An Introduction to Conditioning For Climbing

Rock climbing, originally a mode of training for alpine mountaineering, has developed into a sport and leisure pursuit of its own. It has progressed to include several sub-disciplines, including speed climbing, bouldering and ice climbing (Morrison & Schoffl 2007). Popularity has risen markedly in the last 20 years, with the number of indoor climbing walls in the UK rising from 40 in 1988 to 254 in 2003 (Giles, Rhodes & Taunton 2006).

Climbing is characterised by both high physical and psychological demands, elite climbers must manage the unique puzzle of assessing and choosing the most effective route and technical moves, with potentially high physical force requirements (Morrison & Schoffl 2007).

With the increasing participation levels and a growing competitive interest, physical training approaches that might assist the climber are in demand. Ability to perform dynamic gymnastic like movements, static isometric holds, explosive strength work, stamina and intense isometric gripping appear to be key elements (Morrison & Schoffl 2007). Conditioning professionals must now consider more carefully the physical demands of the various forms of climbing, and choose appropriate methods and means for developing the physical condition of the climber.

Characteristics of Elite Climbers

Despite growing interest, very little scientific analysis has explored the physiological demands of rock climbing, and much of the current programming is as much based on anecdotes and tradition, as conditioning science. A significant review of the anthropometric literature on climbers by Watts (2004) indicated mean height and body mass of male climbers to be around 1m 77cms and 65kg, with body fat percentages measured with calipers around 6%. In females, these figures were 1m 64cm, 51-52kg, and approximately 12%. This data appears to support the general perception that elite climbers have low body fat levels, low body mass and are small in stature (Giles, Rhodes & Taunton 2006) although there is no evidence yet to suggest reduced bodyfat leads to improved performance (Morrison & Schoffl 2007).

Physical Abilities for Climbing Performance

The physical demands of climbing can vary significantly depending on route and grade of difficulty. While a beginner climb may be relatively easy physically, an elite level climb may place very significant challenges on the physiological systems. Climbing is unusual physiologically in that it requires intermittent and prolonged isometric muscle contractions (Sheel 2004). As an individual climbs oxygen consumption and heart rate increase, and with increased difficulty of climb blood lactate levels rise; this indicates that both whole body aerobic capacity and the anaerobic energy systems may be important to performance

(Sheel 2004). Limited data examining physical abilities exists; it has been suggested that strength, power, endurance, flexibility and stamina are important abilities for climbers to develop (Horst 2008). Early work by Grant et al (1996) suggested finger and shoulder girdle strength and endurance along with hip flexibility should be important training considerations. More recently, a significant review was undertaken by Giles et al (2006). They highlighted high levels of muscular endurance, particularly isometric, increased finger strength, and greater strength and endurance in the arms and shoulders, as potentially beneficial to climbing performance. They further suggested that flexibility related to specific climbing movements (e.g. high stepping or bridging) might also be useful. Watts (2004) proposed an **athlete profile for rock climbing** (see figure 1)

1. Small stature / Low body mass / ⇓ body fat
2. ⇑ Upper body strength to weight ratio
3. ⇑ Muscular and isometric endurance
4. ⇑ Upper body power
5. Moderate aerobic power

(Figure 1)

Designing A Conditioning Programme for Climbing

Most information on conditioning ideas for climbers comes from either the internet or climbing magazines, a small number of books have also been produced (e.g. Horst 2008). We must be cautious because to date no scientific evidence exists on the impact of different types of training on climbing performance, nor has any work yet identified any hierarchy of importance for the relevant variables. However, from our understanding of the sports training process and the physiological analysis so far performed, it is possible to design an approach that may be beneficial.

As outlined in previous articles in this series, in order that the development of the physical abilities of the individual takes place sequentially the concept of General Physical Preparation (GPP) and Specialised Physical Preparation (SPP) has developed. GPP requires the development of a persons overall working capacity, with the purpose of increasing capability within all the major biomotor abilities required in all sport (i.e. strength, endurance, agility, flexibility etc.). The major purpose of SPP is to develop the specific skills and abilities required within the sport of choice (in this case climbing). Training focuses on specific joints and muscles determined by movement analysis, considers types of muscle action, speeds of movement, specific loading and patterns of movement (Bompa 1999).

From a resistance training perspective, during GPP, exercise selection might include lower body movements such as Jefferson or sumo squats, lunges and calf work. Upper body movements to strengthen the shoulder girdle should include rows, pulldowns and overhead pressing along with some forearm work. A whole body general flexibility approach would be appropriate here and a range of basic trunk exercises could be used.

In SPP, exercise selection might progress to variations of step-ups, single leg squats and explosive lunges for the lower body and variations of pull-ups and grip work with finger strength emphasis for the upper body. Climbing equipment such as fingerboards can be useful. Specific flexibility work, particularly for the hips and shoulders should be introduced and integrated movements such as reverse wood chops and landmines might also be good choices in this phase of training. Utilising a climbing wall for specific conditioning sessions might also be a smart move at this stage.

Watts (2004) outlined some **general physical training recommendations for rock climbing conditioning** (see figure 2)

1. Develop general aerobic power (target a VO2max of 50-60 ml/kg/min)
2. Develop strength via both hypertrophic and neural adaptation strategies
3. Develop rhythmic isometric endurance
4. Increase specific phosphagen system capacity with short intense interval work
5. Increase lactate tolerance via longer intervals with active recovery
6. Develop and maintain range of motion using both static and dynamic approaches

(Figure 2)

Popularity of rock climbing and its various sub-disciplines has increased markedly in the last twenty years. Climbing performance is influenced by many variables with physical ability becoming more important as difficulty increases. This has resulted in a need for conditioning professionals to design training programmes to help climbers improve performance. Although limited scientific literature exists, early work has highlighted potential areas where physical training may be useful. Further work is likely to identify the importance of well designed physical training interventions in developing climbing ability in all its forms.

References & Suggested Reading

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