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Mudasir Ahmad Magray
M.Phil Scholar, Physical Education, Apex University Jaipur, Rajasthan, India

Dr. Ramneek Jain
Assistant Professor, Department of Physical Education, Apex University Jaipur, Rajasthan, India

Corresponding Author:
Mudasir Ahmad Magray
M.Phil Scholar, Physical Education, Apex University Jaipur, Rajasthan, India

Effect of plyometric training on arm and leg strength of volleyball players of Anantnag, Kashmir

Mudasir Ahmad Magray and Dr. Ramneek Jain

Abstract
The source of data was College Volleyball Players of Anantnag. The research scholar selected 30 subjects by using simple random sampling method. The age of the subjects ranging from 18-25 years. The researcher divided the 30 inter-collegiate Volleyball players into two equal groups on the basis of the mean performance of pre-test score. The groups were equated and distributed into two homogeneous groups namely Experimental Group and Control Group. To collect the data it was essential to select an appropriate test battery to administer the particular test. Here for this study the research scholar selected pull ups, push ups, height, weight and Vertical Jump to find out the effect of Plyometric Training on Arm and Leg Strength of Volleyball players. For data collection of the Pre-test and Post-test. After statistical analysis significant difference found in Arm and Leg strength, hence researcher hypothesis accepted.

Keywords: plyometric training, arm and leg strength, volleyball players etc

Introduction
Training has become a accepted part of the game to improve psychic power as well as physical skills. Hill training is becoming a common part of the preparation and workout routines in all sports and games. It gives athlete stamina, agility, but the most important keeps the athlete healthy. It strength then the leg muscle and helps to increase the fitness. Games and sports hold as a prominent place in modern life, millions of people participate in sporting activities. Watch and read about them and spend money and time on sports related activities and equipments. The impact of sports in modern society has made it clear that sports is a very legitimate field of academic study.

Many people participate in sports and games for fun, happiness, pleasure for health and fitness. Increased participation in sports has resulted in competition which has become an important element of modern life. Competition provides the means by which one can show one's worth by competing successfully. For top level performance, it is very important to spot, select and nurture a budding sportsman as it is recognized by all that athletes must possess some inherent qualities, which can be developed by means of systematized and scientific training.

As sports has developed into a distinct scientific discipline in itself and each nation is vying with each other to produce top class player to win laurels in international competitions, considerable research is devoted to identify factors that will be predictive of achieving high level of skill in a given sports with proper coaching.

A comprehensive fitness program tailored to an individual typically focuses on one or more specific skills, and on age or health-related needs such as bone health. Many sources also cite mental, social and emotional health as an important part of overall fitness. This is often presented in textbooks as a triangle made up of three points, which represent physical, emotional, and mental fitness. Physical fitness can also prevent or treat many chronic health conditions brought on by unhealthy lifestyle or aging. Working out can also help people sleep better. To stay healthy it is important to engage in physical activity.

Plyometric Exercise
Plyometric are a type of exercise originally used in the soviet union and adopted due to its high training effect. The goal of these exercises is to better link speed to strength resulting in an increase in power output. Speed and Agility are improved by plyometric training.

The effect of plyometrics is twofold: it not only strengthens your joints, tendons and muscles, but it also trains your nerve system to react more efficiently. It is proven that someone will jump higher is they first bend their knees slightly, rather than just going up as hard as they can. Also, a person can decrease their total jump if they bend their knees too much. You must load up the muscles quickly and the right amount. The muscle is loaded with an eccentric, lengthening action and immediately it is shortened with a concentric action. The main important factor in this is the stretch reflex. This reflex allows the muscle to act more forcefully and use momentum to your advantage. It is proven that this type of training for 1-3 times a week for about 8-16 weeks in a row can provide great results. Any further training and it will be a lot of stress on the joints in the legs and could result in no further gains.

It is also proven that plyometric training mixed with strength training can result in greater gains in both departments. However, it is recommended not to perform each on the same day to also avoid over-training and getting the most energy out of each workout. Plyometric training will bridge the gap between strength and speed. It will benefit athletes of all ages if done correctly. Plyometrics are training techniques used by athletes in all types of sports to increase strength and explosiveness. Plyometrics consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shorting of the same muscle and connective tissue.

Plyometrics also known as jump training technique designed to increase muscular power and explosiveness originally developed for Olympic athletes. It is after used to condition professional and amature adults athletes. But children and adolescents also can benefit from a properly designed and supervised plyometrics routine, according to the American College of Sports Medicine.

Volleyball

Volleyball game was invented by Williams Morgan in 1896, who was Director of Recreation of Holyoke YMCA in Massachusetts. During the two world wars, American Serviceman spread the game around the world, it soon became established in Europe and Asia. Gradually the game developed past the stage of being just a recreation into a competitive sport played at international level.

The biggest break through came in 1964 when volleyball became Olympic team sport for men and women. The ball is usually played with the hands or arms, but players can legally strike or push (short contact) the ball with any part of the body. 8 The fundamental skills of volleyball game are service, receiving, passing, smashing and blocking. These fundamental skills are very essential for improvement of volleyball game. This game provides a wide opportunity for the development of flexibility, speed, agility, power, reaction time, balance, muscular strength, muscular endurance and co-ordination of all parts of body. Volleyball is played by millions of people around the world. In many countries it has been ranked as a top level competitive sport. It was towards the end of the nineteenth century, to be exact in 1895, that the game was conceived and structuralized by William Morgan, the Director of Physical Education at the YMCA, Holyoke in Massachusetts, U.S.A. Morgan was for years, in search of a recreational activity that could be physically invigorating and psychologically refreshing. In the first version of the game, a rubber bladder (used in basketball) was used for hitting it back and forth across the net. The rules of the game as amended and formulated in the subsequent years were meant to regulate and systematize the game, as well as to give it characteristics that would lead to its recognition as a game fit for competitions like other team sports. Modern volleyball, as it requires high level of fitness and skills, has been accepted as a game fit to be included in international sports competitions. 23

Historically, the YMCA movement and the armed forces got the credit for popularizing the game of volleyball all over the world. This game can be played indoors as well as outdoors depending on the climatic conditions of a particular country. Both sexes can play it over a considerable range of age.

The International Volleyball Federation was constituted in 1947 with its headquarters at Paris and it has contributed a lot to the development of the game all over the world. The first World Volleyball Championship was held at Prague and it was followed by a chain of World Championships from time to time. Volleyball was first included in the Olympic Games in 1964, held at Tokyo, and since then, has become a regular feature of the Olympic programme.

There is some evidence to suggest that volleyball was played in several Asiatic countries for a long time. The game was on the list of the Far-Eastern and West-Asiatic Games. However, it never figured as a game in the 1951 and 1954 Asian Games. It was only in 1958, that volleyball was included as a full-fledged sports item in the Asian Games. Since then, it has become a regular feature of the Games, held on this continent. At the 9th Asian Games, commencing at New Delhi on November 19, 1982, 15 nations arc contesting for championship in men's volleyball and 6 teams are taking part in women's volleyball.

Objectives of the Study

i) To study the effect of plyometric training on Arm strength in Volleyball players.
ii) To study the effect of plyometric training on Leg strength in Volleyball players.

Methodology

The study was based on experimental study in which the research scholar has tried to check the effect of Plyometric exercise on Arm and Leg strength of Volleyball players. To come to the conclusion for this study it was necessary to adopt certain type of method to get the result of the study. The method was adopt for the study is experimental and was discussed under the following headings:

Source of Data

The source of data was College Volleyball Players of Anantnag.

Selection of the Subjects

The research scholar selected 30 subjects by using simple random sampling method. The age of the subjects ranged between 18-25 years for this study.

Formation of Groups

The researcher divided the 30 inter-collegiate Volleyball players into two equal groups on the basis of the mean performance of pre-test score. The groups were equated and distributed into two homogeneous groups namely. 1) Experimental Group2) Control Group

Selection of the Test

To collect the data it was essential to select an appropriate test battery to administer the particular test. Here for this study the

research scholar selected pull ups, push ups, height, weight and Vertical Jump to find out the effect of Plyometric Training on Arm and Leg Strength of Volleyball players.
The test items are consists of:
i) Pull ups ii) Push-Ups iii) Standing Height iv) Body Weight v) Vertical Jump

Administration of Test

1) Pull-Ups:

Purpose: To measure the shoulder strength.
Instruments: Horizontal Bar.
Procedure: The bar was located at such a height so that the feet of the tallest subject did not touch the ground while hanging on the chinning bar. The subject was asked to hang from the bar by his hands with forward grip and to chin up by pulling himself up until his chin was 55
above the bar. Then the subject had to lower the body until his arms were straight and was asked not to use kick or jerky motion.
Scoring: The number of completed pull-ups was recorded as the score.

2) Push-Ups:

Purpose: To measure the Arm Strength.
Instruments: Parallel Bar
Procedure: The test was performed on regular parallel bars. The bars were adjusted at nearly the shoulder height and shoulder width. By standing at the end of the parallel bars, grasping one bar in each hand, the subject was asked to jump upwards so as to make his arms straight and one score was given for taking position on the parallel bars. The subject was then told to lower his body until the angle of upper and forearms, was less than a right angle, and asked to push up to straight arms. The subject was encouraged to repeat as many push-ups as possible without jerk, kick, stop or rest when executing push-ups. The tester held his fist at a height so that the subject‟s shoulder just touched the fist of the tester on repeated push-ups.
Scoring: The proper numbers of execution of the push-up were taken as scores.

3) Standing Height

Purpose: To measure the standing height of the subjects.
Instruments: Stadiometer. 56
Procedure: The standing height of the subject was measured by using Stadiometer. The subject was instructed to stand erect keep the feet (barefoot) together, face sight at horizontal line and arm by the sides. Touching the Stadiometer with heels buttock and back, head erect without lift and hold a full breath and standing erect while height measured was taken. The maximum distance from the floor, the highest point on head were recorded.
Scoring: Height was recorded in inches.

4) Weight

Purpose: To measure total body weight of the subjects.
Instruments: Weighing machine.
Procedure: The weight of the subject was taken with a weighting machine. The subject stood in a steady position with out foot wares at the center of the machine and weight was recorded.
Scoring: The weight was recorded in kilogram.

5) Vertical Jump

Purpose: To measure the explosive power of the leg.
Equipment: Chalk and smooth wall surface with adequate ceiling height etc...
Description: The subject stand with his side towards wall, reach as highest as possible with heels on the floor, and made mark on he wall with a piece.
of chalk or chalked figure. The subject then swung arms downward and backward, assuming a crouched position with the knees bent at about right angle. He then jump as high as possible, swinging the arms upward. As the highest point of the jump was reach.
Rules: Three trials was given for each player.
Scoring: The score was the nearest centimeter between the reach and jump marks. The best of the three trials was recorded in centimeters.

Tools for Collection of Data

The research scholar used the following apparatus and equipments for the collection of data during the administration of the test.
i) Parallel Bar, ii) Vertical Jump Board or Marked Wall. iii) Standiometer iv) Weighing Machine v) Measuring Tape. vi) Marking Chalk Powder, etc.

Training Method

Training programme of Plyometric exercise was designed by the scholar with the help of supervisor. 6 days a week training of plyometric leg exercises and arm exercises daily for 1 hour was given to the experimental group. The tests was administrated before the start of training and after the finish of training was conducted and data was collected.

Training Programme

Experimental group undergo 6 weeks schedule of plyometric exercises. The post-test was taken after 6 weeks schedule of plyometric exercises. General warm-up like Jogging, Stretching, Specific Exercise was given to the experimental group before the plyometric training.

Table 1: training schedule for selected exercises

Sr. No.	Exercise Week	Week (1-2)	Week (3-4)	Week (5-6)
1.	Bounds	5 Times 2 Sets	10 Times 3 Sets	15 Times 4 Sets
2.	Side to Side Ankle Hops	5 Times 2 Sets	10 Times 3 Sets	15 Times 4 Sets
3.	Double Leg Hops	5 Times 2 Sets	10 Times 3 Sets	15 Times 4 Sets
4.	Lateral Cone Hops	5 Times 2 Sets	10 Times 3 Sets	15 Times 4 Sets
5.	Medicine Ball Chest Pass	5 Times 2 Sets	10 Times 3 Sets	15 Times 4 Sets
6.	Push up with One Clap	5 Times 2 Sets	8 Times 3 Sets	10 Times 4 Sets

Note : 10 seconds rest after each repetition.
Cooling Down :- Jogging, Stretching, Shavasana.

Collection of Data

For data collection two test was conducted as given below, administration of the test 1) Pre-test: A Pre-test was conducted for knowing the equal distribution of both the group ie. two Experimental groups and Control group. 2) Post-test: After six weeks training programmed final test was conducted for the final result collected pre-test and post test data was further put for analysis.

Statistical Technique

The raw data collected from pre-test and post-test of both experimental group and control group will be analyzed using t- test, with level of significance at 0.5.

Formulas

1. $\text{Mean} = \frac{\sum X}{N}$

2. $\text{S.D.} = \frac{\sqrt{N\sum X^2 - \sum X^2}}{N(N-1)}$

Where S. D. = Standard Deviation

3. "t"- test was calculated by following formula.

$$t = \frac{M1 - M2}{\sqrt{\frac{(SD1)+(SD2)}{N1+N2}}}$$

$$t = \frac{M_1 - M_2}{\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{N_2}}}$$

Where M1 and M2 are means

Where M1 and M2 are means

Analysis and Interpretation of Data

The researcher conducted a effect of Polyometric Training on Arm Strength and Leg Strength of Volleyball players. For the purpose of this study the researcher collected data on 30 male Volleyball players from Anantnag.

Formation of Group

The researcher divided the selected Volleyball players into two equal groups on the basis of the mean performance of pre-test score. The groups were equated and distributed into two homogeneous groups namely.

1) Experimental Group
2) Control Group

Analysis of Data

To determine the significant difference in the means of cardio-vascular endurance and motor fitness of Volleyball players between the two groups as well as between the pre-test and post test means of experimental and control group „t"-test was employed.

4.3 Level of Significance

To find out the significance difference, level of significance was set at 0.05 level of confidence. 61

Findings of the statistical analysis have been shown in the following tables.

Table 1: Summary of mean, standard deviation and t-ratio for the data on pull ups between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	5.533	1.302	0.267	0.379	0.704@
Post-tesT	5.800	1.082			

@ Not significant at 0.05 level Tabulated t0.05 (14) = 2.144

The above Table 1 show that, Pull Ups mean difference between the pre test and post test of control group is not significant, because the calculated t-value of 0.704 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom. Pull Ups means between the Pre and Post-tests of Control group was graphically shown in figure - 1.

Table 2: Summary of mean, standard deviation and t-ratio for the data on push ups between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	9.333	1.447	0.200	0.504	0.397@
Post-test	9.533	1.727			

@ Not significant at 0.05 level Tabulated t0.05 (14) = 2.144

The above Table 2 reveal that, Push Ups mean difference between the pre test and post test of control group is not significant, because the calculated t-value of 0.397 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 3: summary of mean, standard deviation and t-ratio for the data on body weight between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	56.733	2.492	0.066	0.771	0.087@
Post-test	56.667	2.380			

@ Not significant at 0.05 level Tabulated t0.05 (14) = 2.144

The above Table 3 show that, Body Weight mean difference between the pre test and post test of control group is not significant, because the calculated t-value of 0.087 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 4: summary of mean, standard deviation and t-ratio for the data on standing height between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	66.480	1.884	0.100	0.596	0.168@
Post-test	66.580	1.884			

@ Not significant at 0.05 level Tabulated t0.05(14) = 2.144

The above Table 4 reveal that, Standing Height mean difference between the pre test and post test of control group is not significant, because the calculated t-value of 0.168 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 5: summary of mean, standard deviation and t-ratio for the data on arm strength between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	281.495	49.874	9.959	16.173	0.616@
Post-test	291.454	52.381			

@ Not significant at 0.05 level Tabulated t0.05 (14) = 2.144

The above Table 5 reveal that, Arm Strength mean difference between the pre test and post test of control group is not significant, because the calculated t-value of 0.616 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Discussion on Findings

From the above tables findings of the present study are-

- Insignificant difference observed in pre and post test of Control group in Pull Ups (t = 0.704), Push Ups (t =0.397), Body Weight (t = 0.087), Standing Height (t =0.168), Arm Strength (t = 0.616) and Vertical Jump (Leg Strength) (t =0.330) of Volleyball players because all t values are less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.
- Significant difference found in pre and post test of Experimental group in Pull Ups (t = 2.294), Push Ups (t = 2.522), Arm Strength (t = 2.171) and Vertical Jump (Leg Strength) (t = 2.949) of Volleyball players because t-values are greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom. But insignificant difference in Body Weight (t = 0.425), Standing Height (t =0.161).
- Significant difference found in post test of Control and Experimental group in Pull Ups (t = 2.172), Push Ups (t = 2.189), Arm Strength (t = 2.134) and Vertical Jump (Leg Strength) (t = 2.173) of Volleyball players because t-values are greater than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom, but insignificant difference in Body Weight (t = 0.198), Standing Height (t =0.066).

Summary, conclusion and recommendation

Summary

As sports has developed into a distinct scientific discipline in itself and each nation is vying with each other to produce top class player to win laurels in international competitions, considerable research is devoted to identify factors that will be predictive of achieving high level of skill in a given sports with proper coaching. Plyometric are a type of exercise originally used in the soviet union and adopted due to its high training effect. The goal of these exercises is to better link speed to strength resulting in an increase in power output. Speed and Agility are improved by plyometric training. The effect of plyometrics is twofold: it not only strengthens your joints, tendons and muscles, but it also trains your nerve system to react more efficiently. Plyometrics (also known as "Plyos") is a type of exercise training designed to produce fast, powerful movements and improve the functions of the nervous system generally for the purpose of improving performance in sports. Plyometric exercises may also referred to as explosive exercises. Volleyball is played by millions of people around the world. In many countries it has been ranked as a top level competitive sport. The fundamental skills of volleyball game are service, receiving, passing, smashing and blocking. These fundamental skills are very essential for improvement of volleyball game. This game provides a wide opportunity for the development of flexibility, speed, agility, power, reaction time, balance, muscular strength, muscular endurance and co-ordination of all parts of body. The researcher had selected this problem because this game is most widespread and popular recreational sports world wide. The researcher knows that strength of legs and arms is of utmost importance in Volleyball. Researcher make mind to know how plyometric training effects the Arm and Leg strength in Volleyball players, hence the researcher state the problem as "***Effect of Plyometric Training on Arm and Leg Strength of Volleyball Players***". The main purpose of this study was to know the effect of plyometric training on Arm strength in Volleyball players. Also to know the effect of plyometric training on Leg strength in Volleyball players. Researcher hypothesised that, Plyometric exercise improve the leg and arm strength of Volleyball players. Also hypothesized that, there would be positive effect of Plyometric training on Arm and Leg strength of Volleyball players. The present study was delimited to the study was delimited to the 30 Volleyball players only. The age of the students was ranging in between 18-25 years. The study was limited to no specific motivation technique was used during the test, Socio-economic status, diet control of subjects was not taken into consideration. The review related literature is instrumental in the selection of topic formulation of hypothesis and deductive reasoning to the problem. It helps to get a clear idea and supports the findings with regard to the problem under study. The review related literature is generally used as a basic for inductive reasoning for locating and synthesizing all the relevant literature on particular topic.

Conclusion

On the basis of findings the researcher concluded that

1. Insignificant difference found between pre test and post test of Control group in Arm Strength and Leg Strength.
2. Significant difference observed between pre test and post test of Experimental group in Arm Strength and Leg Strength.
3. Significant difference observed between post test of Control and Experimental group in Arm Strength and Leg Strength.

References

1. ANUG W. Htin, Importance of Qualified Trainers and Their Pre-requisites, Snipes Journal, Jan, 1982.
2. Chaudhary Chetna, Jhajharia Birendra, "Effects of plyometric exercises on selected motor abilities of university level female basketball players", L.N.U.P.E., Gwalior, Madhya Pradesh, India, Volume 44, Issue Suppl 1, Br J Sports Med 2010; 44:i23 doi:10.1136/bjsm.2010.078725.75.
3. Chimera Nicole J *et al.*, "Effects of Plyometric Training on Muscle-Activation Strategies and Performance in Female Athletes, 2004; 39(1):24-31. PMCID: PMC385258
4. Chu, Donald. Jumping into plyometrics (2nd ed. ed.). Champaign, IL: Human Kinetics, 1998, 1-4. ISBN 0880118466.
5. Copen Edward K. "A Study of Four Programs of Geavy Resistance Exercises for Development of Muscular Strength", Research Quarterly. 1956; 27:152.
6. Devries Herbert A. "Evaluation of static stretching procedures for improvement of flexibility." The Research Quarterly. 1962; 2:222.
7. Estger Segal "Arm and Shoulder Girdle Strength of College, Women" Research Quarterly. 1965; 7:115-95
8. Freeman WH. Physical Education and Sports in Changing Society, (New Delhi: Surjeet Publication, 1987, 166.
9. Frost Reuben B., Psychological Concepts Applied to Physical Education and Coaching (London: Addision wesley publishing Company, 1971, 158.
10. Guadalupe-Grau A, Perez-Gomez J. *et al.*, "Strength training combined with plyometric jumps in adults: sex differences in fat-bone axis adaptations". Journal of Applied Physiology. 2009; 107(2):636; 106(4):1100-11.