

An Assessment of a Workload Predictive Model in Manual Materials Handling Tasks

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Abstract

A study on combined manual materials handling tasks, under two different frequencies and four lifting and lowering height combinations, was conducted in a laboratory. Eight male construction workers performed a box handling task repetitively for an hour either at one or two frequencies per minute. On each day, the task consisted of: lifting a box of ceramic tile weighting 23 Kg from a specified height, carrying it for 8.5 m, lowering the box to a specified height, and then walking 8.5 m back. The specific heights included: lifting the box from floor level and lowering to floor level; lifting from the floor and lowering to knuckle height; lifting from knuckle height and lowering to floor; and lifting from knuckle height and lowering to knuckle height. Oxygen uptake, heart rate, and ratings of perceived exertion for whole body and low back discomfort were measured during the task. Additionally, actual energy expenditure of the box handling for an hour was calculated from the oxygen uptake measured, whereas the predicted energy expenditure was estimated using the valid regression equations available in the literature. Statistical analysis demonstrated that both task frequency and lifting and lowering heights influence oxygen uptake, heart rate, and the rating of perceived exertion for whole body ($p < 0.05$). However, the difference between the actual and predicted energy expenditures was not significant ($p > 0.05$). This implies that the predictive equations used in the current study are acceptable in estimating the physiological cost of Chinese construction workers during various materials handling tasks.

Keyword : manual materials handling, back pain, physiological cost