Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

Research Paper

Eight Week Sand Based Speed Workout Applied Among Football Players

Physical Education

KEYWORDS : Football Players, Sand Surface, Sprint Training, RAST, speed, explosive power, fatigue index.

T.Vinoth — PhD Scholar, TNPESU, Chennai.

Dr.A.S.Nageswaran — Associate Professor, Department of Physical Education and Centre for Research, H. H. The Rajah's College, Pudukkottai, Tamil Nadu, India.

ABSTRACT

The purpose of the present study was to find out the effect of sand based speed training applied among football players on sprinting speed, acceleration, strength, explosive power and fatigue index. To achieve the purpose of the study, 24 young football players were selected from Govt Hr Sec School, Thuvarankkurichy, Trichy District, Tamil Nadu at randomly. The selected subjects were divided into two equal groups. Group I underwent sprint training on sand surface for three days per week over a period of eight weeks and Group II acted as control group and no training was given to CG during the course of experiment. Sprint speed (50 mts dash), Acceleration (30 m run test), power (Sargent Jump test), Fatigue Index (RAST Test) was selected as dependent variables. The pre test and post test randomized control group design was used as experimental design. Pre test data was collected before the training programme and post-test was collected immediately after the training session and the entire test were conducted on the firm ground surface. The collected data from the two groups prior to and immediately after the training programme on selected criterion variables will be statistically analyzed with paired samples't' test to find out the significant improvement between pre and post- test means of both groups and analysis of covariance (ANCOVA) was used to find out the significant difference among experimental and control groups. In all the cases 0.05 level of confidence was fixed to test the hypothesis. The result of the study reveals that there was significant improvement on selected dependent variables due to the effect of training and there was a significant difference between experimental and control groups of football players.

I INTRODUCTION

Football refers to a number of sports that involve, to varying degrees, kicking a ball with the foot to score a goal. Football is a game where the technique requires running ability, both for offensive and for defensive strategies; passing and kicking respectively. Football is a game that requires skill and speed. Speed is the ability to perform a movement within a short period of time (Neiman, 1995). The sprint ability at high speed is essential to performance in team invasion games, such as soccer. Sprinting has been shown to represent less than 10% of the distance covered in match and yet it is considered as critical to the outcome of a game. Professional football is characterised by high physical demands and frequent changes in exercise intensity (Di Salvo et al., 2007; Dupont, Akakpo, & Berthoin, 2004; Stolen, Chamari, Castagna, & Wisloff, 2005). Football players conduct 1000 to 1400 short-time actions with frequent changes every 4 to 6 s and high intensity actions about every 70 s (Stolen et al., 2005).

Practising moving and accelerating faster helps to condition the neuromuscular system to improve the firing patterns of fast twitch muscle fibres. Two variations of basic speed training are assisted and resisted speed training. Assisted training (also called over speed training helps to improve stride frequency. Resisted speed training helps to improve speed-strength and stride length. Sand sprinting is another common training method used to develop sprint speed. From Soviet research on Olympic sprinters, it was theorized that sprinting in the sand was one of the best ways to develop the hamstrings. According to a 1991 article from *The National Strength and Conditioning Association Journal* "sprinting in sand exaggerates the various stride components. In order to propel oneself forward through an unstable substance such as sand, hip flexion must reflect a higher knee/thigh action. Such kinesiological demands tax not only hip flexor involvement but also the hamstring braking function in knee extension".

Different surface properties have different effects on the dynamics and mechanics of movement (Ferris et al., 1999; Kerdok et al., 2002), and also affect the energetic of running (Kerdok et al., 2002). They also found that the metabolic rate on various surfaces is positively related to surface stiffness. The characteristics of a sand training surface are quite different. Sand is an amazing, organic training surface that allows one to perform extremely powerful movements with minimal joint impact. Sand also drives athletes to test the limits of their anaerobic thresholds. Running and jumping activities done on sand get results faster than the same activities on any other surface.

Research has shown that training on a sand surface can lead to improvements in firm ground performance. Sand surfaces are a popular alternative training venue for a range of firm ground sports (i.e., team sports, distance runners, etc), with research showing that there are distinct physiological and biomechanical differences associated with exercise on such training surfaces. These include a significant alteration in energy cost, kinematics, and muscle activation patterns when compared with firmer ground. The sand moves underfoot during the ground contact phase of the stride and so the athlete receives a greater training stimulus through the extra work that is performed on the sand. Among sprint coaches there is a concern that sprinting on an unstable sand surface may induce detrimental changes in technique that will transfer to competition performances.

With this in mind, the aim of this study was to find out whether there any improvement on speed, acceleration, power and fatigue index due to the effect of 8 week speed training protocol applied on sand surface among football players. It was hypothesized that the sand based sprint training protocol would achieve significant improvements in selected dependent variables among football players and there would be significant differences in between experimental and control groups on dependent variables.

II METHODOLOGY

Experimental Approach to the Problem

This study was designed to find out the effect of sand based speed training among football players on speed, acceleration, power and fatigue index. A pre test and post test randomized control group design was used as an experimental design in which 24 football players were divided into two groups of twelve each on random basis. No attempt was made to divide the groups in any manner. Subjects are selected based on their interest; selected subjects were clearly instructed about the research by the researcher. In the present study the participants were barefoot when sprinting on the sand surface. The participants were active football players and all had previously used sand

Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

sprinting in their training. The study was conducted over the period of eight weeks, two sessions per week during the pre-season phase of the training. The training surface of sand was a level surface. The sand grains had an average diameter of about 0.2 mm and the density of the sand was about 1530 kg/m3. Before commencing the trials the participants performed a sprint-specific warm-up consisting of 5 minutes of running with a heart rate of 140 Beats/Min, 5 minutes of active stretching, 10 minutes of running technique exercises, and 2–4 sub maximal and maximal short sprints.

Subjects

The subjects were selected from Govt Hr Sec School, Thuvarankkurichy, Trichy District, Tamil Nadu. Twenty four young football players, (mean ± SD: age 17.8 ± 0.5 years, height 1.76 ± 0.07m, body mass 62.3 ± 9.26 kg),were assigned to 1 of 2 groups: sand based sprint training group or control group (n=12 per group).

Testing

The initial testing took place before the beginning of the pre season, whereas the final testing was performed after 8 weeks of intervention with the sand based sprint training method. To prevent unnecessary fatigue accumulation, the players and coaches were instructed to avoid intense exercise for a 24-hour period before each testing session. Also, before each testing, the subjects performed a standard 25-minute warm-up. The entire tests were conducted in three consecutive days, minimum of 24 hours interval between tests. All subjects were familiarized with all testing procedures prior to the commencement of the study.

Selection of variables and tests

The following variables were selected for this study such as,

- Speed (50 mts Dash timing)
- Acceleration (30 mts sprint timing)
- Explosive power (sargent jump test)
- Fatigue Index (RAST Test).

Training procedure

Before the commencement of the training period, all football players completed a 4-week period of sand familiarization, comprising two 30-minute (sand) sessions a week that progressed from light jogging and walking up to higher intensity activity, which was ultimately similar to that performed in week 1 of the training intervention. The sand based sprint training group underwent training for 2 days per week (alternate days) for eight weeks. Every day the work out last at 45 to 60 minutes approximately.

Eight week sand based training programme: Table I

The protocol included a pre training test, Training Period and post training test and was completed before the in - season period.

EIGHT WEEK SAND BASED SPEED WORKOUT				
8 Week/16Session		Training / Intensity	Set/Rep	Recovery
Three consecutive days (sat, sun & mon)		Initial testing took place before the beginning of the pre season		
1	Session 1	Speed bounds (15 mts bounds + 15 mts Sprint)	2×3	3 min bet rep / 6 min rest bet set
	Session 2	35 mts BuildUp Sprints	(1×50%,1×60%,1 × 70%, 1× 80%, 1×90%)	Walk back to the start before the next sprint
2	Session 3	(15 mts bounds + 15 mts Sprint)	2×4	3 min bet rep / 6 min rest bet set
	Session 4	Flying sprints 20 mts (10 mts jog before the start of 20 mts flying sprint)	2×5	4 min rest between repetitions/6 min full rest between set
3	Session 5	(15 mts bounds + 15 mts Sprint)	2×3	3 min bet rep / 6 min rest bet set
	Session 6	50 mts Dash – maximum speed	5	5 min full rest in between rep
4	Session 7	(15 mts bounds + 15 mts Sprint)	3×4	3 min bet rep / 6 min rest bet set
	Session 8	Flying sprints 30 mts	3×3	3 min bet rep / 5 min full rest bet set
5	Session 9	(15 mts bounds + 15 mts Sprint)	3×3	3 min bet rep / 6 min rest bet set
	Session 10	40 mts Build Up Sprints	(1×50%,1×60%,1 × 70%, 1× 80%, 1×90%)	Walk back to the start before the next sprint
6	Session 11	(15 mts bounds + 15 mts Sprint)	2×4	3 min bet rep / 6 min rest bet set
	Session 12	50 mts dash – maximum speed	5	5 min full rest between rep
7	Session 13	(15 mts bounds + 15 mts Sprint)	3×3	3 min bet rep / 6 min rest bet set
	Session 14	Flying sprint 35 mts	7	4 min full rest between rep
8	Session 15	(15 mts bounds + 15 mts Sprint)	3×4	3 min bet rep / 6 min rest bet set
	Session 16	50 mts dash – maximum speed	6	5 min full rest between rep
Immediately after the next day of training (Fri, sat & sun)		Same pre test procedure were applied to find the impact of after the eight week training		

Statistical analysis

The collected data from the two groups prior to and immediately after the training programme on selected criterion variables was statistically analyzed with paired samples't' test to find out the significant improvement between pre and post- test means of both groups and analysis of covariance (ANCOVA) was used to find out the significant difference among experimental and control groups. In all the cases 0.05 level of confidence was fixed to test the hypothesis.

III RESULTS AND DISCUSSION

Analysis of Data:

Table II

Computation of Mean, SD, SE and 'T' Ratio of Pre & Post Tests of Training and control Group

Criterion Variables	Group	Test	Mean	SD	SE	t ' - Ratio
Maximum Sprinting Speed (50 mts run)	Experimental	Pre test	7.41	0.1084	0.0313	8.84*
		Post test	6.97	0.1435	0.0414	
	control	Pre test	7.37	0.0754	0.0218	0.71
		Post test	7.35	0.1314	0.0379	

Acceleration (30 mts run)	Experimental	Pre test	4.8	0.1193	0.0345	8.98*
		Post test	4.6	0.1084	0.0313	
	control	Pre test	4.7	0.103	0.0297	0.32
		Post test	4.7	0.1215	0.0351	
Explosive Power (Sargent jump test)	Experimental	Pre test	32.5	3.4245	0.9886	12.2*
		Post test	36.8	3.1861	0.9198	
	control	Pre test	32.8	4.6677	1.3475	0.62
		Post test	33	4.6122	1.3314	
Fatigue Index (RAST Test)	Experimental	Pre test	9.45	3.0059	0.8677	5.36*
		Post test	12	3.1361	0.9053	
	control	Pre test	10.04	2.6192	0.7561	1.53
		Post test	10.35	2.6232	0.7572	

Significant at 0.05 levels. Degrees of freedom n-1=11 is 1.80.

The analysis of pre test & post test means, SD, SE And dependent 't' test values on data obtained for Speed, Acceleration, explosive power and Fatigue Index of experimental and control group have been analyzed and presented in Table II. The obtained't' ratio 8.84, 8.98, 12.2 and 5.36 which was higher than the table value of 1.80 which was significant. The results of the study indicate that there was significant improvement between the pre and post test means of experimental group on the development of Speed, Acceleration, explosive power and Fatigue Index of football players. However, the control group has no significant improvement as the obtained 't' value is less than the table value; because it was not subjected to any specific training.

ANALYSIS OF COVARIANCE ON CRITERION VARIABLES OF EXPERIMENTAL AND CONTROL GROUP

TABLE III

Criterion Variables	Adjusted post test means		Source of Variance	Sum of Squares	df	Mean Squares	'F' - Ratio
	Experimental Group	Control Group					
Maximum Sprinting Speed	6.96	7.36	B W	0.9 0.4	1 21	0.9 0.02	47.26*
Acceleration	4.51	4.72	B W	0.18 0.17	1 21	0.18 0.01	22.82*
Power	36.99	32.84	B W	102.87 24.68	1 21	102.87 1.18	87.52*
Fatigue Index	12.27	10.08	B W	28.24 34.46	1 21	28.24 1.64	17.21*

*Significant at .05 level of confidence.

(The table value required for significance at 0.05 levels with df 1 and 21 is 4.32).

From the Table III, the obtained F-ratio for adjusted post test means were 47.26, 22.82, 87.52 and 17.21 respectively which are more than the table value of 4.32 for df 1 and 21 required for significant at 0.05 level of confidence. It indicates that there is significant difference between the adjusted post test means of experimental and control groups on the development of Speed, Acceleration, explosive power and Fatigue Index of football players.

The aim of the current study was to find out the effect of eight week sand based speed workout applied among football players. The study succeeded in showing that sand based speed training program of 8 – week duration had a significant training effect with regard to all the measured 50 mts speed timing, acceleration, explosive power and fatigue index values from pre- to post-training. To the best of our knowledge, no studies have been conducted to determine the sand based speed workout program applied among any sports on speed, acceleration, power and fatigue index. This made it difficult to discuss the results of this study to other studies. Study by Pinnington et al. identified a significantly greater contribution of the lower leg muscles when running on sand, partly because of an increased need for stabilization around the hip, knee, and ankle joints during the stance phase of running gait. The increased EC experienced on sand also results in a greater lactate accumulation (2–3 times) compared with running on firmer surfaces at similar speeds.

Another two studies authors applied plyometric and agility training protocols on the sand surface, in a study by Impellizzeri et al. investigated the effect of sand vs. grass training surfaces during 4 weeks of plyometric training in amateur soccer players. They showed a significant improvement in firm ground sprinting and jumping performance at the conclusion of the plyometric training on both sand and grass surfaces, with similar changes seen in both training groups and study by Gortsila et al. showed that sand-based agility training leads to significant improvements (p, 0.05) in agility performance (T test and Illinois test) measured on both sand and grass surfaces, despite no agility training on grass. Over all, in this current study we found greater increased speed, acceleration, power and fatigue index due to the effect of eight week sand based speed training. Therefore, in addition to the well- known training surfaces such as land, down hills, up hills and aquatics, fitness coaching professionals should used sand surface (sand based speed training protocols) in to their conditioning program to enhance speed, acceleration, power and fatigue index performance of field sport athletes.

IV CONCLUSION.

It was concluded that speed, acceleration, explosive power and fatigue index can be improved significantly due to eight weeks of sand based speed training protocol for football players. Hence it is suggested that sand based speed training protocol should be given to importance while designing training programme for football players.

V PRACTICAL APPLICATION

The results of the present study suggest that a short period of sand based speed training (two sessions per week for up to 8 weeks) can enhance speed, acceleration, explosive power and fatigue index in sports participants. Further research is needed to determine whether more intense sand sprint training enhances performance even more and to determine whether specific regimens of sprint training on sand surface improve speed performances of highly trained football players and sprinters. This study can also apply among female sport participants.

Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

REFERENCE

1. Bangsbo, J, Norregaard, L, and Thorso, F. Activity profile of competition soccer. Can J Sport Sci 16: 110–116, 1991. | 2. "Characteristics of a sand training surface" (2011) Retrieved from Sand Training for All Volleyball Players, http://www.volleyballmag.com /10/11/11. | 3. Di Salvo, V., Baron, R., Tschan, H., Calderon Montero, F.J., Bachl, N., & Pigozzi, F. (2007). Performance characteristics according to playing position in elite soccer. International Journal of Sports Medicine, 28, 222–227. | 4. Dupont, G., Akakpo, K., & Berthoin, S. (2004). The effect of in-season, high-intensity interval training in soccer players. The Journal of Strength and Conditioning Research, 18, 584–589. | 5. Ekblom, B. Applied physiology of soccer. Sports Med 3: 50–60, 1986. | 6. Faccioni A. Assisted and resisted methods for speed development (part I). Modern Athlete Coach.1994,32(2):3-6 | 7. Faccioni A. Assisted and resisted methods for speed development (part II). Modern Athlete Coach. 1994 32(3):8-116 | 8. Ferris, D.P., Liang, K., & Farley, C.T. (1999). Runners adjust leg stiffness for their first step on a new running surface. Journal of Biomechanics, 32, 787–794. | 9. Gortsila, E, Theos, A, Smirnioti, A, and Maridaki, M. The effect of sand-based training in agility of pre-pubescent volleyball players. 16th Annual Congress of the European College of Sport Science. Liverpool, United Kingdom. Book of Abstracts, 2011. pp. 643. | 10. Impellizzeri, FM, Rampinini, E, Castagna, C, Martino, F, Fiorini, S, and Wisloff, U. Effect of plyometric training on sand versus grass on muscle soreness and jumping and sprinting ability in soccer players. Br J Sport Med 42: 42–46, 2008. | 11. Jakalski K. Parachutes, tubing, and towing. Track Coach 1998;144:4585– 4589, 4612. | 12. Kerdok, A.E., Biewener, A.A., McMahon, T.A. Weyand, P.G. & Herr, H. M. (2002). Energetics and mechanics of human running on surfaces of different stiffnesses. Journal of Applied Physiology, 92, 469–478. | 13. Lejeune, TM, Willems, PA, and Heglund, NC. Mechanics and energetics of human locomotion on sand. J Exp Biol 201: 2071– 2080, 1998. | 14. Mero A, Komi PV, Gregor RJ. Biomechanics of sprint running. A review. Sports Med. 1992,Jun;13(6):376-92 | 15. Neiman, D. (1995). Fitness and Sports Medicine: A health-related approach. (3rd ed.). Mountain View, California, Mayfield Publishing Company. | 16. Oviatt R., Hemba G. Oregon State: Sandblasting through the PAC. Nat. Strength Cond. Assoc. J. 1991;13:40–46. | 17. Pinnington, HC and Dawson, B. Running economy of elite surf iron men and male runners, on soft dry beach sand and grass. Eur J Appl Physiol 86: 62–70, 2001. | 18. Pinnington, HC and Dawson, B. The energy cost of running on grass compared to soft dry beach sand. J Sci Med Sport 4: 416–430, 2001. | 19. Pinnington, HC, Lloyd, DG, Besier, TF, and Dawson, B. Kinematic and electromyography analysis of submaximal differences running on a firm surface compared with soft, dry sand. Eur J Appl Physiol 94: 242–253, 2005. | 20. Reilly, Tand Thomas, V. A motion analysis of work-rate in different positional roles in professional football match-play. J Hum Mov Stud 2: 87–89, 1976. | 21. Stolen, T., Chamari, K., Castagna, C., & Wisloff, U. (2005). Physiology of soccer: An update. Sports Medicine, 35, 501–536. | 22. Withers, RT, Mercier, Z, Wasilewski, S, and Kell, L. Match analysis of Australian professional soccer players.J HumMovStud 8: 159–176, 1982. | 23. Zamparo, P, Perini, R, Orizio, C, Sacher, M, and Ferretti, G. The energy cost of walking or running on sand. Eur J Appl Physiol 65: 183–187, 1992.