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Grip strength during forearm torque in the elderly: Results from a novel measurement device

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Grip and pinch strength are the more common methods of assessing hand strength. However, they are usually performed in isolation and often only the maximum value is recorded. In real life, hand function is complex and consists of concurrent use of grip and forearm torque (turning door knob) or pinch and forearm torque (key). As such, we developed a custom-made hand measurement device that could not only measure grip, pinch and forearm torque (pronation and supination), it could measure these continuously to get both maximum and sustained measurements. The device was built with a tension load cell and a non-rotating torque sensor (Burster praezisionsmesstechnik GmbH & Co, Germany) which have been calibrated and validated. The grip handle was designed to be similar to that of a Jamar hand dynamometer handle set at position #2. The measurements were digitally recorded using Burster's DigiVision software. We recruited volunteers and collected data from 233 healthy Singaporean adults aged 60 years and above. We have observed that the sustained grip strength during forearm twisting was 10-20% lower than the maximum grip strength in male. Whereas it was 17-24% lower in female. We have quantified grip strength in combination with forearm torque and found that it can be up to 25% lower than maximum grip strength. This data can be used to complement existing ergonomic data for designing of better rehabilitation and assistive tools.

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