

A Prospective Cohort Study of Physical Fitness and Incident Glaucoma: The Niigata Wellness Study

Ryoko Kawakami¹, Susumu S. Sawada, FACSM¹, Yuko Gando², Haruki Momma³, Minoru Tashiro⁴, I-Min Lee, FACSM⁵, Steven N. Blair, FACSM⁶, Motohiko Miyachi², Mitsuru Higuchi, FACSM¹, Kiminori Kato⁷, Hirohito Sone⁷. ¹Waseda University, Tokorozawa, Japan. ²National Institutes of Biomedical Innovation, Health and Nutrition, Tokyo, Japan. ³Tohoku University, Miyagi, Japan. ⁴Niigata Medical Association of Occupational Health, Niigata, Japan. ⁵Harvard Medical School, Boston, MA. ⁶University of South Carolina, Columbia, SC. ⁷Niigata University, Niigata, Japan.

Email: r.kawakami@aoni.waseda.jp

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There is limited evidence exploring the association between cardiorespiratory fitness and the incidence of glaucoma. However, associations between other components of fitness and incident glaucoma are still unknown.

PURPOSE: To investigate the association between muscular and performance fitness and the incidence of glaucoma among Japanese workers in the Niigata Wellness Study.

METHODS: Participants included 26,183 workers (18,129 men) [median (interquartile range) age 50 (44-56) years] free of glaucoma who underwent physical fitness tests in 2001. Muscular and performance fitness index was calculated using a summed z-score by sex and age from grip strength, vertical jump, single-leg balance with eyes closed, forward bending, and whole-body reaction time. The participants were divided into quartiles according to the muscular and performance fitness index and each physical fitness test. During 2002-2007, participants were followed for development of glaucoma, which was defined based on physician diagnosis. Hazard ratios (HRs) and 95% confidence intervals (95% CIs) for the incidence of glaucoma were estimated using Cox proportional hazards models after adjusting for age, sex, body mass index, cigarette smoking, alcohol intake, hypertension, dyslipidemia, and diabetes.

RESULTS: During the follow-up, 292 participants developed glaucoma. The HRs (95% CIs) for developing glaucoma across quartiles of muscular and performance fitness index (lowest to highest) were 1.00 (reference), 0.99 (0.74-1.34), 0.64 (0.46-0.89), and 0.64 (0.46-0.89) (*P* for trend = 0.001). For vertical jump, the HRs (95% CIs) of developing glaucoma across quartiles (lowest to highest) were 1.00 (reference), 0.73 (0.54-0.99), 0.76 (0.56-1.03), and 0.54 (0.38-0.77) (*P* for trend < 0.001). For whole-body reaction time, the HRs (95% CIs) across quartiles (slowest to fastest) were 1.00 (reference), 0.77 (0.57-1.04), 0.65 (0.47-0.89), and 0.51 (0.37-0.72) (*P* for trend < 0.001). There were no associations between the other physical fitness tests and the incidence of glaucoma.

CONCLUSIONS: Muscular and performance physical fitness may be associated with lower risk of incident glaucoma. The precise mechanisms, which may include beneficial changes to intraocular pressure and antioxidant effects, are unknown and should be explored.

Effects of Arterial Stiffness Between Objectively Measured Physical Activity and Domain-Specific Cognition in Older Adults

Leidys Gutierrez-Martinez, Angeliq Brellenthin, Duck-chul Lee, FACSM. Iowa State University, Ames, IA. (Sponsor: Duck-chul Lee, FACSM)

Email: leidysg@iastate.edu

(No relationships reported)

PURPOSE: To examine the effects of arterial stiffness (AS) on the associations between objectively measured physical activity (PA) and domain specific cognitive functioning in older adults.

METHODS: This cross-sectional analysis included baseline data from 415 older adults enrolled in the Physical Activity and Aging Study (PAAS). Cognitive functioning was measured by working memory using Digit Span Test and selective attention and processing speed using computerized Stroop Test. PA over 7 days was measured with Omron accelerometer-based pedometers and time engaged in light-, moderate-, and vigorous-intensity PA with FitBit Charge 2 wristbands. AS was derived from carotid-femoral pulse wave velocity (cfPWV; AtCor Sphygmocor XCEL). High AS was defined as cfPWV ≥ 10 m/s, which is an established risk factor of cardiovascular diseases. Multivariable linear regression was used to model the associations between PA, AS, and each cognitive-domain score.

RESULTS: Participants were a mean age of 72 (± 6) years old and were well educated with 82% having a bachelor's degree or higher. Participants were also cognitively healthy (Mean Score of Mini-Mental State Examination 29.2 [± 1.29] out of 30). Participants with high AS (20.96%, n=87) accumulated fewer total steps per day (*p*=0.01), engaged in less light-intensity PA (*p*<0.01), and had worse precision on the Stroop test (*p*<0.01) compared to those with low AS. There were no significant group differences for other cognitive test scores. Light-intensity PA was associated with better performance on the digit span forward among those with high AS (*p*=0.01), but not those with low AS, after adjusting for age, sex, education, diabetes, hypertension, and current smoking status (*p*=0.01) from linear regression. However, no significant results were found in other PA variables regardless of AS status.

CONCLUSIONS: These results suggest a possible association of increased light-intensity PA with better working memory, particularly among older adults with high AS who are at higher risk of developing cardiovascular diseases.

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Benefits of Behavior: Exercise Enhances Perception of Physical Function Independent of Improvement Among Diabetic Patients

Shabnam A. Behin¹, Cynthia Villalobos¹, Nathaniel J. Holmgren¹, Alexis C. King², J. Mark VanNess¹, Paul D. Vosti³, Courtney D. Jensen¹. ¹University of the Pacific, Stockton, CA. ²University of Illinois at Urbana-Champaign, Champaign, IL. ³St. Joseph's Medical Center, Stockton, CA.

Email: s_behin3@u.pacific.edu

(No relationships reported)

In the U.S., approximately 1.5 million new cases of diabetes arise each year. Although these patients commonly report lower quality of life (QOL) than those without chronic illness, much of the literature remains focused on the physical benefits of weight loss and blood glucose management. To deliver individualized care, practitioners must also evaluate psychological health, including patient perceptions.

PURPOSE: To determine factors that affect perception of physical function in diabetic patients.

METHODS: 38 men and women with diabetes completed a 10-week, 20-session exercise program that included both aerobic and resistance training components. At baseline and follow-up, we measured body fat percent (BF%), body mass index (BMI), and performance on six standard functional tests. Subjects also completed a self-report QOL questionnaire in which perception of physical function was assessed. Linear regressions tested the effect of functional performance (baseline capacity and 10-week change) on perception of function.

RESULTS: Patients were 67.9 \pm 9.1 years of age, mean BMI was 31.5 \pm 6.1, and self-reported physical functioning ranged from 5.0 (very poor) to 100.0 (optimal); mean score was 54.7 \pm 26.8. At baseline, perception of physical functioning was not related to sex (*p*=0.751), age (*p*=0.405), BMI (*p*=0.610), or BF% (*p*=0.864). It was related to improved performances in six-minute walk (*p*<0.001), functional reach (*p*=0.046), timed up-and-go (*p*=0.080), chair stand (*p*=0.006), and sit-and-reach (*p*=0.024). At follow-up, perceptions of functioning improved by 13.8 \pm 24.5 points (25.7%; *p*=0.002) but there was no association with improvement in any anthropometric or functional tests: BMI (*p*=0.457), BF% (*p*=0.526), six-minute walk (*p*=0.131), functional reach (*p*=0.293), timed up-and-go (*p*=0.226), arm curl (*p*=0.966), chair stand (*p*=0.592), and sit-and-reach (*p*=0.970).

CONCLUSION: 10 weeks of exercise improved perception of physical function by more than 25% in patients with diabetes. Improvement was unrelated to enhancement of any anthropometric or performance domain. Patients with diabetes seem to improve their perceptions via participation rather than progress. Thus, it may be important to incorporate the behavior of exercise into treatments, even if it fails to elicit physical improvement.

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