Science & Sports (2015) 30, 51—55

Disponible en ligne sur ScienceDirect www.sciencedirect.com

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

BRIEF NOTE

The association between exercise capacity and angiotensin converting enzyme I/D polymorphism in Brazilian hypertensive elderly

Association entre la capacité d'exercice et polymorphisme de l'enzyme de conversion I/D chez des personnes âgées hypertendues brésiliennes

C. Veloso Carvalho[a,b], M.F. Merli[a], V.S. Probst[a,c], K. Barros Parron Fernandes[a,c], S.M. Maciel[d], R.C. Poli-Frederico[a,*,b]

[a] *Master program in rehabilitation sciences UEL-UNOPAR, avenue Paris 675 Jd Piza, CEP 86041-140. Cx. P. 401, Londrina, PR, Brazil*
[b] *Laboratory of molecular biology, Universidade Norte do Paraná (UNOPAR). avenue Paris 675 Jd Piza, CEP 86041-140. Cx. P. 401, Londrina, PR, Brazil*
[c] *Centre of research in health sciences, Universidade Norte do Paraná (UNOPAR). avenue Paris 675 Jd Piza, CEP 86041-140. Cx. P. 401, Londrina, PR, Brazil*
[d] *Department of pediatric dentistry, dental school, Universidade Estadual de Maingá (UEM), Maringá, Paraná, Brazil*

Received 23 August 2013; accepted 14 April 2014
Available online 16 October 2014

KEYWORDS
Hypertension;
Genetic polymorphism;
ACE;
Exercise;
Elderly

Summary
Introduction. — To evaluate the association of the ACE I/D polymorphism with exercise capacity and history of hypertension in physically independent elderly.
Summary of facts and results. — The study sample consisted of 57 health elderly and 57 hypertensive elderly. Genotyping for ACE I/D was performed by polymerase chain reaction. The 6-Minute Walk Test evaluates the subject's functional exercise capacity and was performed in accordance with the guidelines of the American Thoracic Society. The influence of parameters on the risk of hypertension was assessed by analysis of logistic regression.

* Corresponding author.
E-mail addresses: regina.frederico@unopar.br, reginafrederico@yahoo.com.br (R.C. Poli-Frederico).

http://dx.doi.org/10.1016/j.scispo.2014.04.008

The significance level for all analyses was $P \leq 0.05$. The elderly with the ACE DD genotype were 1.37 (95%CI: 1.09—1.71) more likely to be hypertensive than carriers of the allele I ($P = 0.006$). The hypertensive group exhibited a significantly higher BMI than the normotensive group (OR = 1.16; 95%CI: 1.02—1.33), as well as, elderly with impaired exercise capacity were 1.24 more likely to be hypertensive than those with more preserved exercise capacity (95%CI: 1.09—1.41).
Conclusion. — The physically independent elderly carriers of the DD genotype showed an impaired exercise capacity and consequently an increased risk of hypertension.

MOTS CLÉS
Hypertension ;
Polymorphisme génétique ;
ACE ;
Exercice ;
Personnes âgées

Résumé
Introduction. — Évaluer l'association du polymorphisme ACE I/D avec la capacité d'exercice et l'histoire de l'hypertension chez les personnes âgées physiquement indépendantes.
Synthèse des faits et résultats. — L'échantillon de l'étude comprenait 57 personnes âgées en bonne santé et 57 personnes âgées hypertendues. Le génotypage pour ACE I/D a été réalisée par réaction en chaîne par polymérase. Le test de marche de 6 minutes évalue la capacité d'exercice fonctionnel de l'échantillon et a été réalisé en conformité avec les lignes directrices de l'American Thoracic Society. L'influence des paramètres sur le risque d'hypertension artérielle a été évaluée par l'analyse de régression logistique. Le niveau de signification pour toutes les analyses était $p \leq 0{,}05$. Les personnes âgées avec l'ACE génotype DD étaient plus susceptibles d'être hypertendues à 1,37 fois plus (IC95 % : 1,09—1,71) que les porteurs de l'allèle I ($p = 0{,}006$). Le groupe hypertendu présentait un IMC significativement plus élevé que le groupe normotendu (OR = 1,16 ; IC95 % : 1,02—1,33), et, les personnes âgées avec une capacité d'exercice affaiblie avaient 1,24 fois plus de chances d'être hypertendues que ceux qui ont la capacité d'exercice plus préservée (IC95 % : 1,09—10,41).
Conclusion. — Les porteurs âgées physiquement indépendantes du génotype DD ont montré une capacité d'exercice affaiblie et par conséquent un risque accru d'hypertension.

1. Introduction

ACE insertion/deletion (I/D) polymorphism has been the major target for genetic investigations of hypertension. An I/D polymorphism of the ACE gene consists of the absence and presence of a 287 bp DNA fragment. Individuals who are homozygous for the deletion allele (DD) have serum ACE levels higher than those who are homozygous for the insertion allele (II) [1]. In addition, accumulated evidence suggests that the D allele is associated with a higher proportion of fast-twitch or type 2 muscle fibers, thus individuals with the D allele tend to perform better in resistance training but poorer in aerobic physical activity than those with the I allele. This genetic influence may also account for some of the propensity to be physically active [2]. Thus, it could be possible that, given an ACE I/D genotype, subjects might be more likely to become physically active and, consequently this in turn would lead to protection against hypertension. Hence and, considering that there are few reports in the literature regarding polymorphism genetic and exercise capacity in older adults, the aim of this study was to evaluate the association of the ACE I/D polymorphism with functional exercise capacity and history of hypertension in physically independent elderly.

2. Material and methods

2.1. Subjects

A case-control study age and sex matched was performed between 57 subjects in the hypertensive group and 57 subjects in the normotensive group (mean age 69.2 ± 5.7). All subjects agreed to participate and signed a written informed consent. The project was approved by the Ethics Committee of the UNOPAR (PP/0253/11).

Obesity was diagnosed on the basis of the most commonly used definitions, established by the World Health Organization (WHO). The blood pressure was obtained in the right arm after the participant sat quietly for ≥ 5 minutes. Hypertension was diagnosed according to the diagnostic standard of hypertension set by WHO/ISH in 1999 and if these individuals reported a previous diagnosis of hypertension and if were being treated with antihypertensive medications.

2.2. 6-Minute Walk Test (6MWT)

The 6MWT evaluates the subject's functional exercise capacity and the analysis was based on the percentage of values