INAHTA Briefs

Issue 2009/112

Title **Exercise Testing for the Prediction of Cardiac Events in Patients with Diabetes**

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Reference May 2009 (English). ISBN 978-1-897443-56-9 (print), ISSN 978-1-897443-57-6.
www.ihe.ca/documents/Exercise_Testing_Diabetes.pdf

Aim

To evaluate the safety and prognostic value of exercise testing in predicting cardiac events in patients with diabetes, chronic obstructive pulmonary disease (COPD), or arthritis compared to physician judgment based on medical history and physical examination alone.

Conclusions and results

No eligible systematic reviews or primary studies evaluated exercise testing in patients with COPD or arthritis. Five prognostic studies examined the association between prognostic variables derived from exercise electrocardiogram (ECG) or cardiopulmonary exercise testing and the number of cardiac events in patients with diabetes over a 3- to 16-year period. Although most patients in these studies did not have cardiovascular disease, the patient groups were heterogeneous in terms of co-morbidities and the type, duration, and presence of secondary complications of diabetes.

None of the 5 studies reported any adverse events during or immediately after exercise testing. The prognostic value of variables measured during an exercise ECG (4 studies) and a cardiopulmonary exercise test (1 study) were examined in relation to cardiovascular mortality and nonfatal cardiac events. None of the studies considered physician judgment as a prognostic variable. All studies included body mass index, blood pressure, and resting heart rate as covariates.

The studies demonstrated that ECG ST-segment depression, a low Duke Treadmill Score, delayed heart rate recovery, impaired chronotropic response, reduced metabolic rate, and low peak oxygen uptake were independent predictors of cardiovascular mortality and non-fatal cardiac events. However, the prognostic value of these variables might be overestimated. No conclusions could be drawn on the prognostic value of exercise testing in patients with COPD or arthritis.

Recommendations

Exercise is key in clinical management of diabetes, but patients with diabetes often have asymptomatic myocardial ischemia. Hence, sedentary patients with diabetes may be at risk of future cardiac events if their exercise program is more vigorous than brisk walking. Exercise testing might provide information useful in predicting the risk of cardiac events during or immediately after exercise in patients with diabetes who plan to enter a structured, community-based exercise program. However, evidence is lacking as regards the incremental prognostic value of exercise testing compared to physician judgment.

Methods

All relevant primary studies and systematic reviews of prospective cohort studies published from 1997 to 2009 were identified by systematically searching *The Cochrane Library*; the Centre for Reviews and Dissemination databases (NHS EED, HTA, DARE), MEDLINE, EMBASE, the Web of Science, PEDro, SPORTDiscus, and websites of health technology assessment agencies, research registers, evidence-based resources, and practice guideline clearinghouses. Reference lists of retrieved articles were also searched. No language restrictions were applied.

Two reviewers, using a 10-item checklist, independently assessed methodological quality of the studies. Scoring disagreements were resolved by consensus. Data were synthesized qualitatively.

Further research/reviews required

A cohort study is needed to determine whether exercise testing provides additional information about the risk of exercise-related cardiac events in patients with chronic diseases compared to physician judgment based on medical history and physical examination alone.

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ISSN 1654-501X