Toronto Rehabilitation Institute Hand Function Test (TRI-HFT)

Assessment Overview

Assessment Area

ICF Domain:
Activity
Subcategory:
Mobility

You Will Need

Length:
< 30 minutes (both hands)
Equipment:
Items for palmar grasp object manipulation (part 1):

- Mug
- Book
- Soda can
- Isosceles triangular sponge
- Wireless home telephone
- Paper sheet
- Ziploc bag filled with five golf balls
- Dice
- Credit card
- Pencil
- Nine rectangular blocks in sets of 3 x 100 g, 3 x 200 g, and 3 x 300 g. Each of the three blocks in each weight category have surfaces with different levels of friction.

Items for strength test (part 2):

- Instrumented credit card
- Instrumented cylinder
- Wooden bar

Scoring:
The ability to reach, grasp and manipulate is scored on a scale of 0–7, where greater scores indicate better performance.
If the individual was able to hold objects (in part 2), then torque, force, and eccentric load are measured; however, this part of the TRI-HFT is not validated.
Training:
It should preferably be administered by a hand or upper extremity specialist (e.g., physiotherapist or occupational therapist).

Summary

The Toronto Rehabilitation Institute Hand Function Test (TRI-HFT) is a test to measure unilateral gross motor function of the hand (focusing on lateral pinch, pulp pinch, and palmar grasp) in people with SCI.

It consists of 2 parts and is designed to assess both proximal and distal hand function.

- The first part assesses the individuals' ability to manipulate different everyday objects.
- The second part measures the ability to withstand eccentric forces (Bar test), the strength of lateral pinch using a dynamometer (instrumented credit card test) and the strength of palmar grasp using a dynamometer (instrumented cylinder).

The TRI-HFT has potential for high clinical utility (i.e., low cost, minimal training required to administer). Recently, to improve the accessibility of the test (regarding the objects needed), a 3D printed format has been developed.

Availability

Worksheet: Can be found here.

Languages: English

Assessment Interpretability

Minimal Clinically Important Difference	Statistical Error	Typical Values
Not established in SCI	Not established in SCI	Not established in SCI

Measurement Properties

Validity – Low to High

Moderate to High correlation with FIM self-care:

Right hand: r = 0.56
Left hand: r = 0.73

Low to High correlation with SCIM self-care:

Right hand: r = 0.48
Left hand: r = 0.62

(Kapadia et al. 2012; n=21; ASIA B-D; level of injury: C4-C7; time since injury < 6 months)

Moderate to High correlation between 3D TRI-HFT individual test components and GRASSP Strength:

Sub-acute study: r = 0.774 – 0.946
Chronic study: r = 0.601 – 0.938

Moderate to High correlations between 3D TRI-HFT individual test components and GRASSP Quantitative Prehension:

Sub-acute study: r = 0.804 – 0.938
Chronic study: r = 0.633 – 0.997

(Kapadia et al. 2021; sub-acute study: n=4, 3 males and 2 females, mean age: 51.8 years, injury level C4-C5, ASIA B-D; chronic study: n=3, 2 males and one female, mean age: 57.5 years, injury level C4, ASIA B-C)

Number of studies reporting validity data: 2

Reliability – High

High Inter-rater Reliability:

Pretherapy: ICC = 0.98
Posttherapy: ICC = 0.99

(Kapadia et al. 2012; n=21; ASIA B-D; level of injury: C4-C7; time since injury < 6 months)

ICC = 1.0 (P < 0.01)

(Nagai et al. 2018; n=20; 10 participants with SCI; injury level: C5-C7)

High Inter-rater Reliability of the 10-object manipulation component of the 3D TRI-HFT:

Sub-acute study: ICC = 0.994 (95% CI: 0.985–0.998; P < 0.000)
Chronic study: ICC = 0.990 (95% CI:0.976–0.996; P < 0.000)

(Kapadia et al. 2021; sub-acute study: n=4, 3 males and 2 females, mean age: 51.8 years, injury level C4-C5, ASIA B-D; chronic study: n=3, 2 males and one female, mean age: 57.5 years, injury level C4, ASIA B-C)

High Intra-rater Reliability:

ICC = 1.0 (P < 0.01)

(Nagai et al. 2018; n=20; 10 participants with SCI; injury level: C5-C7)

High Intra-rater Reliability of the 10-object manipulation component of the 3D TRI-HFT:

Sub-acute study: ICC = 0.995 (95% CI: 0.992–0.998; P < 0.000)
Chronic study: ICC = 0.999 (95% CI: 0.999–1.00; P < 0.000)

(Kapadia et al. 2021; sub-acute study: n=4, 3 males and 2 females, mean age: 51.8 years, injury level C4-C5, ASIA B-D; chronic study: n=3, 2 males and one female, mean age: 57.5 years, injury level C4, ASIA B-C)

Number of studies reporting reliability data: 3

Responsiveness

Floor/Ceiling Effect:	Effect Size:	Number of studies reporting responsiveness data:
Not established in SCI	Not established in SCI	0