

Maximal Handgrip Strength

Equipment

- Handgrip dynamometer (hydraulic, spring, other)
- Physician's scale or equivalent electronic scale
- Stadiometer
- Stopwatch
- Individual data sheet
- Group data sheet
- Microsoft Excel or equivalent spreadsheet program

Warm-Up

Regardless of which method is used to assess muscular strength, each subject should perform a structured warm-up to prepare for the tests that will be performed. The warm-up should contain a 5 min general portion and a 5 min dynamic stretching warm-up (8). Sample general warm-up exercises include light jogging, cycling, and jumping rope. Dynamic stretching activities might include wrist, finger, and elbow rotations. After completing the warm-up, the subject can begin the testing process.

Isometric Handgrip Strength Test

The assessment of handgrip strength is generally completed with a handgrip dynamometer. Of the many types available, the hydraulic (e.g., Jamar) and spring (e.g., Stoelting, Smedley, Lafayette; figure 12.2a) are the most prevalent. Regardless of type, the basic testing procedures are the same.

- Step 1:** Gather all the equipment needed to perform the test and set up a testing area. Ensure that the pointer of the dynamometer is set at zero.
- Step 2:** Gather basic data (e.g., age, height, weight) for the individual data sheet as described in laboratory activity 1.1. Instruct the subject to put on his or her shoes.
- Step 3:** Lead the subject through a 10 min warm-up.
- Step 4:** Direct the subject stand and face straight ahead.
- Step 5:** Adjust the dynamometer grip so that the middle portion of the middle finger is at a right angle. The method for adjusting the grip depends on the instrument; refer to the equipment manufacturer's instructions to understand how to adjust the dynamometer.
- Step 6:** Record the grip setting in the appropriate box on the individual data sheet. Use this setting for all subsequent tests.
- Step 7:** Have the subject place the forearm at an angle of 90° to 180° to the upper arm, which is kept in a vertical position. This puts the arm in a position that is either bent at a right angle or straight.
- Step 8:** Ensure the subject keeps the wrist and forearm in a midprone position.

Step 9: Give the subject the following commands (7, 31):

- “*Are you ready?*” Ask just before having the subject initiate the test; when the subject answers *yes*, move to the next command.
- “*Squeeze as hard as possible.*” Say this as the subject initiates the test.
- “*Harder! . . . Harder! . . . Relax.*” Say this as the subject undertakes and then finishes the test.

Step 10: Have the subject undertake two or three (36, 38) trials for each hand (and alternate between hands). Each test should be separated by 1 min (21).

Step 11: After each test, record the maximum force generated in kilograms in the appropriate location on the individual data sheet.

Step 12: After each test, reset the pointer to zero.

Step 13: Take the best trial for each hand and place them in the appropriate location on the individual and group data sheets.

Step 14: Sum the best right and left hand trials to create a sum score. Divide this sum score by body mass in kg and place in the appropriate location on the individual and group data sheets.

Question Set 12.3

1. What are some important considerations when performing a handgrip dynamometer test?
2. Why is it important to reset the pointer after each test? If it were not reset, how would the test be affected?
3. How do your results compare with those of the class?
4. Using Excel or an equivalent spreadsheet program, graph the class, male, and female results. Make sure to place standard deviations on your graph. Based on the graph, what can you say about these data?
5. Graph the relative and absolute strength of the five strongest men and the five strongest women. Based on this graph, what can you say about the class?

LABORATORY ACTIVITY 12.3

INDIVIDUAL DATA SHEET

Name or ID number: _____ Date: _____

Tester: _____ Time: _____

Sex: M / F (circle one) Age: _____ y Height: _____ in. _____ m

Weight: _____ lb _____ kg Temperature: _____ °F _____ °C

Barometric pressure: _____ mmHg Relative humidity: _____ %

Handgrip Strength

Circle the best of the first two trials; underline the best of the three trials.

Instrument	Grip setting position	TRIAL 1		TRIAL 2		TRIAL 3	
		R	L	R	L	R	L
Hydraulic	1 2 3 4 5 (circle appropriate number)						
Spring	mm Setting on handle						
Other	Setting						

R = right and L = left.

Best of two trials	Right hand	+	Left hand	=	Sum	kg	kN	Rank
Hydraulic		+		=				
Spring		+		=				
Other		+		=				

Ratio of grip strength to body mass	Grip sum = _____ kN	÷	Body mass = _____ kg	=	Ratio
Ratio of dominant to nondominant hand	Dominant = _____ kN	÷	Nondominant = _____ kg	=	Ratio

Notes: