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Contents
- Definition / Diagnosis / Assessment
- Normative values of hand grip strength

Definition / Diagnosis / Assessment...(1)

• Definition of Frailty
  ➢ "A state in which there is an increase in an individual's risk for developing increased dependency and/or mortality when exposed to a stressor" 1

• Assessment of Frailty
  ➢ Physical Frailty: Phenotypic approach 2 or Accumulation of deficits approach 3
  ➢ Physical Frailty plus Psychological / Social Frailty 4

Definition / Diagnosis / Assessment

• Definition of Sarcopenia
  ➢ A syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life and death 1,2

• Diagnosis of Sarcopenia (European Working Group on Sarcopenia in Older People) 3
  ➢ Presence of BOTH low muscle mass and low muscle function (strength or performance)

Normative HGS values: Background

• Hand grip strength (HGS)
  ➢ Diagnosis of sarcopenia 1
  ➢ Single indicator of frailty 2 as well as Component of frailty indices 3,4

• Low HGS predicts adverse health events (e.g. mortality, disability), especially among the elderly 5,6

• Measurement of HGS: Time-efficient, Non-invasive, Simple

Normative HGS values: Background

• Normative or reference values are used by clinicians (and researchers) to compare measured values of their patients (and participants) ~ low HGS

• Normative HGS values from elsewhere are not appropriate for Singapore

• In addition, most studies presenting normative values:
  ➢ Use a convenience sample 1,2
  ➢ Usually present the mean and variance in ten-year age groups 1-5


Normative HGS values: **Aim**

Develop age-specific normative values for HGS, utilizing data from a nationally representative sample of community-dwelling elderly Singaporeans.

**Data and methods**

- **Social Isolation, Health and Lifestyles Survey 2009; N = 4990**
- **HGS: Smedley spring-type dynamometer (Hand Grip Meter, No. 6103, TANITA, Tokyo, 75 kg)**
- **After demonstrating its use, the interviewer would**
  1. Request respondent to stand, with arms hanging freely by the side
  2. Adjusted the dynamometer to the respondent’s hand size
  3. Ask the respondent to squeeze as hard as possible and then let go
  4. Record the measurement to nearest 0.5kg
  5. Repeat the process for a total of two times for each hand

**Analytical sample:**

- N = 2664, aged 60-89 years comprising -
  - Healthy (without cognitive impairment or memory problems or limitation in activities of daily living or underweight) elderly, and
  - with no surgery/swelling/severe pain/paralysis/inflammation/injury in the hand in past 6 months, and
  - did not rest their arm on a support, and
  - gave full effort while gripping the dynamometer, and
  - were measured in the standing position

**Data and methods**

- All analyses were stratified by gender and hand dominance ("Which hand do you normally use?")
- Mean HGS was compared across age groups using ANOVA
- Quantile regression models were used to chart single year/ age/ hand specific 5th, 20th (for Fried’s frailty index) and 50th percentile curves
Normative HGS values: **Results**...(1)

- HGS declines with age
- Within same age group and gender, HGS is significantly higher for dominant versus non-dominant hand
- Within same age group and hand-dominance, HGS is significantly higher for men versus women
- Lower than Western counterparts

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Men/Dominant Hand</th>
<th>Men/Non-dominant Hand</th>
<th>Women/Dominant Hand</th>
<th>Women/Non-dominant Hand</th>
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</thead>
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<tr>
<td>0-55</td>
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<td>60-64</td>
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<td>65-74</td>
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</table>

**Conclusion**

- A downward, curvilinear pattern with age was observed only for the 50th percentile for the dominant hand for men
- Rest of the percentile curves showed a negative linear influence of age on HGS

Normative HGS values: **Conclusion**

- Age, gender and hand-specific graphs for normative values of HGS are presented at the 5th, 20th and 50th percentiles.
- These will facilitate interpretation of HGS measurements among the elderly in clinical and research settings in Singapore.

THANK YOU

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