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Predisposition Level of a Newly Developed Portable and Foldable Wheelchair Treadmill (PARAFiTGo) among Individuals with Spinal Cord Injury

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ABSTRACT

Background and Objectives: Spinal cord injury (SCI) results in significant limitations in physical activity due to mobility deficits, muscle weakness, and environmental barriers. PARAFiTGo, a newly developed portable and foldable wheelchair treadmill, was designed to address these challenges by enabling home- and community-based aerobic exercise for wheelchair users. However, user predisposition towards the device has not been previously assessed. This study aimed to determine the predisposition level of PARAFiTGo among individuals with SCI and to characterise the wheelchair anthropometric profile of potential users. **Methods:** A prospective cohort study was conducted between April and June 2024 involving 10 community-dwelling adults with SCI recruited through the Malaysian Advocacy of Spinal Cord Injury Association (MASAA). Participants underwent a 10-minute supervised PARAFiTGo trial, after which predisposition was assessed using the validated Malay version of the Assistive Technology Device Predisposition Assessment (ATD-PA). Wheelchair anthropometric measurements (seat width, back wheel radius, wheelbase length, and overall width) were also obtained. Data were analysed using descriptive statistics. **Results:** Participants had a mean age of 32.8 ± 5.5 years; 70% were male and 90% had paraplegia. ATD-PA scores indicated high predisposition, with Quality of Life scoring 53.0 ± 5.4 (range 12–60) and Device Form scoring 45.3 ± 3.6 (range 0–60). Functional Abilities and Personal Characteristics yielded moderate scores of 37.2 ± 6.5 and 21.5 ± 4.6 , respectively. Wheelchair anthropometrics showed narrow variability in seat width (39.6 ± 2.0 cm) and back wheel radius (29.3 ± 2.0 cm), with greater variability in wheelbase length (45.7 ± 5.4 cm) and overall width (52.1 ± 4.3 cm). **Conclusion:** PARAFiTGo demonstrated a generally high predisposition level among individuals with SCI, particularly in quality of life and device usability domains. Variability in wheelchair dimensions highlights the need for design adaptations to accommodate a wider range of users. Limitations include the small sample size and brief trial duration. Future clinical trials with extended follow-up, pre-post ATD-PA assessments, and larger diverse samples are recommended to confirm these preliminary findings.

Keywords: spinal cord injury; portable and foldable wheelchair treadmill; assistive technology; predisposition assessment; physical activity; wheelchair anthropometrics

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