

EFFECT OF SPEED, AGILITY AND QUICKNESS (S. A. Q) TRAINING ON SELECTED PHYSICAL FITNESS VARIABLES AMONG SCHOOL SOCCER PLAYERS

R. ARJUNAN

Associate Professor, Department of Physical Education & Health Sciences,
Alagappa University, Karaikudi, Tamil Nadu, India

ABSTRACT

The purpose of the study was to find out the effect of speed, agility and quickness (S.A.Q) training on selected physical fitness variables among school soccer players. To archive this purpose of the study sixty school boys from Alagappa Model Higher Secondary School, Karaikudi, were selected as subjects at random. The subjects chosen for the study were divided into four equal groups called control and experimental groups consisting of sixty students, each group consists of fifteen students. Speed, Agility and Quickness training was given to the experimental groups. The control group was not allowed to participate in any of the special training programme except their routine practices. All the subjects of four groups were tested on selected criterion variables such as speed, muscular strength endurance, agility and explosive power at prior to training after the training programme by using 50 meters run, bend knee sit ups, shuttle run and standing broad jump respectively. The Analysis of covariance (ANCOVA) was used for interpreting the results. On the basis of the results the impact of Speed, Agility and Quickness training has significantly contributed to improve the selected Physical Fitness Variables such as speed, muscular strength endurance, agility and explosive power.

KEYWORDS: Training, Speed, Agility, Quickness, Physical Fitness, Soccer

INTRODUCTION

High-speed actions are known to impact soccer performance and can be categorized into actions requiring maximal speed, acceleration, or agility (Thomas, French, & Hayes, 2009). Specific dynamic constant external resistance exercises are highly recommended as part of an annual training program for junior soccer players. (Lebedev, 2013) Speed is the rapidity of movement (Baechle, 1994). Top speed is important for a player such as a midfielder who must cover long distances. To develop speed, one must increase stride length, stride frequency, and hand/arm action. (Little, & Williams, 2005)

Agility is the ability to maintain and control correct body position while quickly changing direction through a series of movements (Twist & Benicky, 1995). This may be required of forwards in order to maneuver around defensive players near the goal. Likewise, defensive players may benefit from these drills for the opposite reason. (Buttifant, Graham, & Cross, 2002)

Quickness is the ability to read and react to a situation; it is a multidirectional skill that combines explosiveness, reactivity, and acceleration (Moreno, 1995). Goalies may specifically require responses that are initiated from a dead stop position (Alves, Rebelo, Abrantes, & Sampaio, 2010; Chelly, Fathloun, Cherif, Amar, Tabka, & Van Praagh, 2009).

Speed, agility and quickness are a system of training aimed at the development of motor abilities and the control of body movement through the development of the neuromuscular system (Lennemann, Sidrow, Johnson, Harrison, Vojta, & Walker, 2013; Yap, & Brown, 2000). It aims to improve the athlete's ability to perform explosive multi directional movements by reprogramming the neuromuscular system, so that it can work more efficiently (Young, Davies, Farrow, & Bahnert, 2013).. According to Jovanovic, Sporis., Omrcen, & Fiorentini, (2011), SAQ training will remove mental blocks and thresholds and will allow the athlete to exert maximal force during controlled and balanced movement patterns, which are specific to their sport(Lennemann, Sidrow, Johnson, Harrison, Vojta, & Walker, 2013). By considering the energy systems involved in the athlete's sport, the specificity of the movement patterns, muscle action, the speed and range of motions performed and the specific needs of the athlete, SAQ training can provide a highly specific and detailed training method that will help the performer reach their goals (Polman, Bloomfield, & Edwards, 2009; Milanović, Sporiš, Trajković, James, & Šamija, 2013; Milanović, Sporiš, Trajković, Sekulić, James, & Vučković, 2014). In this modern era, few scientific studies have been conducted to investigate effective methods of developing speed and agility conditioning among school soccer players.

METHODOLOGY

The purpose of the study was to find out the Effect of Speed, Agility and Quickness (S.A.Q) training on selected physical fitness variables among school soccer players. To archive this purpose of the study sixty soccer players from Alagappa Model Higher Secondary School, Karaikudi, were selected as subjects at random. The subjects chosen for the study were divided into four equal groups called control and experimental groups consisting of sixty students, each group consists of fifteen students. They were assigned randomly into four groups (group I) underwent Speed training, (group II) underwent Agility training, (group III) underwent Quickness training and (group IV) acted as control group. The experimental groups was subjected to the training during morning hours for three days for six weeks and group IV acted as control. The Speed, Agility and Quickness training was selected as independent variables and speed, muscular strength endurance, agility and explosive power were selected as dependent variables. The selected dependent variables were assessed by the standardized test items - 50mts run, bend knee sit ups, shuttle run and standing broad jump respectively. The experimental design selected for this study was pre and post test randomized group design. The data were collected from each subject before and after the training period and statistically analyzed by using analysis of covariance (ANCOVA).

ANALYSIS OF DATA

The influence of Speed, Agility and Quickness training on each variable was analyzed separately and presented below.

RESULTS AND DISCUSSIONSONS

Speed

The ANACOVA results on speed between control and experimental groups 1, 2 and 3 are presented in table 1.

Table 1: Analysis of Covariance of Pre-Test Post Test and Adjusted Post Test Means on Speed of Different Groups (Scores in Seconds)

Speed	Group	Mean	SD	SV	SS	Df	MS	F	P
Pre-test	G1	9.81	0.98	BG	.815	3	0.815	2.94	0.092
	G2	9.63	0.89	WG	20.478	56	6.8		
	G3	9.60	0.90	T	5098.18	59			
	G4	9.74	0.69						
Post-test	G1	8.63	0.90	BG	48.18	3	12.046	23.42	0.000*
	G2	8.80	0.92	WG	16.02	56	0.291		
	G3	9.06	0.94	T	642.212	59			
	G4	10.13	0.75						
Adjusted Post-test	G1	8.54	0.90	BG	20.471	3	6.82	22.42	0.000*
	G2	8.85	0.92	WG	16.02	55	0.29		
	G3	9.13	0.94	T	18.04	58			
	G4	10.10	0.77						

* Significant at.05 level of confidence.

The pretest speed means score on speed of G1, G2, G3 and G4 are 9.81, 9.63 9.60, and 9.74 respectively. The posttest speed mean scores on speed of G1, G2, G3 and G4 are 8.63, 8.80, 9.06, and 10.13 respectively. The adjusted posttest speed mean scores on speed of G1, G2, G3 and G4 are 8.5, 8.85, 9.13, and 10.10 respectively. There exist no significant differences in the pretest speed mean scores of experimental and control groups ($F=2.94, P=0.092>0.05$). There is significant mean differences in the posttest speed scores of experimental and control groups ($F=23.42, P<0.05$). There exist significant mean difference between control and the three experimental groups adjusted posttest mean speed scores ($F=22.42, P<0.05$). Since ANCOVA result showed significant difference in speed among groups, Scheffe’s post hoc test of pair-wise comparisons has been carried out and the details are shown in Table II. In table II, Scheffe’s post hoc test results are presented. It shows there existed significant difference between control and speed, agility and quickness training group, whereas no significant difference was observed between speed and agility training group. Hence it is inferred that speed can only developed by speed training compared to agility and quickness training.

Table 2: Pairwise Comparison of Control and Experimental Groups 1, 2 and 3 on Speeds

Group	Group	Mean Difference	Significance
G1	G2	0.309	0.023*
G1	G3	0.594	0.004*
G1	G4	1.560	0.000*
G2	G3	0.285	0.154
G2	G4	1.251	0.000*
G3	G4	.966	0.000*

* Significant at.05 level of confidence.

Results and Discussions on Muscular Strength Endurance

The ANACOVA results on speed between control and experimental groups 1, 2 and 3 are presented in table 3. The pretest muscular strength endurance mean scores of G1, G2, G3 and G4 are 17.13, 15.86, 15.66, and 15.80 respectively. The posttest muscular strength endurance mean scores of G1, G2, G3 and G4 are 23.20, 21.46, 21.26, and 14.60 respectively. The adjusted posttest muscular strength endurance mean scores of G1, G2, G3 and G4 are 21.94, 21.77, 21.82, and 11.99 respectively. There exist no significant differences in the pretest muscular strength endurance mean

scores of experimental and control groups ($F=0.36$, $P=0.850>0.05$). There is significant mean differences in the posttest muscular strength endurance mean scores of experimental and control groups ($F=57.62$, $P<0.05$). There exist significant mean difference between control and the three experimental groups adjusted posttest mean muscular strength endurance mean scores ($F=57.62$, $P<0.05$).

Table 3: Analysis of Covariance of Pre-Test Post Test and Adjusted Post Test on Muscular Strength Endurance of Different Groups (Scores in Counts)

MSE	Group	Mean	SD	SV	SS	Df	MS	F	P
Pre-test	G1	17.13	4.51	BG	.110	3	.110	0.36	0.850
	G2	15.86	4.40	WG	527.66	56	175.89		
	G3	15.66	3.86	T	26612.0	59			
	G4	15.80	3.74						
Post-test	G1	23.20	5.29	BG	2123.06	3	530.76	57.62	0.000*
	G2	21.46	6.59	WG	167.86	56	3.05		
	G3	21.26	5.44	T	26612.00	59			
	G4	14.60	4.03						
Adjusted Post-test	G1	21.94	6.03	BG	527.65	3	527.65	57.62	0.000*
	G2	21.77	5.58	WG	167.86	55	3.05		
	G3	21.82	6.45	T	168.04	58			
	G4	14.99	4.02						

* Significant at .05 level of confidence.

Since ANCOVA result showed significant difference in muscular strength endurance among groups, Scheffe's post hoc test of pair-wise comparisons has been carried out and the details are shown in Table 4. In table 4, Scheffe's post hoc test results are presented. It shows there existed significant difference in muscular strength endurance between control and speed, agility and quickness training group, whereas no significant difference was observed between speed and agility training group in muscular strength endurance. Hence it is inferred that muscular strength endurance can be developed by speed, agility, and quickness training.

Table 4: Pairwise Comparison of Control and Experimental Groups 1, 2 and 3 on Muscular Strength Endurance

Group	Group	Mean Difference	P
G1	G2	.165	.000*
G1	G3	.177	.001*
G1	G4	6.949	0.000*
G2	G3	4.765	.007*
G2	G4	6.78	0.000*
G3	G4	6.83	0.000*

* Significant at .05 level of confidence.

Results and Discussion on Agility

The ANCOVA results on agility between control and experimental groups 1, 2 and 3 are presented in table 5. The pretest agility mean scores of G1, G2, G3 and G4 are 15.07, 15.14, 15.13, and 15.35 respectively. The posttest agility mean scores of G1, G2, G3 and G4 are 14.58, 14.20, 14.40, and 15.51 respectively. The adjusted posttest agility mean scores of G1, G2, G3 and G4 are 14.70, 14.23, 14.44, and 15.31 respectively. There exist significant differences in the pretest agility mean scores of experimental and control groups ($F=12.1$, $P>0.05$). There is significant mean differences in the posttest agility mean scores of experimental and control groups ($F=78.42$, $P<0.05$). There exist significant mean

difference between control and the three experimental groups adjusted posttest mean agility mean scores (F=78.42, P<0.05).

Table 5: Analysis of Covariance of Pre-Test Post Test and Adjusted Post Test on Agility of Different Groups (Scores in Seconds)

Agility	Group	Mean	SD	SV	SS	DF	MS	F	P
Pre-test	G1	15.07	0.78	BG	.501	3	.501	12.10	0.001
	G2	15.14	0.67	WG	9.74	56	3.24		
	G3	15.13	0.80	T	12975.54	59			
	G4	15.35	0.62						
Post-test	G1	14.58	1.01	BG	50.46	3	12.61	78.42	0.000*
	G2	14.20	0.64	WG	2.27	56	4.13		
	G3	14.40	0.89	T	12967.54	59			
	G4	15.51	0.66						
Adjusted Post-test	G1	14.70	0.68	BG	9.73	3	3.24	78.42	0.000*
	G2	14.23	0.76	WG	2.27	55	4.13		
	G3	14.44	0.66	T	12346.23	58			
	G4	15.31	0.65						

* Significant at.05 level of confidence.

Since ANCOVA result showed significant difference in agility among groups, Scheffe’s post hoc test of pair-wise comparisons has been carried out and the details are shown in Table 6. In table 6, Scheffe’s post hoc test results are presented. It shows there existed significant difference in agility between control and speed, agility and quickness training group, whereas no significant difference was observed between speed and agility training group in muscular strength endurance. Hence it is inferred that muscular strength endurance can be developed by speed, agility, and quickness training.

Table 6: Pairwise Comparison of Control and Experimental Groups 1, 2 and 3 on Agility

Group	Group	Mean difference	P
G1	G2	0.467	0.000*
G1	G3	0.258	0.001*
G1	G4	0.614	0.000*
G2	G3	0.209	0.001*
G2	G4	1.082	0.000*
G3	G4	0.871	0.000*

* Significant at.05 level of confidence.

Results and Discussions on Explosive Power

The ANACOVA results on agility between control and experimental groups 1, 2 and 3 are presented in table 7.

Table 7: Analysis of Covariance of Pre-Test Post Test and Adjusted Post Test on Explosive Power of Different Groups (Scores in Meters)

MSE	Group	Mean	SD	SV	SS	DF	MS	F	P
Pre-test	G1	1.34	0.10	BG	1.44	3	1.44	2.61	0.112
	G2	1.29	0.72	WG	4.50	56	1.50		
	G3	1.28	0.12	T	105.12	59			
	G4	1.24	0.11						
Post-test	G1	1.38	0.11	BG	0.83	3	0.209	27.11	0.000*
	G2	1.33	0.10	WG	3.04	56	5.536		

	G3	1.32	0.11	T	106.13	59			
	G4	1.24	0.10						
Post-test	G1	1.33	0.11	BG	4.50	3	1.501	27.11	0.000*
	G2	1.32	0.10	WG	3.04	55	5.53		
	G3	1.33	0.12	T	106.04	58			
	G4	1.27	0.16						

* Significant at.05 level of confidence.

The pretest explosive power mean scores of G1, G2, G3 and G4 are 1.34, 1.29, 1.28, and 1.24 respectively. The posttest explosive power mean scores of G1, G2, G3 and G4 are 1.38, 1.33, 1.32, and 1.22 respectively. The adjusted posttest explosive power mean scores of G1, G2, G3 and G4 are 1.33, 1.32, 1.33, and 1.27 respectively. There exist no significant differences in the pretest explosive power mean scores of experimental and control groups ($F_{2,61}$, $P > 0.05$). There is significant mean differences in the posttest explosive power mean scores of experimental and control groups ($F = 27.11$, $P < 0.05$). There exist significant mean difference between control and the three experimental groups adjusted posttest mean explosive power mean scores ($F = 27.11$, $P < 0.05$).

Since ANCOVA result showed significant difference in speed among groups, Scheffe's post hoc test of pair-wise comparisons has been carried out and the details are shown in Table 8. In table 8, Scheffe's post hoc test results are presented. It shows there existed significant difference between Quickness training and control, speed, agility and training group, whereas no significant difference was observed between control and speed, control and agility, speed and agility training groups. Hence it is inferred that explosive power can only be developed by quickness training compared to agility and speed training.

Table 8: Pairwise Comparison of Control and Experimental Groups 1, 2 and 3 on Explosive Power

Group	Group	Mean Difference	P
G1	G2	.01	0.400
G1	G3	.00	0.752
G1	G4	.06	0.000*
G2	G3	.01	0.241
G2	G4	.05	0.000*
G3	G4	.06	0.000*

* Significant at.05 level of confidence.

DISCUSSIONS ON FINDINGS

Speed, agility and quickness are important fitness components for a soccer player. The present study was undertaken to find out speed, agility and quickness training improve agility, speed, muscular strength endurance and explosive power which are also required for a elite soccer player. Speed training improves muscular strength endurance, speed and explosive power. Agility training improves agility, muscular strength endurance only. Quickness training improved agility, muscular strength endurance, speed and explosive power.

CONCLUSIONS

To improve soccer related fitness components no single type of training is sufficient. Speed, agility and quickness training may be included in the training schedule of intermediary and elite soccer players.

REFERENCES

1. Alves, J. M. V. M., Rebelo, A. N., Abrantes, C., & Sampaio, J. (2010). Short-term effects of complex and contrast training in soccer players' vertical jump, sprint, and agility abilities. *The Journal of Strength & Conditioning Research*, 24(4), 936-941.
2. Buttifant, D., Graham, K., & Cross, K. (2002). AGILITY AND SPEED IN SOCCER PLAYERS ARE TWO DIFFERENT PERFORMANCE PARAMETERS. *Science and football IV*, 329.
3. Chelly, M. S., Fathloun, M., Cherif, N., Amar, M. B., Tabka, Z., & Van Praagh, E. (2009). Effects of a back squat training program on leg power, jump, and sprint performances in junior soccer players. *The Journal of Strength & Conditioning Research*, 23(8), 2241-2249.
4. J Bloomfield, R Polman, P O'DONOGHUE (2007) Effective speed and agility conditioning methodology for random intermittent dynamic type sports. *The Journal of Strength & Conditioning Research*, 2007
5. Jovanovic, M., Sporis, G., Omrcen, D., & Fiorentini, F. (2011). Effects of speed, agility, quickness training method on power performance in elite soccer players. *The Journal of Strength & Conditioning Research*, 25(5), 1285-1292.
6. Lebedev, S. I. (2013). Determining the level of high-speed abilities of young soccer players aged from 10 to 12 years. *Pedagogika, psihologija ta mediko-biologicni problemi fizicnogo viovanna i sportu*, 6.
7. Lennemann, L. M., Sidrow, K. M., Johnson, E. M., Harrison, C. R., Vojta, C. N., & Walker, T. B. (2013). The influence of agility training on physiological and cognitive performance. *The Journal of Strength & Conditioning Research*, 27(12), 3300-3309.
8. Little, T., & Williams, A. G. (2005). Specificity of acceleration, maximum speed, and agility in professional soccer players. *The Journal of Strength & Conditioning Research*, 19(1), 76-78.
9. Milanović, Z., Sporiš, G., Trajković, N., James, N., & Šamija, K. (2013). Effects of a 12 week saq training programme on agility with and without the ball among young soccer players. *Journal of sports science & medicine*, 12(1), 97.
10. Milanović, Z., Sporiš, G., Trajković, N., Sekulić, D., James, N., & Vučković, G. (2014). Does SAQ training improve the speed and flexibility of young soccer players? A randomized controlled trial. *Human movement science*, 38, 197-208.
11. Polman, R., Bloomfield, J., & Edwards, A. (2009). Effects of SAQ training and small-sided games on neuromuscular functioning in untrained subjects. *Int J Sports Physiol Perform*, 4(4), 494-505.
12. Thomas, K., French, D., & Hayes, P. R. (2009). The effect of two plyometric training techniques on muscular power and agility in youth soccer players. *The Journal of Strength & Conditioning Research*, 23(1), 332-335.

13. Yap, C. W., & Brown, L. E. (2000). Development of speed, agility, and quickness for the female soccer athlete. *Strength & Conditioning Journal*, 22(1), 9.
14. Young, W., Davies, M. J., Farrow, D., & Bahnert, A. (2013). Comparison of Agility Demands of Small-Sided Games in Elite Australian Football. *International Journal of Sports Physiology & Performance*, 8(2).