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Assessing the Reliability and Agreement between Two Low-Cost Dynamometers in Critically Ill Patients: A Cross-Sectional Study of Handgrip Strength Assessment

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[Rozali, Nur Shazleen Nisha Binti](#)^a ; [Azahari, Nuraniza Binti](#)^a ; [Munajat, Munayati Binti](#)^b^a Department of Nutrition Sciences, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Kuantan, Malaysia[Show all information](#)

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Abstract

Background: Handgrip strength assessment with dynamometers has gained significant attention as a simple bedside tool for diagnosing muscle weakness. The availability of affordable dynamometers demands further investigation into their agreement with validated tools. Thus, this study aimed to assess the reliability and agreement of two low-cost handgrip dynamometers in critically ill patients. **Materials and Methods:** A cross-sectional study measuring handgrip strength with two dynamometers (Camry EH101 and Constant 14192-760E) was conducted among critically ill adult patients post-mechanical ventilation weaning. The maximum strength value from each dynamometer was used for analysis. The intraclass correlation coefficient (ICC) and Bland–Altman

analysis were used to examine device reliability and agreement. Results: Forty patients completed handgrip strength testing using both devices. The ICC showed excellent reliability (0.96; 95% confidence interval, 0.92–0.98; $P < 0.0001$). The Bland–Altman analysis showed a small mean difference of 0.07 ± 1.41 kg between the Camry and Constant devices, with a random scatter plot indicating consistent agreement. A strong positive correlation between devices was also observed ($r = 0.96$, $P < 0.001$). No statistically significant association between agreement and sex, admission type, age, or body mass index was detected. Conclusion: Compared with the Camry EH101, Constant 14192-760E demonstrated similar measurement characteristics and agreement in this cohort, suggesting its potential as a cost-effective alternative for assessing handgrip strength among critically ill patients. Further validation and assessment of clinical acceptability are required. These results provide preliminary data on the agreement and reliability of low-cost dynamometers in a strength-compromised cohort. © 2026 Bali Journal of Anesthesiology.

Author keywords

Critical illness; hand strength; muscle strength dynamometer; reproducibility of results

Indexed keywords

EMTREE medical terms

adult; aged; Article; artificial ventilation; body mass; caregiver; clinical article; cohort analysis; correlation coefficient; critical illness; critically ill patient; cross-sectional study; electronic medical record; female; grip strength; hand grip; hand strength; human; intensive care unit; length of stay; major clinical study; male; muscle weakness; observational study; prospective study; reliability; Sequential Organ Failure Assessment Score; strength test; ventilator weaning

Device trade names

Commercial names given to devices, used for branding and differentiation in the market, commonly referenced in scientific and clinical research.

Tradename	Country	Manufacturer
RStudio		
Constant 14192-760E		
Camry EH101	China	Camry

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Corresponding authors

Corresponding author	N.B. Azahari
Affiliation	Department of Nutrition Sciences, Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, Kuantan, 25200, Malaysia
Email address	nuraniza@iium.edu.my

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