Effects of oral L-arginine supplementation and acute resistance exercise on blood pressure and nitric oxide in hypertensive patients

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INTRODUCTION

The blood pressure elevation is a linear, continuos and independent risk factor for cardiovascular diseases. It generates high medical and socioeconomic costs due to its complications related to hypertension, such as coronary artery disease, cerebrovascular disease, renal failure and chronic heart failure [1]. According to Bonow (2002) [2], the risk of cardiovascular disease is reduced by 84% when the individual is able to maintain a normal body weight, regular physical activity, healthy diet, moderate alcohol intake and avoid smoking.

Vasodilator agents have been studied by researchers around the world, among them is the nitric oxide. The amino acid L-arginine is substrate for the NO synthesis under the enzyme nitric oxide synthase (NOS). NO causes vasodilation by activating the guanylate cyclase and increasing the cyclic guanosine monophosphate (cGMP) [3]. L-arginine supplementation appears to promote vasodilation in humans [4], and the NO has been explained as the first mechanism for vascular changes resulting from physical activity [4].

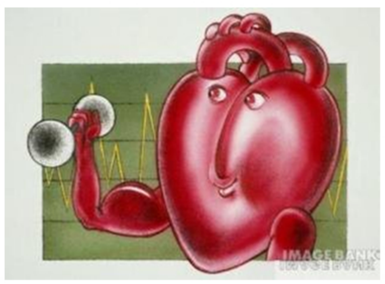
OBJECTIVE

This study examined the effects of oral L-arginine supplementation and acute resistance exercises on blood pressure and nitric oxide in hypertensive patients.

METHODS

Sixteen hypertensive men controlled through antihypertensive drugs, non-smoking and sedentary with age (45±7 yrs), body weight (92.46± 12.99 kg), and body mass index (31.03± 3.76 kg/m^2), volunteered to be in randomised, double-blind, and repeated-measure study and crossover design. They were distributed into groups, based on the supplementation (6 g/day of placebo or L-arg for 7 days), with or without acute resistance exercise (Figure 1); the supplementation periods were separated by a 7-day wash out. Before exercise, the patients underwent an exercise test and a physical evaluation.

Acute Resistance Exercises



The acute resistance exercises sessions included 8 exercises (5 upper limb and 3 lower limb) with an intensity of 60% of 1 maximum repetition. Each session was composed of 3 sets of 12 repetitions and performed before and after the supplementation, according to the experimental design (figure 1).

Supplementation

L-arginine or Placebo

(6 grams/ day for 7 days)

Groups:

Placebo - CTL

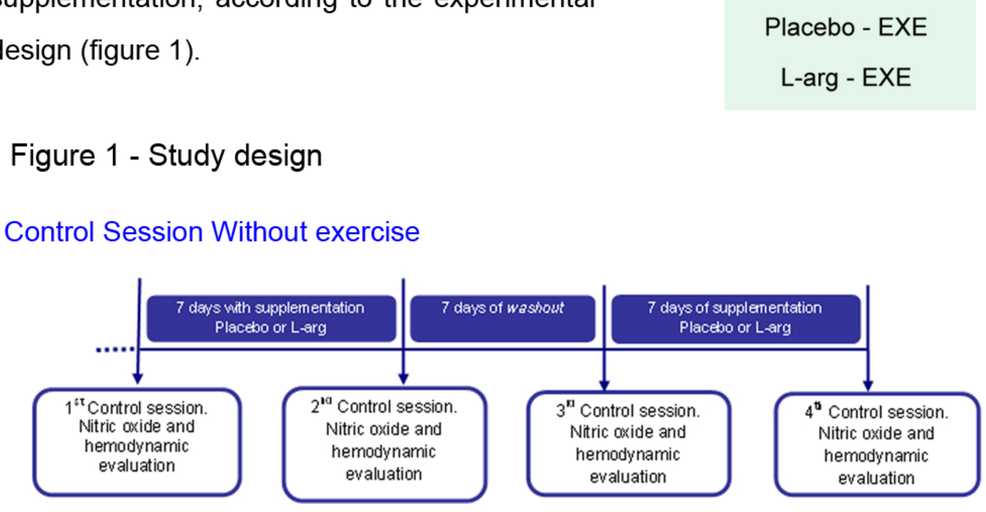
L-Arg - CTL

Placebo - EXE

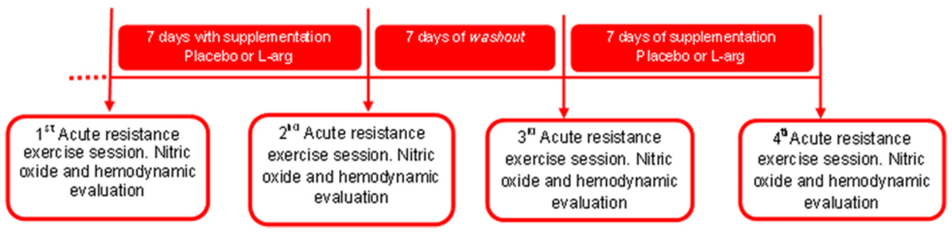
L-arg - EXE

Figure 1 - Study design

Control Session Without exercise



Exercise session



RESULTS

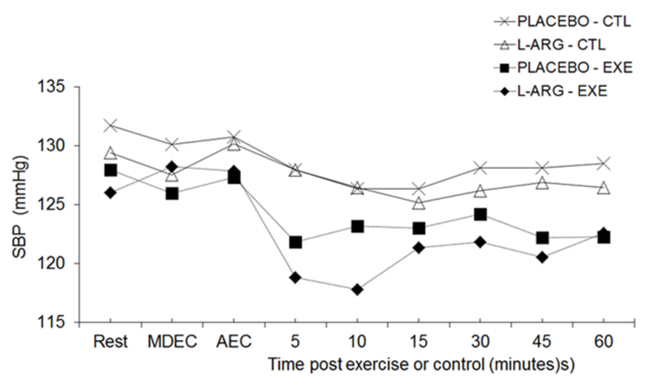


Figure 2 – Sistolic blood presure (SBP). MDEC= mean during exercise or control; AEC= after exercise or control. ANOVA with Tukey post test. non significant (NS)

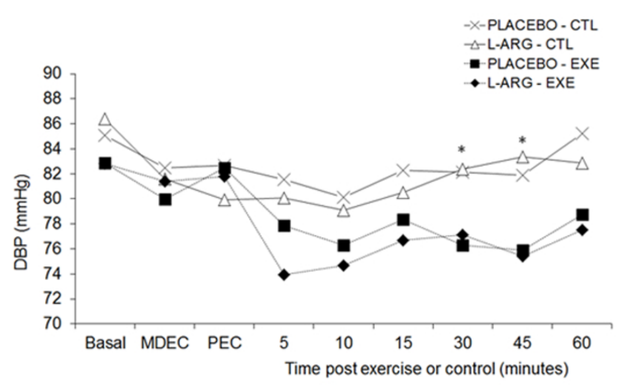


Figure 3 – Diastolic blood presure (DBP). MDEC= mean during exercise or control; AEC= after exercise or control. ANOVA with Tukey post test. *= P<0.05 vs exercised groups.

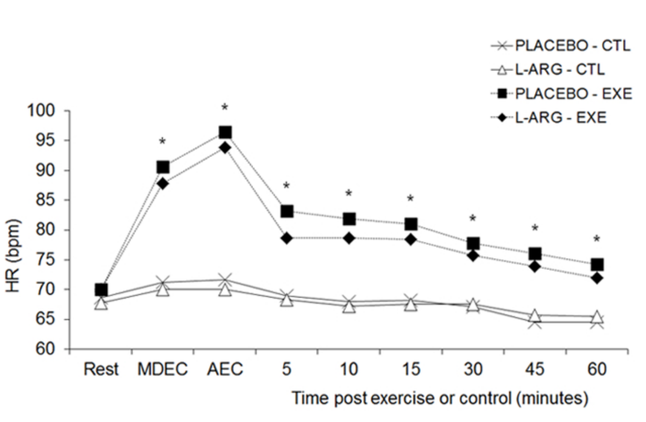


Figure 4 – Heart rate (HR). MDEC= mean during exercise or control; AEC= after exercise or control. ANOVA with Tukey post test. *= P<0.05 vs exercised groups.

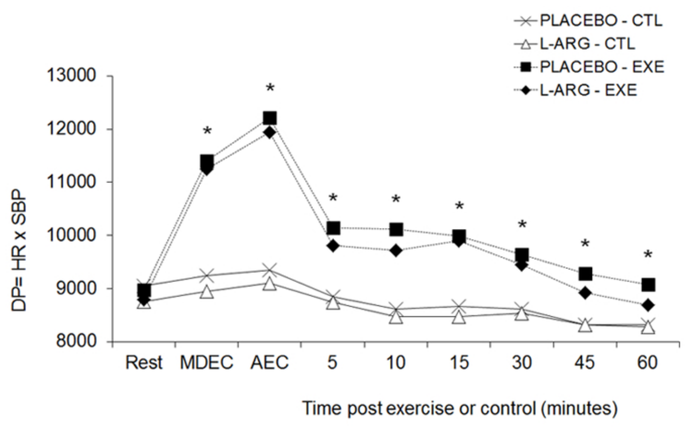


Figure 5 – Double product (DP). MDEC= mean during exercise or control; AEC= after exercise or control. ANOVA with Tukey post test. *= P<0.05 vs exercised groups.

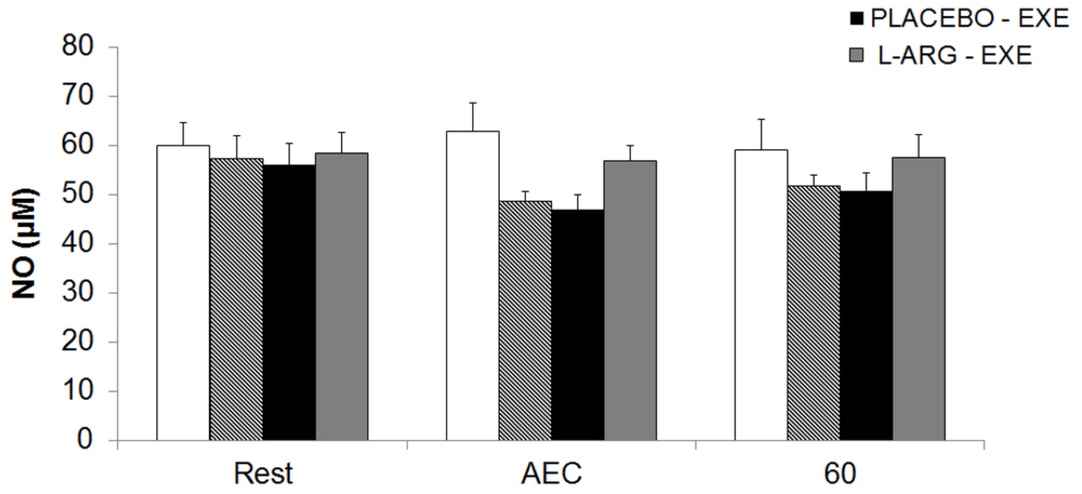


Figure 6 – Nitric Oxide (NO). AEC= after exercise or control. ANOVA with Tukey post test. Non-significant.

CONCLUSION

These results suggest that acute resistance exercise could be a powerful tool to control the blood pressure in hypertensive men, independently of L-arginine supplementation.

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ACKNOWLEDGEMENT

FAPESP

AFIP Associação Fundo de Incentivo à Pesquisa

CEPE Centro de Estudos em Psicobiologia e Exercício

CAPES