

Effect of Varied Neuromuscular Training on Muscular Endurance of School Athletes

Santhoshe T^{1*}, Prof. Dr. P. Kaleeswaran²

¹Research Scholar, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu

²Research Supervisor, Alagappa University College of Physical Education, Alagappa University Karaikudi, Tamil Nadu

DOI: <https://doi.org/10.36348/jaspe.2026.v09i04.008>

| Received: 19.02.2026 | Accepted: 13.04.2026 | Published: 28.04.2026

*Corresponding author: Santhoshe T

Research Scholar, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu

Abstract

The purpose of study was to find out the effect of varied neuro muscular training on muscular endurance of school athletes. To achieve this purpose of the study, forty five school boys athletes from St.Marys school Nagerkiol, were randomly selected as subjects. The age of the subjects ranged between 12 and 13 years. They were divided into three equal groups. The experimental group-1, underwent jump rope training the experimental group-2 underwent ladder training and group 3 served as control group and did not do any specific training. The muscular endurance was selected as criterion variable and the measurement was recorded in counts. The selected two treatments were performed 3 days in a week for the period of twelve weeks, as per the stipulated training program. The collected pre and post data was critically analysed with apt statistical tool of one-way analysis of co-variance, for observed the significant adjusted post-test mean difference of three groups. The Scheffe's post hoc test was used to find out pair-wise comparisons between groups with. To test the hypothesis 0.05 level of significant was fixed in this study.

Keywords: Jump Rope Training, Ladder Training, Muscular Endurance, Sit Up Test, Ancova.

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Jumping rope can additionally use as a high intensity interval training workout. Stewart and J. Warner (2012). Because of the quick rebounding, jumping rope primarily works the foot muscles and joints. It may be regarded as a form of plyometric training to increase power and stiffness, two essential components of endurance-running performance. Pinillos (2019). The ladder is a form of a physical training using stairs to train the agility of the legs and to harmonize movements in a balanced manner. The agility ladder is a training tool for coordination, speed, and agility. In this agility ladder, athletes can move their feet quickly in the right motion Rosdiana and Sidik(2023). Because of the quick rebounding, jumping rope primarily works the foot muscles and joints. It may be regarded as a form of plyometric training to increase power and stiffness, two essential components of endurance-running performance. Pinillos (2019). The ladder is a form of a physical training using stairs to train the agility of the legs and to harmonize movements in a balanced manner.

The agility ladder is a training tool for coordination, speed, and agility. In this agility ladder, athletes can move their feet quickly in the right motion Rosdiana and Sidik (2023).

METHODOLOGY

The experimental group-1, underwent jump rope training the experimental group-2 underwent ladder training and group 3 served as control group and did not do any specific training. The muscular endurance was selected as criterion variable and the measurement was recorded in counts. The selected two treatments were performed 3 days in a week for the period of twelve weeks, as per the stipulated training program.

RESULTS OF MUSCULAR ENDURANCE

The analysis of dependent 't' test on the data obtained for endurance of the pre test and post test of jump rope training, ladder training and control group have been analyzed and presented in table I.

Table I: The Dependent 'T'-Test Summary and Mean of Pre and Post Test on Muscular Endurance of Different Groups

	Pre		Post		't'-Test
	Mean	SD	Mean	SD	
JRT	12.06	1.27	14.6	0.91	13.2*
LT	12.13	0.91	15.93	0.59	21.76*
CG	12.06	1.03	11.93	1.03	1.46

*The table value 2.14 with df14 at 0.05 level of confidence

From the table VIII shows initial and final mean values between jump rope training and ladder training and control group were 13.2, 21.76 and 1.46 respectively. Since the obtained 't'-test value of experimental groups are greater than the table value 2.14 with df 14 at 0.05 level of confidence. It is concluded that

jump rope training and ladder training had significant improvement in the performance of muscular endurance. However, the control groups have no significant improvement in the performance of muscular endurance. The analysis of covariance on experimental and control group have been analysed and presented in table II.

Table II: The Adjusted Post Test Means on Muscular Endurance of Allotted Groups

Adjusted Post Test Means			Source of Variance	Sum of Squares	Df	Mean Squares	'F'-ratio
JRT	LT	CG					
14.61	15.90	11.94	Between	122.06	2	61.03	254.29*
			Within	10.04	41	0.24	

The table value of 3.23 for df 2 and 41 required for significance at 0.05 level of confidence.

The II, table represent adjusted post test mean values of muscular endurance for allotted group's jump rope training, ladder training and control group are 14.61, 15.90 and 11.94 respectively. The obtained F-ratio of 254.29 for adjusted post test mean is more than the table value of 3.23 for df 2 and 41 required for significance at 0.05 level of confidence. The final results

of the analysis was proved that significant difference among the adjusted post test means of static stretching followed by jump rope training, ladder training and control group on the development of muscular endurance. The Scheffe's test was applied as post hoc test to identify the paired mean difference on muscular endurance, the same represented III table.

Table III: The Paired Mean Differences between the Allotted Groups on Muscular Endurance

Adjusted Post Test Means			Mean Difference	Confidential interval value
JRT	LT	CG		
14.61	15.90	----	1.29*	0.56
14.61	----	11.94	2.66*	
----	15.90	11.94	3.95*	

From the table III the pair wise comparisons shows the mean differences of 1.29, 2.66, 3.95 for group 1 and 2, group 1 and 3, group 2 and 3 respectively. The mean difference values were greater than the confidential interval value 0.56. Hence, the result shows that there was a significant difference among the groups.

DISCUSSIONS

The selected two training interventions have enhanced the ability of muscular endurance owing to the 12 weeks of training program. The effect of jump rope training from pre (12.06+ 1.27) to post (14.6+ 0.91) and the effect of training from pre (12.13 +0.91) to post (15.93+ 0.59) have significantly changed. The rope training and ladder training showed a percentage of improvement of 0.03 % and 0.04% respectively. Maria, S. A *et al.*, (2025), their study evaluated the effects of jump rope training on cardiovascular capacity and muscular strength among university students. The findings highlight jump rope training as an effective, low-cost method for enhancing overall fitness. Its simplicity and accessibility make it highly suitable for

educational settings. The study recommends further research to explore its long-term benefits across diverse populations. Torres-Banduc, M. A., Thapa, R. K., Pérez, M. A., & Ramirez-Campillo, R. (2025), their study explored the effects of a six-week weighted jump rope training program on isokinetic shoulder performance in Cross Fit athletes. Overall, the results suggest limited impact of weighted jump rope training on shoulder isokinetic performance. Further controlled research is needed to validate these preliminary findings. Pengsri, K., Jansupom, C., & Hiruntrakul, A. (2024), their study compared the effects of jump rope training and balance board training on ankle stability in athletes with chronic ankle injuries. The findings suggest that while jump rope training is effective, balance-based exercises may provide superior benefits for injury prevention and rehabilitation. The study emphasizes the importance of selecting appropriate training methods based on athlete safety. These results offer valuable guidance for coaches and rehabilitation professionals. Singh, U *et al.*, (2022), their study conducted a systematic review and meta-analysis to evaluate the effects of jump rope training on

health- and sport-related physical fitness. The results highlight the broad effectiveness of jump rope training across multiple fitness domains. This study supports its inclusion as a versatile and efficient training method. Makaruk, H. (2013), their study compared the acute effects of traditional jumps and rope jump warm-ups on power and jumping performance in trained athletes. The results highlight the importance of incorporating dynamic jump-based exercises in warm-up routines. This study suggests that rope jumping may be particularly beneficial for improving horizontal power performance. Uma, V., Harikumar, K. C., & Kumar, M. S (2025), their study observed the effect of ladder training on muscular endurance among football players. The findings demonstrate the effectiveness of ladder training in enhancing endurance performance. This study highlights the practical value of incorporating agility-based drills into football conditioning programs. Natarajan, P., Senthilkumar, K., Rameshkumar, S., & Saraboji, S. (2024), their study explored the effect of agility ladder training on selected physical and physiological variables among school-level male athletes. These results highlight the effectiveness of ladder training in improving key performance-related attributes. The study supports the inclusion of agility ladder exercises in youth training programs. Ravi, P., & Kalimuthu, D. (2024), their study discovered the impact of ladder training on explosive power and speed among adolescent students. The findings emphasize the effectiveness of ladder training in developing key athletic performance variables. This study highlights its potential as a safe and practical training method for youth athletes. Ravi, P. (2023), his study investigated the effects of ladder training and circuit training on strength endurance among school boys. The results suggest that while ladder training is effective, circuit training may be more beneficial for enhancing strength endurance. This study provides useful insights for selecting appropriate training methods in youth fitness programs. Keskinis, I., Bassa, E., Merkou, E., Lazaridis, S., & Panoutsakopoulos, V. (2025), their study examined the effects of a six-week ladder training program on sprint performance and kinematic variables in young track and field athletes. The findings suggest that ladder training primarily enhances early acceleration ability rather than overall sprint mechanics. Individual variations in movement patterns were also noted, indicating diverse adaptation responses. This study highlights the usefulness of ladder training in developing speed in young athletes.

CONCLUSION

The ladder training has produced greater effect on muscular endurance than the other training groups. The second-best improvement was found in jump rope training. The control group did not show any significant changes on muscular endurance.

REFERENCES

- Keskinis, I., Bassa, E., Merkou, E., Lazaridis, S., & Panoutsakopoulos, V. (2025). The effect of ladder training on performance and kinematic parameters of sprinting in prepubertal track and field athletes. *International Journal of Sports Science & Coaching*, 17479541251384101. <https://doi.org/10.1177/17479541251384101>
- Makaruk, H. (2013). Acute effects of rope jumping warm-up on power and jumping ability in track and field athletes. *Polish Journal of Sport and Tourism*, 20(3), and 200. DOI: 10.2478/pjst-2013-0018
- Maria, S. A., Nicolae, O. M., Nicola, M., Szekely, A. S., Sorin, S., Dorina, I., & Teodor, G. V. (2025). Jump Rope Training Improves Muscular Strength and Cardiovascular Fitness in University Students: A Controlled Educational Intervention. *Sports*, 13(9), 307. <https://doi.org/10.3390/sports13090307>
- Natarajan, P., Senthilkumar, K., Rameshkumar, S., & Saraboji, S. (2024). Influence of ladder training on selected physical and physiological variables among school athletes. *International Journal of Physical Education, Sports and Health* 2024, 11(4), 25-28.
- Pengsri, K., Jansupom, C., & Hiruntrakul, A. (2024). Impact of jump rope and balance board training on ankle stability in athletes with chronic ankle sprains. *Journal of Physical Education and Sport*, 24(6), 1388-1393. DOI:10.7752/jpes.2024.06157
- Ravi, P. (2023). Prospective effects of ladder training and circuit training on the strength endurance performance of boys students. *Eur. Chem. Bull*, 12(5), 485-497.
- Ravi, P., & Kalimuthu, D. (2024). The Role of Ladder Training in Enhancing Athletic Performance: A Focus on Explosive Power and Speed in Adolescent Students. DOI: 10.20944/preprints202401.2098.v1
- Singh, U., Ramachandran, A. K., Ramirez-Campillo, R., Perez-Castilla, A., Afonso, J., Manuel Clemente, F., & Oliver, J. (2022). Jump rope training effects on health- and sport-related physical fitness in young participants: A systematic review with meta-analysis. *Journal of Sports Sciences*, 40(16), 1801–1814. <https://doi.org/10.1080/02640414.2022.2099161>
- Torres-Banduc, M. A., Thapa, R. K., Pérez, M. A., & Ramirez-Campillo, R. (2025). Isokinetic shoulder strength adaptations to weighted jump rope training in CrossFit athletes: A pre–post study. *Shoulder & Elbow*, 17585732251409407. <https://doi.org/10.1177/17585732251409407>
- Uma, V., Harikumar, K. C., & Kumar, M. S (2025). Evaluation of Muscular Endurance as a Result of Ladder Training: An Investigation. *International Journal of Multidisciplinary Research and Modern Education (IJMRME)*, Website: www.rdmodernresearch.com, ISSN (Online): 2454-6119, Volume 11, Issue 1, January - June, 2025.