



“COMPARATIVE STUDY OF PLYOMETRICS PUSHUPS VERSUS PLYOMETRICS DRILLS EXERCISES FOR THROWING ACCURACY IN BASKETBALL PLAYERS.”

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ABSTRACT

Introduction: Basketball is one of the most admired and recognized sports worldwide which is played in Teams. plyometric training is a simple method of giving a player a variety of exercises that will improve the three main functions i.e., speed, strength and agility, related to performance on the field. Plyometric training involves lengthening of muscle followed by quick shortening contraction that enhances capability of muscle to produce large amount of force.

Aim: To compare the effectiveness of plyometric trainings (Pushup vs Drills) on speed, strength and agility in aspiring Basketball players.

Materials And Methods: The present study entitled “Comparative study of Plyometrics pushups versus plyometrics drills exercises for throwing accuracy in basketball players.” was carried out at Dehradun under department of physiotherapy. The present study had an experimental study design. 6-week plyometric training program included plyometric push up training and plyometric drills with the help of medicine ball (2kg). 30 male Basketball players in the age group of 18-25 years were included in this comparative study and randomly divided into two groups: Plyometric training for Group A (Plyometric pushup group) is (Clap pushup, lateral explosive pushups and linear explosive pushups) with 15 players in group and Plyometric training for Group B (Plyometric drills) is (Overhead throw side throw and squat throw) with 15 players in a group. All players were evaluated for upper limb strength, agility, running speed with Vertical Jump Test and S3P test. Basketball players performed warm up 15 minutes, Plyometric training 15 minutes, and cool down for 15 minutes. Paired t-test was used to compare the differences within the group and unpaired t-test was used to compare the difference between groups. Data was collected for all variables at baseline, 3rd and end of 6th week.

Results: This finding demonstrates the necessity of a plyometric conditioning program for enhancing performance of basketball players. In activities which involve acceleration, deceleration and a change of direction. The results of this study demonstrate that plyometric push up training is effective as compared to plyometrics drills with help of medicine ball in basketball training for upper limb throwing accuracy. As this training significantly improved performance in the plyometric push up group as compared to plyometrics drills with help of medicine ball training group.

KEYWORDS : Plyometric Pushup, Plyometric drills, Basketball, exercise

INTRODUCTION

Basketball is a game of continuously changing tempo requiring players to be able to sustain high levels of continuous effort especially in scoring points, which when not scored, leads to wasted efforts¹. It is one of the world's most popular and widely viewed sports. The commonly used techniques are shooting, passing, dribbling, and rebounding, as well as specialized player positions and offensive and defensive structures (player positioning) and techniques. Typically, the tallest members of a team will play "center", "power forward" or "small forward" positions, while shorter players or those who possess the best ball handling skills and speed play "point guard" or "shooting guard."²

The word Plyometric is derived from the Greek word “plaything,” which means to increase, while “metric” means to measure, by Vought & Dravovitch (1991). While initially plyometric training was used primarily for jumpers and throwers in track and field, this type of training is commonly used in any sport that requires quick powerful movements, Chu 1992; Boraczyński & Urniaż 2008; Lehnert, Lamrová, Elfmark 2009; Takahashi 1992.²⁹ The first to describe and organize the concept of plyometric, in the literature, was a Soviet Jump coach Verkhoshanski, 1966. The term plyometrics was first introduced in the United States by track and field coach by the name of Fred Wilt in 1975.

Plyometric exercise is a popular form of training commonly used to improve athletic performance. The stretch shortening cycle, which involves stretch of the muscle-tendon unit immediately followed by shortening, is integral to plyometric exercise. The stretch-shortening cycle enhances the ability of the muscle-tendon unit to produce maximal force in the shortest amount of time prompting the use of plyometric exercise as a bridge between pure strength and sports-related speed.⁴

Plyometric training is an established technique for enhancing athletic performance but may also facilitate beneficial adaptation in the sensory motor system that enhance dynamic restraint mechanism and correct faulty jumping or cutting mechanics.²¹The instructor should watch the shooter's way of gripping the ball and check for accuracy. Then instructor will observe player's shooting skill during the lesson. Instructor will break the main skill into its key components and while observing he will check if the player is performing key components appropriate.⁹

The peak torque of an isometric twitch contraction as a result the force of the each successive twitch contraction is increased ,the second is that strength training prior to plyometric causes increased synaptic excitation with in the spinal cord, which in turn result in increased post synaptic potentials and subsequent increased force generating capacity of the involved muscle groups.²² An example of a plyometric move would be crouching down to jump, stretching out your leg muscles (an eccentric contraction) so they can explode with a higher amount of power when ones jump (a concentric contraction). By adding these moves to your routine, you teach your muscles to contract faster and with more force.²³

OPERATIONAL DEFINITION

Plyometric is a traditional form of resistance training emphasizing the loading of muscles during an eccentric muscle action, which is quickly followed by a rebound concentric action. These exercises enable a muscle to reach maximum strength in as short a time as possible Plyometric exercises are a quick, powerful movement using a pre-stretch or counter movement, which involves the stretch shortening cycle.

The term stretch-shortening cycle is used in the physiology literature to describe activities such as running, jumping, or throwing and the term

plyometric is used in the rehabilitation and conditioning literature to describe these activities when they are used in training to capitalize on the stretch-shortening cycle for maximizing force production or enhancing performance.

Accuracy is defined as the ability to perform the task with precision.

Shooting accuracy is the act of attempting to score points by throwing the ball through the basket, methods varying with players and situations.

Medicine ball is a weighted ball roughly diameter of shoulder, often used for rehabilitation and strength training. The medicine ball also serves an important role in the field of sports medicine.

METHODOLOGY:

The present study entitled “Comparative study of Plyometrics pushups versus plyometrics drills exercises for throwing accuracy in basketball players.” was carried out at Dehradun under department of physiotherapy. The present study had an experimental study design. 6-week plyometric training program included plyometric push up training and plyometric drills with the help of medicine ball (2kg). 30 male Basketball players in the age group of 18-25 years were included in this comparative study and randomly divided into two groups:

Procedure

The players, playing basketball at college level will be screened for inclusion and exclusion criteria. After signing the consent form the players will have weekly schedules of practice session. Pretest reading will include accuracy by S3P Activity. An initial session for verbal and visual demonstration about the upper extremity plyometric training will be given to the players. Warm up done prior to training session for ten minutes including:

- Stretching of the upper limb and chest musculature
- Specific medicine ball for shooting drills

Subjects will be randomly assigned into 2 equal groups:

Group A (plyometric pushup group)

Group B (plyometric drills exercise group)

Subjects are required to complete 18 training sessions at a frequency of 3 sessions per week and with at least 48 hrs. rest between these sessions. The shooting accuracy test measurement will be taken on weekly basis.

Group A- Experimental Group

Method –

Subjects asked to perform warm up prior to the training session. After warm up, they asked to perform the upper limb plyometric training.⁷ The exercise will be performed using 3 sets of 10 repetitions with 4 sec rest between each set.⁶ After completion of the training session the players were asked to perform a cool down session.⁶

Plyometric Training Protocol

Week	Sets X Repetitions
1	3 X 10
2	3 X 10
3	3 X 10
4	3 X 10
5	3 X 10
6	3 X 10

Plyometric Push Up/ Group A

POSITION OF PLAYERS-Subjects started their trunk vertical and their arms relaxed and hanging at their sides. From this position they will allow themselves to fall forward, extending their arms forward with slight elbow flexion, in preparation for contact. At contact, the subject will gradually absorb the force of the fall by further flexing the elbows. Stop the movement with the chest nearly touching the floor. Immediately after stopping the downward motion, the subject will reverse the action by rapidly extending his arms and propelling his trunk back to the starting position⁸.

Clap Push Up

At the peak of push up push yourself up off the ground and quickly clap in the midair. the fast-jolting force of clap pushups will help developed explosive power while also bulking up the pectoral muscles for more defined chest.

Lateral Explosive Push Ups

Subject will be in push up position subject will move his body in a left and right direction in a explosive manner.

Linear Explosive Push Ups

Subject will be in a push up position subject will move his body in front and back position in a explosive manner.

Upper body plyometric drills / Group B Overhead throws

1. Stand with one foot in front (staggered stance) with knees slightly bent.
2. Pull medicine ball back behind head and forcefully throw ball forward.
3. Catch ball from the side position by the help of partner and repeat according to prescribed repetitions. Keep the time between pulling the ball back and starting the throw (transition phase) to a minimum. Can also be completed with wall instead of a partner.

Side throw

1. Stand with feet hip-width apart; place left foot approximately one foot in front of right foot.
2. Hold medicine ball with both hands and arms only slightly bent.⁸
3. Swing ball over to the right hip and forcefully underhand toss ball forward to a partner or wall. Keep the stomach drawn in to maximize proper usage of muscle.
4. Catch ball on the bounce from your partner of wall and repeat.¹²

Overhead Throws

1. Stand with feet slightly wider than hip-width apart.
2. Grasp medicine and lower body into a semi-squat position. Explode up extending the entire body and throwing the medicine ball up into the air.
3. The aim is to throw the ball as high as you can and generating most of the power in the legs.^{8,13}
4. Catch ball on the bounce and repeat.⁸

Squat Throws

1. Stand with feet slightly wider than hip-width apart. Knees should be slightly bent.
2. Hold medicine ball at chest level and squat down to a parallel position.
3. Quickly explode up and jump as high as you can. As you start your jump you should start to shoulder press the ball up and reach full extensions with the arms when you are at the peak of your jump. Push ball as high as possible into the air. Try to minimize the time spent in the squatted position. It should be a quick squat and jump.

Catch ball on the bounce and repeat according to prescribed repetitions.^{8,13}

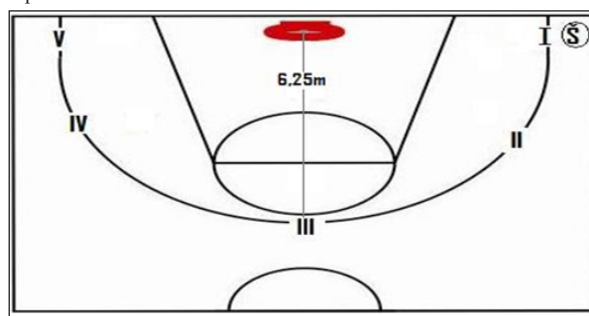


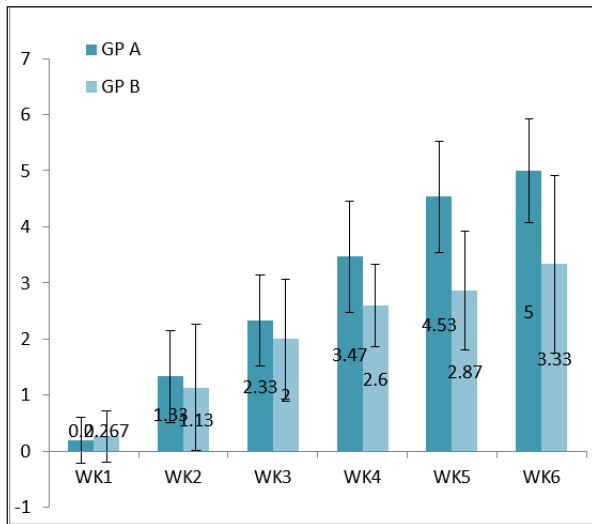
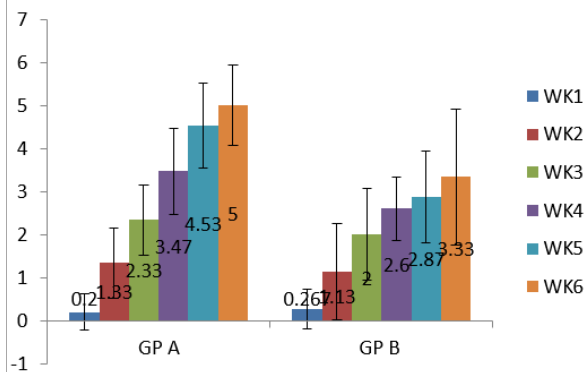
Fig :-1.1

Activity Used In Both Groups

S3P activity: Each player performs two throws from five different positions, i.e., ten shots in total. Player's starting position is on the right wing. Shooting positions are set at distance of six meters and twenty-five centimeters from the vertical projection of the hoop's center on the floor. There is no time limit for the shots. Two other players catch the ball and pass it back to the testee.

Post Intervention both Experimental Groups will be tested for data collection. Pre and Post Data collected will be analyzed statistically by SPSS.⁹

COMPARISON OF THE NUMBER OF BASKETS WITHIN GROUP A & B

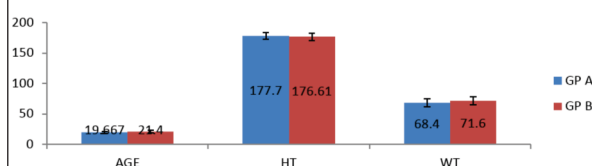


- Analytical test used for within group: Repeated Measures ANOVA
- Analytical test used for between group: Independent T test

CONCLUSION:

group A is better than group B, with statistically significant difference in the 4th, 5th & 6th week.

COMPARISON OF DEMOGRAPHIC DATA BETWEEN GROUP A & B



DISCUSSION

In this study, result reveal that the subject in experimental group A shows significant change in consecutive six week with p value<.05, Group B also showed minor changes in consecutive six week of total 15 participants each group. On comparison of group A and group B it was seen that there was no statistically significant difference between the pre intervention scores of Group A and Group B in the study of 30 players. After training on comparison of Group A and Group B it was seen that there was a statistically significant difference in 4th 5th 6th week between scores of Group A and Group B.

As We tested the six weeks of plyometric push up training would lead to greater improvement in fitness performance in healthy basketball players. It was observed that subjects who added plyometric pushups training were able to achieve greater improvements in upper body power as compared with subjects who participated in a plyometric drills training.

The maximum force that a muscle can develop is attained during a rapid eccentric contraction. However, it should be realized that a muscle seldom performs one type of contraction in isolation during athlete movement. when a concentric contraction occurs (muscle shortens) immediately following an eccentric contraction (muscle lengthens) then the force generated can be dramatically increased. If a muscle is stretched, much of energy required to stretch it is lost as heat, but some of energy can be stored by the elastic components of the muscle. This stored energy is available to the muscle only during a subsequent contraction. It is important to realize that this energy boost is lost if the eccentric contraction is not followed immediately by a concentric effort, express this greater force the muscle must contract within the shortest time possible. This whole process is frequently called stretch shortening cycle and is the underlying mechanism of plyometric training.

High velocity plyometrics which consist of a rapid eccentric muscle action followed by a powerful concentric muscle action are important for enhancing the rate of force development during pushup or drills whereas heavy resistance training is needed to enhance muscular strength and acceleration (Fleck and Kraemer, 2004). ⁴⁷Thus the effects of plyometric training may actually be synergistic, with its effects being greater than other program performed alone. ¹⁸ This potential advantage may be particularly beneficial during the first few weeks of training when young participants are learning how to perform 'loaded' exercises correctly. While this suggestion is consistent with the work of others (Linnamo et al., 2000), In the present investigation.

subjects who participated in the plyometric push up training program made significantly greater improvements in upper body power, than subjects who performed plyometric drill training, while both groups performed exercises for basketball training, this difference is likely due to the upper body plyometric push up exercises that highly improve the ability of group 1 players.⁶

These data concur with findings from Vossen and colleagues 2000) who noted that the addition of upper body plyometrics push up may increase an athlete's ability to improve upper body performance.²⁵

Subjects in the plyometric push up training group made significantly greater improvements in accuracy performance than the plyometrics drills group. Although combined plyometric push up training resulted in greater gains in accuracy performance than plyometric drills group, there is significant difference between groups is observed, although a trend towards significance was noted (p<0.05).

Ethical clearance- Institutional ethical committee NIMS University Rajasthan Jaipur, (India)

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Conflict of Interest - Nil

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