



Impact of strength training on selected physiological variables among hockey players

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Abstract

The purpose of the study was to find out the Impact of Strength training on selected physiological variables among Hockey players. To achieve the purpose of the study thirty male Hockey players have been randomly selected from various colleges in Bharathidasan University of Tamil Nadu, India. The age ranged between 18 and 25 years. The subjects had past experience of at least three years in Hockey and only those who represented their respective college teams were taken as subjects. A series of physiological measurement was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation assessed by spirometer. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The Experimental group participated in the Strength training for 3 alternative days per week for eight weeks. Duration of training session in all days with one session was one hour approximately which including warming up and limbering down. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were statistically analyzed through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. In all cases the criterion for statistical significance would be set as 0.05 level of confidence. The results of the study showed that there were significant differences exist between Strength group and control group. And also Strength training group showed significant improvement on vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation, compared to control group.

Keywords: Strength training, hockey, physiological variables

Introduction

Strength training is well documented as a means of developing athleticism, power and performance potential in a range of sports. Field Hockey places specific demands on the body which are unique to the sport, and therefore it is important that we address these in a well designed training plan. Injuries are something that everyone wants to avoid, and having clarity around the common injury sites in the sport helps us determine where we can begin to make an Impact through a training plan. Each sport possesses specific demands which need to be addressed, but general physical attributes also play an important part in all round athletic performance. A key principle to understand is that of overload specificity. If something is highly specific, it is extremely difficult to overload this task, whereas if we want to overload an athlete it is hard to make it specific.

This makes sense, as an athlete is likely very accustomed to the specific movements of their sport, and therefore trying to recreate these in the gym is not only potentially dangerous but also a little short-sighted. If we want to overload the body, we need to understand that the body adapts based on what the tissue experiences, and not what the movement looks like. Strength training can be seen as a means to stimulate adaptations in the body that increase an athlete's tolerance to training stresses, whilst impacting performance. In a field HOCKEY sense, this means recognising the risks, deciding how to address these in a well-designed programme, and ensuring that the reasons

behind any exercise inclusion are clarified. In a highly tactically determined sport like field Hockey, keeping players robust to tolerate the training demands of the week enables them to complete more on pitch training which ultimately allows them to develop the necessary technical and tactical skills to increase their chances of winning.

Materials and Methods

The purpose of the study was thirty male Hockey players have been randomly selected from various colleges in Bharathidasan University of Tamil Nadu, India. The age ranged between 18 and 25 years. The subjects had past experience of at least three years in Hockey and only those who represented their respective college teams were taken as subjects. A series of physiological measurement was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation assessed by spirometer variables. The subjects were randomly assigned into two groups, such as experimental group (n=15) and control group (n=15). The Experimental group participated in the Strength training for 3 alternative days per week for eight weeks. Duration of training session in all days with one session was one hour approximately which including warming up and limbering down. The control group maintained their daily routine activities and no special training was given. The collected data were statistically analyzed through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. In all cases the criterion for statistical significance would be set as 0.05 level of confidence.

Table 1: Criterion Measures

S. No	Criterion measure	Test items	Unit of measurement
1	Vital capacity	Spirometer	In litres
2	Forced vital capacity	Spirometer	In litres
3	Slow vital capacity	Spirometer	In litres
4	Maximum voluntary ventilation	Spirometer	In litres

Table 2: Descriptive analysis of selected Physiological variables among Control and Experimental groups

S. No	Variables	Group	Pre-Test Mean	SD (±)	Post –Test Mean	SD (±)	Adjusted Mean
1	Vital capacity	CG	2.81	.08789	2.86	.15888	2.86
		CTG	2.80	.06543	3.18	.29730	3.18
2	Forced vital capacity	CG	3.77	.12536	3.88	.47549	3.88
		CTG	3.77	.09716	4.17	.26441	4.18
3	Slow vital capacity	CG	2.89	.15403	3.01	.37293	2.10
		CTG	2.81	.09604	3.39	.39577	3.43
4	Maximum voluntary ventilation	CG	110.47	3.73911	115.10	11.13951	115.08
		CTG	110.53	6.63181	125.07	8.19814	125.09

CTG= Strength training group CG= Control group

The tables II shows the pre and post-test means, standard deviations and adjusted means on selected physiological variables among Hockey players were presented in

numerically. The analysis of covariance on selected variables of Strength training and control groups presented in table – III

Table 3: Computation of analysis of covariance on selected Physiological variables among Hockey players

S. No	variables	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	Vital capacity	Pre-test	Between group	0.00	1	0.00	.056
			Within group	0.17	28	0.01	
		Post-test	Between group	0.78	1	0.78	13.68*
			Within group	1.60	28	0.06	
		Adjusted means	Between sets	0.79	1	0.79	13.61*
			Within sets	1.57	27	0.06	
2	Forced Vital capacity	Pre-test	Between group	0.00	1	0.00	.017
			Within group	0.352	28	0.01	
		Post-test	Between group	0.66	1	0.66	4.46*
			Within group	4.14	28	0.15	
		Adjusted means	Between sets	0.68	1	0.68	4.66*
			Within sets	3.93	27	0.15	
3	slow vital capacity	Pre-test	Between group	0.04	1	0.04	2.58
			Within group	0.46	28	0.02	
		Post-test	Between group	1.05	1	1.05	7.12*
			Within group	4.14	28	0.15	
		Adjusted means	Between sets	1.44	1	1.44	10.92*
			Within sets	3.57	27	0.13	
4	Maximum voluntary ventilation	Pre-test	Between group	0.03	1	0.03	.001
			Within group	811.47	28	28.98	
		Post-test	Between group	744.51	1	744.51	7.78*
			Within group	2678.18	28	95.65	
		Adjusted means	Between sets	752.65	1	752.65	9.51*
			Within sets	2135.90	27	79.11	
		Post-test	Between group	7.50	1	7.50	10.10*
			Within group	20.80	28	0.74	
		Adjusted means	Between sets	2.60	1	2.60	7.38*
			Within sets	9.51	27	0.35	

*Significant at 0.05level of confidences

(Table value for df 1 and 28 was 4. 21, Table value for df 1 and 27 was 4.20)

The obtained F-ratio of 13.61 for adjusted mean was greater than the table value 4.20 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on vital capacity. The above table also indicates that pre test of control and experimental groups did not differ significantly

and post test of control and experimental groups have significant difference on vital capacity.

The obtained F-ratio of 4.66 for adjusted mean was greater than the table value 4.20 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on forced vital capacity. The above table also indicates that pre test of control and experimental groups did not differ significantly

and post test of control and experimental groups have significant difference on forced vital capacity. The obtained F-ratio of 10.92 for adjusted mean was greater than the table value 4.20 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on slow vital capacity. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on slow vital capacity.

The obtained F-ratio of 9.51 for adjusted mean was greater than the table value 4.20 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on maximum voluntary ventilation. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on maximum voluntary ventilation.

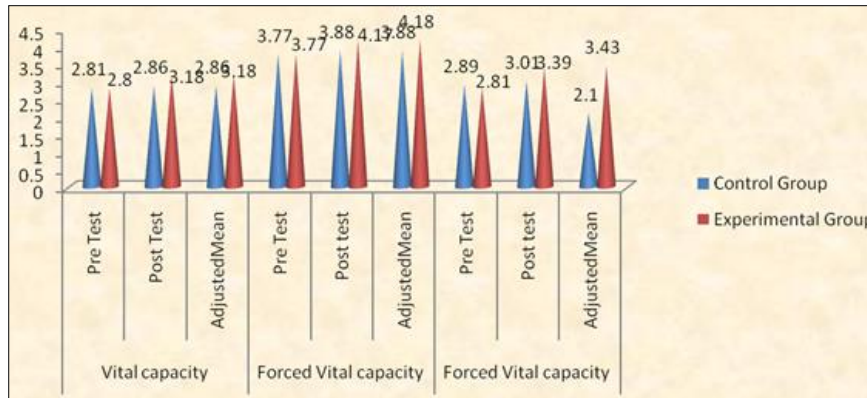


Fig 1: Bar diagram showing the pre-test, post-test and adjusted mean of the control and experimental groups on vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation.

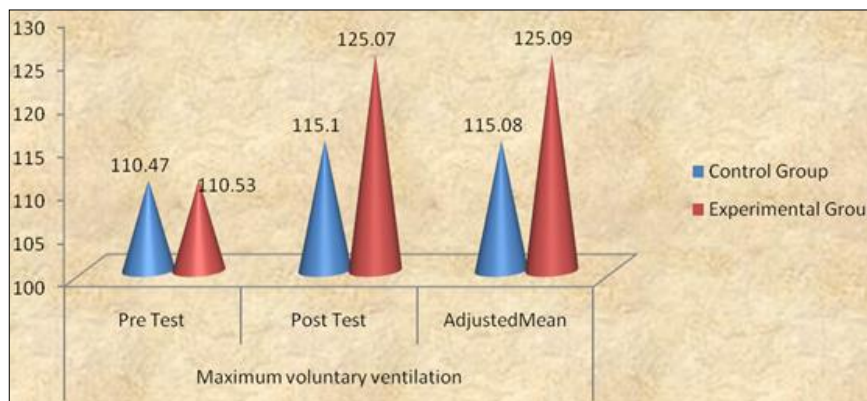


Fig 2: Bar diagram showing the pre-test, post-test and adjusted mean of the control and experimental groups on maximum voluntary ventilation

Discussion of findings

The results of the study indicate that the experimental group which underwent Strength training had showed significant improved in the selected variables namely such as vital capacity, forced vital capacity, slow vital capacity, maximum voluntary when compared to the control group. The control did not show significant improvement in any of the selected variables.

The past studies on selected physical variables also reveals Argus *et al.*, (2012) [1] who had found that tapering had significant improvement vertical jump, 3-RM squat and 3-RM bench press and chin-up (max) and 10-m sprint performance. bodyweight squat jump was a bodyweight countermovement jump, 50 kg countermovement jump, 50 kg squat jump, broad jump, and reactive strength index jump height divided by contact time during a depth jump performance Our findings suggest that high-level rugby union athletes should be exposed to higher volume-load Strength training which includes one heavy lifting

session each week for larger and more uniform adaptation to occur in explosive power throughout a competitive phase of the season. (Duthie *et.*, al (2002) with the higher strength group having a greater improvement in performance using the Strength training method compared with the traditional method. It was concluded that Strength training is advantageous for increasing power output but only for athletes with relatively high strength levels.

Conclusions

From the analysis of data, the following conclusions were drawn.

1. The experimental group showed significant improvement in all the selected physiological variables such as vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation.
2. The control group did not show significant improvement in any of selected variables.

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