



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2015; 1(7): 503-506
www.allresearchjournal.com
Received: 06-04-2015
Accepted: 08-05-2015

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Impact of Sand Training for Endurance Development among Athletes

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Abstract

The intention of the current study was to impact of sand training for endurance development among athletes. 50 Athletes between the age group of 19 to 22 years (25 Experimental Group and 25 Control Group) were chosen for the study. The ten weeks endurance training program for experimental group were specified to experimental group which contains more sand training on alternate days and controlled group was given general training of athletics. The Pre Test and Post Test were accomplished through Cooper Test for both groups to estimate the effects of sand running. This study explains that the sand training has increased the endurance between the Experimental groups along with Physiological capacity of the athletes. It is optional that sand training is fine for the endurance development of athletes.

Keywords: Impact of Sand Training, Endurance Development, Athletes.

1. Introduction

Sand is a great training tool for improving speed and agility. It provides resistance that challenges your muscles, helping to make you faster and more explosive. The constant shifting under your feet engages small stabilizer muscles that improve balance and reduce the risk of injury. Plus, sand training gives you an excuse to work out in the great outdoors.

In the time since, the benefits of sand training have been well documented, and athletes ranging from basketball players to boxers have followed Payton's lead. I began using the training while working as Head Strength and Conditioning Coach at William Jewell College. Having become convinced of its many sports-performance and injury-prevention benefits, I decided to draw up a workout program for the football team that utilized the school's sand volleyball courts. It wasn't long before I discovered that the sand was a great surface for plyometric exercises, and the workouts were effective in improving players' speed and agility. The players responded so well that I incorporated sand training into the workouts of other teams at the school.

In my current role as Director of Strength and Conditioning at East Central University (ECU), I've developed sand workouts for most of the school's 13 varsity sports, including volleyball, baseball, softball, and men's and women's basketball. I believe this training has played an important role in improving our performances and limiting the number of injuries suffered by our players.

Sand training is a simple, low-impact form of resistance training. According to a 1998 Belgian study, running on dry sand requires 1.6 times more energy than running on stable surfaces, and walking in sand requires 2.1 to 2.7 times more energy. This increased resistance helps improve quickness and build explosive strength because the muscles experience a greater workload during training exercises.

Another benefit is the instability of the sand, which requires the muscles that stabilize joints in the ankles, knees, hips, lower back, and core to continually compensate and adjust during movement. This causes a greater range of motion in joints and strengthens the muscles, improving balance and preventing injury.

In addition to these stabilizer muscles, prime-mover muscles are activated, making sand training easier on the joints than workouts on stable ground. Sand work also alleviates compressive forces on the joints during running, jumping, and walking. With less stress on the joints, overtraining symptoms are less likely to occur.

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A sand workout is also useful for improving an athlete's cutting ability because the resistance of the sand makes it easier to achieve the ideal 45-degree body angle when accelerating out of a cut. When cutting, the foot plants in the sand, causing the body to react with a harder knee drive upward. This helps develop the high-knee motion critical to the acceleration phase of sprinting and eliminates wasted backward leg movement. It also trains the athlete to keep positive shin angles--where the ankle is behind the knee--which is an important component of acceleration. In addition, maintaining the 45-degree angle keeps an athlete's hips low while cutting, which provides more activation of the glutes, hamstrings, and quadriceps, and takes energy and stress away from the knees.

Positive shin angles can also be developed by performing plyometrics in the sand. These exercises are effective because they force the athlete to perform a hard knee-up, heel-up, toe-up movement to lift the leg after the foot has been driven into the sand.

Sand work also provides the benefits of another growing workout trend: barefoot training. Athletic footwear has evolved considerably over the past 40 years, with shoes getting more comfortable and ergonomic, yet the incidence of leg injuries has increased. One theory for this increase is that the human body was designed to move barefoot, so we underuse and therefore weaken muscles in the feet and legs by wearing thickly padded footwear. By training barefoot, we activate and strengthen these underworked areas.

However, barefoot training in the sand in extreme temperatures carries the risk of serious and sometimes unbearable discomfort to the athlete. Many regions in the U.S. have summers that can bring the temperature of sand to dangerously hot levels, just as winters can often make sand unbearably cold. In either of these circumstances, athletes can train in socks without sacrificing any of the benefits of the sand work.

Here at ECU, we prefer to have all our sand work completed at least four weeks prior to the start of the regular season. During the final four weeks of preseason, the athletes should be working exclusively on surfaces that provide maximal traction and that transfer to their competitive environment.

During the early stages of a team's offseason workout, we try to get the athletes in the sand once a week. Their weekly workout program includes weight training on Mondays, Wednesdays, and Fridays and linear speed, agility, and plyometric work on Tuesdays and Thursdays. We do the sand training on either Tuesday or Thursday, concentrating on agility and plyometric exercises.

It can be logistically challenging to draw up workouts for small volleyball sand pits and my choices are often determined by the number of pits available and the size of the team. Stationary drills are generally not a problem, but drills that are movement-based can be difficult to coordinate. Depending on how many sand pits are available, we generally put the athletes in lines at the edge of a pit and have them take turns performing their repetitions.

When a team first begins plyometric work in the sand, we allow the athletes to run through the exercises at their own pace so their bodies can adjust to the higher workload. Single-response plyometrics such as squat jumps and star jumps are introduced anywhere from one to three weeks later. These exercises involve performing a rep of a movement, reloading and resetting the body, and then repeating the process for the remaining reps the goal for the

athlete is to achieve good technique, while improving flexibility, balance, and overall body strength.

A recent study compared the effect of sand and grass training surfaces during sport-specific conditioning sessions in team sport athletes. The characteristics of a sand training surface and a grass training surface are quite different. For the athlete there are distinct physiological as well as biomechanical differences when performing on one or the other. This study was performed to determine the effects of each surface on soccer players.

The participants of the study were ten elite athletes - eight male and two female. **The athletes were required to complete five separate testing sessions, which included three performance trials and two training sessions (one on sand, one on grass).** The training session used was designed to mimic the movement patterns that are most common to team sports, including acceleration, agility, and common game simulation drills. The sand training session was conducted on soft, dry beach sand on a level area of beach removed from the water's edge. The grass session was conducted on a well-maintained sporting ground of Kikuyu grass. Athletes were barefoot during the sand trial, compared to the grass trial where they wore shoes. The same training session was completed on both sand and grass surfaces, and 24 hours later, each session was preceded by a performance trial consisting of vertical jump, repeated sprint ability test, and a 3 kilometer running time trial. These measures were then compared to baseline measures acquired prior to the study.

Both physiological and perceptual variables such as blood lactate, heart rate, and ratings of perceived exertion were measured during each session. Additionally, throughout the 24 hour post-exercise period, measures such as muscle damage, inflammation, and hemolysis (the breakdown of red blood cells) were measured. GPS units were used to monitor sport-specific conditioning sessions, and distance and speed were calculated from the data collected on the units. Blood samples were taken pre-, post-, and 24 hours after exercise.

The results of the research showed a significantly higher heart rate and rating of perceived exertion in the sand training sessions. There were no differences in 24-hour post-exercise performance, no indications of muscle damage, and rates of inflammation and hemolysis were similar between each surface. These results suggest that performing a sport-specific conditioning session on sand as opposed to grass can result in a greater physiological response, without inflicting any additional damage to next day performance.

Based on this research, athletes can use sand surfaces to improve performance without worrying about recovery or performance issues. Sand training requires less stability and energy returned during exercise, which results in a greater workload for the muscles to achieve the same output. The fact that it won't affect recovery is promising, since it can be an effective training method.

Endurance is the ability of an organism to exert itself and remain active for a long period of time, as well as its ability to resist, withstand, recover from, and have immunity to trauma, wounds, or fatigue. It is usually used in aerobic or anaerobic exercise. The definition of 'long' varies according to the type of exertion - minutes for high intensity anaerobic exercise, hours or days for low intensity

aerobic exercise. Training for endurance can have a negative impact on the ability to exert strength unless an individual also undertakes resistance training to counteract this effect. Many personnel consider endurance to be an indicator of progress, when strength and cardio training. A person is able to accomplish or withstand a higher amount of effort than their original capabilities means their endurance is increasing expressing improvement. In looking to improve one's endurance they may slowly increase the amount of repetitions or time spent, if higher repetitions are taken rapidly muscle strength improves while less endurance is gained. Increasing endurance has been proven to release endorphins resulting in a positive mind. The act of gaining endurance through physical activity has been shown to decrease anxiety, depression, and stress, or any chronic disease in total. Although a greater endurance can assist the cardiovascular system it does not imply that any cardiovascular disease can be guaranteed to improve. "The major metabolic consequences of the adaptations of muscle to endurance exercise are a slower utilization of muscle glycogen and blood glucose, a greater reliance on fat oxidation, and less lactate production during exercise of a given intensity."

The term stamina is sometimes used synonymously and interchangeably with endurance. Endurance may also refer to an ability to keep going through a tough situation involving hardship, stress, etc Sand running offers the following benefits.

- Helps develop power and muscle elasticity.
- Improves stride frequency and length.
- Promote strength endurance.
- Develop maximum speed and strength
- Improves lactate tolerance

Objectives of the Study

The objective of the study is to find out the impact of sand training for endurance development among athletes.

Hypothesis

It was hypothesized that there would be significant difference in sand training for endurance development among athletes.

Methods and Materials

The subject for this study is 50 college level athletes of C.D.L.U, Sirsa between the age group of 19 to 22 years (25 Experimental Group and 25 Control Group) were chosen for the study. Cooper's 12 Min Test is used for collection of Data

Procedure of Data Collection

The 12 Min Cooper Test were used for Pre Test for Experimental Group and Controlled Group and results was recorded. The 10 weeks training were specified to Experimental Group which consists of Sand Training Sessions on alternate days. The Sand Training Sessions includes Short Sand Sprints, Continuous Running in Sand and Sand Hills were given training to experimental group. The controlled group was specified the general training. After Ten weeks Training the Post Test were accomplished experimental group and controlled group. The athletes normally hail from different socio-economic status, different dietary habits, mode of living etc. confident factors like daily routine, life style and food habits which would have an impact on the presentation of both groups could not be

controlled.

Result and Discussion

12m Run/Walk test was used to assess cardio respiratory endurance before and after both of the experimental conditions. Items on this time are weighted such that a decrease in score is indicative of increase in fitness level in cardio respiratory endurance.

Table 1: Descriptive statistics of different groups measured in post-testing

Group	Mean	Std. Deviation	N
Control Group	3533.45	187.41	25
Experimental group	3668.88	142.48	25
Total	3601.165	164.945	50

Table 1 shows the values of mean and standard deviation for the data on 12m R/W between the control and experimental groups during post-testing. The control group mean was 3533.45 (SD = 187.41) and the experimental group mean was 3668.88 (SD = 142.48).

Table 2: Pair wise comparisons on Cooper Test

Group	Group	Mean Difference	Std. Error
Control Group	Experimental group	-135.43	49.57
Experimental group	Control Group	135.43	49.57

Table 2 shows the pair wise comparisons of 12m run/walk among both groups. The control group showed a MD = -135.43 and the experimental group showed a MD = 135.43.

Table 3: ANCOVA table for post-test data on Cooper Test

Source	Type I Sum of Squares	df	Mean Square	F
Pre Cooper Group	128647.65	1	128647.65	3.75
Group	147289.44	1	147289.44	4.72
Error	1003552.34	47	27148.37	
Corrected Total	1147889.87	49		

An examination of Table 3 indicates that the effect of ten weeks sand training on 12m Run/Walk levels among experimental group gives F- ratio value of 4.72 which is significant of 0.05 levels.

Conclusion and Recommendation

Sand training results in the calf muscles learning to pect more quickly and thereby generating work at a higher rate, they become more controlling. The calf muscles get this by recruiting more muscle fibers, around two or three times as many when evaluated to running on the flat. Sand Running is recommended for endurance athletes more in off season and less in season.

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