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EFFECT OF ISOMETRIC SQUAT EXERCISE ON SPRINT PERFORMANCE OF FOOTBALL PLAYERS

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Abstract

A soccer match makes heavy demands on both aerobic and anaerobic metabolism. Elite players run 8–12 km during a game. Nevertheless, anaerobic metabolism is also crucial in sprints, jumps, and tackles. Many studies have stated that aerobic and anaerobic strength are significant features in soccer games. During a soccer match, soccer team members performed 60 to 70 runs from 12 to 15 m. Sprint running success, with or without the ball, is therefore a significant factor that can explain a winning team's supremacy. In essential ball duals, sprint could be key. In certain cases, the player should be quicker and more effective than the opponent to score goals or to avoid goals being scored. In addition, acceleration and speed can enhance skills vital to soccer, such as turning, sprinting, and changing tempo, by improving strength in appropriate muscles or muscle groups. The study was to evaluate the effect of isometric squat exercise on sprint performance of football players. The sample of 60 student were selected from the population of University of Lahore football team. Within 3 to 5 days after base training pre-test will be conducted in the morning by using 40-yard dash test. Post-test will be conducted after completion of Isometric Squat exercise training sessions. The results show that, differences between the two test 40 Yard Dash Test Post-Test of Experimental Group and 40 Yard Dash Test Post-Test of Control Group. This research study discovered that there was a statistically significant improvement in sprint performance by using Isometric Squat exercise Program.

Key Words: Sprint Performance, Isometric Squats

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Introduction:

Many studies have stated that aerobic and anaerobic strength are significant features in soccer games. During a soccer match, soccer team members performed 60 to 70 runs from 12 to 15 m. Sprint running success, with or without the ball, is therefore a significant factor that can explain a winning team's supremacy. Furthermore, that 96 percent of sprint bouts are shorter than 30 m during a soccer game, with 49 percent being shorter than 10 m. (Stølen, T., Chamari, K, 2005). It should be emphasized in this context that the output of 10 m (or even shorter distances such as 5 m or the production of electricity from a stationary start) is an important test variable in modern soccer. (Chelly, M. S., Chérif, N, 2010).

In essential ball duals, this could be key. In certain cases, the player should be quicker and more effective than the opponent to score goals or to avoid goals being scored. In addition, acceleration and speed can enhance skills vital to soccer, such as turning, sprinting, and changing tempo, by improving strength in appropriate muscles or muscle groups. (Dolci, F., Hart, NH,2020). Soccer is becoming more and more athletic and high short-term muscle strength is needed to win a running or jumping double or to catch the ball before the opponent and to score. Both force and velocity depend on the power produced. (Lehance, C., Binet, J., Bury, T, 2009).

While the total distance covered in an elite soccer match can total as much as 8-12 km, the critical game-changing moments are represented by fast high-intensity sprints. Usually, these sprints last from 2 to 4 seconds over distances of 10 to 30 m, with players performing 17 to 81 sprints per game, contributing up to 11 percent of the overall distance covered during a game. In addition, in both adult and youth soccer players, sprinting ability (both acceleration and maximum sprint speed) can differentiate soccer players from different standards of play. (Austin, D. J., Gabbett, T. J, 2011). Between short sprint performance and lower body power, evaluated using free weight back squats, strong correlations have been recorded. A very strong relationship between absolute back squat strength and sprint performance in soccer players, while McBride et al, Meir et al, and Comfort et al. reported good relationships between short sprint performance and relative strength (1 maximum repetition [1RM]/body mass [BM]). Authors of a recent meta-analysis concluded that lower body strength improvements transition to sprint efficiency improvements (30 m). (Taskin, H, 2008). This is possibly due to the production of greater peak ground reaction force and momentum by stronger athletes, which have been shown to be strong determinants of sprint

success. Good correlations between maximum ground reaction force and maximum sprinting velocity are also recorded, indicating that acceleration and maximum sprinting velocity can also be enhanced by increasing strength or maximum force output. (William J. styles,2016).

For both aerobic and anaerobic metabolism, a soccer match makes strong demands. During a game, elite players run 8–12 km, with aerobic metabolism prevailing. In sprints, leaps, and tackles, however, anaerobic metabolism is also important. During a match, up to 50 rapid turns are made, triggered by sustained and vigorous concentric muscle contractions. In addition, sprints account for 1-11% of the distance traveled, which usually lasts 2-4 seconds and happens every 90 seconds. Professional players can run over 10 m faster than amateurs, but in a 30-m sprint they have little advantage. (Kaplan, T., Erkmen, N., & Taskin, H, 2009).

Sprints range from 1.5 to 105 m, and for soccer success, the ability to accelerate and maintain very short sprints is necessary. For both initial acceleration and full velocity, leg strength is critical. Elite players' overall half squat strength is strongly associated with their times over 10 and 30 m and maximum jump heights. (Mohamed Souhaeil Chelly N. C, 2010).

No studies have previously examined acceleration and sprint speed over distances of 5-35 m, however. In preparation for soccer and other team sports, such knowledge seems important. (Moir, 2008).

Objective:

To evaluate the effect of isometric squat exercise on sprint performance of football players.

Hypothesis:

H_1: There is a positive effect of squat exercise on sprint performance of football players.

H_0: There is no significant effect of squat exercise on sprint performance of football players.

Methodology:

This study was pre & post-testing in nature, which was based on experimental research design. Data was collected from male football players of University of Lahore football team. The players who were part of University of Lahore football team for one or more years. Football players whose age should be between 18-25 Years are included in the study. A total number of 60 male football

players were recruited and randomly assigned to experimental group (male, n=30) and control group (male, n=30). Convenient Sampling Technique was used.

Interventions:

Duration: The training program was last for 8 weeks.

Session: 4 session of Isometric Squat exercise per week.

Exercise: 40 minutes of moderate intensity exercise (Interval training).

Intensity: 60-70% of MHR

Procedure:

Participants' consent will be obtained and then demographic and data related to the history of any medical condition will be collected. Within 3 to 5 days after base training pre-test will be conducted in the morning by using 40 yard dash test. Post-test will be conducted after completion of Isometric Squat exercise training sessions.

The training program was last for 8 weeks. 4 session of Isometric Squat exercise per week. 40 minutes of moderate intensity exercise (Interval training) with 60-70% of MHR.

Data Analysis:

All statistical analysis will be calculated by using the Statistical Package for the Social Sciences (SPSS), version 23. Statistical significance will be kept at an alpha level less than or equal to 0.05. To note whether there will be differences in student's sprint performance in response to the isometric squat exercise training program. In addition, to examine the pre -post training effect of training program 40-yard dash test will be employed.

Results:

Table 1: Paired Sample Test Mean and Std. Deviation of the participants football players 40 Yard Dash Test Pre-Test of Control Group and 40 Yard Dash Test Post-Test of Control Group (n=30).

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	40 Yard Dash Test Pre-Test of Control Group - 40 Yard Dash Test Post-Test of Control Group	**.0233**	**.0430**	**.0079**	**.0073**	**.0394**	**2.971**	**29**	**.006**

The Paired Samples Test table is where the results of the dependent t-test are presented. A lot of information is presented here and it is important to remember that this information refers to the differences between the two test 40 Yard Dash Test Pre-Test of Control Group and 40 Yard Dash Test Post-Test of Control Group. The results of mean and std. deviation of the participants (n=30) are listed in Table 5.15 The table shows that the mean of 40 Yard Dash Test Pre-Test of Control Group (n=30) was 0.233 with a Std. Deviation of 0.0430, and the last three columns express the results of the paired samples t-test, the t value 2.971, the degrees of freedom 29 and the significance level 0.006.

Table 2: Paired Sample Test Mean and Std. Deviation of the participants football players 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group (n=30).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	40 Yard Dash Test Pre-Test of Experimental Group	**5.327**	**30**	**.2876**	**.0525**
	40 Yard Dash Test Post-Test of Experimental Group	**5.077**	**30**	**.3025**	**.0552**

The Paired Samples Test table is where the results of the dependent t-test are presented. A lot of information is presented here and it is important to remember that this information refers to the differences between the two test 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group. The results of mean and std. deviation of the participants (n=30) are listed in Table 5.16 The table shows that the mean of 40 Yard Dash Test Pre-Test of Experimental Group (n=30) was 5.327 with a Std. Deviation of 0.2876, and the mean 40 Yard Dash Test Post-Test of Experimental Group (n=30) was 5.077 with a Std. Deviation of 0.3025.

Table 3: Paired Sample Correlations of the participants football players 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group (n=30).

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	40 Yard Dash Test Pre-Test of Experimental Group & 40 Yard Dash Test Post-Test of Experimental Group	**30**	**.943**	**.000**

Paired Sample Correlations of the participants football players 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group (n=30) shows correlation of 0.943.

Table 4: Paired Sample Test Mean and Std. Deviation of the participants football players 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group (n=30).

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	40 Yard Dash Test Pre-Test of Experimental Group - 40 Yard Dash Test Post-Test of Experimental Group	**.2500**	**.1009**	**.0184**	**.2123**	**.2877**	**13.577**	**29**	**.000**

The Paired Samples Test table is where the results of the dependent t-test are presented. A lot of information is presented here and it is important to remember that this information refers to the differences between the two test 40 Yard Dash Test Pre-Test of Experimental Group and 40 Yard Dash Test Post-Test of Experimental Group. The results of mean and std. deviation of the participants (n=30) are listed in Table 5.18 The table shows that the mean of 40 Yard Dash Test Pre-Test of Experimental Group (n=30) was 0.250 with a Std. Deviation of 0.1009, and the last three columns express the results of the paired samples t-test, the t value 13.577, the degrees of freedom 29 and the significance level 0.000.

Table 5: Paired Sample Test Mean and Std. Deviation of the participants football players 40 Yard Dash Test Post-Test of Experimental Group (n=30) and 40 Yard Dash Test Post-Test of Control Group (n=30).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	40 Yard Dash Test Post-Test of Experimental Group	**5.077**	**30**	**.3025**	**.0552**
	40 Yard Dash Test Post-Test of Control Group	**5.267**	**30**	**.3417**	**.0624**

The Paired Samples Test table is where the results of the dependent t-test are presented. A lot of information is presented here and it is important to remember that this information refers to the differences between the two test 40 Yard Dash Test Post-Test of Experimental Group and 40 Yard Dash Test Post-Test of Control Group. The results of mean and std. deviation of the participants (n=30) are listed in Table 5.19 The table shows that the mean of 40 Yard Dash Test Post-Test of Experimental Group (n=30) was 5.077 with a Std. Deviation of 0.3025, and the mean 40 Yard Dash Test Post-Test of Control Group (n=30) was 5.267 with a Std. Deviation of 0.0624.

Table 6: Paired Sample Correlations of the participants football players 40 Yard Dash Test Post-Test of Experimental Group (n=30) and 40 Yard Dash Test Post-Test of Control Group (n=30).

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	40 Yard Dash Test Post-Test of Experimental Group & 40 Yard Dash Test Post-Test of Control Group	**30**	**.019**	**.921**

Paired Sample Correlations of the participants football players 40 Yard Dash Test Post-Test of Experimental Group (n=30) and 40 Yard Dash Test Post-Test of Control Group (n=30) shows correlation of 0.019.

Table 7: Paired Sample Test Mean and Std. Deviation of the participants football players 40 Yard Dash Test Post-Test of Experimental Group (n=30) and 40 Yard Dash Test Post-Test of Control Group (n=30).

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	40 Yard Dash Test Post-Test of Experimental Group - 40 Yard Dash Test Post-Test of Control Group	**-.1900**	**.4521**	**.0825**	**-.3588**	**-.0212**	**-2.302**	**29**	**.029**

The Paired Samples Test table is where the results of the dependent t-test are presented. A lot of information is presented here and it is important to remember that this information refers to the differences between the two test 40 Yard Dash Test Post-Test of Experimental Group and 40 Yard Dash Test Post-Test of Control Group. The results of mean and std. deviation of the participants (n=30) are listed in Table 5.21 The table shows that the mean of 40 Yard Dash Test Post-Test of Experimental Group (n=30) was -0.1900 with a Std. Deviation of 0.4521, we can conclude that there was a statistically significant improvement in sprint performance and the last three columns express the results of the paired samples t-test, the t value -2.302, the degrees of freedom 29 and the significance level 0.029.

Discussion:

Sprint plays a vital role in football game, sprint helps football player to tackle a ball, sprint helps football players to win a ball first, sprint helps football players to score a goal, sprint helps football players to defend or save a goal. This study was conducting on university football players as we measured sprint performance by using isometric squat exercise for the period of eight weeks with pre and post testing of sprints of football players. A soccer match makes heavy demands on both aerobic and anaerobic metabolism. Elite players run 8–12 km during a game, with aerobic metabolism predominating. Nevertheless, anaerobic metabolism is also crucial in sprints, jumps, and tackles. Up to 50 rapid turns are made during a match, initiated by sustained and forceful concentric muscle contractions. Leg power is important to both the initial acceleration and maximal velocity. The maximal half squat strength of elite players is significantly correlated with their times over 10 and 30 m sprint. (1SOUHAIL HERMASSI, 2010)

Although the total distance covered in an elite soccer match can total as much as 8–12 km, it is the short high-intensity sprints that represent the crucial game-changing moments. These sprints typically last from 2–4 seconds over distances of 10–30 m, with players performing 17–81 sprints per game, accounting for up to 11% of the total distance covered during a match. Moreover, sprinting ability (both acceleration and maximum sprint speed) is able to distinguish soccer players from different standards of play, in both adult and youth soccer. Strong correlations have been reported between short sprint performance and lower body strength, assessed using free weight back squats. A very strong relationship between absolute back squat strength and sprint performance in soccer players, whereas reported good relationships between short sprint performance and relative strength (1 repetition maximum [1RM]/body mass [BM]). Authors of a recent meta-analysis concluded that improvements in lower body strength transfer to improvements in sprint performance 30 m. This is likely due to stronger athletes developing higher peak ground reaction force and impulse, which have been shown to be strong determinants of sprint performance. Good associations are also reported between maximum ground reaction force and maximal sprinting velocity, suggesting that increasing strength, or maximal force production, may also improve acceleration and maximal sprinting velocity. (PAUL COMFORT, 2016)

This research study discovered that there was a statistically significant improvement in sprint performance by using Isometric Squat exercise Program. The results of this research examination

are helpful to football players for deciding to use Isometric Squat exercise program for improvement in sprint performance. The results show that, differences between the two test 40 Yard Dash Test Post-Test of Experimental Group and 40 Yard Dash Test Post-Test of Control Group. The results of mean and std. deviation of the participants (n=30). The mean of 40 Yard Dash Test Post-Test of Experimental Group (n=30) was -0.1900 with a Std. Deviation of 0.4521, we can conclude that there was a statistically significant improvement in sprint performance and the last three columns express the results of the paired samples t-test, the t value -2.302, the degrees of freedom 29 and the significance level 0.029.

Conclusion:

This research study discovered that there was a statistically significant improvement in sprint performance by using Isometric Squat exercise Program. The results of this research examination are helpful to football players for deciding to use Isometric Squat exercise program for improvement in sprint performance. Consequently, the Null Hypothesis "H0: There is no significant effect of squat exercise on sprint performance of football players." was rejected whereas alternative hypothesis "H1: There is a positive effect of squat exercise on sprint performance of football players." has been accepted.

Recommendations:

This research can be done at a large scale for more significant results.
Impact on Sprint performance after performing Barbell Squat, Single leg Squat, Goblet squats exercise program can also be checked in the future studies.

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