

Effect of Complex Training on Agility Explosive Power and Speed among Handball Players

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Abstract

The purpose of the present study was to find out the effect of complex training on selected physical fitness variables of agility, explosive power and speed among handball players. To achieve the purpose of the study thirty handball players participated the summer handball coaching camp were selected from the arts science college as subjects. The selected subjects were divided in to two equal groups of fifteen subjects each as experimental group and control group. Both the group underwent handball training morning one and half an hour and evening two hours in a schedule of weekly 6 days in duration of six weeks. In addition of the above training the experimental group underwent complex training morning one hour before starting the handball training in a schedule of weekly three days in alternative days for all the six weeks. The collected data were statistically analyzed by using ANCOVA to find out the significant difference between the groups if any. It was concluded from the result of the study that the experimental group significantly improved in the selected physical fitness variables of agility and explosive power and no significant difference was found out in speed due to complex training.

Key words: Complex Training, Agility, Explosive power and Speed

Introduction

Handball is a game of applied athletics. Due to the nature of the game the players should have athletics qualities of strength, speed, endurance, explosive power etc. Sports performance is the product of many ingredients, which includes scientific training, anthropometric characteristics, physiological efficiency of various organs and psychic power. High level achievement is becoming more and more demanding. In sports training the coaches are applying various means and methods to make their athletes run faster, jump higher and move quicker than ever before to achieve higher performance. Present study is undertaken to find out the effect of complex training on physical fitness variables of agility, explosive power and speed. Complex training has gained popularity as a training strategy combining weight training and plyometric training.

The combination of plyometric training and weight training are thought to be useful for developing athletic power. Complex training is one of the most advanced forms of sports training, integrates strength training, plyometrics, and sport-specific movement. It consists of an intense strength exercise followed by a plyometric exercise. Complex training describes a power-developing workout that combines weights and plyometric exercises. Baechle and Earle (2000) defined "complex training is a combination of high intensity resistance training followed by plyometrics". Complex training is a workout comprising of a resistance exercise followed by a plyometric exercise like squats followed by squat jumps or bench press followed by plyometric press up. Complex training has been proposed

as a training method to increase power. Power is determined from work per unit of time and considered to be a fundamental aspect of successful athletic performance, especially in sports that require speed, agility and explosive actions (Mayhew et al, 1997).

Several studies have conducted on complex training and its relative effect on physical fitness variables and it shown the positive effect on the part of complex training. Adams et al. (1992) and McLaughlin (2001) demonstrate an enhancement of motor performance associated with plyometric training combined with weight training or the superiority of plyometrics, compared to other methods of training. Santos et al (2008) evaluated the effects of a complex training program, a combined practice of weight training and plyometrics, on explosive strength development of young basketball players. The results of the study supported the use of complex training to improve the upper and lower body explosive levels in young basketball players. The vertical jump performance improvement associated with complex training is consistent with the purported role of complex training as an effective training strategy for improving power (Ebben and Watts, 1998). Rahman Rahimi and Naser Behpur (2005) found in their study that the combination of plyometric and weight training was significantly more beneficial in increasing vertical jump height, explosive performance and muscular strength. Complex training is one of the well known training methods in handball due to its nature of the movement.

Methodology

To achieve the purpose of the study 30 men Handball players participated the college summer handball coaching camp were selected as subjects. The age range of the subjects was 18 to 24. The selected subjects were randomly divided in to two groups consisting 15 each as control and experimental group. Both the group underwent handball training morning one and half an hour and evening two hours in a schedule of weekly 6 days in duration of six weeks. In addition of the above training the experimental group underwent complex training morning one hour before starting the handball training in a schedule of weekly three days in alternative days for all the six weeks.

Complex Training Procedure

The six weeks complex training was designed in emphasizes the necessity of the needs of handball players as per the suggestion given by Chu (1994) in his book, Explosive Power and Strength: complex training for maximum results. In the training each weight training followed by a plyometric training. The following combination of weight training and plyometric exercises are included in the complex training programme.

1. Push Press - Jump and Reach
2. Power clean - In Depth Jumps
3. Hang clean - Box Jumps

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4. Snatch Split - Squat Jumps
5. Clean and Jerk - Single Leg Tuck Jump
6. Power Pull - Squat Jumps
7. Squats - Drop Jumps
8. Bench Press - Plyometric press up
9. Barbell step ups - Hops (each leg) and
10. Power Shrug - Double Leg Tuck Jump and Double Leg Vertical Jump.

Complex training is performed weekly three days in alternative days. Each exercise was carried out 3 to 5 repetitions. Heavy resistance was applied with 80% of the 1 RM. Rest intervals was 10 seconds between pairs and 3 to 4 minutes between sets.

Administration of Tests

The pre and post tests were administered before and after the six weeks training period. The test administered were physical fitness variables of speed (50 mts dash), agility (4x10 mts shuttle run) and explosive power (standing vertical jump). All the tests were administered through standardized test.

Statistical Procedure

The collected data were statistically examined by analysis of covariance (ANCOVA). The level of significance was fixed at 0.05 level of confidence.

Results and Discussion

Analysis of Covariance of Physical Fitness Variables

The analysis of covariance on the data obtained for agility, speed and explosive power of pre and post tests were tabulated and presented in the tables I, II and III respectively.

Table-I

Computation of Analysis of Covariance on Agility

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Control					
Pre test	11.22		B	0.0168	1	0.0168	0.021
		11.27	W	21.4205	28	0.765	
Post test	10.64		B	1.4652	1	1.465	2.542
		11.08	W	16.139	28	0.576	
Adjusted Mean	10.66		B	1.238	1	1.238	8.246*
		11.06	W	4.053	27	0.1501	

*Significant at 0.05 level of confidence for the degree of freedom 1 and 28 is 4.20 and df 1 and 27 is 4.21

It was observed from the Table-I that there were no significant difference in the pre test ($F=0.021 < 4.20$) and also in the post test ($F=2.542 < 4.20$) for df 1 and 28 at 0.05 level of confidence, however the training effect was clearly evident on adjusted post test ($F=8.246 > 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there was an influence on agility through complex training.

The discussion clearly indicated that the experimental group was higher improvement on agility due to six weeks complex training.

Table-II

Computation of Analysis of Covariance on Speed

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Control					
Pre test	6.898	7.051	B	0.17480	1	0.17480	0.608
			W	8.04934	28	0.28747	
Post test	6.608	7.018	B	1.26485	1	1.26485	3.691
			W	9.59261	28	0.34259	
Adjusted Mean	6.672	6.953	B	0.580	1	0.58028	4.122
			W	3.800	27	0.14075	

*Significant at 0.05 level of confidence for the degree of freedom 1 and 28 is 4.20 and df 1 and 27 is 4.21

It was observed from the Table-II that there were no significant difference in the pre test ($F=0.608 < 4.20$) and post test ($F=3.691 < 4.20$) for df 1 and 28 at 0.05 level of confidence and also on adjusted post test ($F=4.122 < 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there will not be any impact in speed due to complex training among handball players.

The discussion clearly indicated that there was not any significant difference in speed among experimental and control group due to six weeks complex training.

Table-III

Computation of Analysis of Covariance on Explosive Power

Test	Group		sv	Sum of Squares	df	Mean Square	F ratio
	Exp.	Control					
Pre test	50	47.66	B	40.8333	1	40.83333	1.199
			W	953.333	28	34.04762	
Post test	53.53	48.53	B	187.5	1	187.5	7.592 *
			W	691.466	28	24.69524	
Adjusted Mean	52.63	49.42	B	74.183	1	74.18304	15.23 6*
			W	131.459	27	4.86886	

*Significant at 0.05 level of confidence for the degree of freedom 1 and 28 is 4.20 and df 1 and 27 is 4.21

It was observed from the Table-III that there was no significant difference in the pre test ($F=0.1876 < 4.20$) for df 1 and 28 at 0.05 level of confidence. But significant difference were observed in post test ($F=3.712 < 4.20$) for df 1 and 28 at 0.05 level of confidence and also adjusted post test ($F=7.758 > 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on standing vertical jump than control group.

The discussion clearly indicated that the experimental group was higher improvement on explosive power due to six weeks complex training

Conclusions

On the basis of the results and discussions the following conclusions are drawn.

1. Complex training was proved a best training method to improve the physical fitness qualities of agility and explosive power.
2. Complex training was not significantly improved the physical fitness quality of speed.
3. Combined weight training and plyometric training may be included in the training programme of handball players where the power is essential part of the game.
4. It was concluded that complex training is a useful and perhaps optimal training strategy to improve physical fitness efficiency.

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