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EFFECT OF SAND PLYOMETRIC AND SAND AEROBIC TRAINING ON SPEED AND MUSCULAR ENDURANCE OF HOCKEY PLAYERS

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Abstract

The aim of this study was to find out the effect of sand plyometric training and sand aerobic training on speed and muscular endurance of hockey players. 60 hockey players (N=60) were randomly selected and divided into 3 groups. Group I underwent sand plyometric training (SPTG), Group II underwent sand aerobic training (SATG) and Group III as control group. The subjects underwent 12 weeks experimental treatment. Prior to and after the experimental period speed and muscular endurance of the subjects were measured. The pre and post test score were subjected to statistical analysis using ANCOVA.The results proved that SPTG reduced 0.16 seconds while SATG reduced 0.13 seconds thereby improved speed of hockey players from initial scores to final scores. The adjusted means proved that comparing to control group, the experimental groups significantly contributed for the speed of the hockey players. Similarly the SPTG improved muscular endurance 1.80 and SATG improved 1.05 from initial to final scores. Comparing to control group, the experimental groups significantly contributed for muscular endurance of the hockey players. The paired means comparisons of adjusted means between SPTG and SATG proved that the SPTG was significantly greater than SATG in improving speed and there was no significant difference between the experimental groups on muscular endurance.

Introduction

Training on sand is so beneficial to every sportsperson when training on a hard durable floor. When training in your dojo, home or wherever it is you normally train, its very easy to take for granted that the floor helps you with movement. Try getting up and jumping from side to side. If you stop to analyze the process of moving, one should notice that in order for this to happen, he has to push into the ground with your feet, so as to drive your legs to start the movement. This pushing into the ground with the feet is also achieved with aerobic activities such as, walking, running, jumping, kicking and lunging. When a grappler moves when ground fighting, not only will he/she use his feet to push, creating movement, but also the hands are used. Having a hard floor surface makes this movement process a whole lot easier, but on dry sand it becomes harder as the surface is not durable and very soft and to move, one has to dig the feet (or hands) into the sand slightly so as to create the momentum needed to move. For this reason polymetric

training becomes a whole lot harder but greater rewards can be obtained. Sparring on sand, either striking, grappling or both, becomes an extremely heavy, and hard work out, as the muscles are used more, but it is another out of the many other hundreds of great ways to improve the leg and arm muscles and stamina. Plyometric is based upon the belief that a rapid lengthening of muscles just prior to the contraction will result in much stronger contraction. The added contraction strength is believed to be due to strength of muscle spindles involving the reflex and resulting in an increase frequency of motor unit discharge. Depth jump is one of the many plyometric exercises. In depth jumping, the athlete stands on a shelf generally 2 mtr of height above the ground stepping of the self they immediately perform a maximum effort vertical or horizontal jump after consign on the ground (Will and Freeman, 1980).Plyometric training is one of the best methods of developing explosive power in sports. Basically plyometrics provide a method of training for the optimum relationship between strength and speed which will ultimately manifest in self as explosive power. Today plyometric movements are performed in almost all sports. Basic strength level must be attained before starting plyometric training programme. The choice of exercise must correspond to age, sex and biological development of sports person. These should be gradually increase stress during a complete training cycle. Body weight should be the determining factor in assigning the value of jumps in work out. Generally the number of sessions to devote the plyometric training is 2 or 3 times per week.The major benefits of aerobic exercises is stronger and more efficiently operating heart and lungs, more energy physical flexibility, conditioned muscles, proper use of fats and effective burning of calories. The increased oxygen flow gained through aerobics re-energies by giving any one more energy and a “re-awakening” of his senses. In other words, as the heart pumps more blood with fewer beats the body systems are in sync, allowing the subject to take in more oxygen. When everything is operating smoothly, your body can efficiently transport and utilize oxygen with no obstructions the nucleus of this whole system is the heart. Each heart beat is responsible for propelling the oxygenated blood through the proper blood vessels. Aerobic training will produce an increased capacity for pumping larger volumes of blood to accommodate the need for extra energy and extra oxygen. (William and Sperryn, 1976).Kotzamanidis.(2006) conducted study of the Effect of plyometric training on running performance and vertical jumping in prepubertal boys and revealed significant differences between control group and plyometric group in the velocity for the running distances 0-30, 10-20, and 20-30 m increased ($p < 0.05$) and vertical jumping ability. John D, (2009) assessed differences between seated and walking conditions on motor skills and cognitive function tests and found aerobic activities improved speed and motor skills. Viskić, et.al. (2007) analyzed the impact of special programmed physical education including dance, aerobics and rhythmic gymnastics on the development of motor and functional abilities and found significantly influence the development of coordination/agility and specific rhythm coordination, functional aerobic ability, repetitive and explosive strength and flexibility. The theoretical foundations based on previous researches proved that while plyometric and aerobic training improves speed and muscular endurance of different groups of people, however there were further scope for research to find out the effect of sand plyometric and sand aerobic training in

improving speed and endurance of hockey players.

Methodology

60 intercollegiate level men hockey players were selected randomly from different colleges in Chennai. They were in the age group of 19 to 25 years. They were divided into three groups, namely, sand plyometric training group (SPTG), sand aerobic training group (SATG) and control group (CG) consisting of 20 in each. The dependent variables selected speed measured through 50 M run test and muscular endurance through one minute sit ups test. The independent variables were 12 weeks SPTG and 12 weeks SATG.

Research design and statistical applications

Randomly selected 60 intercollegiate level men hockey players were divided into 3 groups, namely sand plyometric training group (SPTG), sand aerobic training group (SATG) and control group (CG) consisting of 20 in each group. Prior to the experimental treatment, all the subjects were measured of their speed and muscular endurance using standard tests which formed the initial scores of the subjects. SPTG group were asked to perform Jump and Tuck, Standing long jump and hops with adequate repetitions on beach sand for 12 weeks. SATG group was asked to perform walking, jogging, fast walking and fast run in alternatively with adequate repetitions on beach sand for 12 weeks. In order to draw up a proper schedule of work outs, a pilot study was conducted in which phase training schedules for the experimental designs were well laid out and practiced and tested. After the experimental treatment on the respective training methods, the subjects were again tested of their speed and muscular endurance which formed the final scores of the subjects. The difference between the initial and final scores was considered as the effect of respective treatments. To test statistically ANCOVA was used and in all cases 0.05 level was fixed.

Results

Tab 1: ANCOVA Results Due to 12 weeks Sand Plyometric and Sand Aerobic Training among Hockey players

TESTS	SPTG	SATG	CG	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
ON SPEED								
Pre Test Mean	6.97	7.12	6.99	Between	0.28	2	0.14	5.14*
				Within	1.57	57	0.03	
Post Test Mean	6.81	6.99	6.98	Between	0.43	2	0.22	8.25*
				Within	1.50	57	0.03	
Adjusted Post Test Mean	6.86	6.91	7.02	Between	0.26	2	0.13	34.98*
				Within	0.21	56	0.00	
Mean Diff	-0.16	-0.13	-0.01					
ON MUSCULAR ENDURANCE								
				Between	12.43	2	6.22	
Pre Test Mean	39.25	39.05	38.20	Within	777.90	57	13.65	0.46
Post Test Mean	41.05	40.10	38.05	Between	94.03	2	47.02	3.24

				Within	827.70	57	14.52	
Adjusted Post Test Mean	40.63	39.88	38.68	Between	38.25	2	19.13	19.58
				Within	54.69	56	0.98	
Mean Diff	1.80	1.05	-0.15					

SPTG: Sand Plyometric Training Group SATG : Sand Aerobic Training Group
CG : Control Group
*Significant at 0,05 level.

Tab 2: Scheffe's Post Hoc Analysis – Multiple Paired Mean Comparisons of Adjusted Means of Hockey Players

SPTG	SATG	CG	MEAN DIFF	Reqd. C.I
On Speed				
6.86	6.91		-0.05	0.05
6.86		7.02	-0.16	0.05
	6.91	7.02	-0.11	0.05
On Muscular Endurance				
40.63	39.88		0.75	0.79
40.63		38.68	1.95	0.79
	39.88	38.68	1.20	0.79

Discussions

The results presented in Table I proved that sand plyometric training (SPTG) reduced 0.16 seconds while sand plyometric training (SATG) reduced 0.13 seconds thereby improved speed of hockey players from initial scores to final scores. The statistical analysis through ANCOVA based on adjusted means proved that the obtained F value of 34.98 was significant. Thus, comparing to control group, the experimental groups significantly contributed for the speed of the hockey players. Similarly the SPTG improved muscular endurance 1.80 and SATG improved 1.05 from initial to final scores. The ANCOVA results proved that the obtained F value of 19.53 was significant. Thus, comparing to control group, the experimental groups significantly contributed for muscular endurance of the hockey players. The paired means comparisons of adjusted means between SPTG and SATG proved that the SPTG was significantly greater than SATG in improving speed. (Table II). However there was no significant difference between the experimental groups on muscular endurance.

Conclusions

It was concluded that SPTG and SATG were significantly contributed for the improvement of speed and muscular endurance of hockey players.

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