Computer Methods in Biomechanics and Biomedical Engineering

Volume 14, Supplement 1, 2011

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DOI: 10.1080/10255842.2011.595235

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pages 269-270

Available online: 24 Aug 2011

Computer Methods in Biomechanics and Biomedical Engineering
Vol. 14, No. S1, August 2011, 269–270

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1 Introduction

These last years, the elastic compression, initially used in medicine against the chronic venous insufficiency, appeared in sport. Its interest in recovery is justified by its compressive weaving which, by applying a positive pressure around the muscle, modifies the hemodynamic (improvement of venous return [5] and microcirculation [8]). Indeed, the improvement of venous return accelerates the elimination of the metabolites from the muscular exercise [1] and the phosphocreatine resynthesis is accelerated by the improvement of circulation [4]. The interest of elastic compression during exercise seems less obvious. The manufacturers advance that their products reduce the vibrations generated during race on hard ground, and thus allow to decrease the oscillatory movement of the muscles pushing back the tiredness and the risk of wound. However, the scientific literature on this topic is provided poor.

We thus realized a preliminary study to evaluate the effects of compression sleeves (CS) on the stride biomechanical parameters and the performance realized during running exercises on treadmill.

2 Methods

Ten men (age 21.9 ± 0.7 years) moderately trained in endurance (3.13 ± 0.3 hours per weeks) realized two identical sessions with and without CS (≈ 20 mmHg at the level of the gastrocnemius muscle), in a randomized order. The protocol included three phases: first a 30 minutes exercise at 60% of maximal aerobic velocity on treadmill (60%MAV), 15 minutes of recovery, then an exhausting exercise at 100% of MAV on treadmill named time to exhaustion (tlim).

A kinematic arm [2] (Figure 1) measured the vertical displacement of the gravity center of the subject (Z) and the stride biomechanical parameters [frequency (F), period (P) and length (L)] during the two running exercises.

Maximum time realized by each subject during tlim was used to evaluate the performance.

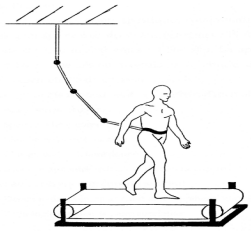

Figure 1Kinematic arm

Statistical analysis used Paired Student T Test. All results are presented as mean ± SEM. Statistical significance was set at $p<0.05$.

3 Results and discussion

The stride biomechanical parameters were modified between 60%MAV and tlim with the two conditions (Z and P decreased and F an L increased) (Figure 2 and 3).

In addition, the performance realized during tlim was not different with the two conditions (respectively 269.4 ± 18.4 s and 263.3 ± 19.8 s with and without CS).

However, with CS, even if the values did not reach the significativity threshold, we observed a modification of the stride between 60%VMA and tlim. The oscillation of the gravity center was less important between the two running exercise for eight subjects (-36.8 ± 3.6% for the group). This tendency was confirmed for the other parameters (-64.0 ± 0.7%, -77,6 ± 1.7% and +27.8 ± 2.7% for P, F and L, respectively).

The CS were perceived as a little comfortable (3.1 ± 0.3).

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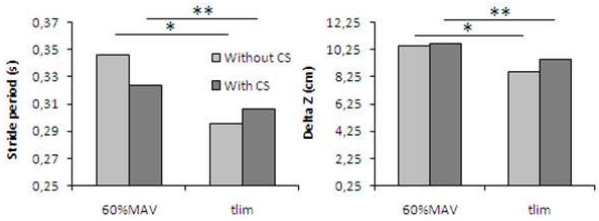

Figure 2 P and Z recorded with and without CS during the two running exercises
*Without CS: difference between 60%MAV and tlim
**With CS: difference between 60%MAV and tlim

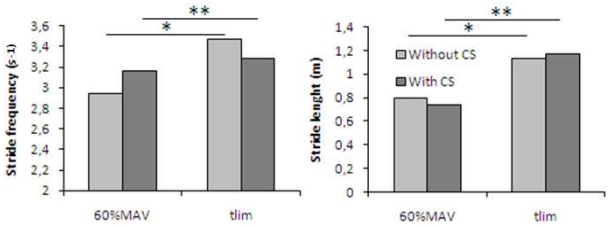

Figure 3 F and L recorded with and without CS during the two running exercises
*Without CS: difference between 60%MAV and tlim
**With CS: difference between 60%MAV and tlim

	Without CS	With CS
ΔZ (cm)	-1.90 ± 0.51	-1.20 ± 0.56
ΔP (s)	-0.05 ± 0.02	-0.02 ± 0.02
ΔF (s-1)	0.54 ± 0.22	0.12 ± 0.21
ΔL (m)	0.34 ± 0.07	0.43 ± 0.06

Table 1 Modifications of the stride parameters between 60%VMA and tlim, recorded with and without CS

In this preliminary study, the CS did not improve the performance recorded during the exercise tlim. The significant part of the psychological determinants in the capacity of the athletes to repeat the same performance during a tlim exercise, could explained partly why we did not observe a positive effect of CS on the performance [3].

However, the results tend to show that the CS limit the stride alteration caused by a change of intensity. Indeed, the stride was less modified between 60%MAV and tlim with the CS. These results could be related to the advanced effects of elastic compression, on the vibrations generated by the impact of the foot on the ground [7].
This tendency was not confirmed for two subjects. But these two subjects perceived the CS as uncomfortable. Consequently, it was possible that these subjects unconsciously modified their stride.

4 Conclusion

In conclusion, the main result of this preliminary study shows that the stride parameters are less modified by the increase in the intensity of running exercise with the CS. The inclusion of other subjects could confirm this tendency. In addition, no improvement of the performance could be observed in this study with CS. It would be judicious to propose another type of exercise that tlim to appreciate the impact of the CS on the running performance.

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Acknowledgments

The authors thank the subjects for their time and enthusiasm. The study was supported by EA3920 Cardiovascular Physiopathology and Prevention and Compressport®.