



EFFECTIVENESS OF UPPER BODY PLYOMETRICS ON AGILITY AND ENDURANCE IN AMATEUR BADMINTON PLAYERS - AN EXPERIMENTAL STUDY.

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ABSTRACT **Background:** Badminton players need to conduct various patterns of movements during the game which includes specialized twists, jumps, footwork, swings to strike the shuttlecock and keep it moving back and forth on the court. Thus, the game is characterized by a changing temporal structure with actions of short period and high or medium intensity coupled with a short resting time. Badminton players need to be quick and agile around the court. Muscle strength, endurance, power, speed, agility, flexibility, balance and coordination are the important components for a player. **Objective:** To see the effectiveness of upper body plyometric to improve the Agility and Endurance in badminton players at the end of 4weeks. **Method:** Subjects were selected according to the inclusion criteria. The study was explained to the subjects individually and written assent was taken from their parents. Pre and post protocol data was collected and data analysis was done **Results:** There was a significant improvement in the Agility and Endurance of upper extremity in Badminton players. **Conclusion:** The study can be concluded that Upper Body plyometrics are effective in improving the endurance and agility of upper body in amateur badminton players.

KEYWORDS : Plyometrics, Agility, Endurance, Badminton Players

INTRODUCTION

Plyometric training: A quick, powerful movement involving a system of reactive exercises and an eccentric contraction, followed immediately by an explosive concentric contraction (Baechle and Earle, 2000). Exercises are of high-intensity, explosive muscular contractions combining strength and speed for acquisitions of benefits in power. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone. It is distinguished by a rapid deceleration of mass followed immediately by its rapid acceleration in the opposite vertical direction. It can help improve strength and build power. These exercises are designed to improve the muscle's elastic and neuromuscular characteristics.

- Agility is the ability to move and change the direction and position of the body quickly and effectively while under control. It requires quick reflexes, coordination, balance, speed, and correct response to the changing situation. It is the ability to maintain or control body position while quickly changing direction during a series of movements (Twist and Benickly, 1995). Agility training is thought to be a re-enforcement of motor programming through neuromuscular conditioning and neural adaptation of muscle spindles, golgi-tendon organs, and joint proprioceptors (Barnes and Attaway, 1996; Craig, 2004, Potteiger et al., 1999).
- Muscular endurance is the ability of a muscle group to execute repeated contractions over a period of time sufficient to cause muscular fatigue, or to maintain a specific percentage of the maximum voluntary contractions for a prolonged period of time. Muscular endurance is an important component of physical fitness.

Badminton is one of the most popular sports played all around the world. It is a racket sport that is either played by individuals or a team of two opposing each other against a divided net to score point. Badminton players need to conduct various patterns of movements during the game which includes specialized twists, jumps, footwork, swings to strike the shuttlecock and keep it moving back and forth on the court. Thus, the game is characterized by a changing temporal structure with actions of short period and high or medium intensity coupled with a short resting time (M. Phomsoupha, 2015). Badminton players need to be quick and agile around the court. Muscle strength, muscular endurance, power, speed, agility, flexibility, balance and coordination are the important components for a player.

NEED OF STUDY

Agility and endurance are the main components for the enhancement of physical performance and for preventing injury in badminton players. Plyometric plays an important role in improving the level of fitness in badminton players.

There are not many studies regarding upper body agility and endurance. This study is to find out the improvement in agility and endurance of upper body by plyometric training in badminton players.

CRITERIA

Inclusion Criteria:

- School going children of age 12 years to 16 years.
- Not involved in any training program.
- Males.

Exclusion Criteria:

- Deformities
- Neurological conditions
- Females (Due to menstrual cycle variations)
- Not willing to participate in the study.
- Cognitive Impairments.
- Any congenital or acquired spinal deformities.

OUTCOME MEASURES:

FOR AGILITY: Davies test

FOR ENDURANCE: Push Up test

EXERCISE PROTOCOL

4 weeks intervention program was given to the players. Total 6 Plyometric drills were included in intervention. Session was carried out every alternate day; numbers of repetitions were increased in every other week.

Plyometric Drills	Week 1 Reps/Sets	Week 2 Reps/Sets	Week 3 Reps/Sets	Week 4 reps/Sets
Medicine ball chest pass	5*2	8*2	10*2	12*2
Push up against walls	5*2	8*2	10*2	12*2
Overhead throws and catches	5*2	8*2	10*2	12*2
Side Throws and Catch	5*2	8*2	10*2	12*2
Single arm overhead throws and catch.	5*2	8*2	10*2	12*2
Pushups on floor.	5*2	8*2	10*2	12*2

Data Analysis and Interpretation

The study included 25 boys aged 12-16 years old. The subjects were taken and their pre post endurance was calculated using Push up test. The data collected was statistically analyzed using Microsoft Excel sheet and Graphpad.com.

Graph 1.Comparison of Agility (Left) Values

Parameter	Pre Test		Post Test		t Value	P Value	Result
	Mean	SD	Mean	SD			
Agility Left	16.16	3.47	22.80	3.29	13.03	<0.0001	Extremel

Result: The comparison of Pre and Post Agility (Left) values. Agility values significantly increased from 16.16±3.47 to 22.80±3.29 i.e. 34.08% as value is <0.0001.

Graph 2.Comparison of Agility (Right) values

Parameter	Pre Test		Post Test		t Value	P Value	Result
	Mean	SD	Mean	SD			
Agility Right	15	3.80	22.96	4.13	12.72	<0.0001	Extremely Significant

Result: The comparison of Pre and Post Agility (Right) values. Agility values significantly increased from 15±3.80 to 22.96±4.13 i.e. 41.93% , p value is <0.0001.

Graph 3.Comparison of Endurance Values

Parameter	Pre Test		Post Test		t Value	P Value	Result
	Mean	SD	Mean	SD			
Endurance	12.76	6.05	21.40	10	7.55	<0.0001	Extremely Significant

Result: The comparison of Pre and Post Endurance values. Endurance value significantly increased from 12.76±6.05 to 21.40±10 i.e.50.58% , p value is <0.0001.

DISCUSSION

In the present study total 25 participants were trained to find the effectiveness of upper body plyometric training on agility and endurance. For which Davis Test and Push-up test were done to measure the parameters like agility and endurance respectively. The mean age of the population was 13.52±0.77 years.

the pre-test mean value for Davies test was 15.8863 whereas the post-test mean value rose to 22.9972. The result shows that the agility level was improved by 36.57%. The most possible reasons for the gains in training are because of changes in the motor unit activation, motor unit coordination, recruitment and firing of motor unit and nerve fibres which produced the short term training gains.

Neural adaptations usually occur when athletes respond or react as a result of improved coordination between the CNS signal and proprioceptive feedback (Craig, 2004).

In the current study, Push-up test was performed to find the amelioration in endurance of upper extremity; the pre-test mean value was 13.0909 whereas the post-test mean value grew to 22.1363. The result shows that the endurance level was improved by 51.35% . The reasons behind the improvement could be higher repetition training, as it may provide a better opportunity to improve coordination or learning and as it increases activation of prime movers. This in turn increases number of motor units' recruitment and increases the discharge frequency.

it suggests that short term, high repetitive training may be effective in enhancing the muscle strength and local muscular endurance of untrained children (Avery, 2001).

CONCLUSION

The study can be concluded that Upper Body plyometrics are effective in improving the endurance and agility of upper body in amateur badminton players.

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