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Effect of anaerobic interval training on selected biomotor and skill performance variables among hockey players

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Abstract
The anaerobic interval training uses the anaerobic system to access energy stored in muscles for use in short bursts of effort. Although the anaerobic system does not use oxygen, the build-up of lactic acid produced by the anaerobic system requires oxygen to it break down. Present are different sports training that aspire at improving sports performance through physical, physiological, psychological, social, rational and ethical aspects thus contributing to development of all-round personality of the player. Researchers have proved the need for both high and low-intensity activities is more efficient to ensure the reduction of a greater number of cardiac risk variables, especially for games like Hockey. To discover the effect of anaerobic interval training, the researcher selected 40 intercollegiate level Hockey players who were randomly divided into two groups. One group formed the investigational group and the other group was control group. The experimental group was given anaerobic interval training for six weeks, consisting of speed endurance exercises, fartlek exercises, sprint intervals and stair stepper exercises and the control group was not provided with any investigational treatment. Initial scores on selected bio motor variables, agility and cardio-vascular endurance, skill performance variables, ability hitting, dribbling ability of the subjects were collected using standard tests. The results proved those six weeks anaerobic Interval training significantly improved bio motor and, skill performance variables. It was concluded that anaerobic interval training can be imparted to intercollegiate level Hockey players

Keywords: Anaerobic interval training, speed endurance exercises, fartlek exercises, sprint intervals and stair stepper exercises biomotor variables, agility, cardio-vascular endurance, hitting, dribbling

1. Introduction
Researchers have proved that Anaerobic training involves high intensity activities, mostly in excess of 85 percent of maximum heart rate (max HR), with limited recovery to develop the two anaerobic energy pathways. One of the most effective ways to train the anaerobic system is to use interval between training, which are often referred to as sprint training. This has some similarities to aerobic interval training; however anaerobic intervals tend to use higher intensity with longer rest breaks. Anaerobic intervals are characterized by brief, maximal activity, generally ranging between 10 seconds and 2 minutes, with a work rest ratio of 1:3, meaning for every 10 seconds you work, you rest for 30 seconds. The rest component, also known as the relief interval, may involve sitting or stretching or gentle work such as walking or slow jogging. Intervals raise the lactate threshold, improve lactate clearance and lactate tolerance, improve sustained power, and can raise the muscle oxygen consumption (VO2-max), vastly Improved performance, faster speed, and greater endurance are all dependent on increasing your anaerobic threshold (lactate threshold). A case study reported by the website Active carried out on a group of high level runners showed that anaerobic threshold accounted for 87 percent variability in 3,000m running performance. Interval training has proven to be one of the best methods to boost your anaerobic threshold. The advantage of anaerobic interval training of 25-meter distance is that it increases the ATP-PC energy system substantially. With 51-60 seconds relief period, the swimmer's ATP-PC energy just recovers. In order to perform the next work, the energy used is not 100% ATP-PC, because it has not recovered 100%. (Mulyono, 1993) [3] Training is the work process undertaken in systematic and sustainable manner, in which the training load and intensity increase more and more, so that finally it gives

stimulation comprehensively to the body and aims to improve the physical and mental capabilities simultaneously. (Esfarjani and Laursen, 2007) [5] Research in runners has found that the use of anaerobic interval training sessions at the velocity at which VO_2max occurs (vVO2max) can lead to improvements in running performance, VO_2max, the velocity at the lactate threshold, running economy, vVO_2max and appears to be a powerful stimulus to neuromuscular co-ordination. In view of the above and similar research findings, the research question posed by the investigator in this study, was whether anaerobic interval training could be successfully used for the improvement of biomotor and physiological levels of intercollegiate level Hockey players, which warrants high level of speed, agility, cardiorespiratory fitness and physiological fitness. The purpose of this study was to find out the effect of anaerobic interval training on selected bio-motor and Skill Performance variables among intercollegiate Hockey players.

2. Methodology

Pre and post-test random group research design was followed in this study. The selected subjects, 40 intercollegiate level Hockey players were randomly divided into two groups. One group formed experimental group and the other group was control group. The experimental group was given anaerobic interval training for six weeks, consisting of speed endurance exercises, fartlek exercises, sprint intervals and stair stepper exercises and the control group was not provided with any experimental treatment. Initial scores on selected bio motor variables, agility and cardio-vascular endurance, skill performance variables, ability hitting, dribbling ability of the subjects were collected using standard tests. After the experimental period of six weeks, the subjects were again tested on selected. The difference between initial and final scores formed the effect of anaerobic interval training on selected criterion variables. The obtained data were subjected to statistical analysis using Analysis of Covariance (ANCOVA).

3. Observations and Discussion

The results presented in Table 1 and Fig. 1 proved that six weeks interval anaerobic training significantly improved the bio motor variable agility and cardiovascular endurance. The results presented in Table 1 and Fig. 2 proved that six weeks interval anaerobic training significantly improved the skill performance variables, ability hitting, and dribbling ability. In this study, the anaerobic interval training, namely, speed endurance exercises, fartlek exercises, sprint intervals and stair stepper were given for six weeks. The number of repetitions the individual was able to sustain for different pause durations and the intensities used in this study, enabled the experimental group subjects to absorb the changes in maximal dynamic power during successive exercise periods which resulted in associated metabolic changes in muscle, which resulted the experimental group to improve the bio motor ability agility and cardio-vascular endurance and altered skill performance variables, ability hitting, dribbling ability, significantly than the control group which was not provided with these anaerobic interval training.

The results of this study are in Agreement with the findings of harris *et al.* (2008) [10], Ingle *et al*. (2006) [4] and Thompson *et al.* (2007) [8] who found functional training programme resulting in significant improvements in speed and several components of functional fitness. The anaerobic interval training would thus, increase the power output and oxygen consumption and as documented by

Vogler *et al.* (2007) [9] and Fry (2004) [11], these contribute to the increased performance, improved vital capacity and stabilized resting pulse rate among the experimental group.

Table 1: Result of analysis of covariance on the biomotor variables between experimental and control group

Endurance							
	Experimental Group	**Control**	**Source of Variance**	**Sum of Squares**	**Df**	**Mean Squares**	**Obtained F**
Pre Test Mean	1886.75	1871.25	Between	2402.5	1	2402.50	0.14
			Within	638307.5	38	16797.57	
Post Test Mean	1976.75	1900.00	Between	58905.6	1	58905.63	5.10*
			Within	438913.8	38	11550.36	
Adjusted Post Test Mean	1627.89	1559.66	Between	46368.0	1	46368.02	6.98*
			Within	245694.1	37	6640.38	
Mean Diff	90.00	28.75					

Agility							
	Experimental Group	**Control**	**Source of Variance**	**Sum of Squares**	**Df**	**Mean Squares**	**Obtained F**
Pre Test Mean	10.90	10.75	Between	0.2	1	0.20	1.04
			Within	7.5	38	0.20	
Post Test Mean	10.77	10.80	Between	0.0	1	0.01	0.03
			Within	8.5	38	0.22	
Adjusted Post Test Mean	7.23	7.40	Between	0.3	1	0.27	6.24*
			Within	1.6	37	0.04	
Mean Diff	-0.33	0.05					

Table 2: Result of analysis of covariance on the skill performance variables between experimental and control group

Dribbling							
	Experimental Group	**Control**	**Source of Variance**	**Sum of Squares**	**Df**	**Mean Squares**	**Obtained F**
Pre Test Mean	53.90	49.85	Between	164.0	1	164.02	0.58
			Within	10708.4	38	281.80	
Post Test Mean	60.15	50.65	Between	902.5	1	902.50	3.17
			Within	10827.1	38	284.92	
Adjusted Post Test Mean	40.89	35.43	Between	293.8	1	293.77	60.77*
			Within	178.9	37	4.83	
Mean Diff	6.25	0.80					

Hitting							
	Experimental Group	**Control**	**Source of Variance**	**Sum of Squares**	**Df**	**Mean Squares**	**Obtained F**
Pre Test Mean	55.20	56.15	Between	9.0	1	9.02	0.05
			Within	6933.8	38	182.47	
Post Test Mean	64.75	56.85	Between	624.1	1	624.10	3.01
			Within	7870.3	38	207.11	
Adjusted Post Test Mean	46.60	37.74	Between	782.9	1	782.85	32.80*
			Within	883.0	37	23.87	
Mean Diff	9.55	0.70					

Table F-ratio at 0.05 level of confidence for 1 and 38 (df) =4.01, 1 and 37(df) =4.01.* Significant

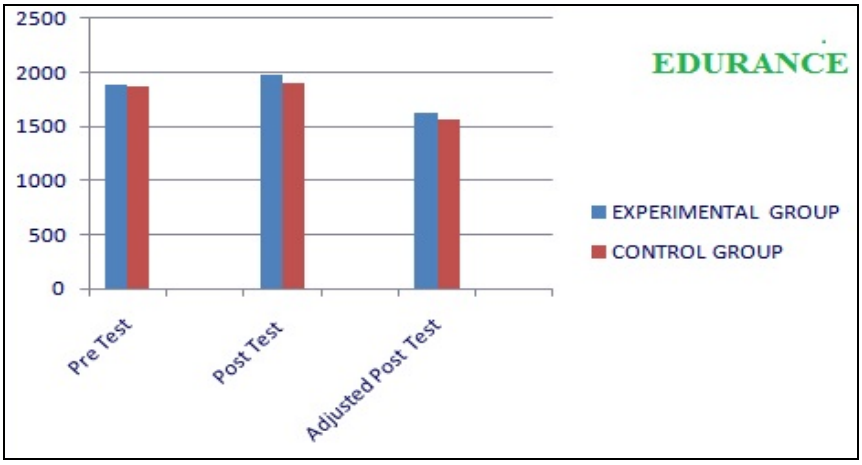

Fig 1: Treatment effects on different stages

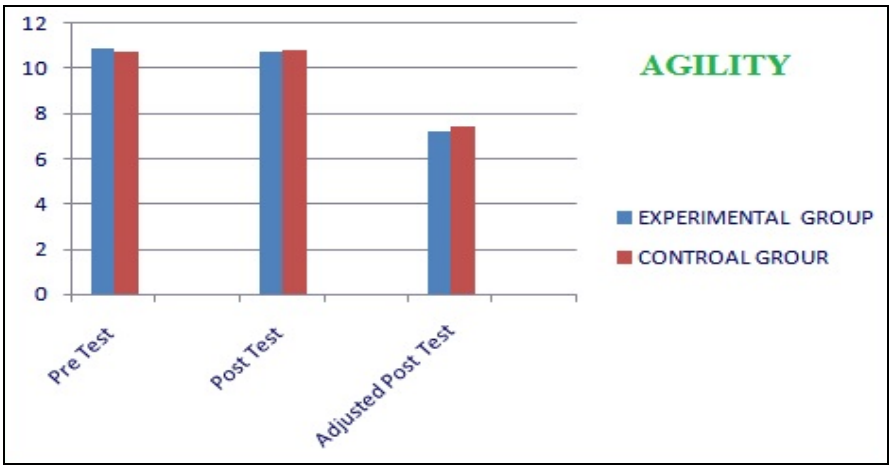

Fig 2: Treatment effects on different stages

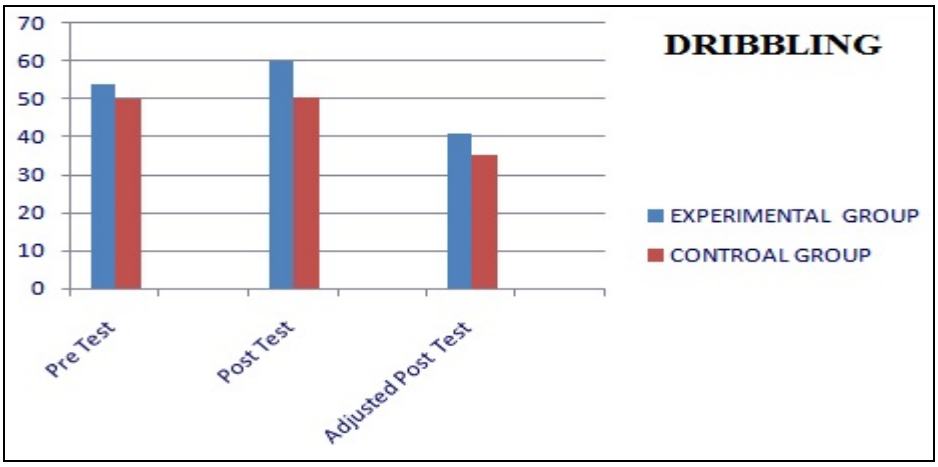

Fig 3: Treatment effects on different stages

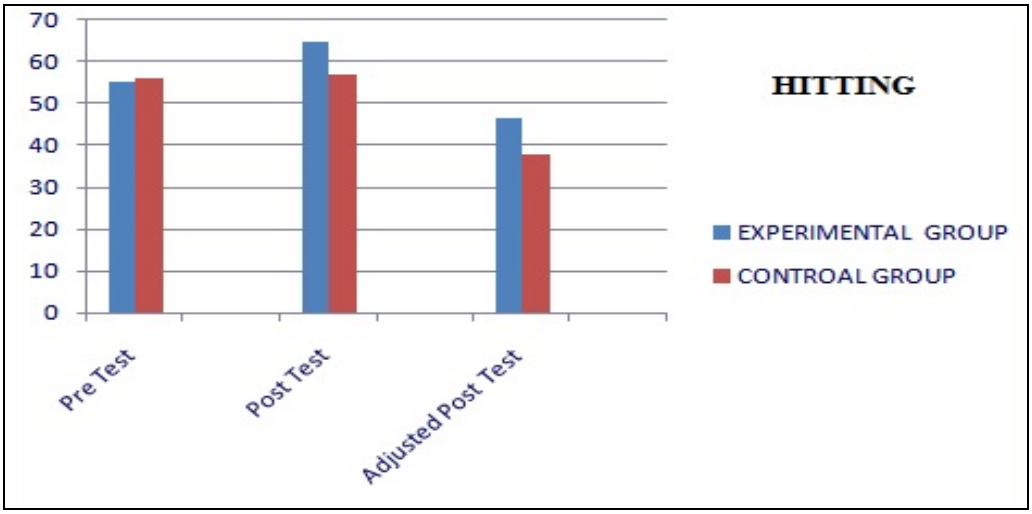

Fig 4: Treatment effects on different stages

4. Conclusion

The results of this one study clearly indicated that anaerobic interval sessions with different work to rest ratios have different energy demands. This interval training performed above the minimal velocity associated with VO2 max. The muscular endurance, maximal oxygen consumption (VO2max), muscular power To develop anaerobic capacity, interval session one is preferred, Improved with anaerobic interval training however, agility, cardio-vascular endurance, and skill performance variables, ability hitting, dribbling ability showed a significant improvement in this study. Hence, Hockey players of intercollegiate level can be safely underwent anaerobic interval whenever necessary.

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