

Laboratory Practical - Strength

Assessing Strength

Grip strength is a general term used by strength athletes, referring to the muscular power and force that they can generate with their hands.

Grip Strength Protocol

- ✓ The patient takes hold of the grip strength dynamometer in their dominant hand and moves their shoulder in to full flexion with the elbow and wrist in extension.
- ✓ The patient takes a breath in, and as they exhale they squeeze the dynamometer with maximum force whilst lower the arm from flexion to neutral (arm by the side).
- ✓ Record the maximum reading (kg)
- ✓ The patient repeats the test 3 times and a maximum reading is recorded.
- ✓ Minimum of 10sec rest between trials
- ✓ Compare the maximum strength in the dominant and non-dominant hand.

Data Recording			
Participant		Dominant L/ R	Male/ Female
Dominant hand:	1. kg	Non-dominant hand:	1. kg
	2.		2.
	3.		3.
	Best:		Best:
	Rating:		Rating:

Table showing grip strength normative data (18-25years sports science students).

	FEMALES (kg)		MALES (kg)	
	Dominant	Non-dominant	Dominant	Non-dominant
Very Poor	<29	<26	<49	<44
Poor	29-31	26-29	49-51	44-47
Average	32-35	30-32	52-56	48-52
Good	36-38	33-34	57-59	53-56
Excellent	>38	>34	>59	>56
Mean	33	31	54	50
SD	5	6	8	7
Minimum	24	21	36	35
Maximum	53	51	78	70

Vertical Jump Test

Assesses explosive power in the legs. The arm swing protocol has been shown to contribute a greater extent to jump height in males than females (probably due to differences in upper body strength).

Three protocols described:

Protocol 1 – includes arm swing

Protocol 2 – excludes arm swing

Protocol 3 – included single step

- ✓ Measure and record body mass
- ✓ The participant completes 5 min warm-up for body temp and 5 min dynamic stretches specific to lower body
- ✓ Participant stands with preferred side of body to wall and raises their arm whilst '*pointing the fingers to the sky.*' While remaining flat footed the individual reaches as high as possible to mark the wall.
- ✓ Three practice attempts are allowed (60sec rest in between)
 - ✓ Protocol 1: No steps, performs an arm swing prior to take-off from 2 feet
 - ✓ Protocol 2: No steps, performs no arm swing prior to take-off from 2 feet
 - ✓ Protocol 3: Single step with arm swing prior take-off from one foot.
- ✓ '*Jump as high as possible*' Mark the peak height reached.
- ✓ At least 3 attempts are made with 30sec rest between attempts

Data Recording			
Participant		Body Mass Kg	Male/ Female
Height	cm	Standing reach measurement	cm
	Variation 1	Variation 2	Variation 3
Trial 1			
Trial 2			
Trial 3			
Greatest effective jump			
Rating			

Table – Vertical Jump normative data

	FEMALES (cm)			MALES (cm)		
	Arm Swing	No Swing	Single Step	Arm Swing	No Swing	Single Step
Very Poor	<34	<28	<32	<55	<44	<54
Poor	34-38	28-34	32-36	55-59	44-51	54-58
Average	39-41	35-36	37-42	60-65	52-56	59-69
Good	42-51	37-44	43-49	66-78	57-66	70-80
Excellent	>51	>44	>49	>78	>66	>80
Mean	41	37	40	64	54	65
SD	10	9	10	12	13	15
Minimum	26	21	20	40	29	40
Maximum	67	67	69	89	84	98

Iso Mid Thigh Pull – Force Platform

Assessing strength of the leg and back musculature.

PROTOCOL

Use the goniometer

- ✓ Take the point of the Greater Trochanter (Bony protuberance on the side of the hip) and follow the line of the femur and line of the spine to produce an angle.
- ✓ Place the goniometer at the mid point of the knee and measure the angle between the femur and tibia.

Strength Protocol

- ✓ The client is measured into a position of 30-40° Flexion of the Knee with the goniometer
- ✓ The instructor puts the chain at the appropriate level whereby the back is straight
- ✓ The client then takes hold of the Bar on the strength dynamometer
- ✓ The client takes a breath in, and as they exhale they squeeze through their heels maintaining a strong hold on the bar
- ✓ Record the maximum reading (kg)
- ✓ The client repeats the test 3 times with a 1 min rest period between repetitions and a maximum reading is recorded.
- ✓ Repeat with Dead Lift Position

Data Recording			
Participant			Male/ Female
Dead Lift:	1. kg		1. kg
	2.		2.
	3.		3.
	Best:		Best:
	Rating:		Rating:

TASK

Put the relevant tables into excel and correlate the information against each other to determine any potential relationships that maybe found.

Produce graphical illustrations of the relationships.

Are there any relationships seen through the information provided?

What other strength measures may we see similar correlations too?

Repetition Maximum Testing

RM testing is used to identify the maximum weight that can be lifted for a particular exercise at a given number of repetitions with satisfactory technique; that is, for 3RM tests measure the maximum weight that can be lifted for 3 complete repetitions.

3RM leg press protocol

The participant sits with feet up on the middle of plate, shoulder-width apart and lowers the plate, flexing to 90° of knee flexion before pressing back to full extension.

- ✓ Measure and record the participant's body mass
- ✓ The participant completes a 5 minute warm-up which may include light jogging, cycling, skipping, etc. This is followed by dynamic stretching for 5 mins
- ✓ Demonstration of correct leg press technique
- ✓ Ensure safety procedures are in place.
- ✓ Participant to sit in leg press with feet positioned on middle of plate, shoulder-width apart. Mark foot position.
- ✓ Instruct the participant to lower the plate to 90° knee flexion and hold. This range must be achieved with each repetition
- ✓ Complete 8-10 reps at 40-60% 3RM
- ✓ After appropriate rest increase load to 60-80% 3RM
- ✓ Complete 5 reps at 60-80% 3RM
- ✓ Increase weight to heavy but conservative estimate of 3RM and allow 1 min rest before commencing the test.
- ✓ Start in extension, lower to 90° flexion and back to full extension.
- ✓ Participants attempt 3 reps at the selected weight. If valid then increase the weight. Rest 3 mins before next attempt.
- ✓ 3RM should be achieved within 3-5 trials

✓ Record the results

Data Recording		
3RM leg press	kg	Rating
Relative strength ratio (3RM/body mass)		Rating