



# INFLUENCE OF STRENGTH AND PLYOMETRIC TRAINING ON PLAYING ABILITY AMONG MALE HOCKEY PLAYERS

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## **Abstract**

The purpose of the study was to find out the effect of strength and plyometric training, on playing ability. Forty five male hockey players aged between 19 and 25 years were selected for the study. They were divided into three equal groups, each group consisting of fifteen subjects in which three experimental groups and one control group, in which the group I (n=15) underwent strength training, group II (n = 15) underwent plyometric training for three days (alternative days) per week for twelve weeks and group III, acted as control, which did not participate in any training apart from their regular hockey game practice. The subjects were tested on selected criterion variable as hockey playing ability at prior to and immediately after the training period. For testing the hockey playing ability was assessed by administering Stewart Pitchers' Hockey skill test, consists of dribbling, passing and goal shooting test. The analysis of covariance (ANCOVA) was used to find out the significant difference if any, between the experimental groups and control group on selected criterion variable separately. Since there were three groups involved in the present study, the Scheffé *S* test was used as post-hoc test. The selected criterion variables such as Stewart Pitchers' Hockey skill test, consists of dribbling, passing and goal shooting test were improved significantly for all the training groups when compared with the control group.

**Key Words:** *strength training, plyometric training, Stewart Pitchers' Hockey skill test, consists of dribbling, passing and goal shooting test.*

## **INTRODUCTION**

A common contributing component in the tough world of sports is intense motivation, which drives athletes to put in long and exhausting workdays. Furthermore, sports scientists and athletic experts might be of aid to coaches, as coaching is a difficult job. Today's athletes are more knowledgeable than ever before, which affects coaching and training methods. The field of sports sciences has progressed from descriptive to scientific methods and their implementation (Bompa, 1999).

One of the most popular and profitable sports, hockey is played by men and women at all levels, from amateur to professional (Andres and Myers, 2008). Hockey is an Olympic sport that is played by both men and women for both leisure and competitive reasons. Strength, speed, skill, and other psychological and physical qualities are all necessary for top performance in this worldwide sport (Kahn, 1999; Burr et al. 2008; and International Hockey Federation, 2019). Players who engage in this intense, high-energy sport run the danger of developing a variety of musculoskeletal issues since it requires unusual movement patterns. (Sherker and Cassel, 2002; and Dick, et al. 2007).

Dynamic balance and endurance are strained by the players' frequent need to stride, leap, sprint, and walk (Hrysonmallis, McLaughlin, and Goodman, 2006). Because they generally have a much higher risk of overuse difficulties, junior athletes are often more vulnerable to injury than adult athletes. The physical attributes required for much of the game include muscular strength, endurance, and dynamic balance. A player's chance of several injuries and their output will both rise and decrease if these motions are disrupted during play (Loose, et al. 2019). Recent research has revealed that poor neuromuscular control, muscular imbalance in different movement patterns, and instability in the core muscles are risk factors for sports injuries (Chorba, Chorba and Helgerud, 2004; and Peate, et al. (2007).

Based on scientific principles, sports training is a strategy designed to increase athletic ability via the methodical development of mental and physical capacity, efficiency, and motivation. Athletes can accomplish amazing and unheard-of sports exploits thanks to this procedure (Harre, 1982). Physical activity is one of the finest techniques to achieve peak performance throughout training. Athletes' physiological attitudes will be improved, and their biomotor skills will be improved to the highest levels.

At different levels, different training techniques are applied to improve every facet of physical and motor fitness. Training plans with basic components and little tweaks will function better and be more suitable for both individual and team players. According to Boucher and Malina (1993), the optimal training program is one that accelerates the desired quality without having undesirable side effects.

The improvement of motor skills, speed, body balance, stamina, and strength can result from receiving effective hockey coaching (Elferink-Gemser, et al. 2007; Macutkiewicz and Sunderland, 2011; and Podgorski and Pawl, 2011). It is important for strength- and resistance-based training programs to recognise that hockey players need strength to perform the necessary motions. It is imperative to use isometrics, unilateral work, heavy drop-sets, long-duration sets (walking lunges for more than a minute), or on-the-clock movements (snatch, clean, and jerk).

Weight training is the most effective strategy to maintain and increase muscle strength, and it also directly improves blood circulation. Furthermore, according to David et al., (1999) weight training has been demonstrated to reduce vascular stiffness. Several studies (Sander, et al. 2013; and Ingle, Sleaf and Tolfrey, 2006) have shown how resistance training impacts a young athlete's capacity to account for their maximal strength.

Plyometric exercise improves muscular strength and power (Markovic, 2007), speed (Diallo et al., 2001; Impellizzeri et al., 2008; and Michailidis et al., 2013), and agility (Arazi, Coetzee and Asadi, 2012;

Ramirez-Campillo, et al., 2014; and Ramirez-Campillo, et al., 2015). This has been demonstrated in numerous scientific studies. The need for a precise plyometric training session to develop motor and physical fitness—which requires both single and multiple abilities—does exist, even though it is not the newest trend in competitive team sports (Chaouachi et al. 2009; Duncan, Woodfield, and al-Nakeeb, 2006; Gabbett, 2000; Ostojic, Mazic, and Dikic, 2006; and Stolen, et al. 2005). Spasmodic team games that combine cyclic and acyclic development in relation to victory in competitive sports include handball, basketball, soccer, hockey, and other team sports (Arazi, Coetzee, and Asadi, 2012; and Chelly, et al. 2014). Regular plyometric training, consisting of three sessions spaced over a 12-week period, improves the maximum kicking velocity, countermovement leap, and drop jump of amateur female football players (Ccampo, et al. 2009).

### Methods

The goal of this study was to determine how strength and plyometric exercise, affected Stewart Pitchers' Hockey skill test, consists of dribbling, passing and goal shooting. 45 male hockey players who were enrolled at various colleges, those who were represented in inter-collegiate tournaments, around Kovilpatti Town, Tamil Nadu, India for the academic year 2023–2024 were chosen as subjects to fulfil the goal. They were divided into three equal groups of fifteen each and further divided as two experimental groups and one control group, in which the group I (n=15) underwent strength training, group II (n = 15) underwent plyometric training for three days (alternative days) per week for twelve weeks, and group III (n=15) acted as control which did not participate in any special training apart from the regular curricular activities.

There will be changes to the playing ability and systems with every training regimen. After consulting with the specialists, the researchers decided to use the following variables as criteria: 1. Dribbling, 2. Passing and 3. Shooting.

### Analysis of the Data

The differences, if any, between the corrected post test means on several criteria variables were examined independently using analysis of covariance. The Scheffé S test was used as a post-hoc test if the adjusted post test mean's "F" ratio was shown to be significant. To evaluate the "F" ratio discovered using analysis of covariance, the level of significance was set at.05 level of confidence.

Table – I

*Analysis of Covariance and 'F' ratio for Dribbling, Passing and Shooting of Strength Training Group, Plyometric Training Group, and Control Group*

| Variable Name         | Group Name            | Strength Training Group | Plyometric Training Group | Control Group | 'F' Ratio |
|-----------------------|-----------------------|-------------------------|---------------------------|---------------|-----------|
| Dribbling (in Points) | Pre-test Mean ± S.D.  | 12.60 ± 0.51            | 12.53 ± 0.92              | 12.33 ± 0.62  | 0.59      |
|                       | Post-test Mean ± S.D. | 14.07 ± 0.88            | 13.73 ± 1.03              | 12.27 ± 1.03  | 14.16*    |
|                       | Adj. Post-test Mean   | 13.958                  | 13.690                    | 12.419        | 19.22*    |
| Passing (in Points)   | Pre-test Mean ± S.D.  | 12.93 ± 0.80            | 12.87 ± 0.83              | 12.13 ± 0.83  | 0.43      |

|                             |   |                  |                  |                  |        |
|-----------------------------|---|------------------|------------------|------------------|--------|
| <b>Points)</b>              | <b>Post-test Mean <math>\pm</math> S.D.</b> | 14.27 $\pm$ 0.80 | 14.40 $\pm$ 1.06 | 12.67 $\pm$ 0.72 | 18.39* |
|                             | <b>Adj. Post-test Mean</b>                  | 14.294           | 14.469           | 12.570           | 31.98* |
| <b>Shooting (in Points)</b> | <b>Pre-test Mean <math>\pm</math> S.D.</b>  | 11.33 $\pm$ 0.72 | 11.20 $\pm$ 0.86 | 11.33 $\pm$ 0.82 | 0.14   |
|                             | <b>Post-test Mean <math>\pm</math> S.D.</b> | 12.53 $\pm$ 0.92 | 12.60 $\pm$ 0.74 | 11.00 $\pm$ 0.76 | 18.88* |
|                             | <b>Adj. Post-test Mean</b>                  | 12.508           | 12.651           | 10.974           | 28.78* |

\* Significant at .05 level of confidence. (The table value required for significance at .05 level of confidence with df 2 and 42 and 2 and 41 were 3.21 and 3.23 respectively).

Table – I shows that the dribbling pre-test "F" ratio value of 0.59 was less than the necessary table value of 3.21 for significant with df 2 and 42 at 0.05 level of confidence. For the post-test mean and adjusted post-test mean 'F' ratio value of 14.16 and 19.22 for the adjusted post-test scores was greater than the necessary table value of 3.24 for significant. According to Table - I, the pre-test averages of passing test 'F' ratio value of 0.43 was less than the necessary table value of 3.21 for significant with df 2 and 42 at 0.05 level of confidence. For post-test and adjusted post-test mean 'F' ratio values of passing were 18.39 and 31.98 was greater than the necessary table value of 3.24 for significant. The shooting pre-test values 'F' ratio of shooting value was 0.14 which was insignificant. For post-test and adjusted post-test mean 'F' ratio values of shooting were 18.88 and 28.78 was greater than the necessary table value of 3.24 for significant. Further, to find out which training group has significant improvement on selected criterion variables, Scheffe S post-hoc test was applied and presented in table – II.

Table - II

*Scheffé S Test for the Difference Between the Adjusted Post-Test Mean of Dribbling, Passing and Shooting Abilities*

| <b>Strength Training Group</b>               | <b>Plyometric Training Group</b> | <b>Control Group</b> | <b>Mean Difference</b> | <b>Confidence Interval at 0.05 level</b> |
|--|----------------------------------|----------------------|------------------------|--|
| <b>Adjusted Post-test Mean for Dribbling</b> |                                  |                      |                        |  |
| 13.956                                       | 13.690                           | ...                  | 0.268                  | 0.66                                     |
| 13.956                                       | ...                              | 12.419               | 1.539*                 | 0.66                                     |
| ...  | 13.690                           | 12.419               | 1.271*                 | 0.66                                     |
| <b>Adjusted Post-test Mean for Passing</b>   |                                  |                      |                        |  |
| 14.294                                       | 14.469                           | ...                  | 0.175                  | 0.67                                     |
| 14.294                                       | ...                              | 12.570               | 1.725*                 | 0.67                                     |
| ...  | 14.469                           | 12.570               | 1.900*                 | 0.67                                     |
| <b>Adjusted Post-test Mean for Shooting</b>  |                                  |                      |                        |  |
| 12.508                                       | 12.651                           | ...                  | 0.143                  | 0.62                                     |
| 12.508                                       | ...                              | 10.974               | 1.533*                 | 0.62                                     |
| ...  | 12.651                           | 10.974               | 1.677*                 | 0.62                                     |

\* Significant at 0.05 level of confidence.

## Results

The adjusted post-test mean difference in dribbling ability between strength training group and control group and plyometric training group and control group was 1.539 and 1.271, respectively, and these



differences were significant at the .05 level of confidence, according to Table II. The table II also indicate that there was no significant difference was occurred between the training groups (0.268). Based on the study's findings, it can be said that strength training group and plyometric training group considerably boost the dribbling ability.

The adjusted post-test mean difference in passing skill between strength training group and control group, plyometric training group and control group was 1.725 and 1.900, respectively, and these differences were significant at the .05 level of confidence, according to Table - II. The passing ability was not significantly differed between the training groups (0.175). Based on the study's findings, it can be said that strength training group and plyometric training group considerably enhance passing ability.

The adjusted post-test mean difference in goal shooting skill between strength training group and control group, plyometric training group and control group was 1.533 and 1.677, respectively, and these differences were significant at the .05 level of confidence, according to Table - II. The passing ability was not significantly differed between the training groups (0.143). Based on the study's findings, it can be said that strength training group and plyometric training group significantly improved the goal shooting ability.

## Conclusions

After completing strength and plyometric training, the study's results shown a notable increase in Stewart Pitchers' hockey skills (dribbling, passing, and shooting). According to Mohan and Rajeswaran's (2019) research, school-level hockey players' shooting skill significantly improved after receiving strength and coordination training as well as combination training. Male university hockey players who received sports-specific instruction showed a notable increase in their shooting and dribbling, according to studies by Kumar (2019) and Shelvam and Sekhon (2016). Ansari (2020) and Churi (2020) discovered that following weight training, passing ability significantly improved. After plyometric training, Rathi (2020) discovered that the ability to shoot, balance with the ball, and move with the ball had all increased.

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