OPEN ACCESS JOURNALS
Indiana Journal of Agriculture and Life Sciences
Abbriviate Tittle- Ind J Agri Life Sci
ISSN *(Online)*- 2583-1623
Journal Homepage Link- https://indianapublications.com/journal/IJALS
DOI- https://doi.org/10.5281/zenodo.17436723

INDIANA PUBLICATIONS
PRODUCTIVE AND QUALITY RESEARCH

Research Article

Volume-05|Issue-05|2025

Impact of Total Resistance Exercise on Selected Motor Abilities of Hockey Players

Dr. Bidyarani Yumnam[1], Dr. Satish Kumar[2],

[1]Assistant Professor, Department of Physical Education, The ICFAI University Tripura.
[2]Assistant Professor, Department of Physical Education, & Director of Sports, The ICFAI University Tripura.

Article History
Received: 11.10.2025
Accepted: 21.10.2025
Published: 24.10.2025

Citation
Yumnam, B., Kumar, S. (2025). Impact of Total Resistance Exercise on Selected Motor Abilities of Hockey Players. *Indiana Journal of Agriculture and Life Sciences, 5*(5), 8-13.

Abstract: The purpose of the study was to evaluate the impact of total resistance exercise on selected motor abilities of hockey players. Thirty (N=30) male hockey players were randomly selected, fifteen (N=15) each for experimental and control groups. Only the experimental group was given a 6-week training program of total resistance exercise. The age range is between 18 to 25 years. The players are practicing regular training at the Hockey Union Club, LYL,Imphal East, Manipur. The selection of subjects has participated in at least a state-level tournament and above. The pertaining data on speed, agility, and explosive strength were collected by administering the 50-yard dash, shuttle run, and standing broad jump. The pertaining data of 50-yard dash, shuttle run, and standing broad jump were expressed in the units of second, seconds and meters, respectively. Descriptive analysis, paired sample t-test, and covariance (ANCOVA) statistical techniques are applied. The level of significance was set at 0.05 confidence level. The results of the paired sample t-test, significant improvement in the experimental groups of total resistance exercise on speed, agility, and explosive strength of hockey players, as calculated values t=7.13, 7.90, and 14.75 is greater than the tabulated value 2.145. However, no significant improvement in the control groups of hockey players on speed, agility, and explosive strength, as calculated values t=2.00, 0.60, and 1.66 are less than the tabulated value 2.145. Further, by using the analysis of variance (ANCOVA), significant differences between the experimental and control groups means comparison of speed, agility, and explosive strength, as calculated values F=52.55, 8.49, and 185.27 are greater than the tabulated value 4.21 at 0.05 confidence level. The study is concluded that six-week total resistance training program was effectively improves the speed, agility, and explosive strength of hockey players in the experimental group compared to the control group.

Keyword: Total Resistance Exercise, Motor Abilities, Hockey Players

INTRODUCTION

Hockey is a field sport, the players demand high physical fitness efficiency, such as speed, agility, explosive strength, strength endurance, aerobic efficiency, and skill efficiency, such as dribbling, passing, and shooting etc. Physical fitness and skill performance are developed from regular training exercises.

Sports training is the basic preparation component for better performance through physical exercise (1). It is based on a systematic process with scientific principles applied toenhance better performance of the athletes. There are a lot of physical activities and specific training programs for the development of physical fitness and skill performance. Techniques, tactical efficiency, and psychological stability play a vital role in the training process. Regular training programs can increase the fitness level of the athletes, such as aerobic capacity, anaerobic capacity, muscular endurance, strength, and flexibility (2). Total resistance exercise refers to a specialized form of suspension training that is a unique exercise program for achieving a high fitness level. There is used gravity allow the body to work against itself.

Speed is a crucial element in field hockey, especially while attacking and defending. Speed helps players to run faster, reach the ball quicker, and ultimately make more successful plays. This is particularly important when defending penalty corners, where the player needs to run quickly to the goalpost and cover it (3)

Agility is the ability to change direction quickly while maintaining balance and control. In field hockey, agility is vital when dribbling past defenders or avoiding tackles (4). Change of direction speed represents the physical quality of agility, while perceptual and decision-making factors constitute the underlying cognitive components of agility (5). The successful performance depends on the ability of quick direction changes without losing speed and balance. Agility is good and reliable in assessing the ability to change direction rapidly (6). Agility has physical relationships with physical qualities such as strength, power, and technique, as well as cognitive components such as visual scanning techniques, visual scanning speed, and anticipation (5).

Explosive strength is fundamental in optimizing a field hockey player's ball control and shooting power. A strong physique allows players to exert more force when striking the ball, resulting in more powerful shots. Explosive strength training exercises focusing on the

***Corresponding Author:** Dr. Satish Kumar

upper body, especially the core and upper arm, can enhance a player's ability to accurately and forcefully strike the ball (7).

Objective

The objective of this study is

- To study the impact of total resistance exercise on the speed performance of hockeyplayers.
- To study the impact of total resistance exercise on the agility performance of hockey players.
- To study the impact of total resistance exercise on the explosive strength of performance hockey players

METHODOLOGY

Selection of Subject

For this study, thirty (N=30) male hockey players were randomly selected, fifteen (N=15) each for experimental and control groups. Only the experimental group was given a6-week training program of total resistance exercise. The age range is between 18 to 25 years. The players are practicing regular training atthe Hockey Union Club, LYL, Imphal East, Manipur. The selection of subjects is participated in at least a state-level tournament and above.

Collection of Data

This study was designed as an experiment, and the collection of data is based on pre- and post-test evaluations. The data on speed, agility, and explosive strength were collected from thirty (N=30) male hockey players and fifteen (N=15) each from experimental and control groups. The pertaining data on speed, agility, and explosive strength were collected by administeringthe 50-yard dash, shuttle run, and standing broad jump. The pertaining data of 50-yard dash, shuttle run, and standing broad jump were expressed in the units of second, seconds and meters, respectively. The training schedule and collection of data were taken only morning session.

Data Analysis

The statistical techniques are descriptive analysis, paired sample t-test, and covariance (ANCOVA) are applied to determine the essential characteristics of the data, significant mean differences between the pre- and post-test of speed, agility, and explosive strengthamong the experimental and control groups. The level of significance was set at 0.05.

The total resistance exercise training plan for six (6) weeks is shown in Table 1.

Table 1: 6 Weeks Training Schedule (Monday to Saturday)

Training Week/Day	Type of Exercise	Rep	No. of Set	Dur. (In Mn.)	Intensity	Rest Between Set (in Second)	Total Dur. (in Min)
I & II (Mon, Tue, Wed, Fri & Sat)	Warm Up	1	1	10	**50-60% (102-122 heart rate)**	30	36
	TRX Squat	12	3	2			
	TRX Single Leg Squat	12	3	2			
	TRX Lunge	12	3	2			
	TRX Side Lunge	12	3	2			
	Sprinting Start	12	3	2		10	
	Calf Raise	12	3	2			
	Hamstring Curl	12	3	2			
	Leg Extension	12	3	2			
	Cooling Down	1	1	8			
III & IV (Mon, Tue, Wed, Fri & Sat)	Warm Up	1	1	10	**60-70% (122-143 heart rate)**	30	46
	TRX Squat	15	3	3			
	TRX Single Leg Squat	15	3	3			
	TRX Lunge	15	3	3			
	TRX Side Lunge	15	3	3			
	Sprinting Start	15	3	3		10	
	Calf Raise	15	3	3			
	Hamstring Curl	15	3	3			
	Leg Extension	15	3	3			
	Cooling Down	1	1	10			
V & VI (Mon, Tue, Wed, Fri & Sat)	Warm Up	1	1	10	**70-80% (143-164 heart rate)**	30	55
	TRX Squat	18	3	4			
	TRX Single Leg Squat	18	3	4			
	TRX Lunge	18	3	4			
	TRX Side Lunge	18	3	4			
	Sprinting Start	18	3	4		20	
	Calf Raise	18	3	4			
	Hamstring Curl	18	3	4			
	Leg Extension	18	3	4			
	Cooling Down	1	1	10			

***Corresponding Author:** Dr. Satish Kumar

FINDING

The mean (M), standard deviation (SD), mean difference, and standard error were calculated by using the descriptive statistics. The paired sample t-test was applied to find out the mean difference between pre- and post-test of Speed, agility, and explosive strength for both experimental and control groups. the data were further examined by applying covariance (ANCOVA) to find out the significance differences among the pre and post test means of speed, agility and explosive strength between the experimental and control groups. The level of significance was set at 0.05.

The mean (M), standard deviation (SD), and paired sample t-test of pre- and post-test of speed agility for the experimental group are shown in Table 2.

Table 2: The Descriptive and Paired Sample 't' test of the Experimental Group

Variables	Test	N	Mean	MD	SD	SE	df	t	Sig. p-value
Speed	Pre	15	7.25	1.14	0.46	0.16	14	7.13	0.00
	Post	15	6.10		0.44				
Agility	Pre	15	9.63	0.79	0.33	0.10	14	7.90	0.00
	Post	15	8.84		0.30				
Explosive Strength	Pre	15	1.82	0.59	0.16	0.04	14	14.75	0.00
	Post	15	2.41		0.12				

Significant at 0.05, where tabulated $t_{(0.05)}(14)=2.145$

The above table 2 reveals that the mean (M) and standard deviation (SD) of pre and post-test of speed performance of hockey were 7.25±0.46 and 6.10±0.44 respectively, and found the calculated value of t=7.13 respectively.

For the agility performance, the mean (M) and Standard deviation (SD) of pre and post-test of hockey players were 9.63±0.33 and8.84±0.30 respectively, and found the calculated t=7.90 respectively.

For the explosive strength, the mean (M) and standard deviation (SD) of pre and post-test of hockey players were1.82±0.16 and2.41±0.12 respectively, and found the calculated t=14.75 respectively.

So, there was found the significant improvement of total resistance exercise on speed, agility and explosive strength performance of the hockey players as the calculated t=7.13, 7.90, and 14.75 is higher than the tabulated t=2.145 at 0.05 level of confidence.

Again, the descriptive analysis and paired sample t-test of pre and post-test of speed, agility, and explosive strength performance of hockey players for the control group are shown in Table 3.

Table3: The Descriptive and Paired Sample 't' test Control Group

Variables	Test	N	Mean	MD	SD	SE	df	t	Sig. p-value
Speed	Pre	15	7.62	0.04	0.55	0.02	14	2.00	0.08
	Post	15	7.58		0.53				
Agility	Pre	15	9.31	0.03	0.57	0.05	14	0.60	0.51
	Post	15	9.28		0.49				
Explosive Strength	Pre	15	1.88	0.05	0.23	0.03	14	1.66	0.12
	Post	15	1.93		0.18				

Significant at 0.05, where tabulated $t_{(0.05)}$ (14) =2.145

Table 3 reveals that the mean (M) and standard deviation (SD) of pre and post-test of speed performance of hockey players were 7.62±0.55 and7.58±0.53 respectively, and found the calculated t=2.00 respectively.

The mean (M) and standard deviation (SD) of pre and post-test of agility performance of hockey players were 9.31±0.57 and9.28±0.49 respectively, and the calculated values of t=0.60 respectively.

The mean (M) and standard deviation (SD) of pre and post-test of explosive strength performance of hockey players were 1.88±0.23 and1.93±0.18 respectively, and the calculated value of t=1.66 respectively.

Therefore, no significant differences in speed, agility, and explosive strength of control group hockey players as the calculated t=2.00, 0.60, and 1.66 is less than the tabulated t=2.145 at 0.05 confidence level.

The graphical representation of mean comparison of speed, agility, and explosive strength performance of hockey players is shown in Figures 1, 2, and 3.

***Corresponding Author:** Dr. Satish Kumar

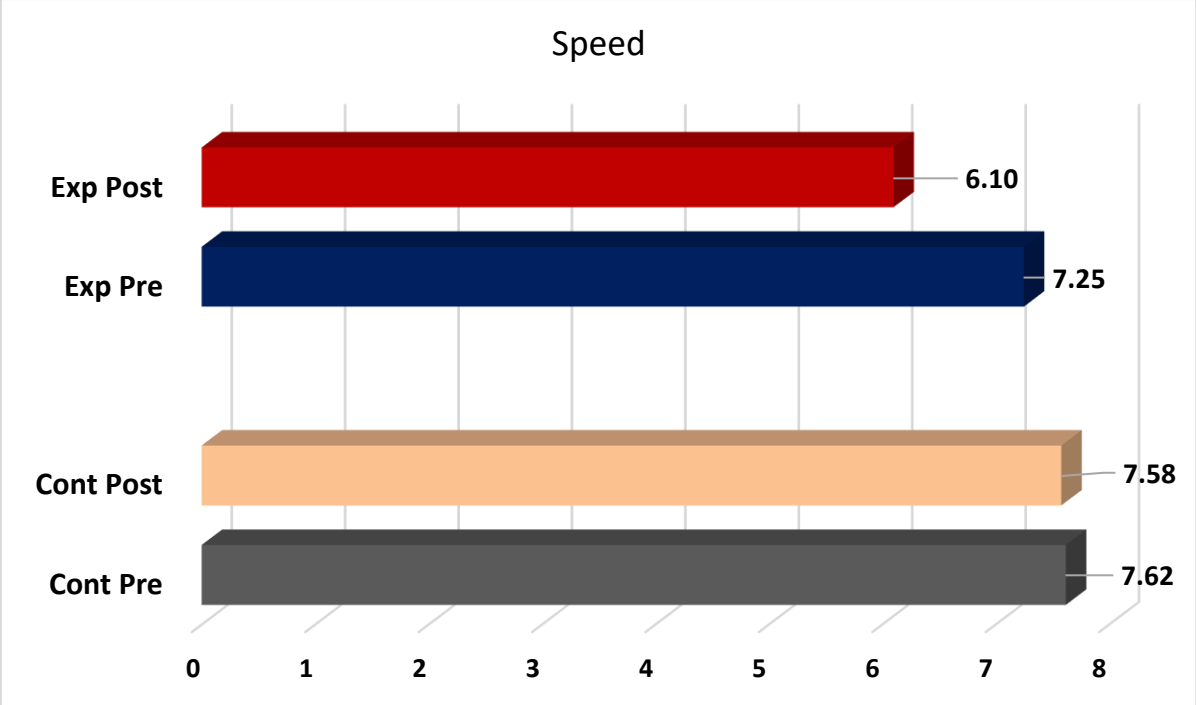

Figure-1: Pre and Post Test Meana Comparison of Experimental and Control group of Speed

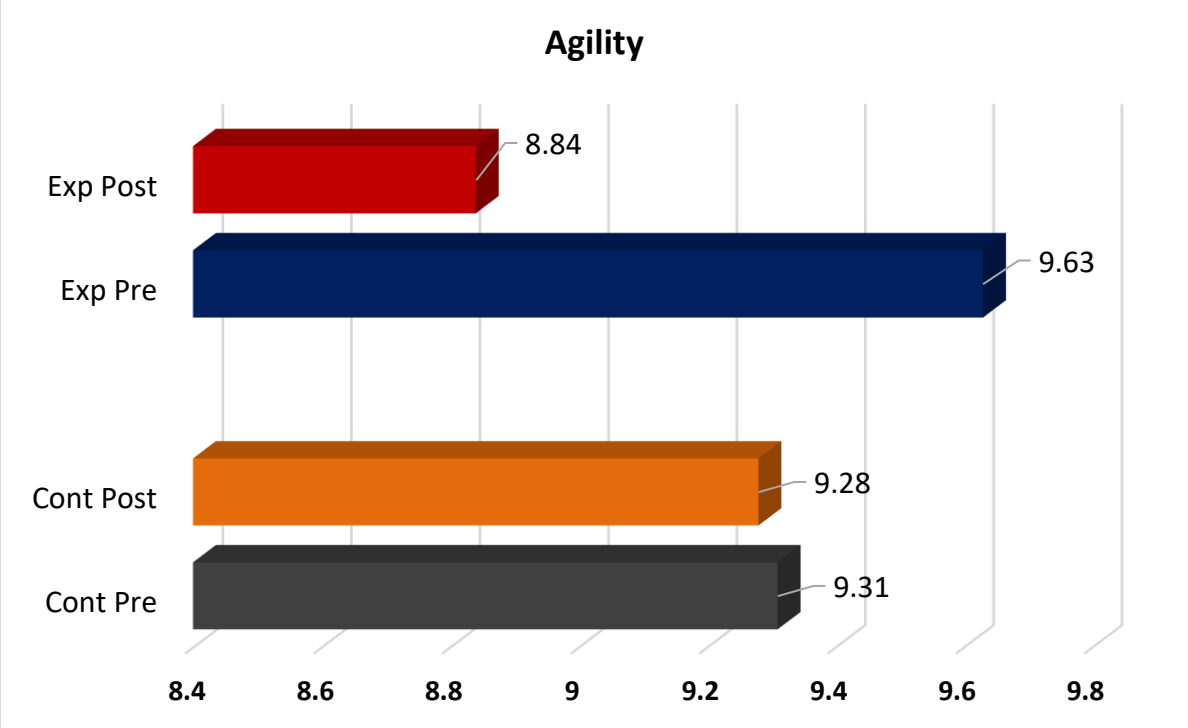

Figure-2: Pre and Post Test Means Comparison of Experimental and Control Group of Agility Performance

***Corresponding Author:** Dr. Satish Kumar

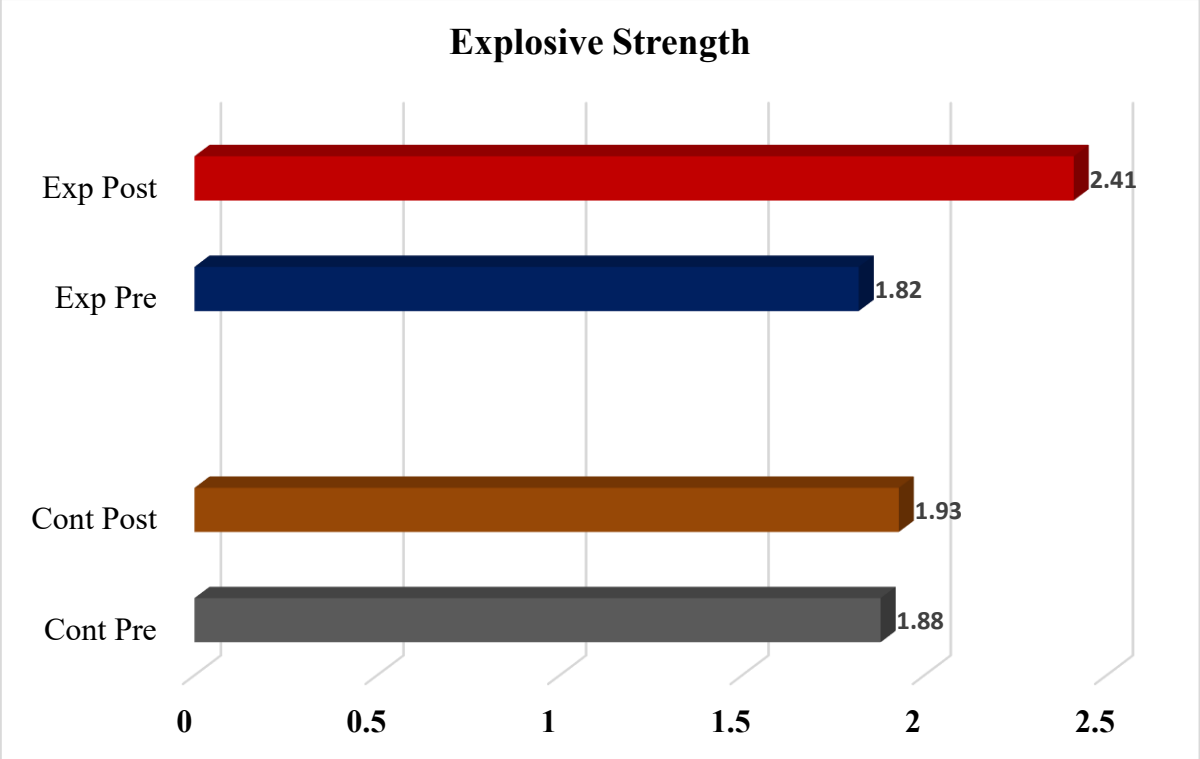

Figure-3: Pre and Post-Test Means Comparison of Experimental and Control Groups of Explosive Strength

To find out the significant differences among the pre- and post-test means of speed, agility, and explosive strength between the experimental and control groups, the analysis of variance (ANCOVA) was employed and is shown in Table 4.

Table 4: Pre- and Post-Means Comparison of Speed, Agility, and Explosive Strength Between Experimental and Control Groups (ANCOVA)

Variables	Source	Type III sum of Squares	df	Mean Square	F	Sig.
Speed	Group	8.995	1	8.99	52.55	0.00
	Error	4.621	27	0.17		
	Total	1405.458	30			
Agility	Group	.887	1	0.89	8.49	0.01
	Error	2.821	27	0.10		
	Total	2426.831	30			
Explosive Strength	Group	1.931	1	1.93	185.27	0.00
	Error	.281	27	0.01		
	Total	143.842	30			

Significant difference at 0.05 level of confidence, where tabulated $F_{(0.05)(1,27)} = 4.21$.

The above table reveals that there was a significant difference between the pre- and post-test means of the speed, agility, and explosive strengthvariables between the experiment and control groups, as the obtained values F=52.55, 8.49, and 185.27 were higher than the tabulated value F=4.21 at the 0.05confidence level.

DISCUSSION OF FINDINGS

The finding of the present study shows that the results of the paired sample t-test there was significant improvement in the experimental groups of total resistance exercise on speed, agility, and explosive strength of hockey players, as calculated values t=7.13, 7.90, and 14.75 is greater than the tabulated value 2.145 at 0.05 confidence level. However, no significant improvement in the control groups of hockey players on speed, agility, and explosive strength, as calculated values t=2.00, 0.60, and 1.66 are less than the tabulated value 2.145 at 0.05 confidence level. Further, by using the analysis of variance (ANCOVA), significant differences between the experimental and control groups means comparison of speed, agility, and explosive strength, as calculated values F=52.55, 8.49, and 185.27 are greater than the tabulated value 4.21 at 0.05 confidence level. The results might be due to the total resistance training emphasis on improving the muscle strength, power,and performance of the hockey players. Thetotal resistance training improves the muscle

***Corresponding Author:** Dr. Satish Kumar

strength, power, vertical jump performance, and running speed, agility performance of the athletes (8). Improving muscular strength and power may also affect anaerobic power performance indicators such as speed and agility performance of the athletes (9, 10). Cin et al. (2021) reported that a six-week of traditional resistance training significantly improves physical fitness parameters such as speed, agility, muscular power, maximum strength, and vertical jump in professional volleyball players (10).

The finding of the study reveals that a six-week total resistance training program effectively improves the speed performance of hockey players. The results might be due to total resistance training can improve muscle power and strength, this power and strength generating the force for sprinting and quick body movement.

The findings of this study show that a six-week total resistance training program effectively improves the agility performance of hockey players. The results might be due to total resistance training, which focuses on targeting muscle groups that generate strength for fast physical activities in specific drills of the athletes. Mainly in hockey, players play in defensive and offensive structures with high agility to cover the whole ground.Resistance training significantly improves the agility performance of the school boy's hockey players (11).

The finding of the present study reveals that a six-week total resistance training program effectively improves the explosive strength of hockey players. The results might be due to total resistance training emphasis on muscle strength and power for the physical activities relative to the demands of the game. The regular resistance training significantly positive effect on the muscular strength and muscular endurance of male hockey players (12).

CONCLUSION

The findings of this study, it was concluded that six-week total resistance training program was effectively improves the speed, agility, and explosive strength of hockey players in the experimental group compared to the control group.

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***Corresponding Author:** Dr. Satish Kumar