

Effect of Complex Training on Selected Physiological Parameters among Handball Players

P. Gopinathan, Assistant Professor, Department of Sports Psychology and Sociology & Sports Secretary, Tamil Nadu Physical Education and Sports University, Chennai

Abstract

The purpose of the present study was to find out the effect of complex training on selected physiological variables on handball players. To achieve the purpose of the study thirty inter collegiate handball players were selected 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 in morning one hour and evening two hours in a schedule of weekly 6 days for the duration of 8 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 eight weeks. The collected data's 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 physiological variables of, breathe holding time and vital capacity and reduced the resting heart rate due to eight weeks complex training.

Keywords: Complex training, resting heart rate, breath holding time and vital capacity

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 also undertaken to find out the effect of complex training on certain parameters. 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).

Methodology

To achieve the purpose of the study 30 men students 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 hour and evening two hours in a schedule of weekly 6 days in duration of 8 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 eight 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
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 eight weeks training period. The test administered were physiological variables of resting heart rate, breath holding time and vital capacity. All the tests were administered through standardized test.

Statistical Procedure

The collected data were statistically examined by analysis of covariance (ANCOVA) and the result have been presented in Table I to III

Results and Discussions

Analysis of Covariance of Physiological Variables

The analysis of covariance on the data obtained for resting heart rate, breathe holding time and vital capacity 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 Resting Heart Rate

Test	Group		SV	Sum of Squares	df	Mean Square	F ratio
	Exp.	Control					
Pre test	69.33	73.13	B	108.3	1	108.3	3.395
			W	893.066	28	31.895	
Post test	66.93	72.4	B	224.133	1	224.133	9.676*
			W	648.533	28	23.161	
Adjusted Mean	68.43	70.89	B	40.350	1	40.350	12.381*
			W	87.989	27	3.2588	

*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 was no significant difference in the pre test ($F=3.395 < 4.20$) and however significant difference were observed in the post test ($F=9.676 > 4.20$) for df 1 and 28 at 0.05 level of confidence and also adjusted post test ($F=12.381 > 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on resting heart rate than control group.

The discussion clearly indicated that the eight weeks complex training reduced the resting heart rate.

Table-II
Computation of Analysis of Covariance on Breath Holding Time

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Control					
Pre test	51.133	49.533	B	19.2	1	19.2	0.157
			W	3409.46	28	121.766	
Post test	56.066	50.4	B	240.83	1	240.833	3.712
			W	1816.53	28	64.876	
Adjusted Mean	55.583	50.883	B	164.78	1	164.787	7.758*
			W	573.49	27	21.240	

*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 ($F=0.157 < 4.20$) and also in the post test ($F=3.712 < 4.20$) for df 1 and 28 at 0.05 level of confidence, however the training effect was clearly evident on adjusted post test ($F=7.758 > 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on breath holding time than control group.

The discussion clearly indicated that the experimental group was higher improvement on breath holding time due to eight weeks complex training.

Table-III
Computation of Analysis of Covariance on Vital Capacity

Test	Group		sv	Sum of Squares	df	Mean Square	F ratio
	Exp.	Control					
Pre test	3.88	3.94	B	0.021333	1	0.0213	0.135
			W	4.420187	28	0.1578	
Post test	4.18	3.96	B	0.354253	1	0.3542	1.950
			W	5.086013	28	0.1816	
Adjusted Mean	4.21	3.94	B	0.534	1	0.5336	12.081*
			W	1.193	27	0.0441	

*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 were no significant difference in the pretest ($F=0.135 < 4.20$) and also in the post test ($F=1.950 < 4.20$) for df 1 and 28 at 0.05 level of confidence, however the training effect was clearly

evident on adjusted posttest ($F=12.081 > 4.21$) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on vital capacity than control group.

The discussion clearly indicated that the complex training influence on vital capacity due to eight weeks complex training.

Discussion on Findings

The results of the study indicates that the experimental group undertaken complex training improved significantly in the selected dependent variables of agility, explosive power in physical fitness variables and resting heart rate, breathe holding time and vital capacity in physiological variables. In the present study all the selected variables except speed were significantly improved due to eight weeks complex training. The post test mean value of control group also showed beneficent of handball training in selected physical fitness and physiological variables in some extent.

Conclusions

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

1. Complex training was a best training method to improve the physiological efficiency. The selected physiological parameters of resting heart rate, breath holding time and vital capacity were significant effect through complex training.
2. 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.
3. It was concluded that complex training is a useful and perhaps optimal training strategy to improve physiological efficiency.

References

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