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Effect of four weeks plyometric training program on vertical jump and speed on male university players of Chhatrapati Sahu ji Maharaj University, Kanpur

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Abstract
Purpose of the study: The purpose of this study was to determine the Effect of four weeks plyometric training program on vertical jump and speed on male university players of Chhatrapati Sahu Ji Maharaj University, Kanpur (U.P.)
Selection of subjects: Fifty (50) male university players were randomly selected as subjects. The age range between 19-26 years who were students of Chhatrapati Sahu Ji Maharaj University, Kanpur.
Selection of variables: The variables selected for the study were plyometric training exercises as independent variables, vertical jump and speed as dependent variables.
Methodology: For the present study pre-test, post-test randomized group design, which consists 2 groups of 50 students, 25 students in each group experimental and control group. Data were collected through the pre-test before the training and four weeks of plyometric training.
Statistical technique: To find out the comparative effect of plyometric exercise training on vertical jump and speed of the subjects the pre-test and post-test scores were analyzed by using paired t-test was used, the data analyzed with the help of SPSS (16.0 version) software and the level of significance was set at 0.05 level of confidence.
Result: The result of the study showed that there was significant difference found between pre-test and post-test in experimental group of vertical jump and speed and no significance difference was found between the control group vertical jump and speed.
Conclusion: It can be concluded that plyometric training were useful to develop vertical jump and speed.

Keywords: Plyometric training, vertical jump, speed

Introduction
Plyometric training is popular between individuals involved in dynamic training and plyometric training such as jumping, hopping, skipping and bounding are performed with a goal to increase dynamic performance of muscles, several study have shown the programs of plyometric training, to increase physical ability and such training leads to increase of muscles power and boosts explosive needs in the bodies. Campo S. *et al*., 2009 [2] have studied the effects of the plyometric training on body composition; explosive strength and speed shoot in gat women footballers. The athletes have trained 3 times a week for 12 weeks and finally then study have shown that in the experimental group plyometric training, a significant increase was seen in the ability to jump after 6 weeks and also shooting speeds increase significantly after 12 weeks, respectively, according to previous studies, the method in plyometric training can be currently most useful training to increase the explosive power in athletes are the requirement for athletes to achieve high levels of performance. Plyometric training is a training strategy designed to improve the performance by incorporating the basic needs of agility and power, allows muscle to reach exponential increase in the maximum strength and speed of movement in the shortest duration a study done by Mondal and Wondirad (2014) [10], to assess the effect of 6-week plyometric training on vertical jump performance demonstrated a significant improvement in the vertical jump performance of an athlete also, Asadi (2013) [1], in his study concluded that a 6-week in season plyometric training program had positive effects for improveing power and agility, performance in young male basketball players However, other research demonstrates that plyometric training has positive effect on the vertical jump there are numerous studies have been done on the plyometric training which have shown positive result in the study.

Plyometric training: It is an essential tool for improving explosive force, plyometric exercises are define as eccentric loading immediately followed by a concentric contraction.

Vertical jump: It is the act of raising one's Centre of gravity higher in the vertical plane solely with the use of one's own muscles.

Speed: - It is the ability of an individual to cover maximum distance in minimum shortest time.

Objective of the study
The objective of the present study was to compare the Effect of four weeks plyometric training program on vertical jump and speed of male university players of Chhatrapati Sahu Ji Maharaj University, Kanpur.

Methodology
Selection of subjects
This study was conducted in University Campus, Kanpur, with 50 male participants who are students of Chhatrapati Sahu Ji Maharaj University, Kanpur. Random sampling was followed for this study. The age range between 19 to 26 Years.

Section of variables
Keeping the feasibility criterion in mind, the researcher selected the following variables for the present study.

Independent variable
- Plyometric exercise

Dependent variable
- Vertical jump
- Speed

Collection of data
Before the administration of plyometric training exercises, the pre-test data of vertical jump and speed were taken on both the experimental and control groups. After the completion of four weeks plyometric exercise training again the same test were conducted to collect the post-training data. Necessary instructions were given to the subjects before administration of the tests.

Table 1: Pre-test and post-test randomized group data design

Group	Observation	Treatment	Observation
Experimental group	O1	T	O2
Control group	O1	No treatment	O2

Where O1 is pre observation, O2 is the post observation and T is training.

Administration of training programme
All the subjects assembled at the university sports arena, and were briefed on type of the training to experimental group, and control group did not participate in any kind of practice except the regular departmental programme. Experimental group also participated in regular departmental programme. The training was carried out for a period of four weeks, five days in each week. The scholar demonstrated the exercises for each group and explained all the related objectives. Each subject of the experimental group performed their respective training with proper warming-up and cooling down.

Table 2: Plyometric training schedule for four weeks

Weeks	Plyometric drill	Sets x Repetitions	Rest interval
Week 1	Ankle hops	2 x 10	2 minutes
	Front cone hops	2 x 10	2 minutes
	Standing long jump	2 x 10	2 minutes
Week 2	Ankle hops	3 x 10	2-3 minutes
	Front cone hops	3 x 10	2-3 minutes
	Standing long jump	3 x 10	2-3 minutes
Week 3	Diagonal cone hops	2 x 10	2 minutes
	Single leg bounding	2 x 10	2 minutes
	Standing long jump with lateral sprint	4 x 06	2 minutes
Week 4	Diagonal cone hops	2 x 08	2-3 minutes
	Single leg bounding	2 x 10	2-3 minutes
	Standing long jump with lateral sprint	4 x 04	2-3 minutes

Statistical Technique
The data analysis was done with paired t-test to evaluate the statistical difference between the pre-test and post-test measure.

Result and discussion of the study
The study group consisted of 50 male university players and randomly divided in two groups 25 players in each group. The measures of outcome variables were assessed before the intervention and end of the training programme.

Table 3: Vertical jump pre and post test of experimental group

Vertical jump	Mean	N	S.D.	S.E.	T value	Sig. (2-tailed)
Pre-test	2.4144	25	.06646	.06646	16.96	.000
Post-test	2.4768	25	.06356	.06356		

Table 4: Vertical jump pre and post test of control group

Vertical jump	Mean	N	S.D.	S.E.	T value	Sig. (2-tailed)
Pre-test	2.4362	25	.06434	.01287	1.36	.185
Post-test	2.4380	25	.06442	.01288		

Table 5: 20 meter sprint pre and post-test of experimental group

20 meter sprint	Mean	N	S.D.	S.E.	T value	Sig. (2-tailed)
Pre-test	2.7676	25	.09448	.01890	7.66	.000
Post-test	2.7336	25	.09210	.01842		

Table 6: 20 meter sprint pre and post test of control group

20 meter sprint	Mean	N	S.D.	S.E.	T value	Sig. (2-tailed)
Pre-test	2.7792	25	.09349	.01870	0.62	.538
Post-test	2.7784	25	.09529	.01906		

The purpose of the present study was to compare the effect of plyometric training on male university players over the vertical jump and 20 meter sprint. Table-3 shows that the experimental group pre and post-test mean, standard deviation and t-values are presented and it reveals that the significant level in the effect of plyometric exercise on experimental group. The t-value of the selected variable is above the table of 16.96. Hence, the study indicates that the plyometric exercise is useful for the significant improvement of physical fitness variables as vertical jump. In table-4 Control group pre and post test mean, standard deviation and t-value are 1.36. The result indicates that there is no significant difference in relation to vertical jump. Table-5 shown that the experimental group pre and post mean, standard deviation and t-value are 7.66 and it reveals that the significant level in the effect of plyometric exercise on experimental group. Hence, the study indicates that the plyometric exercise is useful for the significant improvement of physical fitness variable speed. In table-6 control group pre and post test mean, standard deviation and t-value are 0.62. The result is indicates that there is no significant difference in relation to speed.

This study supported by the previous study that the effect of plyometric training on explosive strength, acceleration capacity and kicking speed in young elite soccer players. Sedano S, *et al*. (2011) [8]. The second finding of the study showed that plyometric training is effective on the 20 meters run and reduce its time. This result of the study is according to the findings of Meylen *et al*. (2009) [11], Sedano *et al*. (2011) [8].

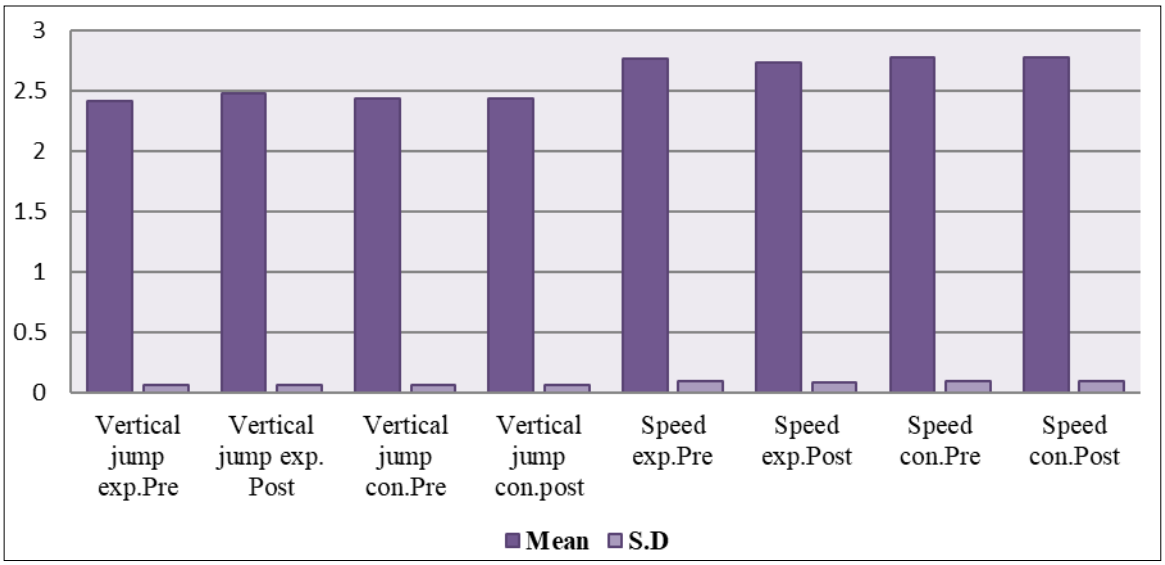

Fig 1: Graphical representation of pre-test and post-test of vertical jump and 20 meter sprint

Conclusion and finding of the study

the findings of this study was revealed that 4 weeks of plyometric training programme would improve vertical jump and speed in university players of Chhatrapati Sahu Ji Maharaj University, Kanpur.

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