The Association Between Isometric Muscle Strength and Injuries Among Recreational and Novice Runners

Dillon, S.[1], MISCP, Whyte, E.[1] , MISCP, ARTC, PhD, O'Connor, S.[1], ARTC, PhD, Burke, A.[1], ARTC, ,Moran, K.[1], PhD
[1]School of Health and Human Performance, Dublin City University.

Introduction:

Running has many health benefits, but injuries associated with running can result in considerable health and economic burdens. This is particularly important given the reported injury incidence of between 18.2 to 92.4%[1]. Previous injury is the primary risk factor related to running injuries[2]. As injured athletes often display deficits in neuromuscular strength [3,4], and these weaknesses may be evident at the time of return to sport[5,6,7] it is thought that persistent residual weakness following injury may predispose an athlete to subsequent injury. To date, studies have mainly compared the neuromuscular strength of currently injured and uninjured runners. More information is needed to explore potential differences in strength among healthy runners with a history of injury, which may allow clinicians to address weaknesses and ultimately better direct treatment.

Aim:

To investigate differences in isometric muscle strength among healthy runners with and without previous running related injuries (RRIs) in the past 2 years.

Methods:

Participants:

121 Injury free recreational and novice runners (47 females, 74 males) with a mean age of 40.39 years ± 8.9.

Outcomes:

Previous RRIs reported in the last 2 years were recorded via online survey. RRIs were defined as any pain in the lower limb or back that caused a participant to:
Stop running/restricted running (either distance, speed, duration or frequency)
AND
(a) lasted at least 7 days or 3 consecutive training sessions
OR
(b) required consultation with a health care professional

A single assessor assessed the maximum value of three measures of:

- Hip abduction isometric strength
- Hip extension isometric strength
- Knee flexion isometric strength
- Knee extension isometric strength
- Plantar flexion isometric strength

Using a hand held dynamometer.

Statistical Analysis:

Independent T-tests were performed to investigate if a difference existed between previous running injuries and isometric muscle strength. Effect size was reported.

Results:

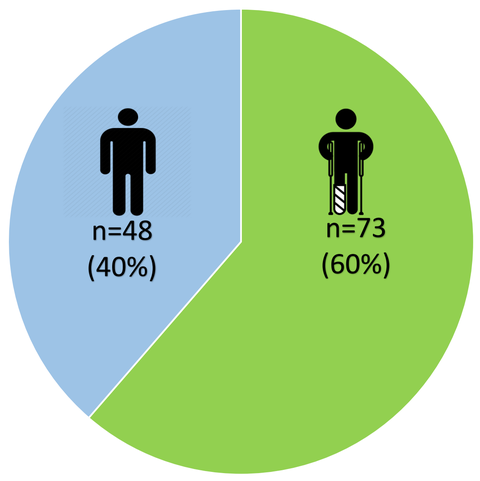

Figure 1. The number of participants with (green) and without (blue) a history of running injuries over the past 2 years.

Table 1: Mean isometric muscle strength of runners with and without previous injury in the past 2 years. * indicates a significant difference in means between groups.

Isometric Muscle Strength	Dominant/ Non-dominant	Injured Group Mean (N/Kg) ± SD	Uninjured Group Mean (N/Kg) ± SD	p Value Mean	Effect Size (d)
Hip Abduction	Dominant	2.23 ± 0.39	2.08 ± 0.40	p= 0.04*	0.40, medium
Hip Abduction	Non-dominant	2.19 ± 0.44	2.01 ± 0.42	p= 0.02*	0.43, medium
Hip Extension	Non-dominant	2.61 ± 0.89	2.30 ± 0.63	p= 0.04*	0.59, large
Hip Extension	Dominant	2.72 ± 1.05	2.42 ± 0.65	p= 0.08	0.33, medium
Knee Extension	Dominant	4.03 ± 1.08	3.90± 1.29	p > 0.05	0.11, small
Knee Extension	Non-dominant	3.89 ± 1.06	3.69 ± 1.40	p > 0.05	0.13, small
Knee Flexion	Dominant	2.98 ± 0.74	2.91 ± 1.04	p > 0.05	0.12, small
Knee Flexion	Non-dominant	2.94 ± 0.79	2.75 ± 0.91	p > 0.05	0.23, small
Plantar Flexion	Dominant	3.50 ± 1.00	3.06 ± 1.00	p > 0.05	0.31, medium
Plantar Flexion	Non-dominant	3.45 ± 1.33	3.14 ± 1.12	p > 0.05	0.25, small

Discussion

- Significant increases hip abduction strength bilaterally, and hip extension strength on the non-dominant side was found among the cohort reporting previous injuries in the past 2 years.
- This finding is counterintuitive to the assumption that deficits in strength may persist following injury and after return to sport as seen in other populations[5,6,7] .
- As 79% of this sample participated in rehabilitation interventions, it is likely that this increase in strength may be as a result of rehabilitation from injury.
- Prospective studies are needed to explore the relationship between muscle strength and injury among this population further.

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@DCU_RISC_Study
@Sarah_D_Tweets
sarah.dillon24@mail.dcu.ie

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