INFLUENCE OF FATIGUE ON THE STRIDE CHARACTERISTICS DURING AN INTENSE ENDURANCE RUNTEST.

Jidovtseff, B, Rodriguez de la Cruz , C, Croisier, JL, Maquet, D, Bury T, Deflandre, D

ULG (Liège, Belgium)

Introduction

The analysis of the stride and its variation during endurance running has been investigated in different studies (Slawinski et al, 2008). Most of them were achieved in laboratory and/or with heavy and complex equipment. Very recently, a small and practical device, adapted to field testing has been developed to analyze stride characteristics: the Myotest Run. This accelerometer allows the measurement of thirteen biomechanical parameters of the running stride. Therefore, the aim of the study was to investigate the influence of fatigue on stride mechanics during an exhaustive endurance test with Myotest Run.

Methods

Twenty male subjects (16-36 yrs) were involved in the study divided into two sessions: 1) a treadmill progressive VO2max test; 2) a field test at 90% of the VvO2max until exhaustion. Mechanical parameters (e.g. step frequency, step distance, contact time, distance on the contact time, stiffness) were recorded with the Myotest Run at each velocity during the treadmill test and at each lap in the 90% exhaustive test. Based on these two tests, three investigations have been conducted: 1) the influence of velocity on stride characteristics; 2) treadmill vs. field running characteristics 3) influence of fatigue on stride mechanics. A reproducibility analysis was also performed with standardized running recordings achieved before the field test.

Results

The results show an excellent reproducibility of the Myotest Run values, except for the asymmetry of the race (CV>5%). The stride on treadmill was not significantly different in comparison with the one on track, except for the hip angle at touchdown ($p<0,05$). Myotest analysis at different speed during the treadmill test showed that all biomechanical parameters changed with running speed ($p<0.05$). Surprisingly, classical statistics revealed only few significant changes in the stride with fatigue (decrease in CM vertical movement and in reactivity; $p<0.05$). However, an individual analysis allowed us to put forward four different changes of the stride with fatigue: 1) increase in stride length; 2) decrease in stride length and in CM vertical movement 3) decrease in stride length contact time; 4) no change in stride characteristics. These observations were partly observed by different authors (Avogadro et al, 2003).

Conclusion

This study confirmed that Myotest Run is a useful device in the stride analysis. The impact of fatigue on running pattern could be different according to subject characteristics. More researches are needed to elucidate how programs should be individualized.

References

Avogadro P, Dolenec A, Belli A. (2003). Eur J Appl Physiol, 90, 165-170.

Slawinski J, Billat V. (2008). Effets de la fatigue sur la depense energetique et sur l'energie mecanique en course de demi-fond. AEIFA