

Plyometric exercises and their benefits for football players



**ASSIGN
BUSTER**

The benefits of plyometric exercises for soccer players and the importance of when in a training session these type of exercises should be implemented.

Introduction

The subject of exercise and physiology is a broad topic. Researchers have known for many years that exercise benefits the body in various ways and there is not a practicing physician anywhere that does not recommend it to his/her patients. But the actual effects of exercise on a person's ability to perform an activity are not well understood. Whether the increase in ability to perform is due to what is known as "muscle memory", increased muscle mass, or simply based on repetitive motion is hard to determine in a quantitative sense. In the next few pages a case will be made for what are known as plyometric exercises specifically for increased soccer playing ability.

In order to explore the subjects of exercise and kinesiology it is necessary to have an adequate amount of background information beforehand therefore before delving directly into the core subject matter, a few general principles will be discussed to provide a framework of thinking for the remainder of the paper. A few principles that are crucial to the understanding of the effects of plyometric exercise are muscle physiology, various exercise regimes, and finally the basics of plyometrics and why they work.

Muscle Physiology

The human body is made up of hundreds of muscles from the most minute (i.e. the muscles that close your eyelid) to very large conspicuous muscles (quadriceps, gluteus maximus, etc.). The large muscles are generally the

ones that human beings “train” to become stronger and more adept, however all muscles have the same basic structure. Each muscle is made up of a series of strands of tissue known as muscle fibers. These fibers work together as one large unit to form what we know as muscle groups. The major muscle groups that most people know about and understand the location of are the bicep brachii (biceps), pectoralis major (pecs), quadriceps femoris (quadriceps), and rectus abdominis (abs). These groups are the major muscle groups that people tend to “workout or train” in order to lose weight or tone up and are the muscles with which the majority of the population is most familiar with.

While a working knowledge of the major muscle groups is sufficient for the everyday layperson going to the gym, to really understand what is involved in the build up of muscle mass and the accumulation of what is known as “muscle memory” it is necessary to understand what is going on at the cellular level. Muscle cells work together with the nerves to perform actions. The body’s nerves create an electrical impulse triggered by a potassium gradient which then stimulates the muscle cells into action. Even though this entire process takes much less than a second, there are still ways of maximizing the efficiency and output of the muscle cells. Some of the muscle cells are part of what are known as fast twitch muscle fibers and others are part of slow twitch muscle fibers. These concepts will be discussed more in the next section.

Fast twitch versus slow twitch muscles

Experts usually split muscles into two general groupings or types. The first type is called fast twitch muscle fiber. Fast twitch muscles are the muscles <https://assignbuster.com/plyometric-exercises-and-their-benefits-for-football-players/>

that react quickly to stressors (ie sprinting, jumping, or punching). The fast twitch fibers are usually what are termed the “ shorter” muscle fibers. Even though the actual physical length of the fibers are no different from the “ longer” or slow twitch muscle fibers, the term short refers to the type of energy they use and the types of activities that these muscle fibers are suited best for. Fast twitch muscle fibers are better suited for activities that require quick movements for short amounts of time. For instance, sprinters build up fast twitch muscle fibers, so do boxers, and to an extent soccer players do as well (Vannatta 2002). These muscle fibers are powered by “ quick or fast” energy which is provided by ATPs produced by carbohydrates. In order to build up these fast twitch muscles specific types of exercises work best. General exercises (jogging, weight training, calisthenics) will build the muscle fibers up to a certain point, especially if this is the first activity in a while or ever for that matter. However, once a reasonable level of fitness is achieved it begins to get harder to realize increased fast twitch muscle enhancement. It is due to this new plateau of difficulty that researchers have developed different types of exercises to specifically address the fast twitch muscle fibers (Pollock et al 1998).

There are several different types of exercises that can be used to overcome fast twitch muscle fiber plateaus. These exercises employ techniques that capitalize on movements that require quick employment of energy. A few examples of exercises would be anything that requires jumping, dexterity drills, or footwork drills. All of these exercises increase the muscle memory of the fast twitch muscle fibers. Muscle memory is defined as the tendency for muscles to “ remember” or acquire a propensity for the motions of a specific

action. This is due to a muscle's direct feedback mechanism connected with growth. Once a muscle is stressed and the stressor is removed, the muscle takes time to recover. Depending on the amount of stress, the muscle can take varying amounts of time to recover. Also, once the muscle is stressed it will not only recover to the original state of the muscle but it will increase its resistance to stressors to the point of the initial stress event (Rhea et al 2003). In other words, once the muscle fiber is torn by work (ie exercise) it will repair itself to a point where it can resist the same type of exercise stress again later and in the process builds up an increased muscle mass. It's the accompaniment of muscle memory exercises and the increased resistance to stressors that leads to the abolishment of a fast twitch muscle fiber performance plateau.

While fast twitch muscle fibers rely on quick use of energy, slow twitch or long muscle fibers require the use of sustainable energy found in slower burning sources such as protein and fats. These muscle fibers are better suited for types of activities that require muscle endurance. Slow twitch muscle fibers are responsible for activities such as long distance running, rowing, and cycling. Long muscle fibers must be equipped with the stamina needed for endurance events, as well as be able to work in conjunction with the fast twitch muscle fibers for quick bursts of speed. No one has solely fast twitch or solely slow twitch muscles. Each person has a specific ratio of slow to fast twitch muscle fibers that determines what kind of sports or activities that they are better suited to (ie endurance vs. sprints). In other words, marathon runners have more slow twitch muscle fibers than do sprinters and boxers have more fast twitch muscle fibers in comparison to cyclists.

Although the ratio of muscle fiber types plays a role in determining the types of sports and activities that a person participates in, it is not a completely “firm” method of deciding on the type of performance expected from an individual.

Some sports, like soccer, are activities that require a fair amount of both slow twitch and fast twitch muscle fibers in order to perform at the highest level, and this holds true for many sports (Ekblom 1986). Therefore the question is “how can athletes enhance the performance of both their slow twitch muscle fibers and fast twitch muscle fibers with one series of exercises?”. In the past there has not been a good answer to this question. Coaches and athletes have simply trained one set of muscle fibers on one day and then train the other muscle fibers on the next days. In this way all of the muscle fiber types were being trained, but not in a single training session, and thus the simulation of a game or competitive event was not accurately depicted. However, recently kinesiology has taken an interesting turn with regard to training multiple muscle groups at the same time. The next section will discuss a few of these techniques at length.

Exercises to train multiple muscle groups

Researchers have determined that there are sets or groupings of exercises that can effectively train both slow and fast twitch muscle fibers, as well as training multiple muscle groups, concurrently. This group of exercises is collectively known as plyometric exercises. The meaning of the word plyometric is just as its roots imply. These are exercises that employ techniques to train multiple (poly-) muscles at once using different

movements (-metrics). There are several different types of exercises that are <https://assignbuster.com/plyometric-exercises-and-their-benefits-for-football-players/>

all considered polymeric exercises. These exercises include all non-isolationistic movement, or in other words, any exercise or movement that trains more than one muscle or muscle group at a time. These exercises can include plyometric exercises, isotonic exercises, polykinetic exercises, polytonic exercises or compound exercises. We will look at each type briefly as a preliminary procedure.

Plyometric Exercise

Plyometric exercises are a group of exercises that many organized sports teams and athletes are familiar with. Plyometrics are usually implemented in what are also known as “drills”. These can include such practices as box jumping, jump roping, line hops, etc. Basically, plyometrics serve to recreate certain situations that the athlete may encounter during a competitive event. This could be anything from jumping over a would be tackler, making a quick turn to avoid an opponent, or jumping over a hurdle. There are many plyometric drills that are employed by various coaches and one only needs to decide on the specific movements that are used in the activity that they are involved with in order for new drills to be designed. Plyometrics are very good at training the fast twitch muscle fibers to react with greater efficiency and at a higher rate than the original state of the muscle. Even though most polymeric muscles are good at training both types of muscle fibers, plyometric exercises in general do not do a good job of training the slow twitch muscle fibers and thus are considered an earlier stage of exercise development than other more advanced polymeric exercises.

Isotonic Exercise

Isotonic exercises are a group of exercises that stresses a constant load of resistance against the opposing muscle. These are most easily generalized as the weight lifting exercises that people perform in a gym such as: bicep curls, bench press, and standing barbell rows. Most experts agree that the use of free weights for these exercises is essential because free weights tend to employ more muscle groups at the same time in order to balance the weight. It is due to the act of balancing muscle groups that more muscle mass may be gained by using free weights instead of machines. Its important to realize that not all isotonic exercises can be called polymeric exercises. In most cases the use of isotonic exercises necessitates the employment of more than one muscle group or type of muscle fiber at a time and therefore may be classified as a polymeric exercise, however in some cases isotonic exercises may isolate a single muscle or muscle group in which case they can no longer be considered a polymeric exercise.

Polykinetic Exercise

Polykinetic exercise literally means multiple motion or multiple movement. Dancers and tennis players perform these exercises most frequently in order to increase their “ spring” or vertical jumping height. Polykinetic exercises sometimes are misclassified as other polymeric exercises such as polymeric. Polykinetics use multiple motion exercises to employ as many muscles as possible in one specific exercises. Again, polykinetics much like plyometrics are used mostly to train fast twitch muscle fibers, however if the exercises are performed for a longer period of time then these could also be used to train the slow twitch muscle fibers as well.

Polytonic Exercise

Polytonic exercise is not actually a separate division of polymetric exercise but is simply used interchangeably with polymetric and plyometric when discussing various sports training activities. Literally polytonic means “multiple tones” and was originally applied to Greek orthography.

Compound Exercise

Compound exercise is also simply another way to express the idea of an exercise which involves multiple muscle employment. However, most researchers acknowledge compound exercises as those that involve a great deal of balance as well as the actual movement of the exercise. There are now specific tools that are used in conjunction with compound exercises which include such items as balance boards, balance balls, posture correcting exercise balls, etc. All of these items are designed to force the person exercising to not only employ their muscles during the exercise, but also use them to balance themselves and the weight at the same time.

Why does polymetric training work?

The idea and principle behind polymetric training is to “get the most bang for your buck”. Exercise kinesiologists have developed methods to get the most muscle fatigue and consequent recovery in the least amount of time and energy expenditure. This age of technology is the fastest paced since the industrial revolution and does not appear to be slowing down any.

Therefore it is imperative for today’s athletes to be able to train as many muscle groups as possible in one session, while still maintaining a high level of performance. Polymetric exercises allow this to happen and in some cases

have been shown to provide the best possible training for the competitive event for which they are intended (Noda et al. 1998).

The Ins and Outs of Polymetrics

Polymetric exercises have been shown to improve the ability of many sports teams and athletes to perform at amazingly high levels when employed correctly. The types of activities that are performed are very important and should be specific to that particular sport.

For example, it has been shown that soccer players need the recruitment of both fast twitch and slow twitch muscle fibers. Soccer is a sport that requires not only stamina to last the entirety of the game while running almost constantly, but also demands small bursts of speed and energy in order to outdistance your opponent or to save the ball (Reilly 2005). In the case of soccer then, it is absolutely essential to not just train for endurance or for speed, but for a combination of the two. By utilizing polymetrics it is possible to not only train both slow and fast twitch muscle groups, but is possible to do this at the exact same time. The optimal conditioning program is the implementation of a holistic fitness approach as stated by Reilly (2005).

While the types of exercises are extremely important, another aspect of training which is often overlooked is that of the time of training. This is not referring to the time of day, but rather the time in the training regime. It is believed that the sequence in the exercise routine is linked to the overall performance of the participant later in a competitive event. Using the concepts of strength and endurance as potential results, it is possible to make a few generalizations concerning training.

First, an athlete will have the most energy during the beginning phase of an exercise or workout routine and will be able to produce the most power. We can say that this is when his/her strength is at its highest level throughout the entire routine.

Secondly, if an athlete wanted to increase his/her strength to the optimal level he/she should train their bodies at the point when their strength is the highest initially so that the amount of stress on the muscles is the greatest, leading to the most growth.

It would seem reasonable then to assume that in order to gain the most strength gains an athlete would do some sort of plyometric training early on in their workout routine. Since plyometrics would work multiple groups and the athlete is working these muscles early, the greatest increase in athletic ability would be in strength instead of endurance.

However, if we assume that at the end of a workout period an athlete's muscles are at their weakest point or are the most tired/stressed, then it is reasonable to say that the opposite is true if the plyometric exercises are performed at the end of a workout session. If performed at the end of an exercise period, plyometric drills will increase the endurance of an individual since the muscles will not be exerting the most force (ie strength) that they are capable of, but will instead be utilizing the longterm energy sources in the body.

Conclusion

Plyometric exercise encompass a wide range of workouts, drills, and exercise regimes which all help to stress the body's muscles in many different ways.
<https://assignbuster.com/plyometric-exercises-and-their-benefits-for-football-players/>

In the case of soccer players it is of the utmost importance that these techniques be employed. According to Reilly (2005) today's soccer players are enjoying an increased physical ability and game tempo compared to decades in the past. This is due not only to better medicine and technology, but also to the increase of high end research performed in the disciplines of physiology and kinesiology. It is an obvious assumption that the temporal aspect of exercise is extremely important in determining what muscles are stressed and how. This paper has shown that in order to increase strength, athletes should perform plyometric drills at the beginning of an exercise routine and to increase stamina or endurance one should perform plyometric drills at the end of a practice or exercise period. This claim is significant in that it implies that plyometrics may be more important to athletes as they increase their basal fitness level and approach loftier performance levels in an effort to perform at their absolute best. It is necessary for research to continue to be done in this area so that athletes may continue to increase their performance levels naturally and without pharmaceutical enhancement.