EFFECT OF GAME SPECIFIC FITNESS TRAINING AND SKILL BASED CIRCUIT TRAINING ON PASSING ABILITY OF YOUNG FIELD HOCKEY PLAYERS

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ABSTRACT

The purpose of this investigation was to find out the effect of game specific fitness training and skill based circuit training on passing ability of young field hockey players. To achieve the purpose of the study, the investigator chosen forty five young field hockey players as participants in the age group of 15 to 18 years. The selected subjects (N=45) were classified into three groups of fifteen each (n = 15) at random. Group-I underwent game specific fitness training, group-II underwent skilled based circuit training and group-III acted as control. The passing ability was selected as dependent variable. By using standard testing procedure, the data were collected before as well as after training. Pre and post test random group design was adopted. The assessed data of the three group's through standardized tests was analyzed to discover the significant variation between two tests (pre & post) through paired 't' test. Additionally, magnitude (%) of changes was also calculated. To abolish the early mean disparity, the three group's data (pre&post) were calculated through ANCOVA statistics. When the 'F' (adjusted) score in ANCOVA was high, the post hoc (Scheffe's) test was followed. The confidence level 0.05 was set. Subsequent to 12weeks of game specific fitness training (GSFT=17.17%) and skill based circuit training (SBCT =8.60%), the field hockey player's passing ability was enhanced noticeably.

Key Words: *Game specific fitness training, Skill based circuit training, Passing ability, Young field hockey players*

INTRODUCTION

The physical, physiological, technical, tactical, and psychological elements that together affect a player's capacity to perform well during practice and competition are referred to as performance determinants in hockey. According to Elferink-Gemser et al. (2004), modern hockey is a multidimensional sport where players must meet the high-intensity and skill-oriented demands of the game through the optimal interaction of multiple performance-related components.

In the physically taxing intermittent team sport of hockey, players must consistently engage in high-intensity tasks while maintaining performance over the whole game. Hockey's unique blend of constant movement, quick pace changes, numerous accelerations and decelerations, and the execution of intricate abilities under exhaustion creates the physical and physiological demands of the sport. Depending on age, playing position, and competitive level, players often cover between 6 and 10 kilometres every game, with significant chunks of this distance being completed at moderate to high levels, according to modern match analysis (Macutkiewicz& Sunderland, 2011; Reilly &Borrie, 1992).

Hockey puts a lot of strain on the anaerobic and aerobic energy systems from a physiological standpoint. Maintaining a work rate over several quarters, sustaining prolonged exercise, and promoting recovery in between repeated high-intensity efforts all depend on the aerobic system. According to Spencer et al. (2004), players that possess a high level of aerobic endurance are able to sustain their technical and tactical efficacy throughout the game and during busy tournament schedules. Simultaneously, short-duration, high-intensity activities like sprinting, tackling, quick direction changes, and explosive goal-scoring motions depend on the anaerobic system. The significance of anaerobic ability and speed endurance in competitive hockey is highlighted by these repeated sprint exercises, which tax phosphagen and anaerobic glycolytic pathways (Gabbett, 2010).

The game's primary physical requirements are muscular strength and power. While upper-body and shoulder strength are essential for stick control, passing velocity, tackling, and forceful shooting motions, lower-body strength helps with sprint acceleration, braking, and agility. According to Keogh et al., (2015), core strength is essential for maintaining posture during dynamic movements and physical contact situations, transmitting force between the upper and lower limbs, and stabilising the trunk. Muscular strength endurance is also crucial since players must execute hard actions repeatedly over long stretches of time without experiencing a noticeable drop in performance.

Because hockey is a fast-paced sport and requires quick reactions to opponents' movements, speed and agility are essential physical characteristics. Short sprints of five to thirty meters are commonly performed by players, frequently interspersed with abrupt stops and direction changes. These motions necessitate effective synchronisation between the neurological and muscular systems and exert significant neuromuscular demands on the lower limbs (Bloomfield et al., 2007). To deal with the increased intensity of modern match play, young hockey players in particular need to cultivate these traits at a young age.

Elevated heart rates and metabolic reactions are additional signs of physiological stress during competition. According to studies, players frequently play for extended periods of time at intensities higher than 80–85% of their maximal heart rate, which indicates a significant cardiovascular load (Spencer et al., 2004). The significance of cardio-respiratory endurance and effective oxygen utilisation for peak performance and recuperation is highlighted by this prolonged cardiovascular strain. Early weariness, poor skill execution, and a higher risk of injury can all be consequences of inadequate physiological conditioning.

Hockey involves a high degree of neuromuscular coordination and movement efficiency in addition to energy system and musculoskeletal demands. Under physiological stress, players must combine physical fitness with accurate skill execution. Performance outcomes can be impacted by fatigue's detrimental effects on motor control, reaction speed, and decision-making. Therefore, compared to isolated or non-specific training approaches, training regimens that closely mimic the physical and physiological demands of match play are more likely to generate transferable adaptations (Hoff &Helgerud, 2004).

Understanding and meeting these physiological and physical needs is especially crucial for young hockey players. This stage of growth is crucial for improving strength, speed, neuromuscular coordination, and aerobic capacity in a methodical and systematic way. Because they seek to simultaneously stress pertinent energy systems and reinforce movement patterns and technical skills needed during competition, game-specific fitness training and skill-based circuit training are consequently well matched with the physiological profile of the sport.

Furthermore, it is crucial to find training strategies that optimize performance gains while guaranteeing safe and gradual adaptation because young athletes are in a crucial stage of their physical and motor development. Coaches will be better able to create age-appropriate, evidence-based training programs if they have a better understanding of how various training interventions affect performance factors. By contrasting the adaptations brought about by skill-based circuit training with game-specific fitness training, it will also be possible to determine whether one strategy is more beneficial than the other or if both focus on distinct areas of performance. Therefore, the necessity to objectively evaluate and contrast the effects of skill-based circuit training and game-specific fitness training on particular performance variables of young hockey players justifies the current study.

METHODOLOGY

Subjects and Variables

To achieve the purpose of the study, the investigator chosen forty five young field hockey players as participants in the age group of 15 to 18 years. The selected subjects (N=45) were classified into three groups of fifteen each (n = 15) at random. Group-I underwent game specific fitness training, group-II underwent skilled based circuit training and group-III acted as control. The football passing ability was selected as dependent variable and it was assessed by conducting Stewart Brothers Field Hockey Test.

Training Protocol

During the training period, the experimental group-I underwent game specific fitness training three days in a week for 12 weeks. The Phase I (Weeks 1–4) emphasizes the development of basic speed, agility, endurance, and efficient movement patterns. The selected drills such as linear sprints, shuttle runs, zig-zag running, continuous dribbling runs, and defensive footwork are fundamental movements frequently performed during game situations. Training intensity is kept at a low to moderate level (60–70%). In Phase II (Weeks 5–8) exercises such as repeated sprint drills, agility T-tests with a stick, small-area shuttle runs with the ball, and 1v1 chase drills closely replicate game-like demands involving rapid accelerations, directional changes, and opponent interaction. Trai.ning intensity is increased to a moderate-to-high range (70–85%). In Phase III (Weeks 9–12) high-intensity drills such as repeated sprint ability (RSA) training, multi-directional agility with the ball, high-intensity shuttle runs, and continuous game-like movement patterns are incorporated to simulate actual match tempo and physiological stress. The inclusion of small-sided conditioned games enhances tactical awareness, decision-making, and technical execution under fatigue. Training intensity peaks at 85–95%.

During the training period, the group-II underwent skill based circuit training three days in a week for 12 weeks. In Phase I (Weeks 1–4) fundamental skills such as stationary dribbling, push passing, zig-zag cone dribbling, forehand hitting techniques, and basic defensive movements were performed. The training intensity is maintained at a low to moderate level (60–70%). In Phase II (Weeks 5–8) skill drills are integrated with dynamic movement patterns such as dribble–sprint combinations, passing and receiving on the move, directional changes, and defensive shuttle movements were performed. The intensity is progressively increased to a moderate-to-high level (70–85%). In Phase III (Weeks 9–12) advanced drills such as repeated dribble–sprint–shoot sequences, rapid pass–receive–turn actions, 1v1 attacking maneuvers, and continuous hitting with recovery runs closely simulate match demands were performed. Training intensity peaks at 85–95%.

Collection of the Data

The data on football passing ability was collected prior to the commencement of experiment (pre test) and after twelve weeks of training period (post test). Both the pre and post tests were administered under identical conditions, with same apparatus, testing personal and testing procedures.

Statistical Technique

The data collected from the experimental and control groups on football passing ability was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated. The data collected from the three groups prior to and post experimentation on football passing ability was statistically analyzed, by applying the Analysis of Covariance (ANCOVA). Since, three groups were involved, whenever the obtained 'F' ratio value in the adjusted post test mean was found to be significant, the Scheffe's test was applied as post hoc test. The level of confidence is fixed at 0.05 for significance.

RESULT

The player's (field hockey) passing ability was explored (Paired 't' Test) statistically and presented in table-I.

Table – I: Paired 't' Test & % of Alteration on Passing Ability of Game Specific Fitness Training and Skill Based Circuit Training & Control Groups

Chosen Group	Time of Test	No.	Test Mean	STD	DbM	't' - ratio	% of Progress
Game Specific Fitness Training (GSFT)	Pretest	15	20.75	1.85	4.30	9.03*	17.17%
	Posttest		22.05	2.81			
Skill Based Circuit Training (SBCT)	Pretest	15	20.85	2.03	2.15	6.28*	8.60%
	Posttest		24.00	2.37			
Control(CG)	Pretest	15	20.30	1.81	0.15	0.34	0.59%
	Posttest		20.15	1.87			

*Table value for df14=2.15(*significant)*

The pretest and posttest values of both training groups (GSFT & GSFT) vary noticeably as the 't'values of game specific fitness training (GSFT=9.03) and skill based circuit training (SBCT =6.28) groups were superior to table value(df14=2.15). Subsequent to

12weeks of game specific fitness training (GSFT=17.17%) and skill based circuit training (SBCT =8.60%), the field hockey player's passing ability was enhanced noticeably.

Further, all 3 groups (GSFT, SBCT &CG) field hockey player's passing ability was explored by using ANCOVA statistics and exhibited intable–II.

Table – II: ANCOVA Output on Passing Ability of Game Specific Fitness Training and Skill Based Circuit Training & Control Groups Field hockey Players

Mean	Game Specific Fitness Training (GSFT)	Skill Based Circuit Training (SBCT)	Control (CG)	SoV	S.S.	df	M.S.	'F' ratio
Adjusted posttest	22.80	24.94	20.01	B	176.18	2	88.09	25.18*
				W	195.95	41	3.50	

*(Tablevalue for df 2&41=3.23)*Significant(.05 level)*

The ANCOVA result proved that the adjusted final means (GSFT =22.80, SBCT =24.94 & CG=20.01) on passing ability of all 3 chosen groups significantly differs, as the derived 'F' value (25.18) is better than the required value (*df 2 & 41* =3.23). As the adjusted final means is significant, the follow up test was applied as put on view in table-III.

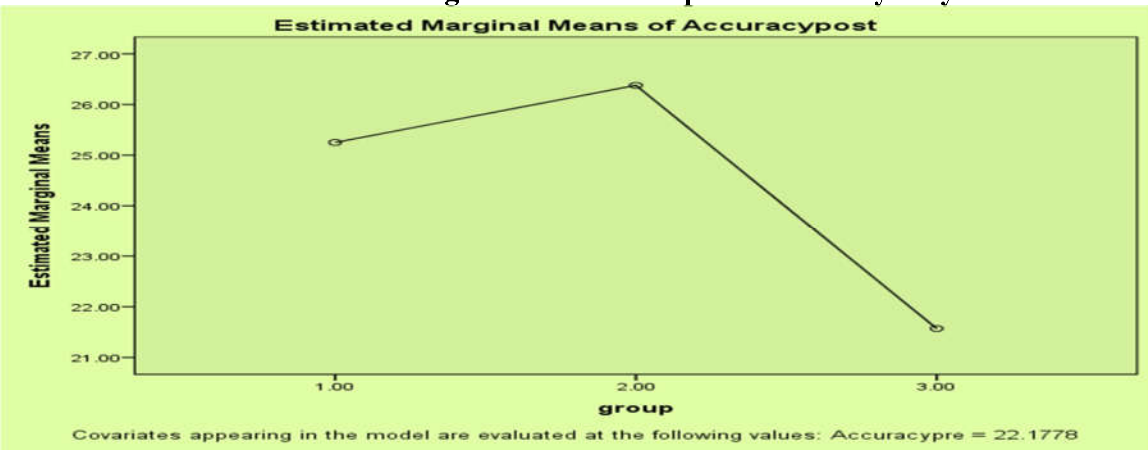
Table – III: Scheffe's Test Outcome on Passing Ability of Game Specific Fitness Training and Skill Based Circuit Training & Control Groups Field hockey Players

Dependent Variable	Game Specific Fitness Training (GSFT)	Skill Based Circuit Training (SBCT)	Control (CG)	Mean Diff.	Confidence Interval(CI)
Passing Ability	22.80	24.94		2.14*	1.49
	22.80		20.01	4.20*	1.49
		24.94	20.01	2.06*	1.49

**Significant(.05)*

It proved that due to game specific fitness training (GSFT=4.20) and skill based circuit training (SBCT =2.06) the passing ability was greatly enhanced. Though, skill based circuit training (SBCT) was much better than game specific fitness training (GSFT) since the mean differences (2.14) is higher than CI value (1.49). Chosen three group's passing ability scores are illustrated in diagram-I.

Figure – I: Chart Showing Passing Ability of Game Specific Fitness Training and Skill Based Circuit Training & Control Groups Field hockey Players



DISCUSSION

In hockey, passing is a fundamental technical talent that calls for accuracy, timing, coordination, spatial awareness, and the capacity to perform in fast-paced, high-pressure situations. Ball retention, tactical build-up, and successful team coordination are all made possible by effective passing, which has a direct impact on game performance (Reilly &Borrie, 1992; McLaughlin, 2010).

Enhanced physical capabilities including agility, speed, balance, and aerobic endurance, which facilitate better movement into passing positions and superior execution during prolonged play, may be the reason for the notable improvement in passing ability following Game-Specific Fitness Training. When handling the stick and ball, GSFT usually entails movement patterns that closely mirror match play, such as accelerations, decelerations, direction changes, and repeated efforts. According to Spencer et al. (2004) and Sheppard & Young (2006), such training enhances players' physical preparedness to execute passing actions during game scenarios, especially when they are fatigued.

However, the current study unequivocally showed that when it came to enhancing passing ability, skill-based circuit training outperformed GSFT. The intrinsic design of SBCT, which stresses frequent, repetitive practice of passing skills along with mobility and decision-making tasks, can account for this superiority. Different passing drills, such as push passes, hit passes, lead passes, and pass-and-move sequences executed at various angles, distances, and speeds, are frequently included in skill-based circuits. Repeated exposure improves proprioceptive feedback, neuromuscular coordination, motor learning, and technical consistency all of which are critical for proficient passing performance (Farrow & Abernethy, 2003; Williams & Ford, 2008).

Additionally, SBCT puts players in time-constrained, context-specific scenarios that closely mimic real-world match demands where passing decisions must be made fast and precisely. Perceptual-cognitive abilities, such as anticipation, visual scanning, and decision-making, are enhanced by such training and are crucial factors in successful hockey passing (Ali, 2011). GSFT, on the other hand, may provide relatively fewer repetitions of technically focused passing tasks, so limiting skill refinement, even though it enhances the physical ability to reach optimal passing postures.

These results are corroborated by prior research, which shows that training regimens that combine conditioning and technical skill execution are more successful in improving sport-specific skills than fitness-oriented training alone. According to Gabbett et al. (2007), skill-based conditioning greatly enhances passing accuracy and ball handling under fatigue, underscoring the significance of skill integration during training sessions. In a similar vein, regular skill practice in representative learning environments improves the transfer of passing skills to competitive performance, according to Farrow and Abernethy (2003). While both Game-Specific Fitness Training and Skill-Based Circuit Training successfully improve young hockey players' passing ability, Skill-Based Circuit Training produces better results because of its targeted, repetitive, and context-driven approach to skill development.

CONCLUSION

Subsequent to 12weeks of game specific fitness training (GSFT=17.17%) and skill based circuit training (SBCT =8.60%), the field hockey player’s passing ability was enhanced noticeably. These results highlight how crucial it is to include structured skill-based circuits in hockey training regimens in order to maximise passing effectiveness and team success.

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