Golf Programming Through Triphasic Emphasis

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Abstract

Golf, being a heavily taxing sport on the body, calls for a strength and conditioning program containing maximal strength, power, flexibility, mobility, and overall high level tailoring to generate a healthy and competitive athlete. The triphasic approach encompasses power optimization while inducing injury prevention with targeting segments of a dynamic movement to create adaptation. Key adaptations that triphasic develops are the body's ability to absorb, withstand, and reverse force to produce peak power in a matter of seconds.

Keywords: Triphasic, Eccentric, Isometric, Concentric, Needs Analysis, Strength and Conditioning

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Needs Analysis

Introduction

Given that the swinging motion of a golf club is one of the most physically demanding biomechanical movements to execute, there calls for a strategically designed strength and conditioning program on how to prevent injury and improve performance. In developing a golfer, it is essential in the needs analysis of athletes to include but not limit to metabolic energy systems, biomechanical analysis of movement performed, and injury prevention.

Metabolic Energy Systems

Contrary to the misconception that golf uses both anaerobic and aerobic systems due to long walks to different holes on the course with 4 hours of mental focus combined with the explosive roughly 40-50 swings depending on how well you play. From tests of an actual tournament, the testing actually shows oxygen intake levels at a relatively low resting pace between swings (Read *et al* 2014). Therefore, with this in mind the primary energy system used within the sport of golf is ATP-PCR. This system produces explosive, fast-twitch, powerful movements. The ATP-PCR system is generally from any action within 6-10 seconds and the average swing time from motion of backswing to contact and follow through is roughly between .8 and 2.5 seconds. Given what we know about the sport specific time of movement, within the strength and conditioning program, it would be beneficial for the athlete to perform movements within the ATP-PCR relative time frame. The more sport-specific movements with timeframe to the actual task at hand, accumulate sustaining adaptations during training (Cronin *et al* 2001).

Movements that would be beneficial for the utmost sport specificity rely on the determinants from a biomechanical analysis of the actual golf swing.

Biomechanical Analysis

Throughout the sport of golf, power serves as a crucial part in the overall speed of the club head thus resulting in the speed and distance that the golf ball can travel (Nesbit 2005). The full golf swing consists of three phases. The first being the preparation phase where posture, grip, ball and clubhead position are lined up. The second consists of the execution phase being the backswing, downswing and impact. Lastly, the third phase delivers the following through Maddalozzo (1987). In this analysis, the execution phase is the focus. From winding up in a backswing to that sudden moment at the top of the swing where all the forces stop and transition in the amortization phase before the concentric power drives to impact and through the golf ball.This rotational movement causes shear forces to be in play in order to generate such high velocity and distance in the golf ball. The more velocity on the ball, the more force has to be absorbed by the body to withstand that amount of power. Withstanding that amount of power consecutively for a multitude of times in practice or in competition can be detrimental to the acute and chronic overuse injuries (Tucker 2016).

Injury Prevention

A round of golf consists of constant repeatability of the swinging motion creating torque along the entire kinetic chain for 18 holes. Thus, meaning on average per round of golf an athlete would swing a golf club around 40-55 times depending on skill at the elite levels of golf from collegiate to professional. A study analyzing competitive golf in nature found over a 2-year period, 60% of professionals and 40% of amateurs experienced an injury that removed them

from play (Gosheger *et al* 2003). Whether these injuries be acute or chronic, both relate to overuse.

A powerful rotational movement such as the golf swing causes its most common injuries along the spine, shoulder, elbow, wrist, and hand (Tucker 2016). The difference in injury among male and female tends to reveal that the male golfer experiences more injuries to the spinal column. A leading theory on the increased frequency of spinal injuries is due to the higher velocities in mechanics of a golf swing for the male counterpart, resulting in increased torque and shear forces on the spine (Gosheger *et al* 2003). Other common upper extremity injuries result in overuse. Amateurs tend to suffer elbow injuries more commonly due to their poor swinging mechanics (Tucker 2016). More common in professionals due to overuse over their career due to these injuries being chronic. With only a few injuries specifically pointed out, any golfer is not limited to a singular injury and therefore, the significance of exposure and training programs in the weight room designed specifically to prevent injury and enhance performance is crucial for longevity and professional careers.

Triphasic Training

Triphasic Introduction

Implementing a non-traditional method for golf athletes such as triphasic may serve as an alternative means of developing maximal strength and power. Triphasic implementation drives specific stressors across the three phases of a traditional dynamic movement. This stylistic training consists of targeting a singular part of the dynamic movement through extensive stress and undergoing extensive stress to produce adaptation (Dietz and Peterson 2012). The three phases of the dynamic movement targeted are eccentric, isometric, and concentric. Eccentric,

being the muscle lengthening, resisting, and decelerating the specific load of a movement. Isometric, responsible for the point in time when muscle and joint angle remain constant. Finally concentric being the force generated to produce the desired movement where muscle shortens and contracts. (Haff and Triplett 2016).

Eccentric Phase

Eccentric phase of programming primarily stands to lay a foundation of the human kinetic chain, primarily in the muscle tissue to develop a tolerance (Dietz and Peterson 2012). This movement is a slow and controlled movement while maintaining constant tension throughout the body. However, even though the eccentric portion is primarily focused on a slow and controlled movement, the key is to produce as much power after the specified seconds of eccentricity as possible to work on the secondary focus of power within the block of training. With the end goal of maximal power at the end of triphasic programming in mind, this french contrast is crucial in developing a neuromuscular and muscular adaptation to power. The designated stress upon the muscles resisting the load, allow for an increased cross sectional area and more efficient neuromuscular connection (Higbie *et al* 1996). Eccentric movement under heavy load, allows for the body to absorb force. The significance behind the first training block of triphasic stands a purpose to create a tolerance of force, meaning injury prevention.

Isometric Phase

The second phase of triphasic training involves the ability to withstand high velocity load into a hard brake at the bottom of a desired movement. From that stopping point before the transition to concentric, the ability to withstand and hold that position becomes a crucial point in the reversibility of sport-specific movement. The significance of the rapid isometric into a

prolonged hold starts the beginning of not only training the musculature but begins to train the tendon for an overall healthy athlete. The same protocol for finishing the movement on an eccentric portion with maximal power output follows after the isometric hold to further create the desired adaptation. The ability to hold a bench or squat at the bottom dictates the power driving out of it in the concentric phase (Dietz and Peterson 2012).

Concentric Phase

The final block of triphasic is the most important for strict performance measures. The concentric phase primarily focuses on power output. The overall velocity of a lighter load is pivotal in training the rapid stretch shortening cycle. The stretch-shortening cycle resembles a spring-like mechanism shown to enhance athletic performance in the golf swing (Miyaguchi and Demura 2008). The maximal amount of power the athlete can produce under control, will aid the development of an adaptation for overall power that has the ability to translate into sport-specific performance (Dietz and Peterson 2012).

Application of Triphasic Programming

The practical application of triphasic programming can go into any offseason programming. The recommendation, in order to create enough stress to adapt, is 2-3 weeks per training block. The protocol would be to follow the order of eccentric, isometric, and concentric. Not every athlete will be ready for the extensive nature of this style of training. Different levels based on training age and athlete readiness are prepared for the individual athlete. From an athlete never attempting any eccentric, or isometric stress (1 Beginner) to the athlete who has an extensive background in weight room tissue tolerance (4 Expert). For each block of training refer

to table 1 for a reference on the time under tension for each of the desired methods. This flow in training allows for injury prevention of tissue tolerance and allows for concentric programming to lead into the pre-season or in-season programming and competition.

Eccentric Tempo				
	Level 1 (*Beginner*)	**Level 2 (*Intermediate*)**	**Level 3 (*Advanced*)**	**Level 4 (*Expert*)**
Squat	04:00:00	04:00:00	06:00:00	08:00:00
Bench	02:00:00	04:00:00	04:00:00	06:00:00
Isometric Tempo				
Squat	00:04:00	00:04:00	00:04:00	00:05:00
Bench	00:04:00	00:04:00	00:04:00	0:05:00
Concentric Tempo				
Squat	00:00:00	00:00:00	00:00:00	00:00:00
Bench	00:00:00	00:00:00	00:00:00	00:00:00

Table 1: *Reference for each block of triphasic with respective Eccentric:Isometric:Concentric times dependent on training status.*

Allow athletes to follow a warm-up routine to get their neuromuscular system and muscular system activated and ready to handle such loads being emphasized in the foundational lifts that triphasic will be implemented on. These warm-up routines should emphasize injury prevention and neural stimulation. Although the athlete will gain rehabilitation through triphasic programming, it would further benefit the athlete to undergo an extensive cooldown method that prioritizes range of motion, flexibility, and mobility to further delay the chronic overuse within the golf athlete (Tucker 2016).

When performing triphasic programming, the athlete maintains power and muscle twitch speed throughout all three phases, French contrasts, plyometrics, and oscillatory methods should be beneficial to the athlete (Dietz and Peterson 2012). These training methods along with triphasic protocol are crucial to the overall development of the strength and power of the golf athlete. When in each phase, so that the body truly adapts to the desired response, accessory movement training, when applicable, takes on the method of either an eccentric, isometric, or concentric motion.

Coaching and athlete emphasis should be focused on the speed of the bar when coming up on a foundational movement (squat and bench press type movements) when performing triphasic to emphasize the end-goal of power and to stress the neuromuscular system as well as the rate of force development. Cueing power and speed shows to have a direct correlation with performance outcome of the athlete (Leahey 2012). Given our knowledge of this, if our goal is to result in an adaptation occurring for power and speed in performance, the significance of this coaching cue is crucial within triphasic programming.

Overall, triphasic programming has been shown in studies, such as collegiate basketball players (Russel and Brooks 2013) and male volleyball players (Sankar 2020), to show drastic improvements within the overall strength and power of an athlete. Although non-traditional, the benefits of the triphasic method shows significance for the performance of golf athletes. The injury prevention and overall strength and power for the golf athlete is crucial due to the high level of physical and mental taxation and anaerobic repeatability that becomes involved with golf.

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