Body Composition And Motor Fitness Changes During Different Phases Of Training Among Hockey Players

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Abstract - **Vigorous training, the blood circulation quickness, blood and lymph stream through the muscle, supply the cells with oxygen and nutrition, removing waste products. The heart activity is accelerated exercise and strengthening its own fibers. Exercise also stimulates growth, and strengthens the bones, muscles, ligaments and tendons. Different activities can be carried out with different intensities which may have different effect in organism. The aim of this study is to find out the effect of changes during different phases of training on body composition variables, body mass index and percent body fat and motor fitness variables, speed and explosive power. 30 hockey players were selected and given resistance training under different phases, conditioning, intensive, in-season, and off season by manipulating the load, intensities and frequencies of selected weight training exercises. Results proved that different phases of training altered body mass index and there was significant differences between initial and in-season phase. Though percent body fat showed reduction they were not significant at 0.05 level at any stage. The results on motor fitness variables proved that though there was improvement in speed at every phase of training there was no significant differences. The explosive power was significantly improved at intensive and in season phases comparing the initial scores. It was concluded that the different phases of training can be utilized for improving body composition and motor fitness variables by hockey players.**

keywords - **Key Words: Resistance Training, Conditioning Phase, Intensive Phase, In-season Phase, Off-season Phase, Body Mass Index, Percent Body Fat, Speed, Explosive Power.**

INTRODUCTION

There are different methods of specific training programmes available for the development of speed, muscular strength level, endurance and cardio respiratory endurance to their maximum. Training methods includes weight training, interval training, fartlek training, circuit training, isotonic training, isometric training, isokinetic training. Vigorous training, the blood circulation quickness, blood and lymph stream through the muscle, supply the cells with oxygen and nutrition removing waste products. The heart activity is accelerated exercise and strengthening its own fibers. Exercise also stimulates growth, and strengthens the bones, muscles, ligaments and tendons (Hardayal Singh, 1991) . Different activities can be carried out with different intensities which may have different effect in organism. It is better to start gradually and take more time reaching the objectives than to start at a high level drop out because of injury caused by either the intensity or frequency of the programme. (Morehouse and Gross, 1975) . Thus, training programmes forms different phases.

Sports training program phases revolve around peaking for major competitions phases generally progress as follows: The first of the phases of training prepares the athlete for more intensive weight training with heavier weight loads. It is referred to as the conditioning phase, the hypertrophy phase, or the starter phase. Fitness training programs typically advance to a more intensive training phase where weight loads are consistently increased until fitness training goals are met under intensive training phase. Then the athlete performs a maintenance or in-season phase in which the athlete stabilize the level of performance which enables for major competition at the right time. The off season phase permits for an active rest so that the athlete can gain recovery in preparation for the next season phase. To phase at the desired level of strength, (Fleck and Kraemer,1996 ; Powers et al.,2006 ; Schmidt and Wrisberg, 2000) different phases of training progress from low intensity and high volume, to high intensity and low volume. In other words, do more repetitions with lighter weights early in training, and fewer repetitions with heavier weights later in training. Testing after each of the phases of training will help one make sound decisions for adjusting the training programme in subsequent phases. This is how one personalize the training programme to promote continuous improvement toward the goals

Sanchez-Medina L, et.al. (2010) analyzed the contribution of the propulsive and braking phases among different percentages of the one-repetition maximum (1RM) in the concentric bench press exercise and highlighted the importance of considering the contribution of the propulsive and braking phases in isoinertial strength and power assessments. Delecluse C et.al. (1995) analyzed the effect of high-resistance (HR) and high-velocity (HV) training on the different phases of 100-m sprint performance and by means of a principal component analysis on all speed variables, three phases were distinguished: initial acceleration (0-10 m), building-up running speed to a maximum (10-36 m), and maintaining maximum speed in the second part of the run (36-100 m). Padilla et al. (2001) evaluate exercise intensity and load during mass-start stages in

professional road cycling, using competition heart rate (HR) recordings and found load zones reflected the physiological demands of different mass-start cycling stage categories. which could be useful for planning precompetition training strategies. Padilla ,et al. (2008) examined the exercise intensity and load of the mountain passes of the major 3-week races according to their difficulty (length and slope) and position within the stage and reported that mountain passes are highly demanding and that their intensity is related not only to the difficulty of the ascents but also to the position within the stage.

The investigator found very few attempts were made to find out the effect of different phases of training on selected body composition and motor fitness variables of hockey players. The purposes of this research was to find out the "body composition and motor fitness changes during different phases of training among hockey players"

METHODOLOGY

To achieve the purpose of this study, 30 men hockey players, who represented their college in inter-collegiate tournaments were selected and tested of their body composition variables, body mass index, percent body fat, and motor fitness variables, speed and explosive power, which formed the initial scores of the subjects. The subjects underwent resistance training under four phases, namely, conditioning, intensive, in-season and off-season phases. Each phase of training lasted for 3 weeks and the subjects were tested of their selected body composition and motor fitness variables on completion of each phase of training. The investigator selected five resistance (weight training) exercises, namely, Military Press, Barebell Rows, Squats, Standing Calf Raises and Leg Press and determined the 1 RM for each resistance exercise using Brzycki Formula (Brzycki, 1998) . The aim of conditioning phase, was to make the body to adjust to the stress of weight training, for this purpose the subjects, hence the subjects were given 40% to 60% of 1 RM with different repetitions. The intensive phase was to gain greater levels of strength, power and other qualities that transfer from weight training to sport skills, hence the subjects were trained with resistance training of 60% to 80% of 1 RM with different repetitions and varied frequencies. The in-season phase aimed at stabilizing the level of performance on the fitness components built during the previous phases and gain a competitive edge for peaking for major competitions at the right time, hence the subjects were trained with resistance training of 60% to 80% of 1 RM with increased repetitions and varied frequencies. The off-season phase would permit the subjects for an active rest to get recovery in preparation for the next pre-season phase, which would be otherwise called the detraining phase. The obtained data of initial (1st day of the training session), end of the 3rd week (conditioning phase), end of 6th week (intensive phase), end of 9th week (in-season phase) and end of 12th week (off-season phase) on selected criterion variables were subjected to statistical treatment using repeated ANOVA and the results arrived at.

RESULTS

Tab: 1: Results on Repeated Analysis of Variance on Body Composition Variables

Calculation of Repeated Analysis of Variance on Body Mass Index (In Index Numbers)									
Means on Completion of Different Phases					Source of Variance	Sum of Squares	df	Means Squares	F
Initial	Conditioning	Intensive	In-season	Off Season					
21.39	20.78	20.25	19.34	19.89	Subjects	294.11	29.00		3.00*
					Trials	75.54	4.00	18.89	
					Residuals	914.31	145.00	6.31	
					Total	544.66	149.00		
Calculation of Repeated Analysis of Variance on Percent Body Fat (In Percentage)									
14.65	14.10	14.00	14.06	14.10	Subjects	48.83	29.00		0.86
					Trials	8.52	4.00	2.13	
					Residuals	361.11	145.00	2.49	
					Total	401.42	149.00		

Required $F_{(0.05),(4,145)} = 2.35$ *Significant

Tab 2: Scheffe's Post Hoc Analysis Results on Body Mass Index

Means on Completion of Different Phases					Mean Difference	Reqd C. I
Initial	Conditioning	Intensive	In-season	Off Season		
21.39	20.78				0.61	2.00
21.39		20.25			1.15	2.00
21.39			19.34		2.06*	2.00
21.39				19.89	1.50	2.00
	20.78	20.25			0.53	2.00
	20.78		19.34		1.44	2.00
	20.78			19.89	0.89	2.00
		20.25	19.34		0.91	2.00
		20.25		19.89	0.36	2.00

			19.34	19.89	-0.55	2.00

* Significant

Tab: 3: Results on Repeated Analysis of Variance on Motor Fitness Variables

Calculation of Repeated Analysis of Variance on Speed (In Seconds)									
Means on Completion of Different Phases					Source of Variance	Sum of Squares	df	Means Squares	F
Initial	Conditioning	Intensive	In-season	Off Season					
7.77	7.57	7.39	7.34	7.38	Subjects	80.20	29.00		1.21
					Trials	3.89	4.00	0.97	
					Residuals	116.71	145.00	0.80	
					Total	32.62	149.00		
Calculation of Repeated Analysis of Variance on Explosive Power (In Meters)									
2.02	2.16	2.26	2.27	2.19	Subjects	-2.29	29.00		3.60*
					Trials	1.22	4.00	0.31	
					Residuals	12.31	145.00	0.08	
					Total	8.80	149.00		

Required $F_{(0.05),\,(4,145)} = 2.35$ *Significant

Tab 2: Scheffe's Post Hoc Analysis Results on Explosive Power

Means on Completion of Different Phases					Mean Difference	Reqd C. I
Initial	Conditioning	Intensive	In-season	Off Season		
2.02	2.16				0.15	0.23
2.02		2.26			0.24*	0.23
2.02			2.27		0.25*	0.23
2.02				2.19	0.17	0.23
	2.16	2.26			0.10	0.23
	2.16		2.27		0.10	0.23
	2.16			2.19	0.02	0.23
		2.26	2.27		0.01	0.23
		2.26		2.19	0.07	0.23
			2.27	2.19	0.08	0.23

* Significant

DISCUSSIONS

The results presented in Table I proved that the obtained F value of 3.00 was greater than the required table value of 2.35 with degrees of freedom 4, and 145 at 0.05 level. And it was proved that different phases of resistance training significantly altered the body mass index of the hockey players. Results were subjected to statistical post hoc analysis using Scheffe's confidence interval test and the results presented in Table 2 proved that there was significant difference between initial scores and in-season phase scores as the obtained value of 2.06 was greater than the required confidence interval value of 2.00. The results proved that due to different phases of resistance training, the body mass index was gradually altered at every phase of the training comparing to initial scores. Though there was reduction in all the phases comparing to initial scores, the difference between initial and in-season phase alone was significant.

The results on percent body fat proved that the obtained F value of 0.86 was less than the required table value of value of 2.35 with degrees of freedom 4, and 145 at 0.05 level. This proved that there was no significant alteration in percent body fat due to different phases of resistance training.

The results presented in Table 3 on speed, proved that the obtained F value of 1.21 was less than the required table value of 2.35 with degrees of freedom 4, and 145 at 0.05 level. This proved that there was no significant alteration in speed due to different phases of resistance training.

The results presented in Table 3 on explosive power, proved that the obtained F value of 3.6 was greater than the required table value of 2.35 with degrees of freedom 4, and 145 at 0.05 level. And it was proved that different phases of resistance training significantly altered the explosive power of the hockey players. Results were subjected to statistical post hoc analysis using Scheffe's confidence interval test and the results presented in Table 4 proved that there was significant difference between initial scores and intensive phase, initial scores and in-season phase scores as the obtained values of 0.24 and 0.25 respectively were greater than the required confidence interval value of 0.23. The results proved that due to different phases of resistance training, the explosive power was gradually improved at every phase of the training comparing to initial scores. Though there was improvement in all the phases comparing to initial scores, the differences they were not significant.

In this study, the investigator arranged the training schedule as suggested by Powers et al.,2006 ; Schmidt and Wrisberg, 2000 different phases of training progress from low intensity and high volume, to high intensity and low volume, this significantly altered the weight of the subjects which resulted in significant reduction in body mass index. However, the weight reduction has not be observed on the percent body fat, which may take some more time, that is why, though it was noted reduction in percent body fat among the subjects, the differences was not significant. The results of this study is in agreement with the findings of the Padilla et al. (2001) Padilla ,et al. (2008) who found load zones reflected the physiological demands of different mass-start cycling stage categories. which could be useful for planning precompetition training strategies. And the findings of this study is in agreement with the findings of Sanchez-Medina L, et.al. (2010) analyzed the contribution of the propulsive and braking phases among different percentages of the one-repetition maximum (1RM) in the concentric bench press exercise and highlighted the importance of considering the contribution of the propulsive and braking phases in strength and power assessments.

CONCLUSIONS

It was concluded that different phases of resistance training can be better utilized for improving body composition and motor fitness variables by hockey players.

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