



CHANGES IN SELECTED STRENGTH PARAMETERS INDUCED BY SPECIFIC MULTIPLE JUMP EXERCISE PROTOCOL IN BASKETBALL PLAYERS

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ABSTRACT

The purpose of the study is to find out the changes in selected strength parameters induced by specific multiple jump exercise protocol in basketball players. To achieve the purpose, thirty women basketball players were randomly selected as subjects. The age of the subjects were ranged between 18 to 24 years. The selected subjects were assigned into two groups of 15 subjects each. Group I underwent specific multiple jump exercise protocol for three days per week for twelve weeks and group II acted as control. Among the strength parameters leg strength and strength endurance were selected as criterion variables. The multiple jump exercise protocol was selected as independent variable. The leg strength and strength endurance were assessed by leg dynamometer and bent knee sit-ups test respectively. All the subjects of two groups were tested on selected dependent variables at prior to and immediately after the training programme. The data was analyzed using Analysis of covariance (ANCOVA). The .05 level of confidence was fixed as the level of significance to test the “F” ratio obtained by the analysis of covariance, which was considered as an appropriate. The results of the study showed that the specific multiple jump exercise protocol for twelve weeks is more effective in enhancing the leg strength and strength endurance of women basketball players.

Key Words: Multiple Jump Exercise Protocol, Leg Strength and Strength Endurance.

INTRODUCTION

Basketball is a game that is played by thousands and watched by millions of spectators throughout the world. With in the span of a little more than half a century, the sport has become so popular that it is played by all. Basketball is now played with skill and fitness, teamwork and strategy, making it the fast, thrilling sport it is. Basketball is one of the most widely viewed and most popular sports in the world. Basketball is an extremely dynamic sport that requires movements in multiple planes of motion as well as rapid transitions from jogging to sprinting to jumping. Basketball is a fast moving game that involves a lot of variety, including shooting, dribbling, passing, rebounding, defense and much more. It is equally important for the athlete to be able to perform these skills in a variety of directions and in a controlled manner to ensure injuries do not ensue (Scott Lucett, 2013). Basketball is a team game, individual execution of fundamental skills is essential for team success (Hal Wissel, 2012). The complexity and sensitivity of training of basketball players are undeniable; hence, the scientific and professional approaches are very

important in developing the process and controlling the effects of training (Magma, 2009).

Strength may define as the neuro-muscular capability to overcome an external and internal resistance. It is fundamental to all sports and games. The lack of strength obviously contributes to poor performance in sports and games, it is one of the important biomotor abilities and its role in an athletes training in paramount (Tudor O. Bompa, 1983).

Leg strength is the capacity of the lower limbs to exert muscular force (Baumgartner & Jackson, 1989). Leg strength is very essential for sports persons, especially athletes. The strength of muscle is related to its cross sectional area of girth. The larger the muscle, the stronger it is (Charles Boucher, 1983). Strength endurance is defined as “the force that muscle or a group of muscle can exert against a resistance for a prolonged period” (Johnson & Stolberry, 1961).

Strength endurance is used to develop the athlete’s capacity to maintain the quality of their muscles contractile force. All athletes need to develop a basic level of strength endurance. Strength endurance is the ability to overcome resistance or to act against

resistance under the conditions of fatigue. Strength endurance can be a form of static or dynamic. Strength is depending on the fact whether the movement is static (iso-metric) or dynamic (iso-tonic). Depending on the nature of the combination of strength and endurance the strength endurance can be further classified into proper strength endurance and endurance strength (Thomas Baechle, 1994).

METHODS

Subjects

Thirty women basketball players were selected as subjects at random. The age of the subjects were ranged between 18 to 24 years. They were divided into two equal groups and each group consisted of 15 subjects. Group-I underwent specific multiple jump exercise protocol for three days per week for twelve weeks and Group-II acted as control who did not participate any special training apart from the regular curricular activities.

Variables

Among the strength parameters, leg strength and strength endurance were selected as criterion variables. The specific multiple jump exercise protocol was selected as independent variable. The leg strength and strength endurance were assessed by leg dynamometer and bent knee sit-ups test respectively.

Training Programme

During the training period, the experimental group (Group-I) underwent (n = 15) specific multiple jump exercise protocol for three days per week (alternative days) for twelve weeks and subjects in Group II as control were instructed not to participate in any strenuous physical exercise and specific training throughout the training programme apart from the regular curricular activities. Everyday the workout lasted for 30 to 45 minutes approximately including warming up and warming down periods. The subjects underwent the respective programmes as per the schedules under the supervision of the investigator. Each training session was conducted only in the morning time. The specific multiple jump exercise is designed to help improve leg strength and strength endurance required for basketball players. Care should be taken when performing specific multiple jump exercise protocol on grass field.

Guidelines for Specific Multiple Jump Exercise

Protocol: (i) Pre-adolescent boys and girls should avoid multiple jump exercise, unless other factors indicate more advanced maturity, because of greater susceptibility to injury prior to puberty (ii) Multiple jump exercise should also be postponed for athlete

who do not have a sufficient strength base. Avoid lower body multiple jump exercise until athlete can leg press 2.5 times of body weight: avoid upper body exercise until athlete perform five consecutive clap push-ups (iii) Athletes who do not respond well to the instructions of coaches are also at greater risk of injury and under – or over training (iv) Precede a multiple jump exercise workout with a general warm-up period consisting of walk-jog-stride-sprint cycles for one-half to three quarters of a mile, followed by careful stretching exercises (v) Use footwear with good ankle and arch support, lateral stability and a wide, non-slip sole, such as basketball or aerobic shoe. Running shoes with narrow soles and poor upper support can lead to ankle problems and are not recommended. Heel cups may be needed for those who are prone to heel bruises (vi) Multiple jump exercise should be performed only on surfaces with good shock-absorbing properties, such as soft grassy areas, well-padded artificial turf, and wrestling mats. Never do plyometric multiple jump exercise on asphalt or gymnasium floors (vii) Boxes should be sturdy and have a non-slip top (viii) Depth jumping from objects that are too high increases the risk of injury, particularly to larger athletes, and prevents the rapid switch from eccentric to concentric activity. The following multiple jump exercise are given in the training programme in Table - I.

Table – I Multiple Jumping Exercises

Sl. No.	Exercises
1.	Zig zag drill
2.	Standing long jump
3.	Step close jump and reach
4.	Double leg tuck jump
5.	Front and back jump
6.	Standing long jump with sprint
7.	Double leg hops
8.	Standing jump
9.	Side jump
10.	Standing long jump with lateral sprint
11.	Pike jump
12.	Single leg bounding

Statistical Procedures

All the subjects of two groups were tested on selected dependent variables at prior to and immediately after the training programme. The analysis of covariance (ANCOVA) was used to analyze the significant difference if any, between the groups on each selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as an appropriate.

RESULTS

It is clear from Table - II that there is no significant difference between specific multiple jump exercise protocol group and control group on leg strength and strength endurance before commencement

of training, as obtained F ratio of 0.002 and 1.60 are less than the required table value of 4.20 at 0.05 for the df of 1 and 28. It denotes that the random assignment of subjects for the two groups is successful; however initial difference is not elicited in leg strength and strength endurance.

Table - II ANCOVA on Leg Strength and Strength Endurance.

Variables	Testing Conditions	Multiple Jump Exercise Protocol Group	Control Group	S OV	SS	df	MS	'F' Ratio
Leg Strength (Kg)	Pre (M $\pm$ SD)	51.13 $\pm$ 5.11	51.08 $\pm$ 5.21	B	1.11	1	1.11	0.002
				W	15142.37	28	540.80	
	Post (M $\pm$ SD)	53.29 $\pm$ 5.31	51.16 $\pm$ 4.92	B	798.22	1	798.22	13.81*
				W	1618.19	28	57.79	
	Adjusted (M)	54.27	51.03	B	792.85	1	792.85	14.40*
				W	1486.52	27	55.06	
Strength Endurance (Number)	Pre (M $\pm$ SD)	28.40 $\pm$ 2.27	28.60 $\pm$ 2.63	B	17.21	1	17.21	1.60
				W	301.89	28	10.78	
	Post (M $\pm$ SD)	31.73 $\pm$ 3.62	28.21 $\pm$ 3.81	B	258.37	1	258.37	14.11*
				W	512.71	28	18.31	
	Adjusted (M)	30.87	28.42	B	387.91	1	387.91	49.35*
				W	212.22	27	7.86	

*Significant at 0.05 level of confidence

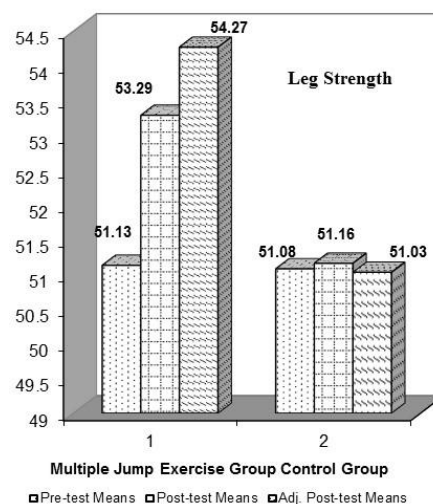
Table - II also reveals that there is a significant difference on leg strength and strength endurance during post test. The obtained F ratio of 13.81 and 14.11 are greater than the required table value of 4.20 at 0.05 for the df of 1 and 28. Thereby it infers that the leg strength and strength endurance found to change significantly before and after twelve weeks of training.

Further, Table -II clearly shows that leg strength and strength endurance differ between the groups after adjusting the pre test scores, as obtained F ratio of 14.40 and 49.35 are greater than the required table value of 4.21 at 0.05 for the df of 1 and 27, indicating that after adjusting pre-test scores, there was a significant difference between the two groups on adjusted post test scores on leg strength and strength endurance. Thus, it is concluded that twelve weeks of specific multiple jump exercise protocol significantly increased both leg strength and strength endurance

Discussion

In the present study, twelve weeks of specific multiple jump exercise protocol significantly increased leg strength and strength endurance are presented in Figure - I & II.

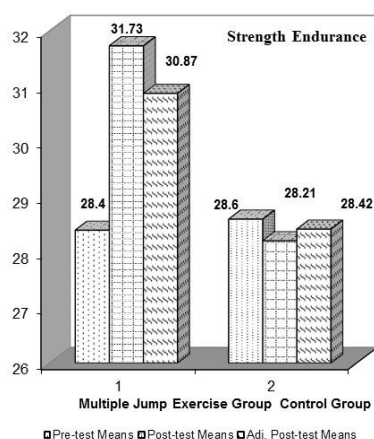
Figure – I Mean Values of Specific Multiple Jump Exercise Protocol and Control Group on Leg Strength



In the present study the specific multiple jump exercise protocol elicited improvements in selected strength parameters such as leg strength and strength endurance. According to **Seenivasagam (1995)** study examined plyometric training improves leg strength, leg explosive power and leg endurance. **Kubachka & Stevens (1993)** study reported that plyometric exercises significantly increase power (8.6 %) and strength (45.9 %). **Gopinath (2000)** studied results showed that significant improvement were found due to plyometric training on leg strength, back strength. These findings are also in agreement with **Sundaramoorthy (1999)** that the leg strength, explosive strength, strength endurance were improved significantly by plyometric training. **Brezzo et.al**

(2001) study indicated that plyometric training programme improves the leg power. **Blakey & Southard (1987)**, plyometric exercises improve dynamic leg strength and leg power. **Buckenmeyar (2000)** research noted that the leg strength improved significantly after 12 weeks of plyometric training. In the present study, the specifically designed multiple jump exercise protocol are highly relevant to the selected criterion variables.

Figure - II Mean Values of Specific Multiple Jump Exercise Protocol and Control Group on Strength Endurance



Conclusions

Observing the results derived from the impact of specific multiple jump exercise protocol, it is concluded that the specific multiple jump exercises are the sources to develop selected strength parameters of women basketball players. It is inferred from the above literature and from the results of the present study that systematically designed specific multiple jump exercise protocol develop the selected criterion variables. These selected criterion variables are very important qualities for better performance in almost all sports and games. Hence it is concluded from the results of the study that systematically and scientifically designed specific multiple jump exercise protocol may be given due recognition and be implemented properly in the training programmes of all the disciplines in order to achieve maximum performance. Hence, it was concluded from the results of the study, that twelve weeks specific multiple jump exercise protocol is efficient enough to improve leg strength and strength endurance. And also the specific multiple jump exercise protocol is very essential and inter related to selected criterion variables.

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