EFFECT OF PLYOMETRIC TRAINING ON LAND SURFACE

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Abstracts

The purpose of the study was to know the plyometric training effect on land surface. Physical improvements have important implications on team sports, as players perform numerous explosive movements like kicking, tackling, jumping, turning, sprinting, and changing pace and directions during the match (Chaouachi et al., 2009; Duncan et al., 2006; Gabbett, 2000; Ostojic et al., 2006; Stolen et al., 2005), thus, plyometric drills usually involve stopping, starting and changing directions in an explosive manner (Gabbett, 2000). Although in those sports, performance requires good aerobic capacity for recovery after high-intensity activity, many authors agree that it is anaerobic capacity that determines success (Chaouachi et al., 2009; Duncan et al., 2006; Gabbett, 2000; Ostojic et al., 2006; Stolen et al., 2005). Fifteen volunteered high school students (N=15) were selected randomly and purposive sample was taken. Subjects underwent 12 weeks progressive plyometric training on land surface. Pre and post test were obtained for fourteen variables. Paired sample correlations and paired't' test was computed to interpret the treatment effect. Results revealed that twelve weeks plyometric training differed significantly in thirteen variables and did not differ significantly with body composition. The variables such as girth measurements (Calf, thigh and waist), flexibility, agility, speed, power and strength variables. It is concluded that plyometric training on land surface can help in improving one's physical fitness components.

Keywords: physical fitness, sports training, plyometrics, land surface.

1. Introduction:

Sports offer much opportunity for people to make the best use of their abilities, to become part of a cooperative team effort, to experience the joy, and sometimes the misery, of winning and losing. In ancient times, our ancestors exhibited extraordinary talents in terms of physical activity. Accompanied by fierce competition, the arena of sports and games has evolved to assume professional dimension. Somehow or other, irrespective of age, the human race is involved in different kinds of sports either for recreation or for competition. To any sport that needs powerful, propulsive movements, such as football, volleyball, sprinting, high jump, long jump, and basketball, the application of plyometric or explosive jump training is applicable (McArdle, Katch&Katch, 2001).Plyometric training involves of quick, explosive movements designed to increase speed and power. This can be attained through performing various exercises that focus on training our bodies and brains to activate more muscle fibers, more quickly, in order to increase the efficiency and speed of our muscle contractions. Plyometric trainings usually involve stopping, starting, and changing directions in an explosive manner. These actions are components that can assist in developing agility (Craig, 2004; Miller et al., 2001).Plyometrics are training methods used by sportspersons in all types of sports to

improve strength and explosiveness. Plyometrics consists of a rapid stretching of a muscle (eccentric action) proximately followed by a concentric or shortening action of the same muscle and connective tissue. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone. Researchers have shown that plyometric training, when used with a periodized strength-training program, can contribute to increases in vertical jump performance, acceleration, leg strength, muscular power, increased joint awareness, and overall proprioception (Miller, et. al., 2006).Recommendations have been made to achieve plyometric training on different surfaces that are neither too hard nor soft, since these different surfaces are thought to increase injury potential or prolong the amortization phase, respectively. In an attempt to evaluate the effects of surface type on plyometrics training, studies have associated Plyometrics training in water versus a control group, plyometric training on land and in water, and training on grass versus sand surfaces (Ebben, et. al., 2012).

2. Methodology

Fifteen (N=15) secondary school students were selected randomly for land surface plyometric training from Sri Adichunchanagiri Vidyavardhaka Trust high school, Bhadravati. The age group of subjects between 14 to 16 years. Purposive random sampling will be observed in order to ascertain minimum levels of fitness of the students.

2.1. Selection of Test Items and Method of data collection

In order to examine the efficacy of land based plyometric training following tests were conducted on all the subjects under the study. The subjects underwent these tests twice during the course of this study i.e. pre-test and post-test. Prior to the administration of the test the investigator had a meeting with the subjects. The objectives and importance of the test was made clear to the subjects at the outset. Demonstration of the test was done by the researcher, if there are any ambiguities in terms of understanding of the test by subjects. A pre-test and post-test was conducted on the same subjects with a time gap of 12 weeks. Data was collected by the researcher with the help of an assistant. List of tests and variables measured are given in table 1.

Table1. DETAILS ON TESTING PROTOCOL AND VARIABLES SELECTED FOR STUDY

Sl. No.	Variables Measured	Testing Protocol
1	Body Composition	Body Mass Index (BMI)
2	Resting Heart Rate	Radial Pulse
3	Calf girth	Measuring tape
4	Thigh Girth	Measuring tape
5	Waist Girth	Measuring tape
6	Flexibility	Sit-Reach Test
7	Coordinative Abilities	Shuttle Run
8	Speed	30 meters Sprint
9	Strength Endurance	Pull Ups (maximum)
10	Dynamic Strength	Sit Ups (1 minute)
11	Lower body explosiveness	3 Hop test
12	Vertical Jump Capacity	Sargent Vertical Jump
13	Upper body Explosiveness	Medicine ball put
14	Static Strength	Grip Dynamometer

3. Results and Discussion

The purpose of the study was to find out the significance difference on land based plyometric training in respect of anthropometric metric measurements physical fitness variables. In order to explore the training effects 12 weeks progressive training programme was scheduled and pre and post test results were obtained. The training results were subjected to descriptive statistics and paired samples 't' test to compare between pre and post results of land surface plyometric training by using SPSS 21 version.

3.1.Analysis of Land Surface Training

The descriptive statistics of land surface training are given in table 2. The perusal of table reveals that the data is normally distributed and skewness or kurtosis was observed as regard to data. The land surface plyometric training data appears to be normal. All the fourteen variables of investigation showed greater mean values than standard deviations. The minimum values were always lesser than maximum values.

Table 2. DESCRIPTIVE STATISTICS OF LAND SURFACE TRAINING

		N	Minimum	Maximum	Mean	Std. Deviation
Body Composition	Pre-test	15	16.57	24.75	20.57	2.36
	Post-test	15	15.37	26.37	20.32	2.59
Resting Heart Rate	Pre-test	15	63.00	78.00	71.82	3.34
	Post-test	15	63.00	78.00	71.56	3.67
Calf girth	Pre-test	15	26.00	38.00	31.96	2.55
	Post-test	15	27.00	38.00	32.20	2.59
Thigh Girth	Pre-test	15	35.00	52.00	43.22	3.71
	Post-test	15	36.00	52.00	43.82	3.34
Waist Girth	Pre-test	15	65.00	83.00	72.27	4.03
	Post-test	15	67.00	84.00	72.53	3.55

Flexibility	Pre-test	15	0.00	12.00	4.22	2.49
	Post-test	15	2.00	11.00	5.80	2.51
Coordinative Abilities	Pre-test	15	12.26	26.52	20.74	2.27
	Post-test	15	16.59	21.45	18.36	1.05
Speed	Pre-test	15	4.89	6.76	5.77	0.50
	Post-test	15	4.22	5.80	4.93	0.38
Strength Endurance	Pre-test	15	0.00	6.00	3.40	2.12
	Post-test	15	1.00	21.00	11.40	4.86
Dynamic Strength	Pre-test	15	8.00	21.00	13.87	3.50
	Post-test	15	18.00	41.00	29.56	5.94
Lower body explosiveness	Pre-test	15	3.24	6.29	4.55	0.76
	Post-test	15	3.60	7.38	5.66	1.00
Vertical Jump Capacity	Pre-test	15	9.00	39.00	16.96	7.30
	Post-test	15	22.00	51.00	39.31	6.56
Upper body Explosiveness	Pre-test	15	1.30	2.76	1.93	0.28
	Post-test	15	2.08	4.07	2.83	0.47
Static Strength	Pre-test	15	11.00	21.00	16.18	2.50
	Post-test	15	19.00	32.00	26.42	3.00

Paired sample't' test results are presented in table 3. The examination of table 3 depicts that except body composition all other variables of study had shown noteworthy differences as regard to pre and post test results. The value obtained with land surface training was greater than the table value (2.02), which indicates that plyometric training had remarkable training effects on thirteen variables of study and proved to show improvements due to the training on land surface.

Table 3. LAND SURFACE TRAINING PAIRED SAMPLE 'T' TEST

			Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Body Composition	pretest	-0.05	0.09	0.02	-2.04	14	0.06
		posttest	2.33	1.39	0.36	6.46	14	0.00
Pair 2	Resting Heart Rate	pretest	-0.40	0.63	0.16	-2.45	14	0.03
		posttest	-0.27	0.46	0.12	-2.26	14	0.04
Pair 3	Calf girth	pretest	-0.40	0.51	0.13	-3.06	14	0.01
		posttest	-1.67	0.98	0.25	-6.61	14	0.00
Pair 4	Thigh Girth	pretest	2.97	2.06	0.53	5.58	14	0.00
		posttest	0.75	0.37	0.10	7.95	14	0.00
Pair 5	Waist Girth	pretest	-7.33	3.29	0.90	-8.64	14	0.00
		posttest	-15.27	3.20	0.83	-18.51	14	0.00
Pair 6	Back Flexibility	pretest	-1.26	0.34	0.09	-14.27	14	0.00
		posttest	-23.13	8.06	2.08	-11.12	14	0.00
Pair 7	Coordinative Abilities	pretest	-1.03	0.33	0.09	-11.89	14	0.00
		posttest	-11.47	2.75	0.71	-16.16	14	0.00
Pair 8	Speed	pretest	-0.05	0.09	0.02	-2.04	14	0.06
		posttest	2.33	1.39	0.36	6.46	14	0.00
Pair 9	Strength Endurance	pretest	-0.40	0.63	0.16	-2.45	14	0.03
		posttest	-0.27	0.46	0.12	-2.26	14	0.04
Pair 10	Dynamic Strength	pretest	-0.40	0.51	0.13	-3.06	14	0.01
		posttest	-1.67	0.98	0.25	-6.61	14	0.00
Pair 11	Lower body explosiveness	pretest	2.97	2.06	0.53	5.58	14	0.00
		posttest	0.75	0.37	0.10	7.95	14	0.00
Pair 12	Vertical Jump	pretest	-7.33	3.29	0.90	-8.64	14	0.00

	Capacity	posttest	-15.27	3.20	0.83	-18.51	14	0.00
Pair 13	Upper body Explosiveness	pretest	-1.26	0.34	0.09	-14.27	14	0.00
		posttest	-23.13	8.06	2.08	-11.12	14	0.00
Pair 14	Static Strength	pretest	-1.03	0.33	0.09	-11.89	14	0.00
		posttest	-11.47	2.75	0.71	-16.16	14	0.00

4. Conclusions

Within the limitations of the present investigation it was concluded that 12 weeks plyometric training differed significantly in thirteen variables and did not differ significantly with body composition. The variables such as girth measurements (Calf, thigh and waist), flexibility, agility, speed, power and strength variables. It is concluded that plyometric training on land surface can help in improving one's physical fitness components, may decrease resting heart rate and helps to improve anthropometric measurements.

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