

DIVIP - Diabetes Prevention in Primary Care

Implications for Physical Activity

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien vid
Göteborgs universitet kommer att offentligen försvaras i hörsal 2119,
Hälsovetarbacken, Arvid Wallgrens Backe, hus 2, Göteborg,
Fredagen den 28 mars 2014 kl 13.00

av

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This thesis is based on the following papers, referred to in the text by their Roman numerals.

- I. Margareta I Hellgren, Max Petzold, Cecilia Björkelund, Hans Wedel, Per-Anders Jansson, Ulf Lindblad. Feasibility of the FINDRISC questionnaire to identify individuals with impaired glucose tolerance in Swedish primary care. A cross-sectional population-based study. *Diabet Med.* 2012. Dec; 29(12): 1501-5.
- II. Margareta I Hellgren, Bledar Daka, Per-Anders Jansson, Ulf Lindblad. Screening in primary care for individuals with impaired glucose tolerance. (Submitted).
- III. Margareta I Hellgren, Max Petzold, Héléne Berteus-Forslund, Hans Wedel, Per-Anders Jansson, Ulf Lindblad. Feasibility of a randomized controlled intervention with physical activity in participants with impaired glucose tolerance recruited by FINDRISC - a pilot study. (Accepted for publication in *Scandinavian Journal of Public Health*).
- IV. Margareta I Hellgren, Bledar Daka, Max Petzold, Charlotte A Larsson, Per-Anders Jansson, Ulf Lindblad. C-reactive protein concentrations differ by sex, physical activity and glucose tolerance: A cross-sectional population-based study in Sweden. (Submitted).
- V. Margareta I Hellgren, Bledar Daka, Per-Anders Jansson, Ulf Lindblad, Charlotte A Larsson. Insulin resistance predicts cardiovascular morbidity in men without diabetes mellitus and this effect is modified by level of physical activity. (Submitted).



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ABSTRACT

Aim: The overall aim was to study the effect of physical activity in impaired glucose tolerance (IGT) and insulin resistance. We set out to: 1. Evaluate different screening instruments to identify individuals with IGT; 2. Study feasibility and metabolic effects of an intervention focusing on physical activity in IGT-subjects; 3. Study the association between self-reported physical activity and subclinical inflammation in individuals with IGT; 4. Study the predictive value of insulin resistance on cardiovascular disease (CVD) in non-diabetic individuals and the modifying effect of physical activity.

Methods: Paper I, II and III: The FINDRISC questionnaire was delivered by mail to people in the Skaraborg county. Individuals with a risk-score ≥ 15 underwent testing of their fasting blood glucose and an oral glucose tolerance test (OGTT, 75 g). In addition, opportunistic screening by asking three short questions was used to identify individuals with IGT. Fifty-two individuals participated in a randomized controlled trial (RCT) comparing two different interventions focusing on increased physical activity with usual care. The participants were metabolically phenotyped at baseline and after one year. Paper IV and V: A population-based survey was performed 2002 – 2005 in the Skaraborg County. A total of 2816 individuals 35-75 years old participated and characterized with anthropometry, blood sampling and an OGTT. Questionnaires on diet and lifestyle were completed. The participants were restudied after 8 years and information on CVD diagnoses and mortality in the cohort was collected.

Results: The FINDRISC questionnaire was sent out to 9734 individuals and was found to be predictive of impaired glucose metabolism (55%) but was less efficient to identify individuals with IGT (16%). Our method to implement physical activity in IGT-subjects showed tendencies to decrease body weight, waist circumference and sagittal diameter, when adjusted for changes in dietary intake, in the intensive care group compared with the basic care and the control groups. Vigorous self-reported physical activity eliminated the difference observed in circulating CRP concentrations in male IGT-subjects compared with men showing normal glucose tolerance. Finally, data from the same Skaraborg cohort showed that self-reporting a high level of leisure time physical activity eliminated the apparent increased risk of insulin-resistant male individuals to develop CVD.

Conclusions: FINDRISC is an efficient screening tool for detection of individuals with impaired glucose metabolism while the opportunistic screening method may be used as an additive tool in primary care. The intervention with focus on physical activity decreased several metabolic risk factors and induced changes in diet. Finally, self-reported physical activity was shown to associate with limited subclinical inflammation in individuals with IGT and was also related to the predictive value of insulin resistance with regard to development of CVD.

Keywords: impaired glucose tolerance, prevention, primary care, insulin resistance, physical activity, prediction, cardiovascular disease, screening, inflammation

ISBN: 978-91-628-8900-5