

Efficacy of Plyometric Training on the Agility in Police Cadets

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Abstract

Background: Plyometric training is a hybrid between strength and endurance training. This allows muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength) which ensures better agility in police cadets. Agility has been defined by the capacity to retain or determine the location of body by shifting its direction rapidly in a sequence of movements. Agility, speed and explosive power are qualifying components of physical fitness and desirable athletic performance, and play a key role in most sports. Agility can enhance the coordination and regulation of locations of the body throughout movement.

Objective: To study the efficacy of the 6-weeks and 12-weeks Plyometric training on the agility in police cadets.

Method: 40 Cadets aged above 18 years were grouped into two. A group continued their regular activities while rest underwent 2 sessions of plyometric training every week for 6 weeks, along with their daily activities. Analysis was then carried out with assessment of T-test Agility test, Illinois Agility Test, Edgren Side Step Test. Study duration is 6 months and intervention duration is 12-weeks, hence participants will be enrolled during first 3-months of study so 12 week intervention will be completed successfully. Assessment will be done on 1st day of visit then at the end of 6th week and again at the end of 12th week. Participants would have to perform 2 session of Plyometric Training per week in other group.

Result: Data will be analyzed using paired T-test.

Conclusion: Will be published after the results are analyzed.

Key words: Plyometric training, Agility, Agility Test.

Introduction

For the physical preparation of the job, tactical sportsmen, such as military, firefighters, or police officers require speed, strength, agility and stamina training.

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While research has shown that the role of a police officer is shockingly often sedentary, it is recognized that physical fitness is an important component of being able to perform unusual and often vital tasks, such as chasing running people, managing arrest and handcuffs and even managing crowds. A police officer's capacity to perform these various physical tasks will decide his professional performance. The tactical athlete literature tends to be a void with a strong emphasis on the physical qualifications of the Police Cadet and the outcomes of training within the academy.¹ Police officers are expected to perform a range of physical activities, including housekeeping and checking the identity of a suspect to chasing suspects on foot over different distances.

Plyometrics are conditioning methods that athletes use to boost strength and quickness in all kinds of sports. Plyometrics is composed of a rapid muscle lengthening followed right away by shortening movement of the muscle and tissue which are connective. Greater strength is generated than the concentrated action itself by the collected elastic energy inside the muscle.

Researchers have explained about plyometric exercises which can lead to changes in efficiency in jumping vertically, agility, strength of leg and that of muscles, improved perception of articulation of bones and muscular sense in whole with the use of a periodic strength training plan. Plyometric drills usually involve the explosive stop, start, and change of direction. All such movements are elements that can help the agility to develop.²

Plyometric exercises — jump, striding, and hop movements which use the stretch muscle unit to alter the process. — It has repeatedly been shown to boost muscular strength and power generation. It is used to improve maximum strength, movement speed and explosive power increase. Dynamic in nature, these exercises comply with the basic training concepts of precision, practice with movements of a similar nature and pace to the skills or activities for which one is trained.³

In fact, the rapid force efficiency of the training muscle is increasing, combined with smaller rises in isometric force level. Such physiological improvements have allowed higher vertical jump heights and reduced sprint and acceleration times. Agility has been defined by the capacity to retain or determine the location of body by shifting its direction rapidly in a sequence of movements. Agility helped in motor learning via neuromuscular stimulation and adaptation of neural spindle, golgi organs of tendon, and proprioceptors present in joint. Theoretically, agility can enhance the coordination and regulation of locations of the body throughout movement.²

Agility, speed and explosiveness are the characteristics of physical fitness and play a important role in most sports.⁴ Agility components includes speed, balance, strength and coordination; necessary for technical, competitive sports and “tactical” players in order to change position quickly for sport or work on

all planes. Upgraded agility benefits involve improved body flexibility throughout rapid movement, improved intramuscular mobility and reduced risk of injury or re-injury.⁵ Agility skills will require a strong mix of dynamics. The balance system will have to be calibrated and modified because the fast code would move the centre of gravity out of the base of support again and again and challenge balance or metastability.⁶

Michael G. Miller et.al determined that plyometric training course of 6 weeks influences the agility and inferred that it has encouraging effect and benefits in increasing the agility in athletes.²

Kevin Thomas and team determined results of 2-plyometric conditioning technique over strength of muscle in young soccer players and results determine both Counter Movement Jump and Depth Jump Plyometric Training are useful in training exercises to develop strength and agility among young soccer players.³

Issam Makhlof et.al explained that strength and plyometric training together has equal fitness advantage with the combination of endurance and plyometric training of soccer players of younger age group and the result are significant improvements in agility in both training group of soccer players.⁶

Although it has been shown that plyometric training enhances performance variables, i.e. agility training targets for visual orientation, retain a good position yet little empirical evidence is present to establish whether the plyometric training actually increases agility.

Objectives

1. To determine the effect of 6-week plyometric training program on agility of the cadet.
2. To determine the effect of 12-week plyometric training program on agility of the cadet.

Methods

This study will be carried out at training camps which are in the vicinity of Wardha District, Wardha, Maharashtra, India only after approval by the Datta Meghe Institute of Medical Sciences Institutional Ethics Committee, Deemed University.

Study design: Experimental Study

Study duration: 6 months.

Inclusion Criteria: -

1. Participants over 18 years of age.
2. Free from lower extremity injuries.
3. At the time of the analysis, they did not engage in any form of plyometric training.

Exclusion Criteria:-

1. History of injuries to the lower limb in recent times.
2. Fractures in the lower limb in near past.
3. Past history of lower limb surgery.
4. Non-cooperative participants.

VARIABLES

Outcome measures:

1. T-test Agility test
2. Illinois Agility Test
3. Edgren Side Step Test

DATA SOURCE MEASUREMENT

1. T-test Agility test - Agility is measured with $r=0.98$, $p<0.05$.⁷ that designates the reliability and validity of the T-test.

2. Illinois Agility Test – It is a reliable and valid velocity change tool with $r=0.77$, $p<0.0001$.⁸

3. Edgren Side Step Test- Another valid as well as reliable tool for changing in duration and speed with $r=-0.640$, $p = 0.046$.⁹

STUDY SIZE –

Group A: 20 participants will continue their regular activities.

Group B: 20 participants must undergo 2 sessions of plyometric training every week for 6 weeks, along with their daily activities.

Procedure

The institutional ethics committee clearance will be obtained before the start of the study. The permission will be obtained from the head of institute for cadets and after meeting the criteria for inclusion and exclusion, the informed consent must be received from the participants. Participants are classified into two categories, i.e. Plyometric Training Group and Control Group. Several tests were developed in order to measure agility, but few were defined for young adult males as effective or legitimate measures and no connection between the tests was established.⁵ Demonstration of agility tests would be given to both groups. And plyometric training would be demonstration only to experimental group.

During the time period of training, all participants will be told not to alter their current physical activities. The participants in plyometric training group will receive plyometric training for 6 week which consists of range of plyometric exercise designed for the lower extremity, whereas no plyometric exercises will be performed by the control group. The plyometric exercise is Squat jump, tuck jump, lateral jump, lunge jump etc. During the 12th -week's duration, all subjects will continue normal daily living activities. The Plyometric training program consists of 2 training programs in a week. The training depends on intensity as well as volume, using similar exercises, sets, and replays.²

Pre and Post 6th week and 12th week-training assessments will be used to analysis the agility results. The T-test gives the measure of the speed of variation in direction. The Illinois agility test assesses the preparedness to increase, decrease, rotate in various directions and move in various angles.

T-Test Procedure

Describe the participant regarding test procedures. Conduct health risk screening and gain informed consent. Prepare forms and record basic details such as age, height, weight, gender, test conditions. Measure and classify the test area. Carry out a good warm-up. Five meters apart three cones are placed in a straight line. 10 meters from the middle cone another cone is positioned and a 'T' shape is formed. Start point of cadets is the base of the 'T'. Go signal is given by the examiner and the period starts as the cadets crosses the mark point.

Cadet heads to the centre cone and hits it. Cadet runs 5 metres towards cone at the right and hits it. Cadet's hand moves 10 meters to the far cone and touches that one. Cadet's hand moves back to the middle cone for 5 meters and hits it. Cadet moves 10m backwards and touches the cone at the 'T' base. When the participant reaches the mark point, the time is stopped and duration is measured.

Illinois Agility Test procedures

Describe the participant regarding test procedures. Conduct health risk screening and gain informed consent. Prepare forms and record basic details such as age, height, weight, gender, test conditions. Measure and classify the test area. Carry out a good warm-up. The test has agility region (10 metres length and 5 meters breadth) that is formed by four cones. Point A cone marks the start point. The turning point is marked by Cone B&C. The end point is shown by Cone D. At the centre of the test area, four cones are positioned 3.3 meters apart. Starts with the person lying down and facing the ground and hands on his side. "Go" button signals the cadet to begin and as the start marker point is crossed, the time starts. The cadet is asked to get up and run in the course of the direction chosen (left to right / right to left) by him. At the turn points B and C, cones are supposed to be touched by hands. As the cadet reaches the finish line and no cones are knocked over and duration is assessed which completes the trial.

Edgren Side Step Test

Describe the participant regarding test procedures. Conduct health risk screening and gain informed consent. Prepare forms and record basic details such as age, height, weight, gender, test conditions. Measure and classify the test area. Carry out a good warm-up. The course is 4 m long and has four intervals of 1 m. The beginning position is at the centre of the circle, facing forward, with the legs straddling the centre line. With the 'go' signal, the person moves in right direction before the right foot crosses the outer cone. The participant then moves in the left direction before his left foot hits the left outer cone. The person runs in backward and forward direction to the outer cones as quickly in duration of 10 seconds. A score of 0 is given to the cadet, if he had not kept the trunk and legs pointing forward in the test period, legs crossed, or failed to successfully complete

the course.

After recording the results of the agility test at the beginning of the plyometric group training, the plyometric training process will be clarified and again the agility test results will be reported after the 6th week of training and the 12th week of training for both classes.

Expected Results

After completion of the study result will be calculated by statistical analysis using paired T-test and will be presented in the form of research paper.

Discussion

To our knowledge, this will be the first study to evaluate the effects of plyometric training on the aspect of agility in the Indian population of police cadets. This is important as good reporting of how agility training is going to impact the agility specific outcomes. Also the process of involving agility training into the regular strength training programs of these cadets would change the focus of just strength training in their routines. More over this study will employ well established and widely used methods with appropriate reliability and validity to assess the agility parameters. Post the sessions at the end of 6th week assessments will provide a immediate effect of the agility training and another timeline of assessments after total 12 weeks will provide the differences to have better understanding about the improvements sustained. The potential lack of keeping a track on the cadet's activities between sixth to twelfth weeks may represent a limitation of the study. Although we assume that the cadets would have a better understanding towards agility-based training in regular routines.

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