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Original article

Determinants of change in insulin resistance response to Nordic walking in community-dwelling elderly women

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ABSTRACT

Introduction: Nordic walking, characterized by the use of two walking poles, is becoming increasingly popular. The aim of this study was to analyze the effects produced by a 12-week Nordic walking training program on functional abilities and metabolic profiles, specifically walk distance and insulin resistance, among elderly women.

Methods: The present study included 74 women (68 ± 7 years). The Nordic walking training program of 120 minutes per week was performed for 12 weeks. Before and at the end of the 12-week intervention, 6-minute walking distance (6MWD) and the homeostasis of the model assessment of insulin resistance (HOMA-IR) were measured.

Results and conclusions: After the 12-week Nordic walking training program, 6MWD increased significantly ($p < 0.001$). HOMA-IR improved significantly from a median (interquartile range) of 2.01 (1.31–2.59) to 1.32 (0.86–2.08) after intervention. Stepwise multiple linear regression analyses for changes in HOMA-IR showed that changes in the body mass index (BMI; $\beta = 0.255$, $p = 0.019$), triglycerides (TG; $\beta = 0.266$, $p = 0.015$), and uric acid ($\beta = 0.279$, $p = 0.009$) were independently and significantly associated with changes in HOMA-IR. The increased 6MWD correlated significantly with improved HOMA-IR in participants with baseline gamma-glutamyl transferase (GGT) ≥ 26 IU/L ($r = -0.682$, $p = 0.005$), but not in those with baseline GGT < 26 IU/L ($r = -0.127$, $p = 0.338$). Analysis of covariance showed that two regression lines in each graph were significantly different ($F = 5.64$, $p = 0.020$). These results suggest that increased 6MWD predicts improvement in insulin resistance after a 12-week Nordic walking training program in participants with elevated GGT.

1. Introduction

Nordic walking is characterized by walking with poles to increase the use of the upper body muscles compared with standard walking, and is becoming a popular activity in Northern Europe. Several studies have demonstrated that compared to standard walking, Nordic walking may lead to greater adaptations in the cardiovascular and respiratory systems, as well as greater energy expenditure on both acute and long-term effects of Nordic walking.[1–3] Nordic walking also has positive effects on aerobic performance, body composition, and the metabolic markers of the risk for cardiovascular disease (CVD). Morgulec-Adamowicz and colleagues[4] advocated in a recent review of scientific literature available on Nordic walking, that there are few literatures examining the benefits of Nordic walking as a potential health intervention in elderly adults.

Insulin resistance plays an important role in the pathogenesis of incident diabetes, hypertension, dyslipidemia, and CVD.[5–7] Alternatives have been sought to simplify the measurement of insulin resistance and one of them includes a homeostatic model assessment of insulin resistance (HOMA-IR), which uses fasting insulin and glucose levels to calculate insulin resistance.[8] In addition, serum gamma-glutamyl transferase (GGT) is also a clinical marker of glucose levels,[9,10] insulin resistance, and metabolic syndrome.[11,12]

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