exercise.

## COMMENTARY

The recently published paper by Whelton and colleagues is the largest meta-analysis to measure the effect of aerobic exercise on blood pressure to date. Previous meta-analyses have shown more dramatic effects of exercise on blood pressure, which may be attributed to trials of shorter duration with better patient compliance or exercise supervision. The meta-analysis by Whelton and colleagues shows that similar blood pressure reductions were achieved with low-, moderate-, and high-intensity exercise and that little benefit was gained from exercising for more than 2.5 h/wk. Physicians who recommend even modest increases in physical activity are therefore providing valuable advice.

Both short- and long-term increases in physical activity or physical fitness have been achieved by using physician-based exercise interventions (1, 2). Increasing physical activity is popular with patients and physicians (3) and has an effect on blood pressure similar to that of other nonpharmacologic interventions. Interventions for weight loss (e.g., with a weight loss of about 4.5 kg), reduction of dietary sodium (4), or lowering alcohol intake all have the potential of reducing blood pressure by 1 to 4 mm Hg for at least 6 months.

Aerobic exercise of even modest duration, frequency, and intensity is a useful adjunct to other lifestyle changes and antihypertensive medica-

tions in the therapy of essential hypertension. It should be recommended to all patients with hypertension who are willing and able to try it.

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