Measuring Grip Strength

University of Jordan

Lab Human

2024

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❖ Objectives:

1. The primary objective is to measure an individual's grip strength, which can provide insights into their overall upper body strength and muscular function.
2. It helps us to evaluate hand and forearm muscle strength and identify any limitations or weaknesses.
3. It helps in monitoring progress by regularly measuring grip strength with a hand dynamometer, it becomes possible to track changes and improvements over time.
4. Grip strength can serve as an indicator of overall health and vitality (screening for Health Conditions).
5. Hand dynamometers are often used in research studies to collect objective data on grip strength across different populations. This data can contribute to the understanding of various factors, including age related changes, gender differences and so on.

❖ Background:

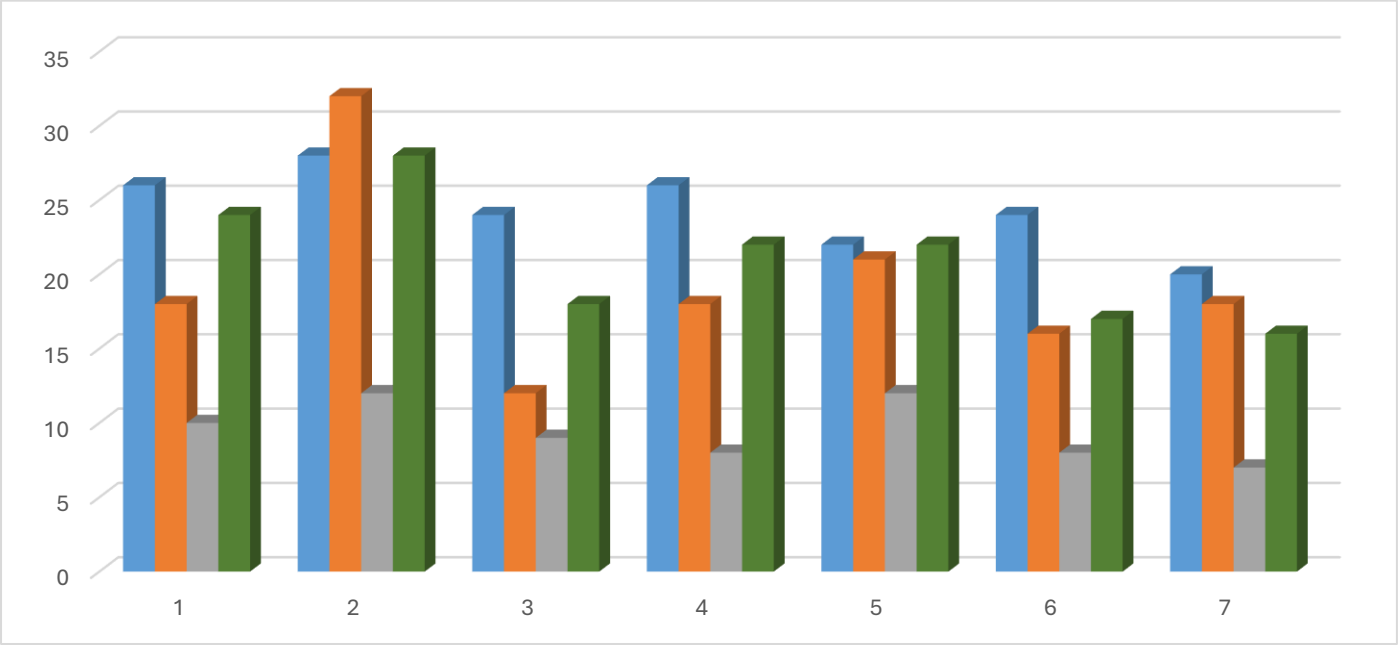
The maximum voluntary contraction (MVC) test, when using a grip strength tool, is all about measuring the maximum force your hand and forearm muscles can generate when squeezing the device as hard as possible. It's a common method used in research, rehabilitation, and sports training to assess hand and forearm strength. During the test, you'll be asked to grip the tool as firmly as you can, giving experts an idea of your muscular capabilities in that specific area.

❖ Equipment:

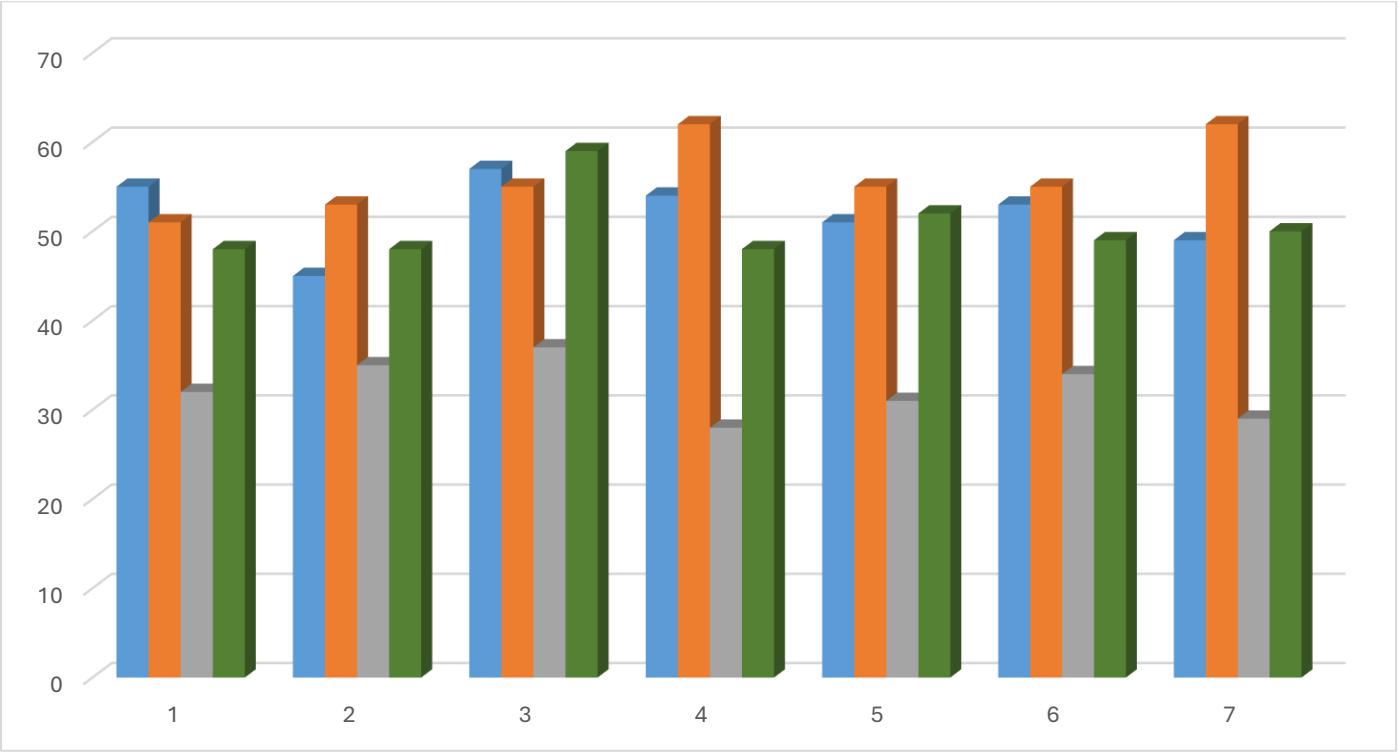
1)Hydraulic hand dynamometer

❖ Tables:

F	dominant Full grip			3 fingers grip	nondominant Full grip 5 cm
	5cm	6.5cm	Name	(5 cm grip size)	grip size
X_1	26	18	lina	10	24
X_2	28	32	eman	12	28
X_3	24	12	sofia	9	18
X_4	26	18	bayan	8	22
X_5	22	21	sepsa	12	22
X_6	24	16	tasneem	8	17
X_7	20	18	aya	7	16
avg	24.28571	19.28571429		9.428571429	21



M	dominant Full grip			3 fingers grip	nondominant Full grip 5 cm
	5cm	6.5cm	Name	(5 cm grip size)	grip size
X_1	55	51	omar	32	48
X_2	45	53	yazan	35	48
X_3	57	55	adel	37	59
X_4	54	62	mohammed	28	48
X_5	51	55	abdalleh	31	52
X_6	53	55	ahmed	34	49
X_7	49	62	mohammed	29	50
avg	52	56.14285714		32.28571429	50.57142857



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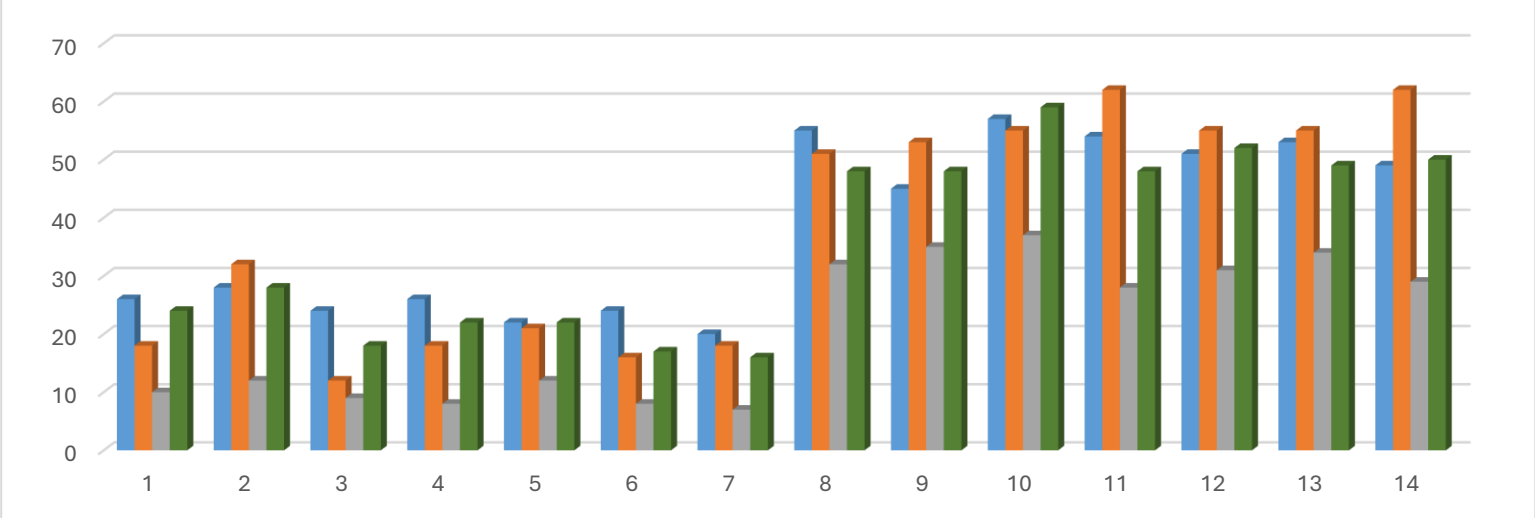
X_7	20	18	aya	7	16
X_8	55	51	omar	32	48
X9	45	53	yazan	35	48
X10	57	55	adel	37	59
X11	54	62	mohammed	28	48
X12	51	55	abdalleh	31	52
X13	53	55	ahmed	34	49
X14	49	62	mohammed	29	50



❖ Procedure:

1. Adjust the Hand Dynamometer: Set the grip span to 5 cm.
2. Zero the Readings: Ensure that the hand dynamometer readings are zeroed before each measurement.
3. Positioning: -Instruct the subject to sit with a straight back and feet flat on the floor.- Hold the hand dynamometer along the sides in an upright position.- Ensure that the elbow forms a 90° angle, with the forearm supported by the chair armrest.
4. Dominant Hand Measurement: - Begin with the dominant hand.- Instruct the subject to grip the hand dynamometer with full strength for 3 seconds.
5. Non-Dominant Hand Measurement: - Repeat the process for the non-dominant hand, ensuring full gripping.
6. Record Measurements: - Record the grip strength readings for each hand separately.- Calculate the average grip strength for each hand based on the recorded readings.
7. Variation in Grip Span: - Repeat the measurement process for the dominant hand.- Adjust the grip span to the minimum value on the hand dynamometer (3.5 cm).- Record the grip strength readings and calculate the average.- Repeat the process with the grip span set to the maximum value (6.5 cm) and record the results.
8. Precise Grip with Three Fingers: - Repeat the first four steps of the process.- Instruct the subject to grip the hand dynamometer using only three fingers of the dominant hand with full strength for 3 seconds.- Record the grip strength readings for each student.

FACTORS THAT EFECT GRIP STRENGTH

1. Age: Grip strength typically decreases with age due to factors like muscle loss and reduced neural activity.
2. Gender: Men usually have greater grip strength than women because of differences in muscle mass.
3. Hand Dominance: The dominant hand tends to be stronger due to more frequent use and specialized neural adaptations.
4. Physical Fitness: Overall fitness, including muscle strength and endurance, correlates with grip strength.
5. Muscle Mass and Strength: Grip strength is linked to the size and strength of hand, forearm, and upper arm muscles.

6. Hand Size: Larger hands may have an advantage in grip strength due to increased muscle mass and leverage.
7. Joint Health: Joint conditions like arthritis can limit grip strength by reducing range of motion and causing pain.
8. Neurological Conditions: Nerve damage or disorders can impair muscle control and coordination, affecting grip strength.
9. Nutrition: Adequate intake of nutrients, especially protein, vitamins, and minerals, supports muscle health and strength.
10. Physical Activity: Regular engagement in activities involving grip improves strength over time.
11. Environmental Factors: Temperature, humidity, and altitude can affect grip strength temporarily due to muscle function changes.
12. Psychological Factors: Stress, anxiety, and motivation can influence grip strength performance during testing.

❖ Sources of Error:

- The accuracy of the results could be impacted by faulty or incorrectly calibrated test tools or equipment.
- Failing to take sufficient rests between trials or not holding the device correctly.
- Incorrect seat selection or poor posture.
- Not aligning the apparatus with the subject's elbow and shoulder in the same plane.
- Ambient elements that affect aim and steadiness include temperature, humidity, and lighting.
- being sidetracked and misreading the time displayed on the stopwatch.

❖ Conclusion:

Our goal in doing this study was to investigate how different factors affect coherence and aim in a controlled laboratory setting. Our findings demonstrated that purpose and consistency were gender-neutral and based on individual variations.
By comprehending the elements that affect aim and steadiness, we may create new instruments and methods to enhance aim and steadiness while lowering the possibility of mishap or error when performing precise tasks.

Finally, our research focusing on the variables affecting stability, which has significant ramifications for applications requiring exact motions.