INNOVARE JOURNAL OF EDUCATION

Vol 13, Issue 3, 2025, 37-40

ISSN: 2347-5528

Research Article

Explosive Adductor Exercise Effects on Range of Motion and Muscular Strength Variables Among Runners

K. Satheesh Kumar

St. Johns College of Physical Education, Veeravanallur, Tirunelveli, Tamil Nadu, India-627426

Abstract

The purpose of the study was to find out the explosive adductor exercise effects on a range of motion and speed endurance variables among runners. To achieve the purpose of the study, thirty college-level runners were selected randomly as subjects from M.D.T. Hindu College and St. Johns College of Physical Education, Tirunelveli District, Tamil Nadu, India, and their ages ranged from 17 to 25 years. The subjects were divided into two groups in equal numbers (*N* = 15). Group I underwent explosive adductor exercise group and Group II acted as the control group who did not attend any special training other than their daily college schedule curriculum. The duration of the training period was restricted to six weeks for 5 days per week. The pre and post-test data were collected before and after the training period. The dependent variables, range of motion and speed endurance, were tested by standardized test items, range of motion and speed endurance consumption tests, respectively. The collected data from the two groups prior to and after the experimental treatments on selected variables, range of motion and speed endurance were statistically analyzed by using the statistical technique of dependent test and analysis of covariance (ANCOVA). In all the cases, the level of confidence was fixed at 0.05 significant. The result of the study indicated that the experimental group had shown significant improvement in the sit and reach test and 300 mts dash variables among college-level runners due to the effects of explosive adductor exercise**.** However, the control group did not show any significant improvement in selected variables such as range of motion and speed endurance.

Keywords**:** explosive adductor exercise, range of motion, speed endurance, college runners

Introduction

The Olympic games feature many athletics events and take place once every four years. Originating in Ancient Greece in 776 BC and revived in the 19th century, the Olympic Games are the world's most significant sporting competition (Spivey, 2006, p. 5). Athletics events and games are the oldest form of organized sport, having developed out of the most basic human activities: running, walking, jumping, and throwing. They are a truly international sports group, with nearly every country in the world engaging in some form of competition.

Explosive is Plyometrics exercises that increase speed, quickness, and power. Most exercises include "jumping," in which the muscles exert maximal effort and force in short bouts or intervals. The work phase can be as short as three reps or 10 seconds, while the rest can be as short as 20 seconds or as long as two minutes. Rest is important for ensuring proper biomechanics and mental focus. The adductors span from various points on the public bone to several locations on the backs of the femurs. They are often referred to as the "groin muscles."

The utility of explosive adductor exercise for endurance athletes has been a matter of debate among sports scientists for a long time. Highly trained endurance runners normally have similar and very high V̇O2max values (70–80 mL/kg/min with relatively small variations between athletes (Nevill et al. 2003).

Explosive adductor exercise effects can be modulated by the range of motion (ROM), defined as the degree of movement that occurs at a specific joint during the execution of an exercise (Haff & Triplett, 2015). Explosive adductor exercise is an excellent lower-body workout. Before performing explosive adductor exercise, it's a good idea to work with a trainer or coach. They can help to optimize the movement to avoid injury. These findings may provide insight into whether there is merit in increasing or limiting the explosive adductor exercise to produce specific adaptations and maximize performance (Pallarés et al., 2021).

Recreated to elite runners, explosive adductor exercise has become a popular addition to distance running training programs to improve performance and prevent running-related injuries (Karp, 2024). Examined effects of 21-week twice weekly strength (ST), endurance (ET), and combined (ST + ET 2 + 2 times a week) (SET) training on neuromuscular, endurance, and walking performances as well as balance. Holviala et al. (2012) investigated the acute effects of light aerobic activity, static stretching (SS), strengthening, and explosive exercises on lower-body muscular performance and range of motion (ROM). The dose-response effect of SS on performance and ROM was also studied. Nineteen young male soccer players (age: 13.9 ± .46 years) participated in a cross-over randomized trial. Participants performed a 5-minute aerobic activity, followed by

DOI: https://dx.doi.org/10.22159/ijoe.2025v13i3.53957. Journal homepage: https://journals.innovareacademics.in/index.php/ijoe.

Acknowledgement: The author expresses sincere gratitude to M.D.T. Hindu College and St. John's College of Physical Education, Tirunelveli District, Tamil Nadu, India, for providing access to facilities, participants, and valuable support throughout the research process. Special thanks to the participants for their enthusiastic involvement and cooperation, which made this study possible. **Author Contributions:** The author is responsible for the study conception, design, data collection, data analysis, interpretation of results, and manuscript preparation. The author reviewed and approved the final manuscript. **Conflict of Interest:** There is no conflict of interest in the publication of this research. **Funding Source:** Nil.

Correspondence concerning this article should be addressed to K. Satheesh Kumar, St. Johns College of Physical Education, Veeravanallur, Tirunelveli District, Tamil Nadu, India-627426. **Email:** sk7532@gmail.com

seven bouts of SS of the calf, quadriceps, adductor, and hamstring muscles lasting 20 seconds each. Additionally, two sets of strengthening and explosive exercises were performed after SS in the experimental condition (Šarabon et al., 2020). The most affected range of motion (ROM) to minimize the risk of injury and maximize the resistance training adaptations. (Pallarés et al., 2021).

Objective

The purpose of this study was to find out the explosive adductor exercise effects on a range of motion and speed endurance variables among runners.

Methodology

To achieve the purpose of the study, thirty college-level runners were selected randomly as subjects from M.D.T. Hindu College and St. Johns College of Physical Education, Tirunelveli District, Tamil Nadu, India and their ages ranged from 17 to 25 years. The male college-level runners were assigned at random into two groups of fifteen (N =15). Group I underwent college-level runners and Group–II acted as the control group who did not attend any special training other than their regular daily college schedule curriculum. The duration of the training period was restricted to six weeks for 5 days per week. The pre and post-data were collected before and after the training period. The dependent variables' range of motion and speed endurance were tested by standardized tests, such as the sit and reach test and 300 mts dash consumption test.

Results

The explosive adductor exercise effects on a range of motion and speed endurance variables among runners were analyzed and presented below. The *t*-test on the range of motion of the pre-test and post-test scores of the explosive adductor exercise group and control group have been analyzed and presented in Table 1.

Table I showed that the obtained *t*-test values of explosive adductor exercise and control groups are 9.22 and 0.24, respectively, which are greater than the tabulated *t*-values of 2.14 with df 14 at a 0.05 level of confidence. This means that the explosive adductor exercise groups had significantly improved in range of motion among the participants (men college runners). However, the control group did not show any significant improvement in participants' range of motion because they did not undergo any special training.

Table 1
Comparative Analysis of Pre and Post-Test Range of Motion Scores for the Adductor Exercise Group and Control Group

Group	Pre-Test M	MD	Post-Test M	*SD*	Obtained t-ratio
Explosive adductor exercise group	18.37	0.73	19.77	0.76	9.22*
Control group	18.37	0.03	18.32	0.11	0.24

Note. *Significant at 0.05 level. The table value required at 0.05 levels with *df* 14 is 2.14.

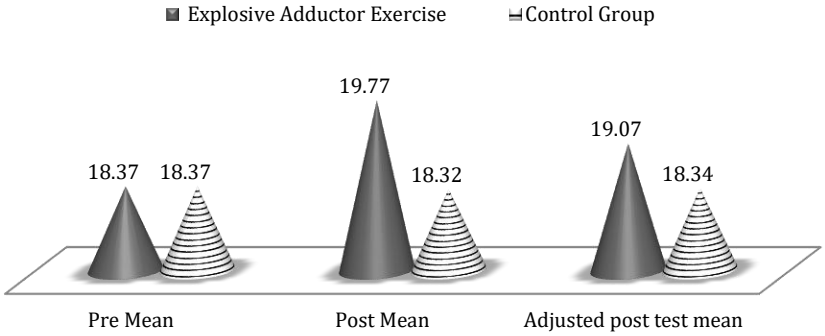
The analysis of covariance on a range of motion of the explosive adductor exercise group and control groups has been analyzed and presented in Table 2. The obtained *F*-ratio value is 18.40, which is higher than the value 4.21, with *df* 1 and 27 required for significance at 0.05 level. Since the value of *F*-ratio is higher than the table values, it indicates that there was a significant difference in the range of motion among the adjusted post-test means of explosive adductor exercise and control groups.

Table 2
Analysis of Covariance on Range of Motion of Explosive Adductor Exercise Group and Control Groups

Adjusted post-test mean		Source of variance	*SS*	*df*	*MS*	*F*-ratio
Explosive adductor exercise group	Control Group	Between	1 31.39	1	131.39	
19.07	18.34	Within	192.79	27	7.14	18.40*

Note. *Significant at 0.05 level. The table value required at 0.05 levels with *df* 1 and 27 is 4.21.

Figure 1
Pre, Post, and Adjusted Post-Tests Mean Values of Explosive Adductor Exercise Group and Control Groups on Range of Motion



Range of Motion

Speed Endurance Test

The *t*-test on the speed endurance test of the pre and post-test scores of the explosive adductor exercise group and control group have been analyzed and presented in Table 3. The results showed that the obtained *t*-test values of explosive adductor exercise and control groups are 17.43 and .33, respectively, which are greater than the tabulated *t*-value of 2.14 with *df* 14 at a 0.05 level of confidence. This means that the explosive adductor exercise groups had significantly improved speed endurance among the participants (men college runners). However, the control group did not show any significant improvement in participants' explosive power because they did not undergo any special training.

Table 3
Summary of Means, Standard Deviation, and Dependent 't' Test Values on Speed Endurance of Explosive Adductor Exercise and Control Groups

Group	Pre-test *M*	*SD*	Post-test *M*	*SD*	Obtained *t*-ratio
Explosive adductor exercise group	47.31	6.00	45.49	1.20	17.43*
Control group	47.53	0.07	47.31	0.14	0.33

Note. *Significant at 0.05 level. The table value required at 0.05 level with *df* 14 is 2.14.

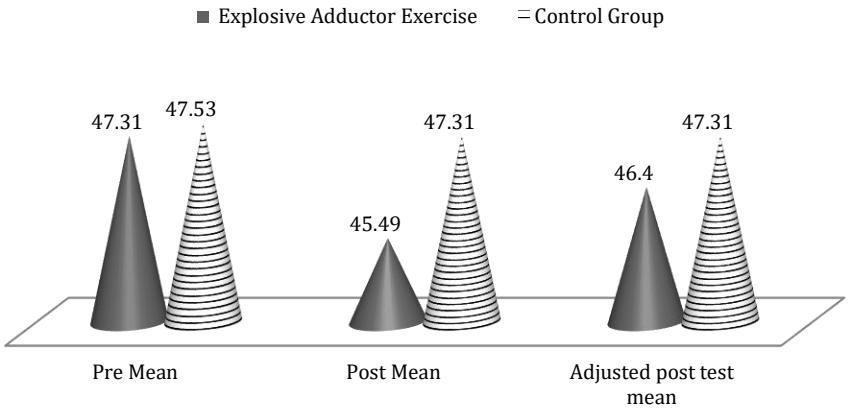
The analysis of covariance on Speed Endurance of the explosive adductor exercise group and control groups have been analyzed and presented in Table 4. The Table presented obtained *F*-ratio value of 30.61, which is higher than the value 4.21 with *df* 1 and 27 required for significance at .05 level. Since the value of *F*-ratio is higher than the table value, it indicates that there was a significant difference in Speed Endurance among the adjusted post-test means explosive adductor exercise and control group. However, the experimental group is better than the control group on speed endurance among male college runners. The bar diagram shows the mean values of the pre-test, post-test, and adjusted post-test on the speed endurance test of the explosive adductor exercise group and control group.

Table 4
Analysis of Covariance on Speed Endurance of Explosive Adductor Exercise Group and Control Groups

Adjusted post-test mean		Source of variance	*SS*	*df*	*MS*	*F*-ratio
Explosive adductor exercise group	Control group	Between	105.61	1	105.61	30.61*
46.4	47.31	Within	93.34	27	3.45	

Note. *Significant at 0.05 level. The table value required at 0.05 level with *df* 1 & 27 is 4.21.

Figure 2
Pre, Post, and Adjusted Post-Tests Mean Values of Explosive Adductor Exercise Group and Control Groups on Speed Endurance



Speed Endurance

Discussion

The present study aimed to examine the impact of explosive adductor exercise as a substitute for a completion method of therapy for performance full body symptoms. Godse et al. (2015) found a significant improvement in range of motion and speed endurance levels after explosive adductor exercise. Behm et al. (2016) found that explosive adductor exercise is the best performance range of motion in healthy runners' systematic activities. In addition, some studies analyze explosive adductor exercise as the best slow range of motion and speed endurance, a maximum with contractions in male college runners (Hein et al., 2014). Manipulating joint range of motion during explosive adductor exercise may have differential effects on adaptations to strength training with implications for running (Bloomquist et al., 2013). The multiple advantages of explosive adductor exercise are maintaining the body with explosiveness and the brain calm (Di Giminiani & Visca, 2017). The dynamic, explosive adductor exercise has significantly improved flexibility and endurance among college-level runners (Pucsok et al., 2021). Delecluse (1997) has reported improved low back and hamstring flexibility and speed endurance after practicing explosive adductor exercise. It may be commented that the observations from the current research show the practice of explosive adductor exercise to improve flexibility and speed endurance after practicing twice a day for 6 weeks.

Conclusions

The finding of this study demonstrates that explosive adductor exercises significantly enhance the range of motion and speed endurance among college-level runners. The six-week training program resulted in improved hip flexibility and dynamic muscle performance, which are critical factors for optimal running mechanics and endurance in speed-based events. The significant improvements observed in the experimental group, compared to the control group, highlight the effectiveness of targeted explosive adductor training in improving lower body flexibility, neuromuscular coordination, and anaerobic performance. These results reinforce the importance of incorporating explosive adductor exercises into the training routines of runners to enhance performance and reduce injury risk. Future research can explore the long-term effects of such training across different age groups, genders, and competitive levels to further validate these findings.

References

Behm, D. G., Blazevich, A. J., Kay, A. D., & McHugh, M. (2016). Acute effects of muscle stretching on physical performance, range of motion, and injury incidence in healthy active individuals: A systematic review. *Applied Physiology, Nutrition, and Metabolism*, *41(*1), 1–11. https://doi.org/10.1139/apnm-2015-0235

Bloomquist, K., Langberg, H., Karlsen, S., Madsgaard, S., Boesen, M., & Raastad, T. (2013). Effect of range of motion in heavy load squatting on muscle and tendon adaptations. *European Journal of Applied Physiology*, *113*(8), 2133–2142. https://doi.org/10.1007/s00421-013-2642-7

Di Giminiani, R., & Visca, C. (2017). Explosive strength and endurance adaptations in young elite soccer players during two soccer seasons. *PloS one*, *12*(2), e0171734. https://doi.org/10.1371/journal.pone.0171734

Godse, A. S., Shejwal, B. R., & Godse, A. A. (2015). Effects of suryanamaskar on relaxation among college students with high stress in Pune, India. *International journal of Yoga*, *8*(1), 15–21. https://doi.org/10.4103/0973-6131.146049

Haff, G. G., & Triplett, N. T. (eds) (2015). *Essentials of strength and conditioning* (3rd ed.). Human Kinetics.

Hein, T., Janssen, P., Wagner-Fritz, U., Haupt, G., & Grau, S. (2014). Prospective analysis of intrinsic and extrinsic risk factors on the development of a chilles tendon pain in runners. *Scandinavian Journal of Medicine and Science in Sports*, *24*(3), e201–e212. https://doi.org/10.1111/sms.12137

Holviala, J., Kraemer, W. J., Sillanpää, E., Karppinen, H., Avela, J., Kauhanen, A., Häkkinen, A., & Häkkinen, K. (2012). Effects of strength, endurance and combined training on muscle strength, walking speed and dynamic balance in aging men. *European Journal of Applied Physiology*, *112*(4), 1335–1347. https://doi.org/10.1007/s00421-011-2089-7

Karp, J. R. (2024). The effects of strength training on distance running performance and running injury prevention. *Journal of Physical Education & Sport*, *24*(10), 1352 – 1367. https://doi.org/10.7752/jpes.2024.10259

Nevill, A., Brown, D., Godfrey, R., Johnson, P., Romer, L., Stewart, A. D., & Winter, E. M. (2003). Modeling maximum oxygen uptake of elite endurance athletes. *Medicine and science in sports and exercise*, *35*(3), 488–494. https://doi.org/10.1249/01.MSS.0000053728.12929.5D

Pallarés, J. G., Hernández-Belmonte, A., Martínez-Cava, A., Vetrovsky, T., Steffl, M., & Courel-Ibáñez, J. (2021). Effects of range of motion on resistance training adaptations: A systematic review and meta-analysis. *Scandinavian Journal of Medicine and Science in Sports*, *31*(10), 1866–1881. https://doi.org/10.1111/sms.14006

Pucsok, J. M., Kovács, M., Ráthonyi, G., Pocsai, B., & Balogh, L. (2021). The impact of COVID-19 lockdown on agility, explosive power, and speed-endurance capacity in youth soccer players. *International Journal of Environmental Research and Public Health*, *18*(18), 9604. https://doi.org/10.3390/ijerph18189604

Šarabon, N., Hostnik, J., & Markovic, G. (2020). Acute effects of aerobic activity, static stretching, and explosive exercises on muscular performance and range of motion of young soccer players. *International Journal of Sports Science and Coaching*, *15*(5–6), 706–716. https://doi.org/10.1177/1747954120942895

Spivey, Nigel (2006). *The ancient Olympics* (1st ed.). Oxford University Press.

Received: 05 December 2024
Revised: 25 February 2025
Accepted: 05 March 2025