International Journal of Applied and Advanced Scientific Research (IJAASR)
Impact Factor: 5.655, ISSN (Online): 2456 - 3080
(www.dvpublication.com) Volume 3, Issue 2, 2018

EFFECT OF FARTLEK TRAINING AND COMPLEX TRAINING ON SELECTED PHYSICAL VARIABLES AMONG HOCKEY PLAYERS

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Cite This Article: Dr. Baiju A, "Effect of Fartlek Training and Complex Training on Selected Physical Variables Among Hockey Players", International Journal of Applied and Advanced Scientific Research, Volume 3, Issue 2, Page Number 51-55, 2018.

Abstract:

The purpose of the study was to find out the effect of fartlek training and complex training on selected physical variables among hockey players. To achieve the purpose of the present study, forty five hockey players from Thiruvananthapuram, Kerala, India were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into three equal groups of fifteen each. The groups were assigned as Experimental Group-I, Experimental Group-II and Control Group in an equivalent manner. Experimental Group-I was exposed to fartlek training, Experimental Group-II was exposed to complex training and Control Group was not exposed to any experimental training other than their regular daily activities. The duration of experimental period was 6 weeks. After the experimental treatment, all the forty five subjects were tested on their physical variables. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using dependent 't' test and Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, Scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

Key Words: Fartlek Training, Complex Training, Hockey Players.

Introduction:

Since Fartlek is a modified form of interval training, all the benefits that apply to interval training are also applicable to Fartlek. Fartlek training sessions can greatly help in increasing speed and endurance in runners. This is especially useful if you have reached a plateau in your training sessions. While experienced runners who are already into interval training can use Fartlek for increasing their anaerobic threshold and stamina, newbies to the running circuit can use Fartlek for helping their speed training and endurance training and for adding variety to their cardio workout program. Fartlek scores over interval training in a number of ways. For one, it gives the athlete a chance to be more self aware, to test her limits more and to become a better judge of her own pace (Gopi & Rajkumar, 2017).

Complex training is one of the most advanced forms of sports training, integrates strength training, plyometric, and sport-specific movement. It consists of an intense strength exercise followed by a plyometric exercise. The combination of plyometric training and weight training are thought to be useful for developing athletic power. More specifically, complex training alternates biomechanically similar high load weight training exercises with plyometric exercises, set for set, in the same workout. An example of complex training would include performing a set of squats followed by a set of jump squats. Anecdotal sources have described the application of complex training (Ebben, 2002).

Reviews:

Pardeep (2015) examined the effect of fartlek training for developing endurance ability among athletes. 30 athletes between the age group of 18 to 24 years (15 Experimental Group and 15 Control Group) were selected for the study. The six weeks endurance training program for experimental group were specific to experimental group which contains more sand training on alternate days and controlled group was given general training of athletics. The Pre Test and Post Test were proficient through Cooper Test for both group to estimation the effects of sand running. This study explains that the sand training has increased the endurance between the Experimental groups along with Physiological capacity of the athletes. It is optional that sand training is fine for the endurance development of athletes.

Das Aditya Kumar (2014) analyzed the effect of continuous running fartlek training and interval training on selected motor ability and physiological variables among male football players. The investigator has selected sixty inter collegiate football men players at random, their age ranged from 18–25 years. The subjects chosen for the study were divided into four equal groups and designated as experimental group 'A' experimental group 'B' experimental group 'C' and control group 'D'. Continuous running were given to group 'A' Fartlek training group 'B' Interval training given to group 'C' and the control group 'D' were restricted to participate in any activities. The trainings were given for a period of twelve weeks. The data were collected before and after the training. The obtained data's were analyzed by Analysis of Covariance (ANCOVA). The level of significant was fixed at 0.05 levels. Where ever the 'F' ratio was found significant scheffe's post test was used for find out the significant differences among the paired mean. The results of the study showed that continuous running, fartlek training and interval training are significantly improved than control group.

Esformes, et al. (2011) examined post activation potentiation effects produced by isometric (ISO), concentric (CON), eccentric (ECC), or concentric-eccentric (DYN) conditioning contractions on upper body force and power performance. Ten male, competitive rugby players (mean ± SD: age 20.4 ± 0.8 years, height 177.0 ± 8.1 cm, body mass 90.2 ± 13.8 kg) performed a ballistic bench press throw (BBPT) followed by a 10-minute rest and one of the conditioning contractions. After a 12-minute rest, the subjects performed another BBPT (post-BBPT). The conditioning contractions, applied on separate days and in counterbalanced randomized order, were a 7-second isometric barbell bench press for ISO and 1 set of 3 bench press repetitions at 3 repetition maximum for CON, ECC, and DYN (each repetition lasting 2 seconds for CON and ECC, overall execution time <7 seconds for DYN). Peak power (P_{peak}), peak force (F_{peak}), maximum distance (D_{max}) and rate of force development (RFD) were measured using a linear position transducer. Electromyography (EMG) of the pectoralis major and triceps brachii was also recorded. The ISO produced significantly higher P_{peak} (587 ± 116 and 605 ± 126 W for pre- and post-BBPT, respectively; $p < 0.05$). No significant differences in P_{peak} were revealed for CON, ECC, and DYN ($p > 0.05$), and no significant differences existed in F_{peak}, D_{max}, and RFD for ISO, CON, ECC, and DYN ($p > 0.05$). Finally, EMG was not significantly different between pre- and post-BBPT for any of the conditioning contractions ($p > 0.05$). Isometric contractions appear to be the only conditioning contractions increasing upper body power output after long resting periods.

Jayaraman (2011) conducted a study to find out the effect of fartlek training and fartlek training on selected physiological variables among college men students. To achieve the purpose of the study, forty five men students were selected randomly as subjects and divided in to three groups namely resistance training group, fartlek training group and control group of fifteen subjects in each groups and the subject's ages ranged from 18-23yrs. All the subjects were tested on selected variables prior to and immediately after the training period. The selected criterion variables such as cardio respiratory endurance was measured by Copper's 12 min/walk test and resting pulse rate was measured by counting the pulse rate per minute. The analysis of covariance (ANACOVA) were used to find the significant difference if any, among the experimental and control groups on selected criterion variables separately. In all the cases, 0.5 level of confidence was fixed to test the significance, which was considered as an appropriate. Since there were three groups involved in this study the Scheffe's test was used as posthoc test. There were significant improvements in the variables such as leg strength, muscular endurance, vital capacity, resting pulse rate and cardio respiratory endurance due to physical training on the experimental groups.

Alves et al. (2010) analyzed the short-term effects of complex and contrast training (CCT) on vertical jump (squat and countermovement jump), sprint (5 and 15 m), and agility (505 Agility Test) abilities in soccer players. Twenty-three young elite Portuguese soccer players (age 17.4 6 0.6 years) were divided into 2 experimental groups (G1, n = 9, and G2, n = 8) and 1 control group (G3, n = 6). Groups G1 and G2 have done their regular soccer training along with a 6-week strength training program of CCT, with 1 and 2 training sessions/week, respectively. G3 has been kept to their regular soccer training program. Each training session from the CCT program was organized in 3 stations in which a general exercise, a multiform exercise, and a specific exercise were performed. The load was increased by 5% from 1 repetition maximum each 2 weeks. Obtained results allowed identifying a reduction in sprint times over 5 and 15 m (9.2 and 6.2% for G1 and 7.0 and 3.1%, for G2; p , 0.05) and an increase on squat and jump (12.6% for G1 and 9.6% for G2; p , 0.05). The results suggested that the CCT induced the performance increase in 5 and 15 m sprint and in squat jump. Vertical jump and sprint performances after CCT program were not influenced by the number of CCT sessions per week (1 or 2 sessions/week). From the obtained results, it was suggested that the CCT is an adequate training strategy to develop soccer players' muscle power and speed.

Bevan, et al. (2009) after a bout of heavy resistance training (HRT), skeletal muscle is in both a fatigued and potentiated state. Subsequent muscle performance depends on the balance between these 2 factors. To date, there is no uniform agreement about the recovery time required between the HRT and subsequent muscle performance to gain performance benefits in the upper body. The aim of the present study was to determine the recovery time required to observe enhanced upper-body muscle performance after HRT (i.e., complex training). Twenty-six professional rugby players performed a ballistic bench press (BBP) at baseline and at approximately 15 seconds and 4, 8, 12, 16, 20, and 24 minutes after HRT (3 sets of 3 repetitions at 87% 1 repetition maximum). Peak power output (PPO) and throw height were determined for all BBPs. A significant time effect with regard to PPO ($F = 29.145$, partial $Eta2 = 0.538$, $p < 0.01$) and throw height ($F = 17.362$, partial $Eta2 = 0.410$, $p < 0.01$) was observed. Paired comparisons indicated a significant decrease in PPO and throw height in the BBP performed approximately 15 seconds after the HRT compared with the baseline BBP. After 8 minutes of recovery from the HRT, both PPO and throw height were significantly higher than the PPO and throw height recorded at baseline (e.g., PPO: 879 +/- 100 vs. 916 +/- 116 W, $p < 0.01$). It was concluded that muscle performance can be significantly enhanced after bouts of HRT during a BBP providing that adequate recovery (8 min) is given between the HRT and the explosive activity.

Daniel, et al. (2009) evaluated and to compare the effects of a complex training program and a conventional training program, on power and strength development in sport science students. Sixteen

undergraduates were randomly divided into two equivalent groups: Complex Training Group (CPG; n=8) and Conventional Training Group (CVG, n=8), both of which completed a similar volume and intensity of training. CPG combined maximum strength exercises with power exercises using the complex training method. Subjects comprising the CVG group performed similarly to their CPG counterparts in the first four weeks and the equivalent power training during the second half of the program. Both programs produced gains in the weight lifted ($p<0.01$) 1RM back squat and the Squat Jump ($p< 0.01$). CPG subjects achieved gains in Maximum Strength, the Counter Movement Jump ($p< 0.01$), and 10, 15 and 20-m runs ($p< 0.05$) whereas CVG subjects achieved improvements in the 5-m run ($p< 0.05$). After detraining, CPG subjects experienced a decline in the Counter Movement Jump and in the 10-m run ($p< 0.05$). Complex and non-complex training programs in untrained subjects may increase the power and maximum strength, and generally result in improvement of these parameters without any one program showing appreciable advantages over the other.

Methodology:

The purpose of the study was to find out the effect of fartlek training and complex training on selected physical variables among hockey players. To achieve the purpose of the present study, forty five hockey players from Thiruvananthapuram, Kerala, India were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into three equal groups of fifteen each. The groups were assigned as Experimental Group-I, Experimental Group-II and Control Group in an equivalent manner. Experimental Group-I was exposed to fartlek training, Experimental Group-II was exposed to complex training and Control Group was not exposed to any experimental training other than their regular daily activities. The duration of experimental period was 6 weeks. After the experimental treatment, all the forty five subjects were tested on their physical variables. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using dependent 't' test and Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, Scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

Results:

Table 1: Computation of Analysis of Covariance of Mean of Fartlek Training Complex Training and Control Groups on Speed

	FTG	CTG	Control Group	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	7.60	7.61	7.62	BG	0.003	2	0.002	0.06
				WG	1.13	42	0.02	
Post-Test Means	7.18	7.13	7.60	BG	1.98	2	0.99	39.33*
				WG	1.05	42	0.02	
Adjusted Post-Test Means	7.18	7.14	7.59	BG	1.89	2	0.94	51.92*
				WG	0.74	41	0.01	

An examination of table 1 indicated that the pre test means of fartlek training, complex training and control groups were 7.60, 7.61 and 7.62 respectively. The obtained F-ratio for the pre-test was 0.06 and the table F-ratio was 3.21. Hence the pre-test mean F-ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post-test means of the fartlek training, complex training and control groups were 7.18, 7.13 and 7.60 respectively. The obtained F-ratio for the post-test was 39.38 and the table F-ratio was 3.21. Hence the post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of the fartlek training, complex training and control groups were 7.18, 7.14 and 7.59 respectively. The obtained F-ratio for the adjusted post-test means was 51.92 and the table F-ratio was 3.22. Hence the adjusted post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. This proved that there was a significant difference among the means due to the experimental trainings on speed.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in table 2.

Table 2: The Scheffe's Test for the Differences between the Adjusted Post Test Paired Means on Speed

Adjusted Post-test means			Mean Difference	Required CI
FTG	CTG	Control Group		
7.18	7.14	---	0.04	0.09
7.18	---	7.59	0.41*	
---	7.14	7.59	0.45*	

* Significant at 0.05 level of confidence

The multiple comparisons showed in Table II proved that there existed significant differences between the adjusted means of fartlek training and control group (0.41) and complex training and control group (0.45) at 0.05 level of confidence with the confidence interval value of 0.09. The mean difference between fartlek training and complex training group (0.04) was not significant at 0.05 level of confidence with the confidence interval value of 0.09. The pre, post and adjusted means on speed were presented through bar diagram for better understanding of the results of this study in figure 1.

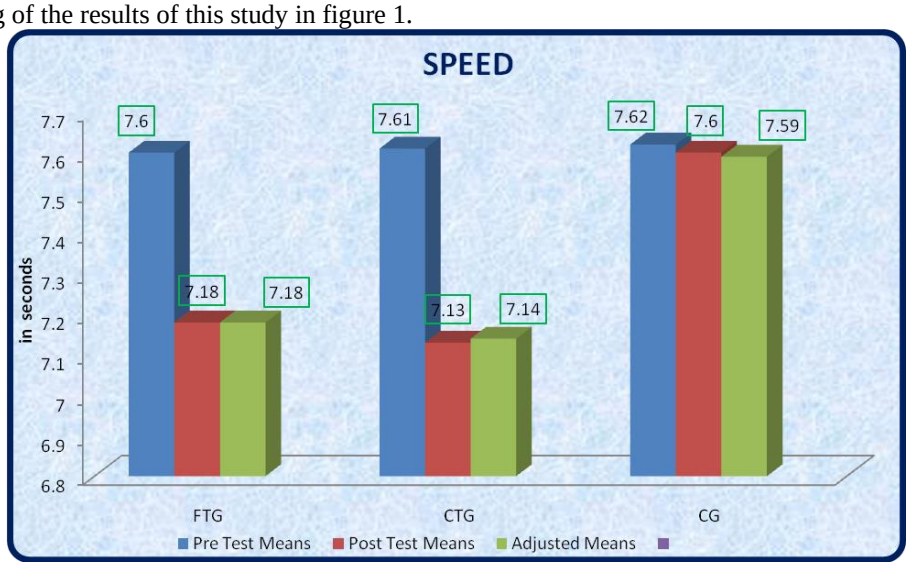

Figure 1: Pre Post and Adjusted Post Test Differences of the Fartlek Training Complex Training and Control Groups on Speed

Table 3: Computation of Analysis of Covariance of Mean of Fartlek Training Complex Training and Control Groups on Endurance

	FTG	CTG	Control Group	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	1571.33	1555.46	1577.13	BG	3774.17	2	1887.08	1.17
				WG	67686.80	42	1611.59	
Post-Test Means	2055.60	2063.46	1577.66	BG	2322418.97	2	1161209.48	795.88*
				WG	61278.66	42	1459.01	
Adjusted Post-Test Means	2055.63	2063.33	1577.76	BG	2258097.34	2	1129048.67	755.50*
				WG	61271.66	41	1494.43	

An examination of table 3 indicated that the pre test means of fartlek training, complex training and control groups were 1571.33, 1555.46 and 1577.13 respectively. The obtained F-ratio for the pre-test was 1.17 and the table F-ratio was 3.21. Hence the pre-test mean F-ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post-test means of the fartlek training, complex training and control groups were 2055.60, 2063.46 and 1577.66 respectively. The obtained F-ratio for the post-test was 795.33 and the table F-ratio was 3.21. Hence the post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of the fartlek training, complex training and control groups were 2055.63, 2063.33 and 1577.76 respectively. The obtained F-ratio for the adjusted post-test means was 755.50 and the table F-ratio was 3.22. Hence the adjusted post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. This proved that there was a significant difference among the means due to the experimental trainings on endurance. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in table 4.

Table 4: The Scheffe's Test for the Differences between the Adjusted Post Test Paired Means on Endurance

Adjusted Post-test means			Mean Difference	Required CI
FTG	CTG	Control Group		
2055.63	2063.33	---	7.70	35.76
2055.63	---	1577.76	477.87*	
---	2063.33	1577.76	485.60*	

* Significant at 0.05 level of confidence

The multiple comparisons showed in Table IV proved that there existed significant differences between the adjusted means of fartlek training and control group (477.87) and complex training and control group (485.60) at 0.05 level of confidence with the confidence interval value of 35.76. The mean difference between fartlek training and complex training group (7.70) was not significant at 0.05 level of confidence with the confidence interval value of 35.76. The pre, post and adjusted means on endurance were presented through bar diagram for better understanding of the results of this study in figure 2.

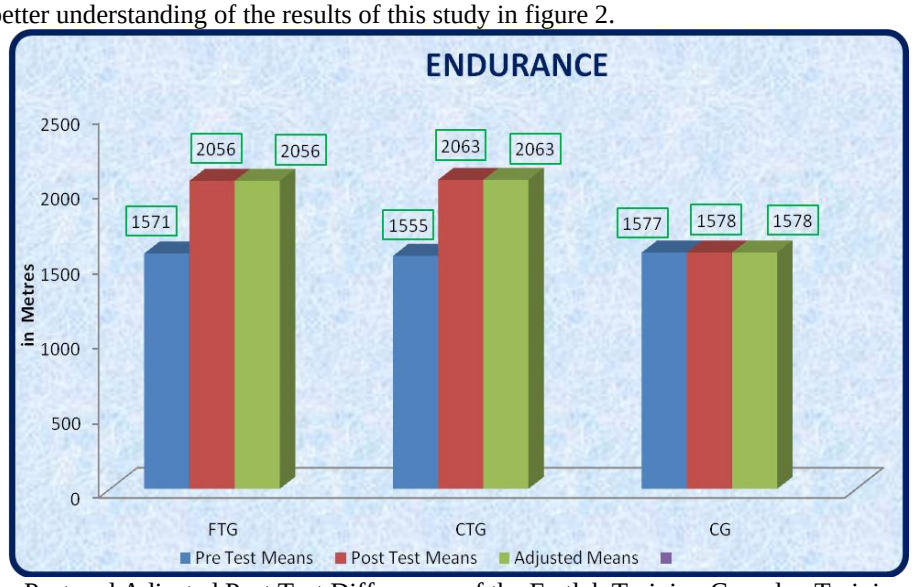

Figure 2: Pre Post and Adjusted Post Test Differences of the Fartlek Training Complex Training and Control Groups on Endurance

Conclusion:

It was observed that the six weeks of complex training have significantly improved the selected physical variables than the fartlek training and control group.

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