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Effectiveness of Plyometric Training versus Speed Agility Quickness Training on Agility and Performance among Elite Hockey Players - A Comparative Study

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*doi: 10.33472/AFJBS.6.6.2024.6221-6229***ABSTRACT:**

Background: Field hockey participation may contribute to player's health through the well-known benefits of regular exercise. However, participation in field hockey also entails a risk of injury. In field hockey, as well as in other sports, this information can aid researchers and health professionals in developing appropriate strategies to reduce and control injuries. Agility is an ability of the neuromuscular system to coordinate explosive changes of direction of an individual and/or multiple body segments in all planes of motion.

Objectives: The study's primary objective was to evaluate the effectiveness of Plyometric training versus Speed agility quickness training to improve agility and performance among Elite hockey players.

Subjects and methods: 30 Subjects with Essential hypertension were selected for this study based on the selection criteria. Group A consisting of 15 subjects and they were treated with Plyometric training. Group B consisting of 15 subjects and they were treated Speed agility quickness training. The objective and the aim of the study were clearly explained to the ethical committee of PPG College of Physiotherapy and permission was obtained. Both the groups received before the treatment sessions a basic warm up slow jog and dynamic stretching for 5 minutes and plyometric training was given for 45min/day for 8 weeks, and Speed agility quickness training was given for 45mins/day for 8 weeks. The pre and post-test value of agility and performance using Illinois agility test and 50meter dash test. The data was recorded and analyzed. The treatment session was conducted for 3 days a week for 8 week.

Results: Thus, the resultant of the study shows that in paired't' test, the obtained result was 2.145 greater than observed calculated probability. In unpaired't' test post- post comparison results was 4.3, 5.4 greater than observed't' value was 2.048. It showed that there was significant improvement on agility and performance. Eventually, alternate hypothesis is accepted.

Conclusion: In this study both training were trained for 8 weeks. Therefore, the study concluded that Plyometric training shows highly significant improvement in agility and performance among elite Hockey players.

Clinical Implications: Buteyko breathing technique along with Aerobic reducing Blood pressure and improving Functional Capacity in essential hypertensive subjects.

Keywords: Elite Hockey players, Plyometric training, Speed Agility Quickness training, 50 meter Dash test, Illinois agility test.

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1. Introduction

Hockey is a sport in which two teams compete against each other by using a hockey stick to manoeuvre a ball or puck into the opponent's goal. Bandy, field hockey, ice hockey, and ring hockey are some of the different styles of hockey.

Hockey players need to create a powerful push during the step and maintain balance during the sliding phase¹. The ankle joint is critical for generating a high level of force during the take-off phase and for shock absorption during the landing phase. The knee joint acts as a shock absorber during the landing phase and helps propel the body forward during the take-off phase. The hip joint contributes to forward momentum and stability during stride. In addition to skating, hockey players also perform various moves that require strength and agility, such as checking, passing, throwing, and turning. These movements require the coordination of multiple joints and muscles to create efficient and effective movements.² Field hockey is a sport with unique demands that requires players to possess a combination of physical attributes like agility, speed, strength, and endurance and specific skills like dribbling, passing, and shooting accurately. To achieve a high level of performance in this sport, players must engage in a specific training program that improves their fitness level and skills while minimizing the risk of injury. Players need to have the ability to move quickly, have strength to tackle opponents, and agility to avoid defenders. Therefore, it is essential to understand the importance of these attributes for field hockey players and their performance⁶. Due to repetitive use, the highly trained muscles become hyperactive and shortened. In the infield of hockey, the player needs to do adapt extensive postures such as bending sideways and forward, keeping one upper limb in external rotation and another in internal rotation. There are many ways to hit a ball in hockey such as scoop, drag-flick, drive, slap shot as well as push. There is a need to improve the basic and special skills. Many researchers have explained the role of repetitive strain and of overload-induced changes in field hockey players which caused various postural and structural as well as functional impairments in them. Plyometric training may also decrease the risk of injury, increase incoordination, balance, stability, proprioception and improve neuromuscular adaptations rather than to gain explicit strength. SAQ training has proved to be effective in improving the physical and motor abilities of players in many sports events. Speed and agility training will provide improvement in the overall aspects of techniques of a field hockey player. There is no recent study stating the efficacy of plyometric training and speed agility quickness training on agility and performance in hockey players. So the need of the study is to find out both plyometric training and Speed agility quickness training had focuses on improving the agility and performance of the players which eventually reduces the risk of injuries and thereby enhancing a better performance.

2. Methodology

Study design: A comparative study design, pre-test, post-test evaluation was used with two different intervention groups to assess the effectiveness of Plyometric training versus Speed agility quickness training to improve agility and performance among Elite hockey players.

Subjects: Those subjects with medical history of Elite hockey players. 30 subjects were randomly allocated into two groups by using lot method. This study was conducted in held at PPG Sports academy, Coimbatore, The treatment duration was for 8 weeks. The inclusion criteria for this study are Elite Male Hockey player, Age group; 18 – 25 years, Players who were continually playing hockey more than 2 to 3 years. Willingness to participate in this study. The exclusion criteria are Players who are injured recently, Players who are in recovery states, Impingement syndrome, and recent surgery, Individual with any cardiac and metabolic disease.

Treatment procedure was clearly explained to the patient and the informed consent form was received from the patient prior to the study. 30 young self-reported healthy elite male hockey players were selected based on selection criteria. These subjects were randomly described into two groups (15 in each group) by using the lot method. All the participants underwent their daily regular exercises along with the intervention. The treatment technique involves plyometric training for group A and Speed Agility quickness training for group B. The Pre and post-test values of agility and performance using 50 Meter dash test, Illinois agility test are used. The data was recorded and analyzed. The subjects in Group A consisted of 15 players and they were received with plyometric training and Group B consisted of 15 players and they were received with speed agility quickness training. Before the treatment sessions a basic warm up slow jog and dynamic stretching for 5 minutes and plyometric training was given for 45min/day for 8 weeks, and Speed agility quickness training was given for 45mins/day for 8 weeks. The pre and post-test value of agility and performance using Illinois agility test and 50meter dash test. The data was recorded and analyzed. The treatment session was conducted for 3 days a week for 8 weeks.

Description of Experimental Intervention

Plyometric Training

The group A received with the training protocol of plyometric training method. Plyometric training consisted of following exercises

Warm Up Period: Slow jog, Dynamic stretching for 5 minutes, Arm Circles (30 to 60 seconds) Plank walk out (10 repetitions), Walking lunge twist (10 repetitions), Hamstring scoops (10 repetitions), Leg kicks with opposite Arm Reach (10 repetitions), High knees (1 minute) Squat jumps (30 to 60 seconds), Butt kick (10 repetitions).

Recovery Period

Minutes is given between sets.

WEEKS	EXERCISES	SETS	REPETITIONS
WEEK 1	Side to side ankle Hops Standing jump and Reach Front cone hops.	3	15-20
WEEK 2	Squat jump Depth jump	3	15-20
WEEK 3	Exercises on divided box Lateral box jump	3	15-20
WEEK 4	Double leg hops Single leg hops	3	15- 20
WEEK 5	Exercises On hurdles Double legbutt kick	3	10 -15
WEEK 6	Squat jump Depth jump	4	10-15
WEEK 7	Exercises on divided box	4	10- 15
WEEK 8	Side to side ankle Hops Standing jump and Reach	4	10-15

Cool Down Period: Dynamic Stretching For Lower And Upper Body For 5 Minutes.

Treatment Protocol for Saq Training

WEEKS	EXERCISE	SETS	REPETATIONS
WEEK 1	Warm up dynamic stretching Agility disc	3	15-20
WEEK 2	Agility disc	3	15-20
WEEK 3	Sewer development Turn	3	15-20
WEEK 4	Fast feet zigzag run	3	15-20
WEEK 5	Four turn four angle Run	4	10-15
WEEK 6	Side steeper drills	4	10-15
WEEK 7	Ball drops	4	10-15
WEEK 8	Depth jump To forward run	4	10 -15

Statistical Analysis:

The result was analyzed for pre and post-test values using paired 't' test favored for alternate hypothesis. The statistical tools used in the study are paired t-test. The paired 't' test was used for within group analysis. Pre-test and post-test values were calculated using paired 't' test at significant level of $p < 0.05$ with t value of 2.145. In between group analysis t value was calculated by unpaired 't' test at 5% level of significance with table t value of 2.048

3. Results

The demographical presentation of subjects is shown in table 1. The group A consists of 15 males and the group B consists of 15 males the age range of the group is 18-25 years.

Table 1: Demographic characteristics of subjects

VARIABLES	GROUP A PLYOMETRIC TRAINING	GROUP B SAQ TRAINING
AGE	18-20 = 10 21-25 = 5	18-20 = 9 21-25 = 6
HEIGHT	170-175 = 6 176-180 = 9	170-175 = 8 176-180 = 7
WEIGHT	70-75 = 8 76-80 = 7	70-75 = 9 76-80 = 6

Table 2: Both group A and B pre intervention phase

Outcome Parameter	Groups	Mean	SD	T-value*
Illinois agility test	Group A	17.8	0.46	0
	Group B	17.6	0.45	
50 meter dash test	Group A	7.65	0.33	1.1
	Group B	7.9	0.39	

*Significant at 0.05 levels ($p > 0.05$)

The table 2 analysis showed that the calculated 't' value using the unpaired 't' test the pre-intervention phase and at the end of the 8 weeks of the intervention phase at 0.05 levels significance as shown in table 3.

Table 3: pre-intervention and post-intervention phase

Dependent variable	Groups	Pre-intervention stage		Post intervention stage		T-value*
		Mean	SD	Mean	SD	
Illinois agility test	Group A	17.8	0.46	16.3	0.44	17.0
	Group B	17.6	0.45	17.1	0.43	9.67
50 meter dash test	Group A	7.65	0.33	6.31	0.30	5.13
	Group B	7.9	0.39	6.9	0.40	8.84

*Significant at 0.05 levels ($p < 0.05$)

Further, a significant difference is observed between the two groups while analysing the effect therapeutic intervention on the three dependent variables such as agility and performance. Furthermore, while considering the mean score of all the outcome variables, group A is better than the Group B (Table 4).

Table 4: Both Group A and Group B during the post intervention stage

Outcome Parameter	Groups	Mean	SD	T-value*
Illinois agility test	Group A	16.3	0.44	4.36
	Group B	17.1	0.43	
50 meter dash test	Group A	6.3	0.30	5.46
	Group B	6.9	0.40	

*Significant at 0.05 levels ($p < 0.05$)

From table 4, it is inferred that the group A, which was greater than the Group B, at 0.05 levels of significance.

Results: Thus, the resultant of the study shows that in paired 't' test, the obtained result was 2.145 greater than observed calculated probability. In unpaired 't' test post- post comparison results was 4.3, 5.4 greater than observed 't' value was 2.048. It showed that there was significant improvement on agility and performance. Eventually, alternate hypothesis is accepted.

4. Discussion

Field hockey training programs are designed to improve the specific skills that are necessary for playing hockey, such as speed, agility, and strength, and have been shown

to be more effective in improving hockey-specific skills than regular exercise programs. To achieve high level of performance in this sport, players must engage in a specific training program that improves their fitness level and skills while minimizing the risk of injury.

Walankar prachita P et al, 2023. They conducted a study on compare the effect of plyometric exercises versus speed agility quickness (SAQ) training on agility, speed, power, dynamic balance and reaction time in badminton players. Total 36 amateur badminton player, 12 participants in each - Plyometric training group, SAQ training group and control group. All received intervention for 6 weeks. They concluded that both plyometric and SAQ training were equally effective in improving speed and agility in badminton players. Hence, these training protocols can be used as evidence based approach to improve skills in badminton players for optimal performance.

Dr.s. malar et al, 2022. They conducted a study on the effect of circuit training combined with speedagility quickness drills and jump rope drills on agility. Thirty school boys from different schools and their age group range between 11 to 14 years. The selected two treatment groups were performed five days in a week for the period of six weeks. They concluded that the performance of the agility better in circuit training combined with the drills of speed, agilityand quickness than the circuit training combined with the drills of jump rope.

The resultant of this study is mainly due to the following mechanisms. Plyometric plays an important role in improving the performance of hockey players. Plyometric training also improves proprioception, kinesthetic sense as well as provide functional ability to joint, it may also decrease the risk of injury, increase in-coordination, balance, stability rather than to gain explicit strength. Plyometric training has also been shown to increase the activation of motor units and thus increases neural adaptation which improves the rate of force development and thus helps in improving agility and Performance. Plyometric training has been advocated for sports that require the athletes to have explosive power and agility.

SAQ training is a method of progressive exercise and instruction targeted at building fundamental motor abilities in order to improve the competence of sportsmen to be skilled at higher speeds and with more precision. SAQ training strengthens muscles, tendons and ligaments making them more resilient to stress. It also improves proprioception the body's ability to sense its position in space, which is crucial for maintaining balance and preventing falls. SAQ training can be used to increase the speed and the capacity to develop maximum force during movements at high speed, since it manipulates and take better advantage of the stretch-contraction cycle of the muscle thus reducing the gap that exists between training traditional resistance and functional training with specific movement. The following studies also that the result of my study that plyometric training and speed agility quickness training programme are improved on agility and performance.

The subjects were given plyometric training and Speed Agility Quickness training for a period of 60 minutes till 8 weeks. The pretest and posttest of agility and performance evaluated by Illinois agility test and 50 meter dash test. The resultant of the study concluded that there is statistically significant difference between group A and group B. Group A subjects who received Plyometric training for 8 weeks showed marked improvement when compared to Group B subjects who received SAQ training in hockey players.

Eventually, my study proved that plyometric training and speed agility quickness trainings are given more effective on agility and performance on hockey player

Limitations

The study was conducted on smaller samples.
 The study was limited to particular age group.
 The study was conducted in short duration.
 This Study did not have follow up care.

Further Directions of This Study

Future studies are recommended with larger samples.
 Future studies are recommended to conduct a study with female Hockey players. Other parameter such as horizontal velocity and leg muscle power can also be included.
 Future studies are recommended to conduct a study on plyometric training program along with any other training programs for improving muscle power among athletes.
 Future studies are recommended to conduct a study for other athletic main events such as basketball and volleyball.

5. Conclusion

The study finally concluded both the group showed statistically significant improvement in agility and performance after the application of plyometric training and speed agility quickness training for a period of 8 weeks. But group A (plyometric training) showed highly significant improved the agility and performance when compared with group B (SAQ training).

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