Abstract model

Sprinting Performance and Resistance Based Training Interventions: A systematic review with meta-analysis

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Introduction
Much of the research which focuses on improving sprinting performance has been carried out with team sport athletes or endurance athletes (Berryman, Maurel, & Bosquet, 2010; Esteve-Lanao, Rhea, Fleck, & Lucia, 2008; Hanon, Bernard, Rabate, & Claire, 2012; Rhea, Kenn, & Dermody, 2009; Shalfawi, Haugen, Jakobsen, Enoksen, & Tønnessen, 2013; West et al., 2013). There is little consensus with the prescription of resistance based training within this body of research. The majority of studies carried out with sprinters have been acute in nature with many kinetic, kinematic and biomechanically focused studies (Alcaraz, Romero-arenas, Vila, & Ferragut, 2011; Lockie, Murphy, Schultz, Knight, & Janse de Jonge, 2012; Okkonen & Häkkinen, 2013; Paulson & Braun, 2011; Sáez de Villarreal, Requena, & Cronin, 2012; Sedano, Marín, Cuadrado, & Redondo, 2013; Tønnessen, Haugen, & Shalfawi, 2013). The aim of this review is to identify the primary studies, which have used sprinters as subjects in resistance based interventions. Also to ascertain any trends regarding the prevalence of resistance-based training and to shed light on the types of resistance movements being used, be they of a more traditional variety or less traditional.

Method
The PRISMA approach to meta-analysis was used to complete the review (Liberati A, 2009). The search criteria for this paper used the search terms “Sprinters OR Sprint” and numerous exclusion terms to limit the results to that of just sprinters. The relevant databases (Science Direct, Medline, Sports Discus, CINAHL, PubMed, SCJ & JSCR) where searched from 1823 – 2013 for literature related to resistance training interventions with sprinters.

Original research was reviewed using the Physiotherapy Evidence Database (PEDro) scale (Moseley, Herbert, Sherrington, & Maher, 2002). Five studies met inclusion criteria (Blazevich & Jenkins, 2002; Carlos Balsalobre-Fernández, 2013; Klimentini Martinopoulou, 2011; Satkunskienė, 2009; Sigitas Kamandulis, 2013): Competitive adult male sprinters who participated in any kind of resistance based intervention (>4 weeks), with outcome measures of sprinting performance in the form of 20-100m sprint times. Exclusion criteria were acute studies (<4 weeks), non-sprinting populations including team sports, studies with no sprinting performance outcome measures (10-100m sprint times).
Data Synthesis

The five selected articles PEDro scale scores ranged from 6-7 out of a maximum of 11. Concealment of allocation is not entirely relevant in studies of this nature, because one subject is no more likely to improve with training than another subject if all training elements are monitored for intensity and volume. Blinding of subjects and therapists is also not applicable in this case. The data presented shows a prevalence towards more dynamically orientated resistance-based exercises (power cleans, squat jumps, plyos, box jumps etc.) with less prevalence on more traditional types of resistance training (back squats, deadlifts, leg extensions). Low ES (effect size) due to limited number of studies with a small encatchment of the sprinting population over time.

Discussion

This systematic review of five resistance training based intervention studies suggests that resistance of a locomotive nature (involving unilateral movement, 2-4 times per week, 60-100% intensities) improves sprinting performance. The moderate PEDro scale scores (6-7) should not diminish the quality of the reviewed studies, considering the constraints that training studies have in blinding subjects, therapists, and assessors to the treatment received. Despite the volume of sprint studies available, few have focused on competitive sprinters as a population sample. One limitation of the study is the small number of papers which made the inclusion criteria, however this highlights the necessity amongst the athletics community to facilitate studies of this nature within the sprinting population.

Conclusion

Current research supports increased sprinting performance with resistance based training programs. The importance of a general base requirement of strength in conjunction with dynamically orientated strength programming forms the basis for training competitive sprinters. The authors recommend the inclusion of well-structured, periodized resistance training programs in their athletes’ training regimens based on the health and ability of individual athletes during each training phase. We believe that the positive benefits of resistance based training in sprinters cannot be overlooked despite the limited body of evidence. However, it is evident that there is a need for further research with highly trained competitive sprinters on the potential benefits of various forms of resistance based training and the effects of different periodization methods on sprinting performance.
References


