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A Comprehensive Study On The Effects Of Strength And Skill Training On The Physical Performance Of Male Hockey Players

Bikram Singnar[1], Dr. N. Suhindar Singh[2]

[1](Ph.D. Scholar LNIPE, NERC, Guwahati)

[2](Physical Education, Assistant Professor, Lakshmibai National Institute of Physical Education, NERC, Guwahati, Assam)

Abstract

This study aims to find the effects of an 8-week strength and skill training program on the physical performance of male field hockey players, specifically focusing on speed and agility. Forty-five competitive players aged 16 -23 years were randomly assigned to one of three groups: Skill Training (n = 15), Strength Training (n = 15), and a Control Group (n = 15) with no specialized intervention. Physical performance was evaluated before and after the training period using the 50-meter sprint for speed and the T-test for agility. Data were analyzed using analysis of covariance (ANCOVA), controlling for baseline measurements.

The findings revealed statistically significant improvements in both speed and agility among the experimental groups, with the greatest gains observed in the Strength Training group (Speed: M = 6.45 s; Agility: M = 11.68 s). ANCOVA results indicated significant between-group differences—Speed ($F(2, 41) = 33.61$, $p < .001$) and Agility ($F(2, 41) = 10.37$, $p < .001$)—demonstrating a strong effect of the intervention. These results align with previous research suggesting that integrated strength training is highly effective for improving sprint mechanics and multidirectional movement, both of which are essential in field hockey.

In conclusion, an approach to strength training with regular practice significantly enhances speed and agility more effectively than skill training alone or standard practice routines. These outcomes offer valuable implications for coaches and trainers seeking to develop comprehensive, evidence-based conditioning programs that optimize athletic performance.

Keywords: field hockey, strength training, skill training, speed, agility, physical fitness, sports performance.

Introduction

Field hockey is a high-intensity sport that demands a unique combination of speed, strength, agility, endurance, and technical skill from its players. (Budiman & Prabowo, 2020) Given these physical requirements, the implementation of targeted strength and skill training has become increasingly important in sports science to enhance player performance. The sport involves frequent, short bursts of intense activity—such as sprinting, tackling, striking, accelerating, decelerating, and changing direction—throughout a match. (Burr et al., 2008; Noblett et al., 2023; Azam et al., 2021) To meet these demands, well-structured training programs are essential for developing key physical attributes like muscular strength, sprint speed, and agility, which are critical for success in competitive play.

Numerous studies have explored how different training interventions influence athletic capabilities relevant to field hockey. Strength training, in particular, stands out as a cornerstone for elevating performance. For

example, Bieniec and Grabara (2025) demonstrated that strength programs emphasizing functional movement patterns significantly enhance sprint speed and agility in elite young players, highlighting the importance of developing lower-body power for improved mobility on the field. Complementing this, Bustamante-Garrido et al. (2023) underscored the critical role of horizontal force production in strength training, showing its effectiveness in boosting sprint performance and reducing ground contact time—both crucial for rapid changes of direction while controlling the ball.

In addition to strength, skill-specific training is equally essential for refining performance. Research by Bezak and Pridal (2017) established that upper-body strength plays a major role in shot velocity, a key factor in scoring success. Moreover, Hanjabam and Kailashiya (2014) found that combined regimens incorporating strength, sprint, and agility exercises lead to significant improvements in cardiovascular fitness and body composition, which support sustained athletic effort throughout games. Anaerobic power and endurance, especially critical for elite field hockey players, are also developed through rigorous strength conditioning, as noted by Roczniok et al. (2018). These physiological gains not only enhance individual performance metrics but also improve fatigue resistance, enabling players to maintain high levels of speed and precision during extended periods of play.

This study aims to investigate the effects of strength and skill training on the overall physical performance of male field hockey players. By analysing existing research alongside empirical data collected from athletes, this research seeks to identify the most effective training strategies to optimize speed, power, coordination, and technical abilities. Ultimately, the findings are intended to provide actionable insights for coaches and players, facilitating the development of evidence-based training programs that maximize performance outcomes on the field.

II. Materials and Methods

Selection of Subjects: A total of forty-five (n = 45) male field hockey players were randomly selected for the present study. The participants, aged between 16 -23 years, were recruited from local field hockey clubs in the Nagaon district of Assam. To maintain a homogeneous sample, only those with a minimum of two years of active field hockey experience at the district or club level were included. Players with recent injuries or medical conditions that could affect their physical performance were excluded. The selected subjects were then randomly divided into three equal groups of fifteen (n = 15) each. The first group served as the Skill Training Group (Experimental Group I), the second as the Strength Training Group (Experimental Group II), and the third as the Control Group, which did not undergo any specialized intervention. Before the commencement of the study, informed consent was obtained from all participants, and all procedures were conducted in accordance with established ethical guidelines.

Pre-Test Preparation: Participants were instructed to avoid strenuous physical activity for 48 hours before testing to minimize the effects of fatigue. They were also advised to maintain normal hydration levels and avoid alcohol or caffeine consumption within 24 hours of testing. Each participant completed a standardized warm-up protocol consisting of 10 minutes of light aerobic activity followed by dynamic stretching to prepare the body for physical exertion and minimize injury risk during testing.

Selection of Test and Criterion Measure: The following tests and criterion measures were taken to evaluate the Physical fitness measurement of the subject they are as followed: -

Variables	Test	Measuring units
Speed	50-meter Dash	Sec.
Agility	T-test	Sec.

Training Program: The 8-week strength program was periodized into two four-week mesocycles with progressive overload:

Frequency: 3 sessions/week (Monday, Wednesday, Friday)

Session Duration: 60 minutes (including warm-up and cool-down)

Exercises	Week 1-4		Week 5-8	
	Repetition	Set	Repetition	Set
Bench Press	10 RM	3	8 RM	4
Shoulder Press	10 RM	3	8 RM	4
Back- Half Squat	10RM	3	8 RM	4
Burpee Jumps	10	3	8	4
Dead Lifts	10 RM	3	8 RM	4

Training loads were individualized based on initial testing and adjusted weekly to maintain optimal training stimulus.

Skill training: In hockey skill training, the players practiced zigzag dribbling, dribbling in one spot, dribbling in a circle, passing to a partner, shooting at the goal, hitting the ball against a wall, dribbling and stopping the ball, passing and stopping, and hitting the ball against a wall and stopping it. The activity lasted for 45 to 60 mins. These nine exercises were done regularly for eight weeks.

Statistical Technique: In the study, descriptive statistics like mean and standard deviation were used and analysis of covariance (ANCOVA) was used to compare the experimental and control group. The significance of the study was set at 0.05.

Results: The Descriptive statistics Mean and Standard deviation for the variables are given below:

Variables	Group	Mean	Standard Deviation	Total
Speed	Skill Training	6.787	.5303	15
	Strength Training	6.453	.2722	15
	Control	7.513	.3623	15
Agility	Skill Training	11.827	.4543	15
	Strength Training	11.679	.3887	15
	Control	12.426	.7652	15

Table 2: Mean and Standard Deviation of Post-test data on Speed, Agility

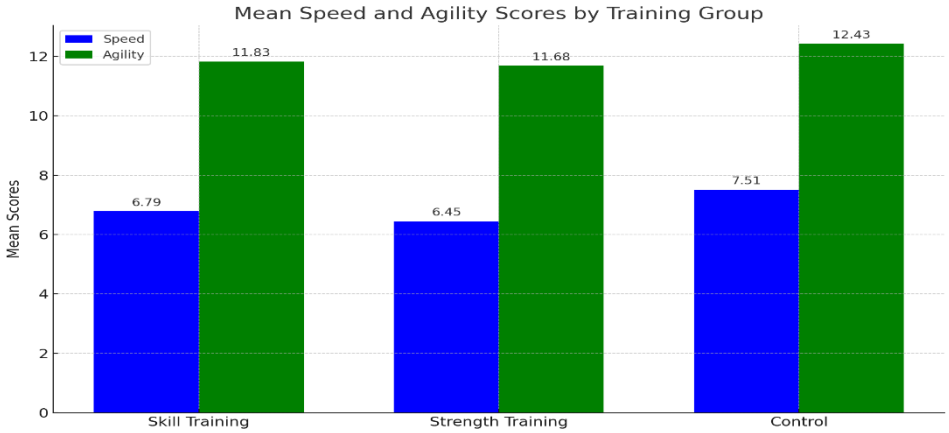

Fig: Graphical representation of mean scores of Speeds and Agility

Table 3: ANCOVA Table for the Post-test data on Speed and Agility.

Variables	Source	Type III sum of squares	Df	Mean square	F	Sig.
Speed	Speed Pre-Test	4.195	1	4.195	65.714	.000
	Group	4.291	2	2.146	33.612	.000
	Error	2.617	41	.064		
	Corrected Total	15.626	44			
Agility	Agility Pre-Test	5.180	1	5.180	26.471	.000
	Group	4.059	2	2.030	10.373	.000
	Error	8.023	41	.196		
	Corrected Total	17.892	44			

In the above table ANCOVA was performed to evaluate the impact of various training programs on post-test outcomes for speed and agility, while accounting for pre-test scores. For speed, a significant difference was found between the three groups, $F(2, 41) = 33.61$, $p < .001$, indicating a strong effect (partial $\eta^2 = .621$). The group receiving strength training had the fastest adjusted average time ($M = 6.45$, $SD = 0.27$), followed by the Skill Training group ($M = 6.79$, $SD = 0.36$); the Control group was the slowest ($M = 7.51$, $SD = 0.53$).

Agility results also revealed significant group differences, $F(2, 41) = 10.37$, $p < .001$, with a moderate to strong effect size (partial $\eta^2 = .336$). Again, the Strength Training group achieved the best performance ($M = 11.68$, $SD = 0.39$), slightly ahead of the Skill Training group ($M = 11.83$, $SD = 0.45$), while the Control group lagged behind ($M = 12.43$, $SD = 0.77$).

Overall, the findings suggest that strength training significantly enhances both speed and agility in male field hockey players more effectively than skill training alone or no intervention.

Discussion: This research investigated how an eight-week strength and skill training program influenced the physical abilities of male field hockey players. The participants who received the training showed marked improvements in speed, agility, and muscular endurance compared to those following regular hockey routines. These outcomes support existing studies emphasizing the role of specialized training in enhancing athletic performance. Improved sprinting ability mirrors findings by Bustamante-Garrido et al. (2023), who linked strength training to better sprint mechanics, while enhanced agility aligns with Thapa et al. (2023), who showed that contrast and multidirectional training boost agility. Similar improvements have also been reported in basketball players after strength training (Keerthi Kumar & Sundar Raj Urs, 2018). Other research confirms that high-load strength training paired with sport-specific drills boosts speed and power (Kumar, 2015), and resistance and free-weight programs enhance muscular strength (Raja Gopal & Gopi Krishna, 2014). Additionally, a seven-week resistance training protocol was found effective in increasing leg power and agility (Golda & Glory Darling, 2014). Overall, incorporating strength and skill-based training significantly elevates key performance traits essential in field sports like hockey

Conclusion:

This study demonstrates that a structured 8-week strength training program is significantly more effective in improving physical performance—particularly speed and agility—in male field hockey players compared to skill-only or no intervention. These findings underline the importance of integrating both strength-based elements into athletic training regimens. Coaches and trainers should consider such a dual-focused approach to optimize performance outcomes and better prepare players for the physical demands of competitive field hockey

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