

Study summary – I thought I would write this to save you wading through the whole thing. It is my subjective summary so please feel free to read it and be critical. Any feedback appreciated and if you want to use the raw data to analyse yourself – feel free

Is the ratio between finger/wrist flexor and extensor strength the same in climbers as in healthy non-climbers?

Abstract

Introduction: Gripping is a prime function of the hand and overuse injury as a result of vocation or recreation tends not to reduce participation merely performance. Climbers present the therapist with a unique set of problems not least of these the expectation to be able to continue climbing but also the climber's physiology which, in terms of grip is significantly stronger than a comparable non-climber (Macleod, 2007).

The role of the extensors in grip is fundamental but, unlike flexion there are no population norms for extension strength and no research into the likelihood of flexor/extensor muscle imbalance as a cause for overuse syndromes.

Objective: This study investigates the strength of the wrist and finger flexors and extensors in a population of climbers and a healthy non-climbing group. A significant difference in the ratio of flexor/extensor strength between sample groups would provide grounds for further research to consider whether this is a factor in climbing related injuries.

Participants: Convenience sample of 30 'elite' climbers and 30 non-climbers.

Method: Each were tested for grip strength using a dynamometer and then each had their extensor strength tested and results were compared to establish whether there was a 'normal' ratio and to ascertain whether climbers were outside of this.

Results: The non-climbing control group were within national averages for flexion strength and had a mean average flexor to extensor strength ratio of 3.08 with no significant difference between dominant hands or due to demographic variables of gender, height or weight. The climbing group were up to 12% stronger but demonstrated an average ratio of 3.08 ($p>0.05$).

The 10 strongest flexion readings between both participant groups did demonstrate a significantly increased ratio of 3.45.

Conclusions: It can be postulated that the population 'norm' for flexor/extensor strength ratio is 1:3.08 and that very few climbers train beyond this 'safe' limit. Individuals with a particularly strong grip may demonstrate flexor/extensor imbalance. *(I have included the next bit from the full text as it does demonstrate one particular feature) If we were to compare only the 10 strongest flexion measurements (4 from non-climbers, 6 from climbers) all of which were above 60Kg, with their corresponding extensor strength the result would show that their average extensor/flexor ratio is 3.43; significantly beyond our 'norm' (Table 3). This could be seen as providing evidence to support physiological change in the very strongest of examples but does not, necessarily prove a link with climbing as 4 out of 10 of this sample were non-climbers.*

So what does this all mean?

First thing – the study itself:

- It is not a bad study – it covered some new ground and was a simple, analysis of straightforward, objective data
- It had a good sample size for both study and control cohorts – 60 people (took ages)
- It produced lots of easy to analyse data (see appendix 9:12 & 9:13)

General conclusions:

- There *is* a correlation between weight and strength – the bigger you are the stronger you are (I know – obvious but needs saying)
- Climbers have a 12% stronger grip than non-climbers even when relative height and weight are taken into account
- However there is *no* difference between the ratio of flexor/extensor strength in climbers and non-climbers
- 4 out of 10 of the strongest participants (those crushing more than 60kg) were *not* climbers
- These 10 strongest participants *did* have a flexor/extensor strength imbalance.

And some more conclusions where the evidence is a bit thin:

- There is an average difference of 7% between dominant and non-dominant hands, females slightly less different than males.
- Extension strength increases with flexion strength to a point
- Non-climbers are relatively stronger with their dominant hand compared to their non-dominant hand – climbers develop a more even bi-lateral strength.
- Climbers testing scores are the same or higher on the third test for the flexors demonstrating a better resistance to fatigue.
- However extensors do not show the same fatigue resistance in climbers but *do* in the non-climbers – this could be because of the relative strength of the flexors in the climbers.

We could say that those with grip strength above 60kg are likely to have a muscle imbalance – particularly when fatigued. This could increase the likelihood of injury so I want to do the following:

- Measure many climber's grip
- Compare to climber's current climbing grade
- Record the incidence of hand/wrist/elbow injury.
- Draw some more conclusions.

That's enough for now – hope you found it interesting.