Original Article

Effect Of Plyometric Training On Jumping Performance Of The Volley Ball Players

Dr. Mohibullah Khan Marwat[1] , Dr. Rahila Nizami[2] , Muhammad Shah[3] , Tehmila Wahid[4] , Tofiq Ahmad[5] , Samera Saman[6] , Kashif Mehmood[7]

[1]Professor, Department of Sports Sciences and Physical Education, Faculty of Allied Health Sciences, The University of Lahore, Lahore Email: mohibullah.khan@ed.uol.edu.pk
[2]Assistant Professor, Department of Sports Sciences & Physical Education, Faculty of Allied Health Sciences, The University of Lahore, Lahore Eamil: rahilanizami@gmail.com
[3]Assistant Professor, Department of Physical Education & Sports, Abdul Wali Khan University Mardan Email: muhammadshah@awkum.edu.pk
[4]MPhil Scholar, Department of Physical Education Sports Sciences, The Islamia University of Bahawalpur Email: tehmilaiub@gmail.com
[5]MPhil Scholar, Department of Physical Education Sports Sciences, The Islamia University of Bahawalpur Email: tofiqghauri949@gmail.com
[6]PhD Scholar, Department of Sports Sciences and Physical Education, Gomal University Dera Ismail Khan. Email: samerasaman83@gmail.com
[7]Lecturer, Department of Sports Sciences and Physical Education, Faculty of Allied Health Sciences, The University of Lahore, Lahore Email: kashif.mehmood@sports.uol.edu.pk
DOI: 10.47750/pnr.2023.14.02.442

Abstract

Background: Plyometric training is comparatively new pattern of training used for improving the vertical jumping performance. However, its effectiveness has been confirmed elsewhere. In this study effect of the Plyometric training has been evaluated in perspectives of Volley Ball players. **Objectives:** Evaluation of the effect of eight weeks plyometric training with regard to the vertical jumping performance, body fats and Heart Rate of the players were the main objectives of the study. **Methodology:** A pre and post-experimental design was used with an experimental group and control group of Volley Ball players. Experimental group got plyometric training and control group followed their routine of daily life. Pre and post-test data were taken and analyzed for observing the effect of plyometric training. **Results:** Difference between pretest and posttest scores on all the different variables was observed in experimental group, and no differences were observed in the control group. One-way analysis of variance and paired sample t- test indicated a significant improvement at the 0.05 level in Vertical Jumping, body fats and heart rate of the respondents. **Conclusion:** Findings of the present study have confirmed that plyometric training has very positive and encouraging effect on the vertical jumping performance and body fats percentage and heart rate of the respondents. Plyometric training may be used for the improvement of the jumping performance, body fats percentage and heart rate of the amateur and as well as professional players.

Keywords: Plyometric, Players, Performance, Volley Ball, Jumping, BMI.

Introduction

Volley Ball is a game, which puts a significant level of pressure on a player's speed, chest zone, various parts of the lower-body and capacity of the lungs to supply oxygen to the body. A series of contraction followed by extension of the muscles is the principal feature of plyometric training and the same type of actions are executed in Volley Ball while performing jumping activities. In this regard, coaches and trainers associated with Volley Ball often rely upon plyometric training. It has been very productive system of training and has yielded very positive results wherever it is used. The most important training system in Volley Ball is the plyometric training, which utilizes a

great deal of a stretch-shortening cycle (SSC) so as to improve the farthest point of the neuromuscular structure to pass on maximal power in the briefest conceivable time. Plyometric training is an effective way used for the development of jumping, hopping and leaping ability among the Volley Ball players (Ziv and Lidor, 2010). In light of the common features of the game, which includes continued skipping, hoping, running and abrupt changing the body position, this game requires strength, speed, explosive power, agility and flexibility on part of the player. Young player intending to excel in performance and trying to show outstanding performance need to pass through tough course of training to have the desired results. In case of deficiency in either attribute of the body mentioned above, outstanding performance will be out of question and, secondly, the player will be at risk of any fitness related injury. Musculoskeletal injuries and fitness are very closely related particularly at the elite level of performance. Strengthening the stable state of neuromuscular proficiency gives additional strength for athletic execution and avoids sport-related possible injuries. Dynamic competency is perceived as one of the pointers of neuromuscular capacity to improve motor ability of the body in terms of performance. The improved neuromuscular control gives an improved capacity to control biomechanical changes therefore gives powers for prompt overall performance.

Plyometric (PM) have been used for quite a while in the Russian and eastern European as a tool for training the players for Olympics and other same level of global competitions. PM is a type training consisting of alternate and repeated muscular actions of stretching and contracting to improve their efficiency in terms of strength and speed. Silva et al. (2019) have claimed that various performance variables like agility, jumping ability of the body, power are improved by plyometric training. The word plyometric is derived from a Greek words plythein or plyo, which means to increase measurement. It is a combination of two words; “Plio” referring to "more" and “Metric” referring to "length". Accordingly, the purpose behind plyometric training is to enhance the stretching ability and output of the skeletal muscles of the body. Plyometric training is always aimed to enhance and improve the speed, explosiveness, improving running rate and skipping limit, and for extending quality in performance. This type of attributes require neuro-muscular coordination particularly among the big skeletal muscles. With plyometric training, muscles experience an amazingly quick changes from the an ordinary to the advanced stage, which is called amortization. The amortization phase exists in between the concentric and eccentric stages and it is one of the main phases of the plyometric training. This stage is vital particularly in terms of production and improvement of the strength, speed and power.

Considerable research studies have been conducted worldwide to establish that PM can add to vertical jumping capabilities of Volley Ball players. Held et al. (2019) have confirmed that athletic performance and plyometric training have been positively co-related particularly in vertical jump height, speed, explosiveness, agility and power. In Pakistan, however, this type of research in perspectives of college players has never been conducted to ascertain the effect of plyometric in this regard. To measure the effect of PM training, the researcher intended to conduct a study entitled, “The effect of Plyometric Training upon Vertical jumping performance of the Volley Ball player”. Other than that the motivation behind the study was to evaluate the effects of 8-weeks low to medium-force plyometric training on Heart Rate and BMI of Volley Ball players.

Literature Review

The most important feature of playing Volley Ball is vertical jumping and the ability to use explosive power for vertical jumping either in boosting smashing or defense. Affective jumping and stable leg power is an essential part for productive performance in Volley Ball (Fattahi et al., 2015). Coaches and trainers agree to the fact that jumping stature and force of player could be improved utilizing plyometric training (Pocek et al., 2020). Fonseca et al. (2017) have reported that a notable number of school guides use PM in their training programs for the Volley Ball teams. Most of the coaches understand the effectiveness of plyometric training therefore they follow and recommend this method of training for the improvement of performance of Volley Ball players (Silva et al., 2019).

Training to Improve Vertical Jump

Affective Vertical jumping enables the player to dominate in performance particularly in gymnastic, Basket Ball, Jumping events and Volley Ball. It improves general physical capacity and flexibility of the player. To see how PM activities work, one must acknowledge basic muscle physiology and the activities the muscles will perform (Ramirez-Campillo et al., 2020). During PM work outs, muscles are forced by the quick stretch, causing a reflexive muscle activity (). Extension of the muscle under strain put an additional pressure on the muscular tissues and resultantly rendering them to acclimatize with the extra pressure. The VJ execution is subject to the five factors, the nature of the muscles of the lower body, the rate at which the muscles can make control, and the speed with which the muscles can contract and explosive power (Dell'Antonio et al., 2016).

Plyometric training always aims to expand the pace of the stretching shortening cycle (SSC), correspondingly it improves the overall competency of the muscle fibers resulting in enhanced output (Pereira et al., 2015). The quicker the muscle is stretched the more effective force it passes on for the execution of the activity. Enhancing VJ and explosive power through plyometric training is the ideal approach among professional trainers and coaches (Tsoukos et al., 2019a).

Intensity

Intensity is the genuine level of exertion required by the competitor to play out the action. Execution of the activity in either intensity and muscular competency are indispensable (Ramirez-Campillo et al., 2018). In plyometric, the sort of activity controls the power. Plyometric activities can come in numerous structures and forces. A few exercises, for example, reciprocal hopping to a case are lower level plyometric while others, for example, single leg hops for vertical jumping, supporting the total weight of the body on single leg, resulting in strengthening big skeletal muscles of leg. These factors must be viewed as when structuring molding or recovery programs (Held et al., 2019.

Volume

Volume is the absolute work performed in alone work session or cycle (periodization). On account of plyometric training, volume is frequently assessed by analyzing the heap, tallying the quantity of redundancies, sets, and so on in relation to the particular movement (number of tosses, bounces, and so on.) Fifty foot contacts during an instructional training are viewed as low volume, while 200 plus are viewed as high volume. Volume ought to be expanded in a dynamic way to diminish danger of damage or overtraining (Wertheimer et al., 2018).

Methodology

For this research study, sixty Volley Ball players were recruited from three different public sector colleges of Abbott Abad city. Respondents were randomly divided into two groups; experimental group (n=30) and control group (n=30). First of all, pre-test data were recorded for vertical jumping performance, body fats and heart rate for all the participants representing both groups. In the next stage, eight weeks Plyometric training program was implemented. After completion of the eight weeks' intervention once again post-test data were recorded to compare it with the pre-test data to observe any possible difference between the pre and post test data. Inferential data were analyzed using SPSS (23.0) by t-test and ANOVA. The significance level kept at the 0.05 level.

Objectives

1. To examine the effect of Plyometric training on the vertical jumping of Volleyball players.
2. To examine the effect of Plyometric training on body fats.
3. To examine the effect of Plyometric training on the Heart Rate of the players.

Hypotheses

1. H_1: There will be significant effect of Plyometric training on vertical jumping of the players
2. H_1: There will be significant relationship between Plyometric training and body fats of the players
3. H_1: There will be significant difference in heart rate in the pre and post-test assessment

Results

Inferential analyses were conducted to test the hypotheses.

Table 1: Mean Comparisons (Pre/Post)

Group		Body Fat Pre	Body Fat post	Heart Rate Pre	Heart Rate post	Vertical Jump Pre	Vertical Jump Post
Experimental	Mean	16.3000	13.4000	73.0000	69.7333	17.0000	23.1667
	N	30	30	30	30	30	30
	Std. Deviation	1.11880	.49827	1.01710	.69149	.83045	1.05318
Control	Mean	16.3000	16.3000	73.0000	72.9333	17.1667	17.9667
	N	30	30	30	30	30	30
	Std. Deviation	1.11880	1.11880	1.01710	1.14269	.69893	.96431
Total	Mean	16.3000	14.8500	73.0000	71.3333	17.0833	20.5667
	N	60	60	60	60	60	60
	Std. Deviation	1.10928	1.69571	1.00844	1.86554	.76561	2.80657

Difference between mean scores of the pretest and posttest on all the variables (body fat, heart rate, and Vertical Jump) was observed in experimental group, and no difference was observed in mean score of the control group as depicted in Table 1.

Table 2: One Sample t-Test

	N	Mean	Std. Deviation	Std. Error Mean
Body Fat Pre	60	16.3000	1.10928	.14321
Body Fat post	60	14.8500	1.69571	.21891
Heart Rate Pre	60	73.0000	1.00844	.13019
Heart Rate post	60	71.3333	1.86554	.24084
VJ Pre	60	17.0833	.76561	.09884
VJ Post	60	20.5000	2.82543	.36476

Table 3: Pre & Post Differences

					95% Confidence Interval of the Difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Body Fat Pre	113.821	59	.000	16.30000	16.0134	16.5866
Body Fat post	67.835	59	.000	14.85000	14.4120	15.2880
Heart Rate Pre	560.724	59	.000	73.00000	72.7395	73.2605
Heart Rate post	296.186	59	.000	71.33333	70.8514	71.8153
Vertical Jump Pre	172.839	59	.000	17.08333	16.8856	17.2811
Vertical Jump Post	56.201	59	.000	20.50000	19.7701	21.2299

One sample t-test indicated statistically significant differences between pre and post assessment ($p<0.05$) on all the variables. Body fat reduced from pre to post test (pre=16.3 & post=14.8), heart rate was also reduced from pre to posttest (pre=73.0 & post= 71.3), and the height of VJ improved (pre=17.0 & post=20.5). A paired sample t-test (Table-4) was also conducted, indicating the similar results as with one sample t-test.

Table 4: Paired Sample

		Paired Differences					T	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	Body Fat Pre Body Fat post	1.45000	1.59899	.20643	1.03694	1.86306	7.024	.000
Pair 2	Heart Rate Pre Heart Rate post	1.66667	2.18366	.28191	1.10257	2.23077	5.912	.000
Pair 3	VJ Pre – VJ Post	-3.41667	2.95899	.38200	-4.18106	-2.65228	-8.944	.000

Table 5: Effect of Plyometric on Vertical Jump

		Sum of Squares	df	Mean Square	F	Sig.
VJ Pre	Between Groups	.417	1	.417	.707	.404
	Within Groups	34.167	58	.589		
	Total	34.583	59			
VJ Post	Between Groups	405.600	1	405.600	397.826	.000
	Within Groups	59.133	58	1.020		
	Total	464.733	59			

One-way analysis of variance (ANOVA) indicated a significant effect of the plyometric training on VJ of Volley Ball players as indicated in Table-6 ($p<0.05$).

Table 6: Effect of Plyometric on Body Fat

		Sum of Squares	df	Mean Square	F	Sig.
Body Fat Pre	Between Groups	.000	1	.000	.000	1.000
	Within Groups	72.600	58	1.252		
	Total	72.600	59			
Body Fat post	Between Groups	126.150	1	126.150	168.200	.000
	Within Groups	43.500	58	.750		
	Total	169.650	59			

One-way analysis of variance (ANOVA) indicated a significant effect of the plyometric training on body fat of Volley Ball players as indicated in the above table ($p<0.05$).

Table 7: Effect of Plyometric on Heart Rate

		Sum of Squares	Df	Mean Square	F	Sig.
	Between Groups	.000	1	.000	.000	1.000

Heart Rate Pre	Within Groups	60.000	58	1.034		
	Total	60.000	59			
Heart Rate post	Between Groups	153.600	1	153.600	172.206	.000
	Within Groups	51.733	58	.892		
	Total	205.333	59			

One-way analysis of variance (ANOVA) indicated a significant effect of the plyometric training on heart rate of Volley Ball players as indicated in the above table ($p<0.05$).

Discussion

Physiological reactions to physical training, including plyometric training have been all around contemplated by numerous examiners. It might be relied upon to decidedly effect numerous physical and biochemical capacities. In a past investigation of plyometric training, the creators guessed that upgrades were because of improved quality of physical engagement and execution of physical exertions (Davies et al., 2019). Plyometric training has been demonstrated to be one of the best techniques for improving muscular power and other physical capabilities parameters. A wide range of competitors can profit by control training especially in the event that it pursues or corresponds with a quality training program. Plyometric training improves execution in vertical bouncing, long hopping, run and dash cycling. Only a couple of plyometric practice finished 1 to 3 times each week for 6 to 12 weeks can altogether improve physical wellness parameters (Stojanović et al., 2017). Moreover, just a limited quantity of volume is required to realize these positive changes that is, 2 to 4 arrangements of 10 repetitions for every session or 4 arrangements of 8 repetitions. Utilizing a variety of plyometric exercise, for example, counter-develop hops, leg bouncing and bouncing and so forth, can improve physical wellness parameters and execution of Jumpers (Boeth et al., 2017), while most of studies have concentrated on undeveloped subjects, trained competitors, for example, jumpers have improved their performance with plyometric (Inkinen et al., 2013). More investigations are expected to decide the aftereffect of plyometric training and how it influences physical wellness parameters.

Conclusion

The two months of plyometric training performed three times each week have prompted more grounded positive changes in the height of Vertical jump as well as in the muscle versus fat proportion and the pulse. Vertical hop statures expanded in any event a few creeps among pretest and posttest of the 30 members of the exploratory group while, no progressions or contrasts were seen in the members of the control group. The low to direct force together with the probability of increasingly precise alteration of training load in plyometric training are likely the most significant determinant of such differential effects. Subsequently, the use of a comparable plyometric-training program so as to improve bouncing and muscle versus fat proportion in college level Volley Ball players. Further, the outcomes may at present be applicable for groups and mentors who look for basic, minimal effort and productive techniques to advance the physical training of their competitors and may even be an option in contrast to other training, which can be difficult for the beginner groups with a low monetary spending plan and which has no demand for modern equipment.

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