International Tennis Federation
www.itfcoachingreview.com
April 2010. 18th Year. Issue 50. 18-20
ISSN 2225-4757
https://doi.org/10.52383/itfcoaching.v18i50.623

Strength & Conditioning for Tennis -A 25 Year Journey.

Mark Kovacs.

United States Tennis Association.

ABSTRACT

This article will highlight the major areas of physical training and how each area has changed since the first issue of the ITF Coaching and Sport Science Review. The focus gives an insight into strength, power, speed, endurance, flexibility and recovery.

Key words: Strenght, conditioning, Physical training.
Received: 25 February 2010.
Acepted: 15 April 2010.
Corresponding author: Mark Kovacs, United States Tennis Association.
Email: kovacs@usta.com

INTRODUCTION

In any industry, time results in change. Certain time periods in history are acknowledged as defining periods – the industrial revolution, the roman empire, the internet age. In tennis, it could be said that we are in the physical age of tennis. The game has changed dramatically in the past 30 years: the requirements of the sport, distances covered, forces produced, stroke changes due to racket and string technology all have resulted in an extremely physically demanding sport. As a result the players/coaches have adapted their training to be successful in this new era of tennis.

STRENGTH TRAINING

Strength training is a confusing term for many coaches. Many times this term is used to define any exercise involving loading - via body weight or added weight - (barbell, dumbbell, medicine ball, kettlebell, cable pulley etc) irrespective of the purpose of the exercise. Unfortunately, this has resulted in some confusion about exercises and how best to use them in designing programs. For the sake of simplicity strength training will be defined as movements requiring loading that results in appropriate overload based on age and stage of development and has three overarching purposes: 1) Absolute Strength, 2) Hypertrophy 3) Muscular Endurance.

All three components of strength training are important for the tennis player. The focus of each of these needs to be altered throughout a training and competition cycle; this will change substantially as athletes' develop. Over the last few decades the focus of strength training programs has changed. In the early 1980's, strength training became popular and most techniques involved isolated muscle movements predominantly on machines, to more multi-joint "functional" movements that load the movements seen in tennis more than just developing strength in the individual muscles.

POWER TRAINING

Power training should be thought of as a separate training component than strength training. Power is the major training variable that directly relates to improve on-court tennis performance. All other components (strength, flexibility etc) directly and indirectly relate to improved power output, but power training needs to be a major focus of a training program. Power training has changed tremendously over the decades. The use of implements such as medicine balls, cable pulley machines, hydraulic machines and other tools that allow for unimpeded movements at high rates of velocity aid in the development of power. Also, technology has improved whereas power (as measured in Watts) can now be measured using different devices and machines. The goal of power training is to recruit as many fast twitch muscle fibers as possible, so that these fibers can be recruited more often during play to hit the ball harder and move more powerfully. It must be mentioned that improved power is a combination of

strength and speed, so developing power also means a need for improvement in both speed and power. This area of training will continue to be a major focus in the coming years and more tennis-specific power movements will be integrated into players' training programs.

SPEED TRAINING

Tennis speed training has developed from general speed training (i.e. track or soccer sprint training) to more tennis-specific individualized to the individual athlete, playing style and goals. Historically a lot of speed training was done on a track running 20, 40 or 100 meter sprints to develop speed. It is clear that this type of one-directional movements can be beneficial, but is not the most efficient way to train for tennis. Linear speed is one component of tennis movement, but we know that this is less than 20% of all movement on a tennis court (M. S. kovacs, 2009; Weber, Pieper, & Exler, 2007). The majority of tennis movement is multi-directional (specifically lateral), and this needs to be the major focus of movement training for tennis. Developing speed and quickness over short distances (<10 meters) will continue to be the focus of speed training programs over the coming years.

TENNIS-ENDURANCE

Debating the best way to train for tennis endurance is and will continue to be a discussion point between coaches, trainers and sport scientists. The majority view has changed over the last few decades as more research has highlighted the demands of tennis. It is recommended to train for tennis endurance by simulating work and rest ratios, intensities and durations similar to matchplay. Long slow distance running (i.e. 5-8km) is an example of an endurance workout that does not simulate tennis requirements or muscle recruitment patterns, but can improve aerobic capacity. From a physiological standpoint, it is not the best method to train for tennis endurance, yet many coaches and players feel this type of training is beneficial. This perception is more likely a psychological benefit, as this type of training is not the most physiologically efficient method to improve tennis-specific endurance. Short repeated, multi-directional sprints, using a work:rest ratio similar to tennis for an extended period of time (>30-45 minutes) will develop tennis movements, utilizing explosive movements, yet still improve aerobic capacity.

FLEXIBILITY

Flexibility training has changed substantially over the past three decades. Static stretching was considered the safest and best method to improve an athlete's flexibility. Static stretching is still a good safe method to improve range of motion for athletes, but it is in a static environment and the direct transfer to dynamic situations (ie. tennis play) is still not well understood. Also, the timing of static stretching is important. Research studies on strength and power performances following static stretching have shown decreases in immediate performance by as much as 2%-30% (Avela, Kyröläinen, & Komi, 1999; Fletcher & Jones, 2004; Fowles, Sale, & MacDougall, 2000; Kokkonen, Nelson, & Cornwell, 1998; M. Kovacs, 2010; Nelson, Guillory, Cornwell, & Kokkonen, 2001).

Over the years many different stretching techniques have gone in and out of favor with coaches. Currently, dynamic stretching routines have been shown to improve dynamic range of motion and improve strength, speed and power activities if used during the warm-up period (Bergh & Ekblom, 1979; Blomstrand, Bergh, Essen-Gustavsson, & Ekblom, 1984; M. Kovacs, 2010; M. Kovacs, Chandler, & Chandler, 2007; M. S. Kovacs, 2006a, 2006b; Shellock & Prentice, 1985). It is recommended to limit static stretching to post-match and evening stretching and utilize dynamic movements before and during tennis or fitness training or competition.

RECOVERY

Training has changed substantially over the past few decades and in the next decade recovery will be the next major area that will substantially result in improved on-court performance and a reduction in injuries in tennis. At present, our understanding of recovery is less advanced than our understanding of training, but much work is currently being done looking at how to improve recovery for tennis. Nutrition, flexibility, injury prevention, sleep, massage, contrast therapy, psychological and medical are just some areas that directly aid in the improvement of recovery. Please see the following resource for

an in-depth review of tennis recovery (M. S. Kovacs, Ellenbecker, & Kibler, 2009).

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