

攀岩運動上肢肌肉疲勞及重覆性危險因子分析

An analysis of muscular fatigue and repetition risk of upper extremity in rock climbing

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摘要

本研究目的在針對攀岩上肢肌肉骨骼運動傷害評估，透過現場資料收集的方式，建立國內在運動方面上肢肌肉骨骼危害的量化數據。本實驗計畫延攬15名受測者，8位專業者及7位初學者；使用可攜式資料記錄器擷取受測者攀岩時雙手之、肱二頭肌、肱三頭肌、腕屈肌、及伸腕肌的肌電圖(EMG)活化情形。將EMG以強度-機率分佈函數(APDF)方式整理呈現。即可獲得第10、50及90百分位之肌肉負荷大小，分別用來代表作業中肌肉低、中以及高負荷的EMG大小。研究說明受測者慣用手(右手)在90%ile的肱二頭及伸腕肌明顯大於左手的施力，而經驗及技巧使專業者於50%及90%ile的肱二頭及屈腕肌能以較小的施力完成攀岩。初學者由於過大的負荷及攀爬時間延長，造成他們攀岩後就疲勞無法再作第二次攀爬動作。因此，對初學者攀爬技術及手臂肌力及肌耐力的加強是非常重要的，而現場攀岩的資料可提供教練而攀岩者訓練的依據。

關鍵詞： 攀岩、肌電圖、強度-機率分佈函數、肌肉疲勞

Abstract

The purpose of this study was to investigate the musculoskeletal disorders of upper extremity in rock climbing. The data were collected through the field test. Fifteen subjects were recruited, 8 professionals of rock climbing and 7 beginners. The study onsite measured bilateral wrist and elbow electromyography (EMG) of subjects using a portable data logger. The physiological RMS EMG amplitudes were analyzed with the amplitude-probability distribution function (APDF). The 10th, 50th, and 90th percentiles of APDF of RMS EMG were used to describe low (static load, 10%ile), median (median load, 50%ile), and high (peak load, 90%ile) degrees of muscular exertions, respectively. The study shows that subject's dominant hand (right hand) in the 90% ile of the biceps and wrist extensor muscle load were significantly larger than the left. The experience and skills to professionals in the 50% and 90% ile of the biceps and wrist flexors can be applied to smaller ability to complete rock climbing. Beginners due to excessive load and prolonged climbing time, resulted in causing them to fatigue after climbing for a second time can not climb, so for beginners, climbing techniques and arm muscle strength and endurance enhancement is very important. The field information of rock climbing can provide rock-climbing coach in the basis of training players.

Keywords: rock climbing, electromyography, amplitude-probability distribution function, muscle fatigue.