Investigate the Hollow Sprint Training Effects on Acceleration and Maximum Running Speed among Team Sport Athletes

[*1]Dr.S.Arumugam, Assistant Professor
[2] D.Mariyappan, M.P.Ed. Student
[1&2]Department of Physical Education and Sports, Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamilnadu, India, Pin Code: 627012

Abstract

The purpose of the study was to investigate the hollow sprint training effects on acceleration and maximum running speed among team sport athletes. To achieve the purpose of this study, twenty four male team sport athletes were randomly selected from Department of Physical Education and Sports, Manonmaniam Sundaranar University, Tirunelveli, Tirunelveli, Tamil Nadu, India. Their age were ranged from 23 to 27 years. The selected participants were randomly divided into two groups such as Group 'I' underwent hollow sprint training (n=12) and Group 'II' acted as control group (n=12). Group 'I' underwent hollow sprint training for three days and one session per day and each session lasted for an hour for six week periods. Group 'II' was not exposed to any specific training but they were participated in regular activities. The data on selected criterion variables on acceleration was measured by 30 m acceleration test (seconds) and maximum running speed was measured by sprint test (seconds). The pre and post-tests data were collected on selected criterion variables prior to and immediately after the hollow sprint training. The pre and post tests scores were statistically examined by the dependent 't' test and Analysis of Co-Variance (ANCOVA) for each and every selected variables separately. It was concluded that the hollow sprint training group were improved criterion variables on acceleration and maximum running when compared to the control group. However the control group had not shown any significant improvement on selected criterion variables.

Keywords: *Hollow Sprint Training, Acceleration, Maximum Running, Team Sports Players*

1. Introduction

The training-performance relationship is of particular importance to coaches to determine the optimum amount of training required to attain specific performance levels (Avalos, Hellard & Chatard. 2003).

Training is the planned and systematic realization of measure (training contents and training methods) for the durable attainment of goal (training goals) in and through sport (Hohmann, Lames & Letzelter, 2002).

In team sports, the positive acceleration ability is of particular importance because sprint efforts during team sport competitions are generally of short duration (e.g., 10–20 m, 2–3 seconds). Coaching and conditioning literature commonly use the word "acceleration" to mean a positive horizontal acceleration (increasing running speed) or even short sprint performance, so the colloquial meaning of the word will be used for the remainder of this article (Spencer, Bishop, Dawson & Goodman, 2005).

The training load should be increased in order to improve the performance load must be increased from time to time for improvement of the continuous performance. Training load can be increased gradually or step by step is result in strong and faster adaptation process and more effective reaction from the organism. Step by step of increase of load gives time to the organism to adapt to the increased demands. Beginning lesser load is greater improvement but latter higher load is necessary to produce even a small increase in performance (Arumugam, 2018)

Sprinting is effective for improving sprinting performance in both recreational and highly-trained athletes, as might be expected based on the principle of specificity. Highly-trained athletes might benefit more from sprint running training than less specific methods, while recreationally-trained athletes may benefit similarly from both specific and non-specific approaches (Lockie, 2011).

The anaerobic process comes into play when sufficient oxygen is not available to produce enough energy aerobically and that this process is very important explosive type activities such as sprinting, football, weight lifting, ice hockey, basketball etc. It is generally agreed that anaerobic endurance training for the development of the ATP-CP energy system is developed best by working the 8 specific muscles maximal for a period of less than 30 seconds (Shaver, 1992).

2. Purpose of the Study

The purpose of the study was to investigate the hollow sprint training effects on acceleration and maximum running speed among team sport athletes.

3. Methodology

To achieve the purpose of this study, twenty four male team sport athletes were randomly selected from Department of Physical Education and Sports, Manonmaniam Sundaranar University, Tirunelveli, Tirunelveli, Tamil Nadu, India. Their age were ranged from 23 to 27 years. The selected participants were randomly divided into two groups such as Group ‘I’ underwent hollow sprint training (n=12) and Group ‘II’ acted as control group (n=12). Group ‘I’ underwent hollow sprint training for three days and one session per day and each session lasted for an hour for six week periods. Group ‘II’ was not exposed to any specific training but they were participated in regular activities. The data on selected criterion variables on acceleration was measured by 30 m acceleration test (seconds) and maximum running speed was measured by sprint test (seconds). The pre and post-tests data were collected on selected criterion variables prior to and immediately after the hollow sprint training. The pre and post tests scores were statistically examined by the dependent ‘t’ test and Analysis of Co-Variance (ANCOVA) for each and every selected variables separately. In all the cases 0.05 level was fixed as significant level.

4. Result and Discussions

4.1 Acceleration

The analysis of dependent ‘t’ test on the data obtained for acceleration of the pre-test and post-test means of experimental and control groups have been analyzed and presented in Table 1.

Table 1: Computation of 't' - Ratio between Pre and Post Test Means of Experimental and Control Groups on Acceleration (Seconds)

Tests		Pre Test	Post Test	't' - Value
Experimental Group	Mean	4.29	4.15	6.87*
	SD	0.05	0.03	
Control Group	Mean	4.28	4.26	1.16
	SD	0.12	0.08	

***Significant at 0.05 level. The table value required for 0.05 level of significance with df 11 is 2.20.*

The table 1 shows that the pre-test mean values of experimental and control groups are 4.29 and 4.28 respectively and the post test means are 4.15 and 4.26 respectively. The obtained dependent t-ratio values between the pre and post test means of experimental and control groups are 6.87 and 1.16 respectively. The table value required for significant difference with df 11 at 0.05 level is 2.20. Since, the obtained 't' ratio value of hollow sprint training group was greater than the table value, it was understood that hollow sprint training group had significantly improved on acceleration. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.

The analysis of covariance on acceleration of experimental and control groups have been analyzed and presented in Table 2.

Table 2: Analysis of Covariance on Acceleration of Experimental and Control Groups

Adjusted Post Test Means		Source of variance	Sum of squares	df	Mean square	F–ratio
Experimental Group	Control Group	Between	0.062	1	0.062	31.27*
4.14	4.25	Within	0.042	21	0.002	

** Significant at 0.05 level. Table value for df 1, 21 was 4.32*

Table 2 shows that the adjusted post-test means of experimental group and control groups are 4.14 and 4.25 respectively. The obtained F-ratio value is 31.27 which is greater than the table value 4.32 with DF 1 and 21 required for significance at 0.05 level. Since the value of F-ratio is greater than the table value, it indicates that there is a significant difference among the adjusted post-test means of experimental group and control groups on acceleration.

The pre, post and adjusted post-test means values of experimental and control group on acceleration were graphically represented in the figure 1.

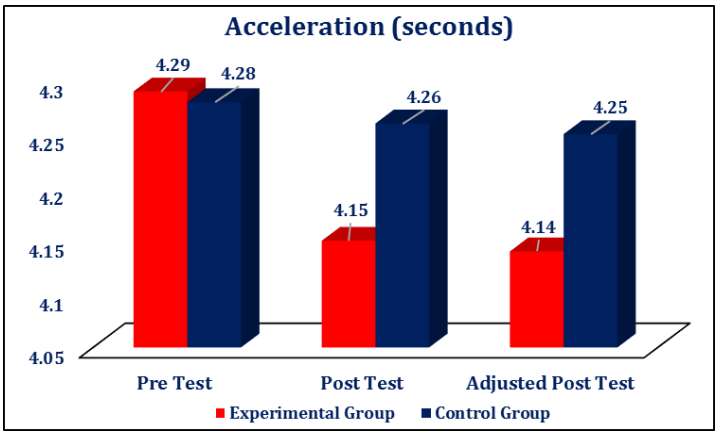

Figure 1: Pre, Post and Adjusted Post Test Means Values of Experimental and Control Group on Acceleration.

4.2 Maximum Running Speed

The analysis of dependent 't' test on the data obtained for maximum running speed of the pre-test and post-test means of experimental and control groups have been analyzed and presented in Table 3.

Table 3: Computation of 'T' - Ratio between Pre and Post Test Means of Experimental and Control Groups on Maximum Running Speed (Seconds)

Tests		Pre Test	Post Test	't' - Value
Experimental Group	Mean	3.49	3.38	4.43*
	SD	0.09	0.06	
Control Group	Mean	3.47	3.46	0.39
	SD	0.05	0.06	

***Significant at 0.05 level. The table value required for 0.05 level of significance with df 11 is 2.20.*

The table 3 shows that the pre-test mean values of experimental and control groups are 3.49 and 3.47 respectively and the post test means are 3.38 and 3.46 respectively. The obtained dependent t-ratio values between the pre and post test means of experimental and control groups are 4.43 and 0.39 respectively. The table value required for significant difference with df 11 at 0.05 level is 2.20. Since, the obtained 't' ratio value of hollow sprint training group was greater than the table value, it was understood that hollow sprint training group had significantly improved on maximum running speed. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.

The analysis of covariance on maximum running speed of experimental and control groups have been analyzed and presented in Table 4.

Table 4: Analysis of Covariance on Maximum Running Speed of Experimental and Control Groups

Adjusted Post Test Means		Source of variance	Sum of squares	df	Mean square	F–ratio
Experimental Group	Control Group	Between	.032	1	.032	10.87*
3.36	3.45	Within	.063	21	.003	

** Significant at 0.05 level. Table value for df 1, 21 was 4.32*

Table 4 shows that the adjusted post-test means of experimental group and control groups are 3.36 and 3.45 respectively. The obtained F-ratio value is 10.87 which is greater than the table value 4.32 with df 1 and 21 required for significance at 0.05 level. Since the value of F-ratio is greater than the table value, it indicates that there is a significant difference among the adjusted post-test means of experimental group and control groups on maximum running speed.

The pre, post and adjusted post-test means values of experimental and control group on maximum running speed were graphically represented in the figure 2.

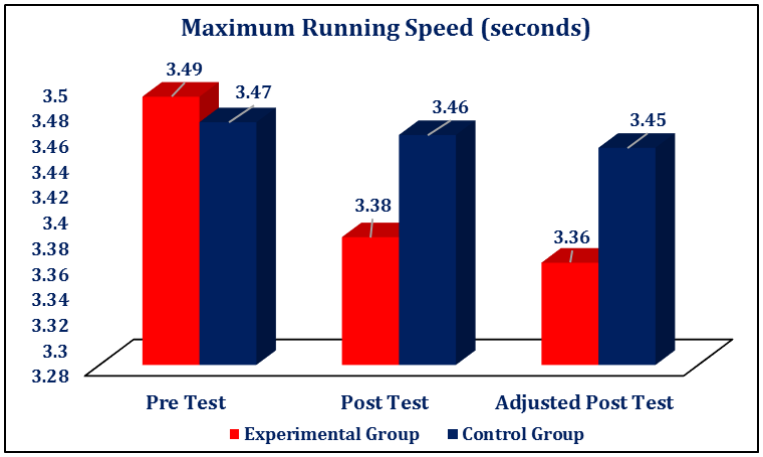

Figure 2: Pre, Post and Adjusted Post Test Means Values of Experimental and Control Group on Maximum Running Speed

5. Discussion on Findings

The result of the study indicates that the experimental group namely hollow sprint training group had shown significant improvement on selected criterions variables such as acceleration and maximum running speed. The control group athletes had not shown significant changes in any of the selected variables. The following studies are supported to the result of this investigation such as Lawrence, (2016), Giridharaprasath & Nandagopal, (2018), Dewanti & Lumintuarso, (2018), Arumugam & Suriya, (2018) and Lockie, Murphy, Knight & de Jonge, (2014)

6. Conclusions

1. There was a significant improvement on selected criterion variables such as acceleration and maximum running speed due to the effect of hollow sprint training.

2. There was a significant difference exists between experimental and control groups on acceleration and maximum running speed due to the effect of hollow sprint training.

7. References

1. *Avalos, M., Hellard, P., & Chatard, J. C. (2003). Modeling the training-performance relationship using a mixed model in elite swimmers. Medicine and science in sports and exercise, 35(5), 838.*
2. *Hohmann, A., Lames, M., & Letzelter, M. (2002). Einführung in die Trainingswissenschaft.*
3. *Spencer, M., Bishop, D., Dawson, B., & Goodman, C. (2005). Physiological and metabolic responses of repeated-sprint activities. Sports Medicine, 35(12), 1025-1044.*
4. *Lockie, R. G., Murphy, A. J., Knight, T. J., & de Jonge, X. A. J. (2011). Factors that differentiate acceleration ability in field sport athletes. The Journal of Strength & Conditioning Research, 25(10), 2704-2714.*
5. *Arumugam, S. (2018). Sports Training and System of Coaching. First Edition, Shanlax publications ISBN 978-93-87871-68-7 pg-9.*
6. *Arumugam, S. & Suriya, P (2018) "Effect of Sprint Training on Speed and Agility among Soccer Players", Journal of Emerging Technologies and Innovative Research, An International Open Access Journal, Vol: 5, Issue: 7, July 2018, pp. 308-311, ISSN: 2349-5162, UGC serial no. 63975*
7. *Lawrence, W. (2016). U.S. Patent No. 9,254,417. Washington, DC: U.S. Patent and Trademark Office.*
8. *Giridharaprasath, R. G., & Murugavel, K. (2016). Power and running velocity response to the influence of sprint training on football players. IJAR, 2(3), 430-432.*
9. *Dewanti, G., & Lumintuarso, R. (2018). Influence of Training Method and Leg Power on Running Speed. In 2nd Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS 2018) and 1st Conference on Interdisciplinary Approach in Sports (CoIS 2018). Atlantis Press.*
10. *Lockie, R. G., Callaghan, S. J., Berry, S. P., Cooke, E. R., Jordan, C. A., Luczo, T. M., & Jeffriess, M. D. (2014). Relationship between unilateral jumping ability and asymmetry on multidirectional speed in team-sport athletes. The Journal of Strength & Conditioning Research, 28(12), 3557-3566.*