

A RELIABLE AND VALID STRENGTH MEASUREMENT OF THE CRIMP GRIP IN ROCK CLIMBING

D.M.Binney

University of Sheffield Centre of Sports Medicine

Purpose

Various studies have measured the isometric grip strength of the finger flexors in rock climbers. However, they have used different types of grip, different body positions and different apparatus. To date no definitive protocol exists. Since it is vital that scientist are able to compare valid and reliable results the aim of this study was to present a standard measure of the climbing crimp grip.

Methods

15 elite male and 12 female competitive rock climbers took part in the reliability study. Through discussion with climbers and researchers in the field a consensus opinion of the anatomical description of the crimp grip and dynamometer specifications was agreed. From this a specialised dynamometer was developed to measure finger strength. Both hands of each subject were tested on two separate occasions. Repeatability analysis was carried out in accordance with the method of *Bland & Altman (1986, Lancet, Feb 8, 307-310)*. An analysis of variance was computed on the changes in force across left and right hands, and across gender between pre and post testing.

Results

The crimp grip is a classic rock climbing handgrip where the fingers are flexed at the proximal interphalangeal joints and hyperextended at the distal interphalangeal joints, with the thumb wrapped over the distal phalanx of the index finger.

The specifications for the dynamometer were as follows: Allow positions to be adopted found in real rock climbing. Be reliable and accurate with full scale deflection 0-1000 N and sensitivity of 1N. Enable the measurement of finger strength removing the contribution from other muscle groups. Adaptable to variation in morphology of climber, number of fingers used and type of grip. Allow the measurement of both strength and endurance. Audio and visual feed back via computer. Inexpensive to build and maintain. Mobile, robust and safe.

There was no significant difference between test re-test ($p = 0.890$). There was no significant difference in the performance of hands ($p = 0.343$). Significant difference was found between males and females (422 ± 81 N, 330 ± 54 N mean \pm S.D, $p < 0.05$). The apparatus coefficient of repeatability was ± 2 N, and the mean difference was 1 N. The apparatus/subject coefficient of repeatability was ± 9 N, and the mean difference was -1 N.

Conclusion

The climbing specific dynamometer developed in this study may be used as a reliable and valid measure of crimp grip strength in elite rock climbers. Further work is necessary to ascertain the importance of crimp grip strength in elite competition climbing and allow coaches to judge their athletes training programmes as they prepare for elite competition.