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Impact of Treadmill and Sprint Interval Training Packages on Selected Motor Fitness Components and Skill Performance of Hockey Players

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Abstract

This study was conducted to determine the possibility cause and impact of treadmill and sprint interval training packages on selected motor fitness components and skill performance of hockey players. to achieve this purpose of the study, forty-five male hockey players were selected randomly from department of physical education, Bharathidasan Tiruchirappalli, Tamil Nādu state, India, their age groups between 19 to 22 years, the participants were divided into three groups namely experimental group-I experimental group- II and control group-III consisting of fifteen hockey players each. Group-I underwent to treadmill training and Group-II underwent to sprint interval training and group-III acted as control group, who had not participated in any specific activity during the training period other than their daily schedule in the curriculum. All the participants were tested on selected motor fitness components namely speed, cardio vascular endurance, and skill performance namely passing, hitting. The training programme was scheduled for alternative days per week for six weeks. The duration of training session one hour to one and half hours approximately, the data were statistically analyzed with paired sample 't' test and analysis of co-variance (ANCOVA). In all cases 0.05 levels will be fixed as level of confidence to test the hypotheses. There was a significant improvement on selected motor fitness components and skill performance of hockey players due to the impact of six weeks of treadmill and sprint interval training.

Keywords: Treadmill and Sprint Interval Training, Speed, Cardio Vascular Endurance, Passing and Hitting

Introduction

According to the International Hockey Federation (FIH), "the roots of hockey are buried deep in antiquity. There are historical records which suggest early forms of hockey were played in Egypt and Persia c. 2000 BC, and in Ethiopia c. 1000 BC. Later evidence suggest that the ancient Greeks, Romans and Aztecs all played hockey-like games. In Ancient Egypt, there is a depiction of two figures playing with sticks and ball in the Beni Hasan tomb of Khety, an administrator of Dynasty.

In East Asia, a similar game was entertained, using a carved wooden stick and ball, prior to 300 BC. In Inner Mongolia, China, the Daur people have for about 1,000 years been playing beikou, a game with some similarities to field hockey. A similar field hockey or ground billiards variant, called suigan, was played in China during the Ming dynasty, post-dating the Mongol-led Yuan dynasty. A game similar to field hockey was played in the 17th century in Punjab state in India under name refers to the woolen ball, and khundi to the stick. In South America, most specifically in Chile, the local natives of the 16th century used to play a game called which also shares common elements with hockey. (Chetwynd, J. 2018; and Cadman, John, 1981) ^[1, 2].

Treadmill Training

The treadmill training provides a structured aerobic workout, enabling athletes to maintain consistent running speed and monitor intensity through controlled settings. It enhances aerobic endurance, running economy, and cardiorespiratory efficiency. Progressive overload on the treadmill helps improve the players' recovery between sprints and increases overall stamina, the treadmill has the advantages of ease running or walking and of positioning so as to obtain various cardio pulmonary measures reported that treadmill-based aerobic training significantly

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improved cardiovascular endurance, oxygen uptake, and recovery efficiency among field sport athletes. (Longo, A. F., *et al.*, 2022) [3].

Sprint Interval Training

Among various conditioning methods, sprint interval training (SITG) have emerged as effective strategies for enhancing both speed and anaerobic and aerobic power, increases neuromuscular efficiency lactate tolerance capacity. (RST) typically involves multiple short sprints with limited recovery, targeting the athlete's ability to maintain high the other hand, consists of fewer repetitions at maximal intensity with longer recovery, emphasizing peak power output and metabolic adaptations, SITG is particularly beneficial for hockey players as it simulates the stop-and-go demands of match play. (Taylor & Jakeman. 2022) [4].

Methodology

To achieve this purpose of the study, forty-five male hockey players were selected randomly from Department of Physical

Education & Yoga, Bharathidasan University, Tiruchirappalli, Tamil Nādu, India, their age groups between 19 and 22 years, the participants were divided into three groups namely experimental group-I experimental group II and control group-III consisting of fifteen hockey players each. Group-I underwent to treadmill training and Group- II underwent to sprint interval training and group-III acted as control group, who had not participated in any specific activity during the training period other than their daily schedule in the curriculum. All the participants were tested on selected motor fitness components namely speed, cardio vascular endurance and performance variables namely, passing and hitting. The training programme was scheduled for alternative days per week for six weeks. The duration of training session one hour to one and half hours approximately, the data were statistically analyzed with paired sample 't' test and analysis of co-variance (ANCOVA). In all cases 0.05 levels will be fixed as level of confidence to test the hypotheses.

Table 1: Selection of Variables and Test Items.

S. No.	Factors	Variables Selected	Test Used	Unit
1	Motor Fitness Components	Speed	50 Meters Dash	Seconds
2		Cardio Vascular Endurance	Cooper's 12-min run (m)	Meters
3	Performances Variables	Passing	Number of successful passes in 60 sec	Points
4		Hitting	Distance Covered	Points

Results

The influence of independent variables on each criterion variables were analyzed and presented below, the analysis of paired sample 't' test on the data obtained of the pre-test and

post-test means of the treadmill training, sprint interval training and control groups have been analyzed and presented in table 2.

Table 2: The Summary of Mean and Paired Sample 't'-Test for the Pre and Post Tests on Speed, Cardio Vascular Endurance, Passing and Hitting of Treadmill and Sprint Interval Training and Control Groups (In Seconds)

Variables	Groups	Pre-test Mean	Post-test Mean	't' test
Speed	TTG	7.98	7.34	8.04*
	SITG	8.05	7.61	11.37*
	CG	8.02	7.99	1.09
Cardio Vascular Endurance	TTG	2021.28	2358.11	12.58*
	SITG	2045.39	2264.29	16.31*
	CG	2019.24	2028.47	1.24
Passing	TTG	5.06	6.87	11.45*
	SITG	5.11	6.04	6.80*
	CG	5.09	5.13	0.39
Hitting	TTG	7.21	9.16	10.27*
	SITG	7.26	8.73	13.00*
	CG	7.18	7.25	0.61

*Significant at 0.05 level table value with df 14 was 2.145.

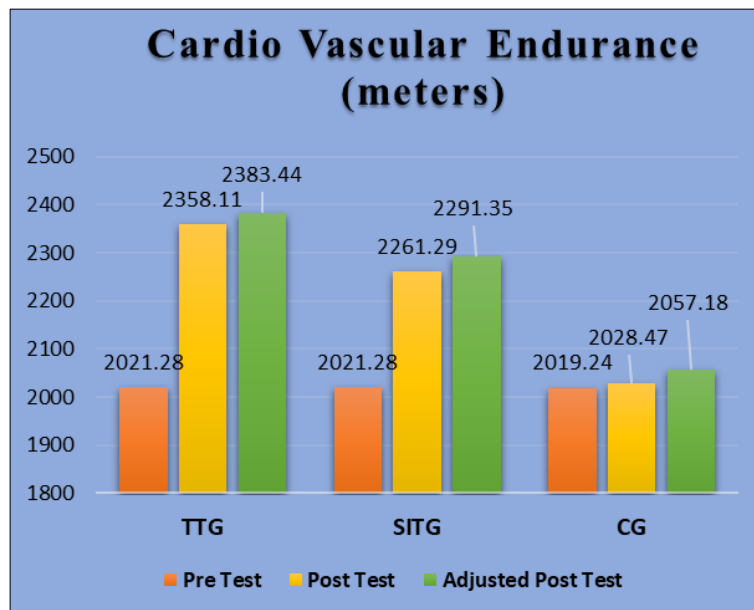
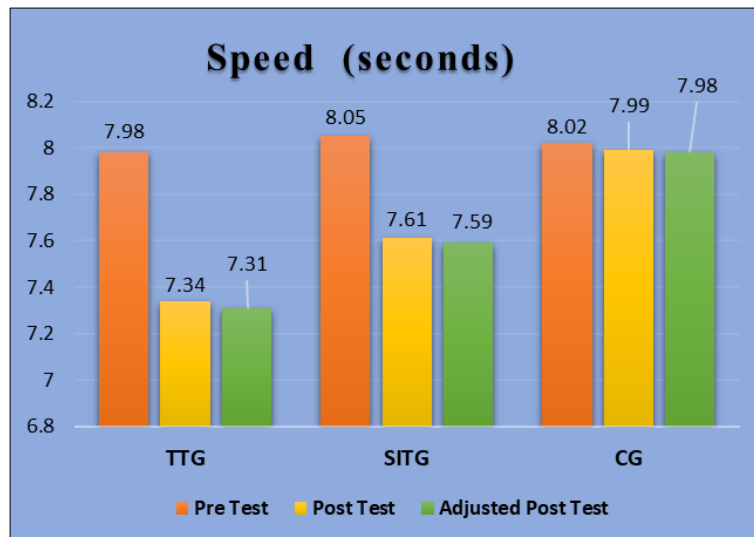
Table 2 shows that the obtained paired sample t-test values between the pre and post-test means of selected variables such as speed, cardio vascular endurance, passing and hitting of the treadmill training, sprint training and control groups were 8.04, 11.37, 12.58, 16.31, 11.45, 6.80, 10.27 and 13.00 respectively. The table value required for a significant difference with df 14 at 0.05 level was 2.145. Since, the obtained t ratio value of treadmill and sprint interval training was greater than the required table value, it is understood that

treadmill and sprint interval training groups significantly improved the performance of speed, cardio vascular endurance, passing and hitting. However, the control group had not shown any significant improvement on speed, cardio vascular endurance, passing and hitting of hockey players. The analysis of covariance on the speed, cardio vascular endurance, passing and hitting of treadmill training, Sprint Interval training and control groups have been analyzed and presented in table 3

Table 3: Analysis of Covariance on Speed, Cardio Vascular Endurance, Passing and Hitting of Treadmill and Sprint Interval Training and Control Groups

Component	Adjusted Post-test Mean Values			SV	SS	Df	MS	'F'- Ratio
	TTG	SITG	CG					
Speed	7.31	7.59	7.98	BG	2.88	2	1.44	19.46*
				WG	3.034	41	0.074	
Cardio Vascular Endurance	2383.44	2291.35	2057.18	BG	1010046.56	2	505023.28	55.29*
				WG	374497.28	41	9134.08	
Passing	6.92	6.09	5.14	BG	28.92	2	14.46	19.02*
				WG	31.16	41	0.76	
Hitting	9.23	8.75	7.29	BG	18.48	2	9.24	40.17*
				WG	9.43	41	0.23	

*The table value required for a significant difference with df 14 at 0.05 level with df 2 and 41 was 3.23.



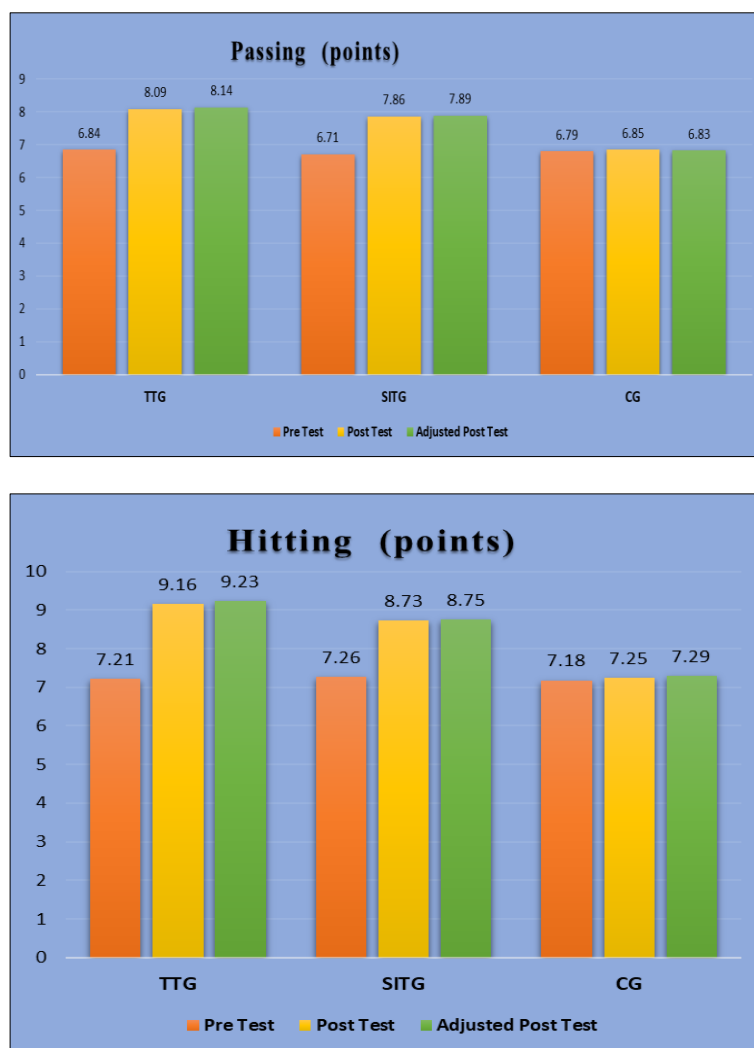


Fig 1: The Pre, Post and Adjusted Post-Test Means Values of Treadmill Training Group, Sprint Interval training and Control Groups on Speed, Cardio Vascular Endurance, Passing and Hitting.

Table 3 shows that the obtained paired sample F-ratio values between the pre and post- test means of selected variables such as speed, cardio vascular endurance, passing and hitting of the treadmill training, sprint interval training and control groups were 19.46, 55.29, 19.02 and 40.17 respectively. the obtained F-ratio value of treadmill training and sprint interval training was greater than the required table value, it is understood that treadmill training and sprint interval training groups significantly improved the performance of speed, cardio vascular endurance, passing and hitting. However, the control group had not shown any significant improvement on selected criterion variables of hockey players. The analysis of covariance on the speed, cardio vascular endurance, passing and hitting of treadmill training, sprint interval training and control groups have been analyzed and presented in table 3

Justification for Selecting the Variables

Hockey is popular team sports which required high level of motor fitness and skills performance. The Motor fitness components such as speed, cardio vascular endurance, plays a critical role in hockey performance. Similarly, performance factor such as passing and hitting are fundamental skills in hockey, which plays influential role in hockey performance.

Discussion on Findings

It was showed that treadmill training group (TTG) was significantly outperformed than the sprint interval training group (SITG) and control group (CG) on the improvement of

hockey players. Further, it was showed that sprint interval training group (SITG) was significantly better than the control group (CG) on the improvement of speed, cardio vascular endurance among hockey players. However, the control group did not show any significant improvement on cardio vascular endurance among hockey players. The results of the studies were in line with the studies who also reported that treadmill and sprint-based training methods effectively enhanced cardiovascular endurance and speed performance in team sport athletes. (Kasper, K., Hildebrandt, T. and Muller, J. 2021) [5].

Furthermore, the sprint interval training group (SITG) demonstrated a significant improvement in speed and cardiovascular endurance compared to the control group. sprint interval training involves repeated bouts of high-intensity running interspersed with recovery periods, which enhances both the anaerobic and aerobic energy systems. This dual adaptation is particularly beneficial for hockey players, who frequently alternate between short bursts of intense activity and moderate recovery phases during matches. The results are consistent with findings. (Buchheit and Laursen 2013., & Senthil Kumar T) [6, 7].

On the other hand, the control group (CG), which did not participate in any specialized training, showed no significant improvement in speed cardiovascular endurance. This suggests that regular game practice alone may not be sufficient to bring about notable physiological adaptations without structured conditioning programs.

Conclusions

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

- There was a significant improvement on selected motor fitness components namely, speed, cardio vascular endurance due to the impact of six weeks of treadmill and sprint interval training packages among hockey players.
- There was a significant improvement on selected performance variables such as passing, hitting due to the impact of six weeks of training and sprint interval training among hockey players.
- Treadmill training group was found to be significantly outperformed when compared with sprint interval training and control groups in all the selected dependent variables namely speed, cardio vascular endurance, passing and hitting among male hockey players.

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