

## SUBACUTE BLOOD PRESSURE OF STREET RUNNERS AFTER CONTINUOUS AND HIGH-INTENSITY INTERVAL TRAINING SESSION

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### SUMMARY

Street running is a poorly investigated modality due to the limitations of in-locus measurements and the diversity of its practitioners. Regarding blood pressure, there are no published studies with different training methodologies that are conducted on-site. The objective of the present study is to evaluate the subacute responses of blood pressure (BP) in healthy young adults who practice street running, after a session of high-intensity interval running and a session of moderate-intensity continuous running, and a control session. This is a cross-sectional study conducted with 10 street runners, subjected to 3 protocols: continuous aerobic (PAC); high-intensity interval (PIAI); and control (PC). Hemodynamic measurements were taken before, immediately after, and every 10 minutes until 40 minutes after the completion of the protocols. **Results:** Significant elevation of SBP immediately after the running session, both in PAC and PIAI, when compared to the pre-exercise moment, but significantly higher in the PIAI group. These responses were not exaggerated, returning to baseline values in subsequent moments (without significance in intra- and intergroup analysis). DBP showed a significant increase in both exercise protocols immediately post-exercise and 20 minutes after, but to the same extent. At the 40-minute mark, the PIAI group maintained a significantly higher DBP than the PAC group. **Conclusion:** The runners exhibited higher blood pressure values immediately after both exercise sessions in a similar magnitude, but did not experience post-exercise hypotension in either protocol.

**Keywords:** Blood pressure; street running; continuous training; interval training.

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## **Introduction**

Street running has increased significantly in recent years. This type of exercise is characterized by the outdoor environment of parks and city streets, under variable environmental conditions, and different from treadmill runs, in addition to its practitioners being mostly amateurs. Regardless of the environment in which it is performed, endurance running, aerobic, continuous, and long-duration, has been a good strategy for improving cardiorespiratory fitness and biochemical parameters. Continuous aerobic exercises have been recommended by various national and international guidelines as a form of treatment or prevention of cardiovascular diseases and for conditioning gains. However, high-intensity interval runs, which are anaerobic in nature, are not mentioned in these documents, although there is promising evidence for both normal individuals and those with heart conditions.

In this context, high-intensity interval training generates numerous benefits for practitioners, and the gains seem to be more effective compared to continuous low/moderate-intensity exercise, including in terms of individuals' adherence to exercise practice. However, there are gaps in the literature regarding hemodynamic response. Thus, this study aims to evaluate the subacute blood pressure (BP) responses in healthy young adults who practice road running, after a high-intensity interval running session and a moderate-intensity continuous running session, and a control session.

## **Materials and Methods**

Cross-sectional, controlled, and crossover study, which had a sample of 10 runners from a park used for street running practice. For the evaluation of the sample characteristics, body mass, height, and body mass index (BMI) measurements were adopted. After the pre-participation evaluations (semi-structured interview, physical assessment, BMI<sup>2</sup>, blood pressure measurement, and heart rate (HR), the individuals carried out the study protocols, where the sequence of execution was randomized through a draw.

Control Protocol (CP) – The individuals remained for an average time similar to the experimental protocols, however, without engaging in any type of physical exercise. They were allowed to stand, sit, and talk. Continuous Aerobic Protocol (CAP) – Consisting of a 3,000-meter run, with an intensity of 75% of the reserve heart rate 13. High-Intensity Interval Protocol (HIIP) – Consisting of 8 stimuli of 300m sprints performed at the maximum speed the runner could achieve, followed by 100m of active recovery, with slow walking. The protocols had a 72-hour interval between them.

The measurements of BP and HR were taken before the protocols (Pre); immediately after (minute 0); 10 minutes (minute 10); 20 minutes (minute 20); 30 minutes (minute 30); and 40 minutes after (minute 40). The measurements were repeated after 2 minutes, and the average was calculated for analysis purposes.

### Results and Discussion:

**Table 1.** Behavior of systolic blood pressure before the running session, immediately after, and every 20 minutes until the 40th minute.

PAS			
MOMENT	PC n=10	PAC n=10	PIAI n=10
PRE	122,14±11,74	117,28±15,33	124,75±6,33
Min 0	115,78±12,79 &#	147,21±11,40 *&\$	160,75±12,57 *#&\$
Min 20	117,35±11,15	122,57±8,26	122,66±10,55
Min 40	116,57±9,51	117±7,14	120,41±9,45

Source: Own elaboration. Legends: \* = Intragroup comparison p<0.05; & = Intergroup comparison with Interval p<0.05; # = Intergroup comparison with Continuous p<0.05; \$ = Intergroup comparison with Control p<0.05

**Table 2.** Behavior of diastolic blood pressure before the running session, immediately after, and every 20 minutes until the 40th minute

PAD			
MOMENT	PC n=10	PAC n=10	PIAI n=10
PRE	67,57±7,74	70,21±6,99	81,11±11,58
Min 0	66,64±7,91 &#	76,92±12,47 \$	85,41±12,86 \$
Min 20	67,5±6,91 &#	74,92±4,54 \$	80,05±10,49 \$
Min 40	68,07±5,49	71±5,98 &	79,41±10,58 #

Source: Own elaboration. Legends: \* = Intragroup comparison p<0.05; & = Intergroup comparison with Interval p<0.05; # = Intergroup comparison with Continuous p<0.05; \$ = Intergroup comparison with Control p<0.05

The runners showed a significant increase in SBP immediately after the running session, both in the PAC and PIAI groups, when compared to the pre-exercise moment, but it was significantly higher in the PIAI group. However, these responses were not exaggerated, returning to baseline values in subsequent moments (without significance in intra- and intergroup analysis). Similarly, the DBP showed a significant increase in both exercise protocols immediately post-exercise and 20 minutes after, but to the same extent. At the 40-minute mark, the PIAI group maintained a significantly higher DBP than the PAC group. This increase in SBP and DBP found in both exercise protocols of the present study can be explained by the cardiovascular adaptations to exercise that generate the increase in BP, such as the increase in HR and stroke volume 14, which in turn will increase cardiac output, impacting the rise in BP<sup>14,15</sup>.

In the subsequent moments of the present study, it was observed that the SBP stabilized quickly in both groups, with no difference between the exercise protocols, although it was higher than the PC. DBP showed a significant increase 20 minutes after in both exercise protocols to the same extent. At the 40-minute mark, the PIAI group showed a significantly higher DBP response than the PAC group. The stabilization of SBP can be explained by the acute adaptations to exercise, which lead to a decrease in peripheral vascular resistance (PVR), due to the decrease in HR, SV, and CO with the cessation of exercise<sup>16</sup>. Vasodilator substances such as nitric oxide also positively impact the reduction of BP<sup>17, 18</sup>.

## **Conclusion**

The present study identified that normotensive runners subjected to street running training in 2 protocols exhibited higher blood pressure values immediately after both exercise sessions in similar magnitude, but did not show post-exercise hypotension in either protocol, although a tendency for rapid normalization of SBP was

observed, and a significantly greater DBP response was noted in the interval protocol compared to the continuous one at the 40-minute mark.

### **Bibliographic References**

- Pazin, J., et al. (2008). Corredores de rua: características demográficas, treinamento e prevalência de lesões. *\*Revista Brasileira de Cineantropometria e Desempenho Humano\**, 10(3), 277-282.
- O'Leary, V. B., et al. (2006). Exercise-induced reversal of insulin resistance in obese elderly is associated with reduced visceral fat. *\*Journal of Applied Physiology\** (1985), 100(5), 1584-1589.
- Thompson, P. D., et al. (2001). The acute versus the chronic response to exercise. *\*Medicine & Science in Sports & Exercise\**, 33(6 Suppl), S438-S445; discussion S452-453.
- Chobanian, A. V., et al. (2003). Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *\*Hypertension\**, 42(6), 1206-1252.
- Herdy, A. H., et al. (2014). Diretriz Sul-Americana de Prevenção e Reabilitação Cardiovascular. *\*Arquivos Brasileiros de Cardiologia\**, 103(2), 1-31.
- Gibala, M. J., & McGee, S. L. (2008). Metabolic adaptations to short-term high-intensity interval training: a little pain for a lot of gain? *\*Exercise and Sport Sciences Reviews\**, 36(2), 58-63.
- Hargreaves, M., et al. (1998). Muscle metabolites and performance during high-intensity, intermittent exercise. *\*Journal of Applied Physiology\** (1985), 84(5), 1687-1691.
- C., V. S., et al. (2015). High intensity intermittent training as an alternative in cardiovascular rehabilitation: a meta-analysis. *\*Brazilian Journal of Physical Activity and Health\**, 20(4), 340-351.
- Irving, B. A., et al. (2008). Effect of exercise training intensity on abdominal visceral fat and body composition. *\*Medicine & Science in Sports & Exercise\**, 40(11), 1863-1872.
- Boutcher, S. H. (2011). High-intensity intermittent exercise and fat loss. *\*Journal of Obesity\**, 2011, Article ID 868305.
- Duncan, G. E., et al. (2005). Prescribing exercise at varied levels of intensity and frequency: a randomized trial. *\*Archives of Internal Medicine\**, 165(20), 2362-2369.