Effects of Pause Design on the Decline in Pulling Effort and the Evaluation of Perceived Effort in Pulling Tasks

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Abstract

Pulling is one of the manual material handling activities which could lead to work-related musculoskeletal disorders. The objectives of this study were to explore the development of muscular fatigue when performing intermittent pulling task and to establish models to predict the pull strength decrease due to performing the tasks. A simulated truck pulling experiment was conducted. Eleven healthy male adults participated. The participants pulled a handle with a load of 40 kg which resulted in a pulling force of approximately 123 N. The pull strength after each pull and rest was measured. Ratings of perceived exertion on body parts after each pull were also recorded. The results showed that development of muscular fatigue under rest frequency was insignificantly different. It was found that development of muscular fatigue for pulling tasks with embedded pauses was significantly slower than that of continuous pulls. The forearm had higher CR-10 score than the other body parts indicating that forearm was the body part suffering early muscle fatigue. An exponential model was developed to predict the pull strength of the pulling tasks with embedded pauses. This model may be used to assess the developing of muscular fatigue for pulling tasks.

Keyword: musculoskeletal disorders; pulling tasks; muscular fatigue; pull strength