

G. Prescribing physical activity for older patients.

Kligman EW, Pepin E.

Geriatrics. 1992 Aug;47(8):33-4, 37-44, 47.

Department of Family and Community Medicine, Arizona Center on Aging, University of Arizona College of Medicine, Tucson.

Regular exercise is an effective nonpharmacologic therapy for stress, sleep disorders, depression, and anxiety, as well as such chronic conditions of aging as hypertension, obesity, diabetes mellitus, coronary artery disease, hyperlipidemia, and constipation. Pre-exercise office assessment of cardiac risk, possible limitations, and contraindications is advised. A balanced fitness training program includes activities to increase flexibility, strength, and cardiovascular endurance. The most effective exercise prescription begins with a type of aerobic activity the patient enjoys. A prescribed schedule of stepwise increments in frequency, duration, and intensity gradually leads to a maintenance level of fitness.

Publication Types:

Gait variability and fall risk in community-living older adults: a 1-year prospective study.

Hausdorff JM, Rios DA, Edelberg HK.

Arch Phys Med Rehabil. 2001 Aug;82(8):1050-6.

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OBJECTIVE: To test the hypothesis that increased gait variability predicts falls among community-living older adults attending an outpatient clinic. **DESIGN:** Prospective, cohort study. **SETTING:** Three outpatient geriatric clinics. **PARTICIPANTS:** Fifty-two community-living, ambulatory men and women aged $>$ or $=$ 70 years. **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURES:** Subjects walked at a normal pace for up to 6 minutes wearing force-sensitive insoles that measured the gait rhythm on a stride-to-stride basis. Afterward, subjects reported fall status on a weekly basis for 1 year. The primary outcomes were the association between measures of the stride-to-stride fluctuations in gait rhythm and (1) subsequent falls during a 12-month follow-up period and (2) potential contributing factors. **RESULTS:** Almost 40% of the subjects reported falling during the 12-month follow-up period. Stride time variability was 106 \pm 30 ms in subjects who subsequently fell ($n = 20$) and 49 \pm 4 ms in those who did not experience a fall ($n = 32$) during the 12-month follow-up period ($p < .04$). Logistic regression also showed that stride time variability predicted falls ($p < .05$). Stride time variability correlated significantly with multiple factors including strength, balance, gait speed, functional status, and even mental health, but these other measures did not discriminate future fallers from nonfallers. **CONCLUSIONS:** These findings show both the feasibility of obtaining stride-to-stride measures of gait timing in the ambulatory setting and the potential use of gait variability measures in augmenting the prospective evaluation of fall risk in community-living older adults.

MeSH Terms:

The effect of strength and endurance training on gait, balance, fall risk, and health services use in community-living older adults.

Buchner DM, Cress ME, de Lateur BJ, Esselman PC, Margherita AJ, Price R, Wagner EH.

J Gerontol A Biol Sci Med Sci. 1997 Jul;52(4):M218-24.

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BACKGROUND: The study tested the effect of strength and endurance training on gait, balance, physical health status, fall risk, and health services use in older adults. **METHODS:** The study was a single-blinded, randomized controlled trial with intention-to-treat analysis. Adults (n = 105) age 68-85 with at least mild deficits in strength and balance were selected from a random sample of enrollees in a health maintenance organization. The intervention was supervised exercise (1-h sessions, three per week, for 24-26 weeks), followed by self-supervised exercise. Exercise groups included strength training using weight machines (n = 25), endurance training using bicycles (n = 25), and strength and endurance training (n = 25). Study outcomes included gait tests, balance tests, physical health status measures, self-reported falls (up to 25 months of follow-up), and inpatient and outpatient use and costs. **RESULTS:** There were no effects of exercise on gait, balance, or physical health status. Exercise had a protective effect on risk of falling (relative hazard = .53, 95% CI = .30-.91). Between 7 and 18 months after randomization, control subjects had more outpatient clinic visits (p < .06) and were more likely to sustain hospital costs over \$5000 (p < .05). **CONCLUSIONS:** Exercise may have beneficial effects on fall rates and health care use in some subgroups of older adults. In community-living adults with mainly mild impairments in gait, balance, and physical health status, short-term exercise may not have a restorative effect on these impairments.

Publication Types:

Age-related changes in spatial and temporal gait variables.

Grabiner PC, Biswas ST, Grabiner MD.

Arch Phys Med Rehabil. 2001 Jan;82(1):31-5.

Clinical Biomechanics and Rehabilitation Laboratory, Department of Biomedical Engineering, Lerner Research Institute, Cleveland Clinic Foundation, Cleveland, OH, USA.

OBJECTIVE: To extend recent findings describing the effect of age on spatial and temporal gait variables. **DESIGN:** Experimental. **SETTING:** A gait analysis laboratory. **PARTICIPANTS:** Two experiments with healthy nonfallers were conducted. Experiment 1 included 33 subjects (n = 15, 72.13 +/- 3.96yr; n = 18, 25.06 +/- 4.02yr); and experiment 2 included 24 subjects (n = 14, 75.57 +/- 6.15yr; n = 10; 28.10 +/- 3.48yr). **INTERVENTIONS:** The effect of age, walking velocity, shoe condition, and performance of an attention-splitting task on gait variables was investigated. **MAIN OUTCOME MEASURES:** Temporal and spatial gait variables were quantified using an instrumented

surface across which subjects walked. The independent variables were walking velocity variability, stride length variability, stride width variability, and stride time variability. RESULTS: Stride width variability of older adults was significantly larger than that of younger adults in both experiments. The remaining gait variables demonstrated nonsystematic or no age-related differences. CONCLUSIONS: With the exception of stride width variability, the variability of the remaining gait variables of interest were insensitive to the speed at which subjects walked, whether the subjects were wearing shoes or not, and performing an attention-splitting task while walking. These findings contribute to an emerging interpretive framework established by similar work published by others regarding gait variability.

MeSH Terms:

- Adult
- Aged

A comparison of community-based resistance exercise and flexibility exercise for seniors.

Barrett CJ, Smerdely P.

Aust J Physiother. 2002;48(3):215-9.

St George Hospital, Sydney.

Progressive resistance training has positive effects on the health of elderly people, however exercise programs for seniors frequently focus on other forms of exercise. This study is a randomised trial with a blinded assessor comparing a community based progressive resistance training program (n = 20) with a flexibility program (n = 20), both one hour twice weekly for 10 weeks. Outcomes were strength, gait, balance and quality of life. Progressive resistance training had a greater effect than flexibility training on right sided quadriceps strength (mean difference between groups = 7.7%; 95% CI 3.6-11.8%, p < 0.003 MANOVA), left sided quadriceps strength (mean difference = 9.9%; 95% CI 5.6-14.2%, p < 0.003 MANOVA), left sided biceps strength (mean difference = 15.2%; 95% CI 11.7-19.2%, p < 0.003 MANOVA), functional reach (mean difference = 11.7%; 95% CI 7.1-16.3%, p < 0.003 MANOVA) and step test (mean difference = 8.6%; 95% CI 3.8-13.4%, p < 0.003 MANOVA). Neither group had improvements in SF36 quality of life measures. Results suggest progressive resistance training produces greater strength, gait and balance improvements in elderly people than a flexibility exercise program.

Publication Types:

A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis. The Fitness Arthritis and Seniors Trial (FAST).

Ettinger WH Jr, Burns R, Messier SP, Applegate W, Rejeski WJ, Morgan T, Shumaker S, Berry MJ, O'Toole M, Monu J, Craven T.

JAMA. 1997 Jan 1;277(1):25-31.

Comment in:

- JAMA. 1997 Jan 1;277(1):64-6 PMID: 8980213

Department of Internal Medicine, Bowman Gray School of Medicine, Winston-Salem, NC, USA.

OBJECTIVE: To determine the effects of structured exercise programs on self-reported disability in older adults with knee osteoarthritis. **SETTING AND DESIGN:** A randomized, single-blind clinical trial lasting 18 months conducted at 2 academic medical centers. **PARTICIPANTS:** A total of 439 community-dwelling adults, aged 60 years or older, with radiographically evident knee osteoarthritis, pain, and self-reported physical disability. **INTERVENTIONS:** An aerobic exercise program, a resistance exercise program, and a health education program. **MAIN OUTCOME MEASURES:** The primary outcome was self-reported disability score (range, 1-5). The secondary outcomes were knee pain score (range, 1-6), performance measures of physical function, x-ray score, aerobic capacity, and knee muscle strength. **RESULTS:** A total of 365 (83%) participants completed the trial. Overall compliance with the exercise prescription was 68% in the aerobic training group and 70% in the resistance training group. Postrandomization, participants in the aerobic exercise group had a 10% lower adjusted mean (\pm SE) score on the physical disability questionnaire (1.71 \pm 0.03 vs 1.90 \pm 0.04 units; $P < .001$), a 12% lower score on the knee pain questionnaire (2.1 \pm 0.05 vs 2.4 \pm 0.05 units; $P = .001$), and performed better (mean [\pm SE]) on the 6-minute walk test (1507 \pm 16 vs 1349 \pm 16 ft; $P < .001$), mean (\pm SE) time to climb and descend stairs (12.7 \pm 0.4 vs 13.9 \pm 0.4 seconds; $P = .05$), time to lift and carry 10 pounds (9.1 \pm 0.2 vs 10.0 \pm 0.1 seconds; $P < .001$), and mean (\pm SE) time to get in and out of a car (8.7 \pm 0.3 vs 10.6 \pm 0.3 seconds; $P < .001$) than the health education group. The resistance exercise group had an 8% lower score on the physical disability questionnaire (1.74 \pm 0.04 vs 1.90 \pm 0.03 units; $P = .003$), 8% lower pain score (2.2 \pm 0.06 vs 2.4 \pm 0.05 units; $P = .02$), greater distance on the 6-minute walk (1406 \pm 17 vs 1349 \pm 16 ft; $P = .02$), faster times on the lifting and carrying task (9.3 \pm 0.1 vs 10.0 \pm 0.16 seconds; $P = .001$), and the car task (9.0 \pm 0.3 vs 10.6 \pm 0.3 seconds; $P = .003$) than the health education group. There were no differences in x-ray scores between either exercise group and the health education group. **CONCLUSIONS:** Older disabled persons with osteoarthritis of the knee had modest improvements in measures of disability, physical performance, and pain from participating in either an aerobic or a resistance exercise program. These data suggest that exercise should be prescribed as part of the treatment for knee osteoarthritis.

Publication Types:

- Clinical Trial
- Multicenter Study
- Randomized Controlled Trial

MeSH Terms:

Short-term training effects on left ventricular diastolic function and oxygen uptake in older and younger men.

Harris SK, Petrella RJ, Overend TJ, Paterson DH, Cunningham DA.

Clin J Sport Med. 2003 Jul;13(4):245-51.

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OBJECTIVE: To determine the effect of plasma volume change with short-term training and diuresis on left ventricular diastolic filling and exercise oxygen uptake (VO_2) in older versus younger men. **METHODS:** Eleven older (68 \pm 5 y) physically active (maximal oxygen uptake [VO_{2max}] = 25.9 \pm 3.6 mL. kg⁻¹. min⁻¹) and 10 younger sedentary males (24 \pm 5 y, VO_{2max} 40.5 \pm 5.0 mL. kg⁻¹. min⁻¹) were randomly assigned to 5 consecutive days of (1) 1 h/d high intensity stationary cycling (EXER); (2) 100 mg/d spironolactone (DIUR); and (3) exercise and diuretic (EXDI). Each treatment was separated by a 21-day washout. Doppler echocardiographic indices of left ventricular diastolic filling including peak early and atrial transmitral flow velocity and isovolumic relaxation time; percent change in plasma volume; submaximal VO_2 kinetics; and VO_{2max} were determined at baseline and 48 hours after each treatment. **RESULTS:** Plasma volume was increased more in the young following EXER (8.92 \pm 7.6 vs. 6.2%, $P = 0.038$) and decreased more in the older group following DIUR (-11.5% vs. -3.54 \pm 9.0, $P < 0.001$). There was no significant difference between groups after EXDI. Significant changes in peak early flow velocity with EXER in older subjects were not reflected in any other changes in left ventricular diastolic filling across conditions. No changes in left ventricular diastolic filling were observed in the young group with any condition. VO_{2max} and VO_2 kinetics were unchanged under all conditions from baseline in both groups. **CONCLUSIONS:** These results suggest that exercise VO_2 responses either at maximal or submaximal workrates are not limited by alterations in left ventricular pump function in physically fit older adults.

PMID: 12855928 [PubMed - in process]

From PubMed

Effects of aerobic exercise training in community-based subjects aged 80 and older: a pilot study.

Vaitkevicius PV, Ebersold C, Shah MS, Gill NS, Katz RL, Narrett MJ, Applebaum GE, Parrish SM, O'Connor FC, Fleg JL.

J Am Geriatr Soc. 2002 Dec;50(12):2009-13.

Comment in:

- *J Am Geriatr Soc.* 2002 Dec;50(12):2089-91 PMID: 12473025

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OBJECTIVES: To assess the ability of sedentary, frail subjects aged 80 and older to train in a community-based exercise program and to evaluate clinical factors that predict improvements in peak oxygen consumption (VO_{2peak}). **DESIGN:** Pretest, posttest. **SETTING:** Charlestown Retirement Community, Catonsville, Maryland **PARTICIPANTS:** Twenty-two (11 male, 11 female; mean age \pm standard deviation = 84 \pm 4.0, range 80-92) self-referred. **INTERVENTION:** Six months of moderate-intensity aerobic exercise training, two to three sessions/week, 20 to 30 minutes per session. Training modes included treadmill walking and/or stationary cycling. **MEASUREMENTS:**

Baseline and follow-up maximal exercise treadmill tests (ETTs) with electrocardiogram monitoring and respiratory gas analysis. RESULTS: Six months of aerobic exercise training resulted in significant increases (mean +/- standard deviation) in ETT duration (11.9 +/- 3.3 vs 15.9 +/- 4.3 minutes; P =.01), VO₂peak (1.23 +/- 0.37 vs 1.31 +/- 0.36 L/min; P =.04), and oxygen pulse (9.3 +/- 2.8 vs 10.1 +/- 3.2; P =.03). Mean heart rate was significantly lower during submaximal ETT stages 1 through 4 (P <.05), and resting systolic blood pressure decreased (146 +/- 18 vs 133 +/- 14 mmHg; P =.01) after training. Multiple regression analysis indicated that baseline VO₂peak (r = 0.75, P =.002) and the total amount of time spent in exercise training (r = 0.55, P =.008) were independent predictors of the training-related improvements in VO₂peak. CONCLUSION: Subjects aged 80 and older can increase aerobic capacity and reduce systolic blood pressure in a community-based exercise program of moderate intensity. The most important predictors of change in VO₂peak were baseline VO₂peak and the time spent in exercise training. Subjects with a lower baseline VO₂peak had the greatest improvements in VO₂peak after training.

MeSH Terms:

- Aged
- Aged, 80 and over/*physiology
- Electrocardiography
- *Exercise
- Exercise Test
- Female