Science & Sports (2010) **25**, 245—252

Disponible en ligne sur ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com

ORIGINAL ARTICLE

The effects of different intensity walking programs on serum blood lipids, high-sensitive C-reactive protein, and lipoprotein-associated phospholipase A2 in premenopausal women

Effets de programmes de marche de différentes intensités sur les lipides sériques, la protéine C réactive ultrasensible et la phospholipase A2 associée à une lipoprotéine chez des femmes préménopausées

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Received 13 August 2009; accepted 25 January 2010
Available online 5 March 2010

KEYWORDS
Premenopausal;
Serum lipids;
High-sensitive C-reactive protein;
Lipoprotein-associated phospholipase A2;
Walking

Abstract
Aim. — This study examined the effects of 12 weeks of walking programs on serum lipids, high-sensitive C-reactive protein, and lipoprotein-associated phospholipase A2.
Methods. — Twenty-six pre-menopausal women (30—49 years) completed 12 weeks of walking programs either at moderate or high intensity (50—55%, 70—75% maximum heart rate reserve, respectively). Estimated maximal oxygen consumption was assessed with a 2-km walking test; body composition, blood lipids, high-sensitive C-reactive protein, and lipoprotein-associated phospholipase A2 were measured before and after the study.
Results. — Maximal oxygen consumption increased, favoring high-intensity group; body weights, percent body fat ($p < 0.01$) and body mass index ($p < 0.05$) decreased in both exercise groups. There were no significant changes in the measured blood lipids in any of the groups, except for a significant reduction in low-density lipoprotein-cholesterol in high-intensity group ($p < 0.05$).

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0765-1597/$ - see front matter
doi:10.1016/j.scispo.2010.01.002

High-sensitive C-reactive protein and lipoprotein-associated phospholipase A2 levels reduced significantly in high-intensity ($p < 0.01$) and moderate-intensity ($p < 0.05$) groups, which were also different from the changes in the control group.
Conclusion. — Walking programs with different intensity result in favorable changes; however, for protective effects against cardiovascular diseases, high-intensity walking may be advised due to greater reductions in low-density lipoprotein-cholesterol, and high-sensitive C-reactive protein and lipoprotein-associated phospholipase A2.

MOTS CLÉS
Préménopausée ;
Lipides sériques ;
Protéine C réactive ultrasensible ;
Phospholipase A2 associée à une lipoprotéine ;
Marche

Résumé
Objectif. — Étudier les effets de 12 semaines de programmes de marche sur les lipides sériques, la protéine C réactive ultrasensible et la phospholipase A2 associée à une lipoprotéine.
Méthodes. — Vingt-six femmes préménopausées (30—49 ans) ont suivi 12 semaines de programmes de marche d'intensité modérée ou élevée (respectivement 50—55 % et 70—75 % maximum de la fréquence cardiaque de réserve). L'estimation de la consommation maximale d'oxygène a été réalisée par un test de marche sur 2 km. La composition corporelle, les lipides sanguins, la protéine C réactive ultrasensible et la phospholipase A2 associée à une lipoprotéine ont été mesurés avant et après l'étude.
Résultats. — La consommation maximale d'oxygène a augmenté, favorisant le groupe à activité élevée. Le poids corporel, le pourcentage de graisse corporelle ($p < 0,01$) et l'indice de masse corporelle ($p < 0,05$) ont diminué dans les deux groupes d'exercice. Il n'y a pas eu de changements significatifs dans les mesures des lipides sanguins dans aucun des groupes, à l'exception d'une réduction significative du cholestérol à lipoprotéine de basse densité dans le groupe à activité élevée ($p < 0,05$). Les taux de protéine C réactive ultrasensible et de phospholipase A2 associée à une lipoprotéine ont diminué de manière significative dans le groupe à activité élevée ($p < 0,01$) et le groupe à activité modérée ($p < 0,05$). Ces changements étaient également différents de ceux observés dans le groupe témoin.
Conclusion. — Les programmes de marche à différentes intensités entraînent des changements favorables. Cependant, pour obtenir des effets protecteurs contre les maladies cardiovasculaires, la marche à intensité élevée peut être conseillée en raison de plus importantes réductions des taux de cholestérol à lipoprotéine de basse densité, de protéine C réactive ultrasensible et de phospholipase A2 associée à une lipoprotéine.

1. Introduction

Coronary heart disease (CHD) is one of the main causes of death in many countries. Research has shown that elevated plasma levels of low-density lipoprotein cholesterol (LDL-C) and triglyceride (TG) are major factors for developing CHD, however, elevated high-density lipoprotein cholesterol (HDL-C) may play a role in reducing the risk of CHD [31]. Frequent, moderate exercise is likely to result in ''good enough'' levels of fitness to decrease risk of CHD for the majority of physically inactive adults, while avoiding much of the risk. Brisk walking (energy expenditure of approximately 4.5 metabolic units; one metabolic unit = oxygen consumption of 3.5 mL/min kg^{-1}) has been suggested as one of the easiest forms of exercise that can be used to meet the American College of Sports Medicine (ACSM) [2] recommendation. The ACSM recommends that aerobic endurance exercise should be performed 3 to 5 days per week, for 20 to 60 minutes (continuously), at 55% to 90% maximum heart rate (HRmax), or 40 to 85% of heart rate reserve (HRR) [2].

In recent years, research has indicated that inflammation in coronary artery is associated with the formation and advance of plaque and researchers have been working on high-sensitive C-reactive protein (hsCRP), which is thought to be a much better predictor of CHD than usual known cardiovascular risk factors alone [16,34]. Research has shown that chronically elevated levels of hsCRP contribute independently to later risk of CHD [35] and the initial development of myocardial infarction, stroke, and obstructive arteriosclerosis can be predicted by hsCRP in healthy subjects [36]. Circulating lipoprotein-associated phospholipase A2 (Lp-PLA2) is a novel marker of inflammation — independent of and additive to traditional risk factors — that plays a critical role in atherogenesis; its inhibition may have antiatherogenic effects. Lp-PLA2 is expressed in atherosclerotic plaques [17], and in macrophages within the fibrous cap of human rupture prone lesions [22]. As with elevated hsCRP, an elevated Lp-PLA2 level doubles the risk for primary and secondary cardiovascular events and when two of these inflammatory markers are increased together, they provide an even greater predictive capability to identify very high-risk individuals. Preventing the development and advancement of CVD by controlling the risk factors is important. Regular physical activity confers many physiological and psychological benefits including an improved lipid profile, enhanced insulin sensitivity, lowered blood pressure and an increased energy expenditure which has the potential to lower body fat and body weight [21]. However, the role of physical activity on inflammatory markers is not known clearly. It was hypothesised that the baseline CRP concentration is affected by two antagonistic influences. While