

Isometric Strength and Its Relationship to Dynamic Performance: A Systematic Review

Juneja¹, H., Verma, S. K.², Khanna³, G.L.

¹Research Scholar, Dept. of Sports Science, Punjabi University, Patiala,

²Professor, Dept. of Sports Science, Punjabi University, Patiala, Punjab, India. Email: satishsk1@rediffmail.com

³Professor & Dean, Faculty of Allied Health Sciences, Manav Rachna International University, Faridabad, Haryana, India

Abstract

Study Design: Systematic Literature Review

Objective: 1) to identify the overall trends of association of isometric strength and dynamic activities 2) to summarize the findings of reported literature on the relationship of Isometric strength and dynamic performance.

Background: Isometric Strength measures have been used for many years to predict dynamic performance but there are considerable controversies regarding the potential of isometric muscle assessments to predict dynamic performance. Although researches have been conducted to study the relationship, it is important that the current available literature be reviewed to summarize the findings for clinical use.

Methods: A systematic review was conducted to identify the published studies that correlated the Isometric and dynamic variables. Studies were searched using electronic databases and the methodological quality of each study was assessed using the modified Downs and Black 13 point criteria.

Results: Fifteen studies met the inclusion criteria. Marked difference in the methodology and variables used for isometric and dynamic activities were observed. Most studies correlated isometric strength assessments to dynamic activities or dynamic strength measurements.

Discussion & Conclusion: Although there are conflicting opinions regarding the use of isometric measurements, most studies in our review report moderate to strong correlation between Isometric strength and dynamic performances specially those which involve large amounts of force and explosive power.

Keywords: Isometric, dynamic, strength, power, performance, methodological quality

Introduction

Strength is a fundamental quality necessary in achieving optimal physical function and is defined as the ability to produce more force. (Siff M; Stone MH et al., 1993). Thus the display of strength has characteristics which include a magnitude, rate and direction. The force production can be measured by isotonic, isometric or isokinetic methods. The isotonic techniques require lifting a particular weight through a fixed number of repetitions such as 1RM testing or using prediction equations (Bryzcki, 1993). The Isokinetic measurements involve the use of isokinetic devices. The isometric testing is done by a maximal voluntary contraction performed at a specific angle against an unyielding resistance which in series with a strain

gauge, cable tensiometer, force platform or similar device whose transducer measures the applied force (Stone et al., 2002).

In dynamic activities such as sports, if greater strength makes a difference then the stronger teams should perform better. Sports requiring rapid directional changes and acceleration or movement sequences primarily depend upon average power production but activities such as jumping, sprinting, and weightlifting may depend a lot on peak power (Garhammer, 1993; Thomas et al., 1996; McBride et al., 1999; Kauhanen et al., 2000). It can be argued that peak power depends to great extent on maximal strength. Therefore, it might be expected that maximum strength would have a greater effect in sports in which relatively larger loads have to be