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生物谐振规律对步行效率影响的前驱研究

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摘要：

目的：通过下肢软瘫模型研究生物谐振对步行效率的影响。方法：下肢软瘫并导致步行障碍的男性小儿麻痹后遗症患者12名(17±1岁，身高1.68±4.6m，体重52.5±5.4kg)与同龄健康青年12名匹配对照。采用三维步态分析系统获取步态参数，采用便携式气体分析系统测定氧价，作为能量效率的指标。评测状态为自然步行、80%自然步频以及120%自然步频，即100%、80%、120%自然步频。结果：儿麻患者在100%、80%、120%自然步频的条件下步速分别为（65.45±8.71、53.04±5.92、74.47±9.49）m/s，步速和步频密切相关（r=0.96，P<0.01）；耗氧量分别为（15.17±3.56、20.76±4.31、21.48±6.16）ml/min/kg， 慢速与快速步频的耗氧量均显著高于自然步频 (P<0.01)；氧价分别为（0.231±0.043、0.294±0.061、0.288±0.072）ml/m/kg，和同龄正常人比较自然、慢速与快速步频下的氧价均明显增加（P<0.01）。慢速与快速步频的氧价亦显著高于自然步频 (P<0.05)。结论：儿麻患者自然步频的能量效率最高，步频加速或者减慢均降低此效率，提示肌肉固有谐振规律的作用。

关键词：生物谐振 步态分析 氧价 小儿麻痹后遗症

Effect of muscle bio-resonance on walking efficiency: A primary study

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Fund Project:

Abstract:

Objective: To explore the internal walking bio-resonance essence in the patient with poliomyelitis sequela so as to discover ideal walking state of lowest energy expenditure. Method: Twelve young male students with poliomyelitis sequela were involved in this study (age 17.25±1ys, height 1.68±4.6m and weight 52.5±5.4kg). Another 12 healthy students were matched as control. The time-space parameters were collected with Motion Analysis System and oxygen cost was obtained with a Cosmed K4b2 portable gas analysis system. The self-selected, comfortable walking frequency was recorded through three dimensional gait analysis system. The participants walked according to 80% and 120% comfortable walking frequency. Result: The comfortable walking frequency in poliomyelitis was 101.3±8.5 steps/min. Low speed and high speed walking frequency were 80.42±8.5 steps/min and 121.1±10.0steps/min (P<0.001). The walking speed (m/min) was 65.45±8.71, 53.04±5.92 and 74.47±9.49(P<0.01). The comparison of oxygen consumption in three conditions were significantly different (P<0.01), and the oxygen cost was lowest (0.231±0.043ml/m/kg) in natual walking frequency (P<0.05). Meanwhile, the oxygen cost of patients with poilomyelitis were higher than normal subjects(P<0.01). Conclusion: The ideal walking state in the patients with poliomyelitis sequela is in a natual, self-selected, comfortable walking rhythm and energy consumption and oxygen cost are lowest. The change of walking rhythm may result in increase of energy expenditure and decrease of work efficiency.

Keywords: bio-resonance gait analysis oxygen cost poliomyelitis sequela

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