Maximum endurance time modeling for push and pull tasks considering gender and handle height

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Abstract

The strengths of both push and pull using both hands at handle heights of 75, 90, and 135 cm were measured for 11 female and 8 male participants. In addition, simulated push and pull tasks were performed on one of the three heights as in the strength measurements. In these tasks, the participants either pushed or pulled a swing suspended with one of the two loads (32.5 and 42.5 kg) until they could no longer do so. Then, the strength of push or pull was measured again. The participants also reported bodily discomfort on their body parts on a CR-10 rating scale. It was found that hands and leading leg had the highest CR-10 scores among the body parts and were the bottleneck body parts for the push and pull tasks, respectively. Models of maximum endurance time incorporating gender and handle height, in addition to force ratio, were developed. These models may be adopted in predicting the endurance time in job design concerning work/rest arrangement.

Keyword: manual materials handling, muscle fatigue, musculoskeletal disorders, task-specific model