長時間運動時におけるコンプレッションタイツの着用が筋疲労や筋損傷・炎症反応に及ぼす影響

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Influence of Wearing Compression Tights During Prolonged Exercise on Muscle Fatigue, Muscle Damage and Inflammatory Responses

by

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ABSTRACT

The purpose of the present study was to determine the influence of wearing compression garments (compression tights) with different pressure intensity on muscle function, metabolite and endocrine responses, muscle damage and inflammatory responses to 120 min run at moderate intensity. Eight healthy young men conducted four trials on different days, consisting of [1] trial with wearing compression garments of heavy pressure intensity (approximately 40 hPa, High), [2] trial with wearing compression garments of moderate pressure intensity (approximately 20 hPa, Middle), [3] trial with normal sport garments (pressure intensity was set below 10 hPa, CON). Each trial was performed with randomized orders, and four weeks of rest period were provided between the trials.

Exercise consisted of 120 min of running on treadmill at 60% of maximal oxygen uptake ($\dot{V}O_{2max}$). Time-courses of changes in power output for lower limb muscles (maximal jump height), heart rate, ratings of perceived exertion (RPE), metabolic and endocrine responses, muscle damage and inflammatory responses were evaluated.

Maximal jump height was decreased after 120 min of running in the High and CON trials, whereas the Middle trial showed no significant reduction of maximal jump height. Moreover, the maximal jump height immediately after the 120 min of running was significantly higher in the Middle than in the High ($P < 0.05$). Average heart rate during 120 min of running was lowest in the Middle trial, with a significant difference from the value of CON trial ($P < 0.05$). Although no significant difference among three trials was observed in RPE for leg muscles over 120 min of running, the RPE for respiration was significantly lower in the Middle trial than in the CON trial ($P < 0.05$). A 120 min of running increased serum cortisol, myoblogin and creatine kinase concentrations, with no significant difference among three trials at any time points. In contrast, exercise-induced elevation of plasma IL-6 concentration was significantly lower in the Middle trial than in the CON trial ($P < 0.05$). However, there was no significant difference in plasma IL-6 response between the High trial and CON trial. These results indicate that wearing compression garments with moderate pressure intensity (approximately 20 hPa) attenuated exercise-induced fatigue of lower limb muscles and elevation of heart rate, and inflammatory responses to prolonged (120 min) running at moderate intensity.

要　旨

本研究では，長時間運動時における着圧の異なるコンプレッションタイツの着用が代謝・内分泌動態，筋損傷および炎症反応，下肢筋群の筋パワーに及ぼす影響を検討することを目的とした．健康な男性8名を対象に，運動時に①強圧（約40hPa）の着圧が施されたコンプレッションタイツ（強圧条件），②弱圧（約20hPa）の着圧が施されたコンプレッションタイツ（弱圧条件），③着圧を施さない（10hPa以下）タイツ（コントロール条件）のいずれかを着用する測定を，それぞれ異なる日に実施した．各条件での測定では，最大酸素摂取量の60%に相当する走速度でトレッドミル上での120分間のランニングを実施した．運動前から運動終了後1時間まで経時的に，筋機能，代謝・内分泌動態や筋損傷および炎症反応に関わる血液指標の変化を検討した．

その結果，運動直後における垂直跳び跳躍高は，弱圧条件が強圧条件に比較して有意に高値を示した（$P < 0.05$）．120分間の運動中における心拍数の平均値は弱圧条件が最も低値を示し，コントロール条件との間に有意差が認められた（$P < 0.05$）．また，120分間の運動に伴う血漿インターロイキン6（IL-6）濃度の上昇の程度は弱圧条件において最も小さく，コントロール条件に比較して有意に低値を示した（$P < 0.05$）．

以上の結果から，120分間のランニング時における弱圧（約20hPa）を施したコンプレッションタイツの着用は，強圧（約40hPa）を施した同様のタイツまたは着圧が施されていないタイツに比較して，下肢筋群の筋疲労の軽減や心拍数の上昇

抑制，および炎症反応の抑制に有効であることが明らかとなった.