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On-body ergonomic lifting aid: It's effectiveness, safety and user acceptability

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The purpose of this presentation is to summarize 14 research studies involving an on-body ergonomic aid called the Personal Lift-Assist Device (PLAD). Three major questions asked were: 1) Is PLAD effective? 2) Is PLAD safe? 3) Is PLAD user-friendly? Data were collected using several different measurement tools: Liberty® electromagnetic sensors, Delsys® and Bortec® electromyography, Optotrak® position sensors, AEI Moxus® metabolic cart and subjective questionnaires. Measures of effectiveness revealed a 13.2-19.4% ($p<0.05$) reduction in back moments under the PLAD condition and 17-27% ($p<0.05$) in lumbar and thoracic EMG. During a fatiguing test, erector spinae EMG amplitudes were reduced by ~70% ($p<0.001$) over the No-PLAD condition. Measures of safety demonstrated that the PLAD altered the lifting technique so that lifts had less lumbar spine flexion and greater hip rotation ($p<0.05$). In addition, there was increased lumbar spine-hip coordination ($p<0.05$) and greater dynamic stability ($p<0.05$). In terms of user-acceptability, 83% of workers stated that they believed PLAD was effective and 67% said they would wear it for specific jobs. When energy consumption demands were evaluated, there was no significant difference between the PLAD and No-PLAD conditions indicating that the same amount of work was being done by specific leg muscles rather than the back. In conclusion, the PLAD is effective at reducing numerous risk factors and safety-related factors that are predispose workers to low back pain. It is also inexpensive, durable and suitable to many manual handling tasks including specific tasks in farming, construction, warehouse distribution, and assembly work.

Biography

Joan M Stevenson (PhD) is a Professor Emeritus in Occupational Biomechanics and Ergonomics at Queen's University in the School of Kinesiology and Health Studies. She has led various research teams on various applied projects with her current research initiatives involving the development of ergonomic assistive devices for industry and the military andcreation of objective measurement tools for biomechanical evaluations.

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