

Effects of Exercise Order in a Resistance Training Exercise Session on Selected Speed Related Variables among Women Athletes

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DOI: <https://doi.org/10.36348/jaspe.2026.v09i07.005>

| Received: 27.05.2026 | Accepted: 21.07.2026 | Published: 23.07.2026

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Abstract

The Purpose of the study was to find out the effects of exercise order in a resistance training exercise session on selected speed related variables among women athletes. For this purpose, forty-five (N=45) women athletes who were participated in the inter collegiate athletic meet in Bharathidasan University, Tiruchirappalli, Tamil Nadu, India during the year 2025-2026 were randomly selected as subjects. The age of the subjects was ranged from 18 and 21 years. The subjects were divided into three groups of fifteen in each (n=15). Group-I underwent Large and Progressed toward Small Muscle group Exercises (LG-SM) and Group-II underwent Small and Advanced to Large Muscle group Exercises (SM-LG) and group – III was act as the Control group (CG). Experimental groups underwent their training programme for 12 weeks in addition to the training program designed by the college curriculum. The control group was no underwent any specific training. Speed, Stride Length and Acceleration Speed were selected as dependent variables. Speed and Stride Length were assessed by 50 Meters Sprint Test; and Acceleration Speed was measured by 30 Meters Acceleration Sprint Test. The data collected from the three groups prior to and immediately after the training programme on the selected criterion variables were statistically analyzed with dependent 't' test and Analysis of Covariance (ANCOVA). Whenever the 'F' ratio for adjusted posttest means was found to be significant, Scheffe's test was followed as a post hoc test to determine which of the paired mean differences were significant. In all the cases 0.05 level of confidence was fixed as a level of confidence to test the hypotheses. The results of the study showed that there was a significant difference was found among the experimental groups. Small and advanced to large muscle group exercises (SM-LG) group is found to be better than other groups in developing Speed, Stride Length and Acceleration Speed.

Keywords: Large and progressed toward small muscle group exercises, Small and advanced to large muscle group exercises, Speed, Stride Length, Acceleration Speed, Athletes.

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INTRODUCTION

A growing number of people, especially boys and girls, are drawn to sports these days, and the number of countries represented in the sports arena is rising. As prevention and curative health measures have become more successful throughout the third world war, millions of teenagers should have a chance to enjoy sports. Man is advancing quickly in all spheres of life in the current era of scientific knowledge, and games and sports are no exception. Also, scientific knowledge has revolutionized the standards of human performance in sports disciplines. In order to achieve optimal performance in their particular sports with the least amount of time and

effort, the athletes are now trained according to scientific principles using extremely advanced technology (Khan *et al.*, 1995).

Sports have grown to play a significant role in national and international cultures. Many have referred to sports as a microcosm of society because of how deeply ingrained they are in society. According to Coakely (1988), sports are a reflection of societal traits.

According to Hardayal (1991), training is a pedagogical process that enables the achievement of high-standard performances without causing any

physical or mental harm by means of the planned, methodical development of certain specific skills, physical capabilities, spiritual qualities, and organism adaptation.

For the preservation of physical health, exercise is just as important as rest and sleep. Fitness allows a person to meet unforeseen or emergency demands. It also helps a person look and feel well, successfully perform daily tasks and responsibilities, and have enough physical reserves to enjoy other social, civic, cultural, and recreational interests (John Parthiban & Meenakshi, 2025)

According to Dick (1980), athletes use neuromuscular coordination and the conversion of chemical energy to kinetic energy to convey force through the body's lever system. Athletes express this force against an external force (resistance) in every physical activity. Weights, throwing objects, water, air, the athlete's own body weight, momentum, and more can all be forms of resistance. According to Moran & McGlynn (1990), RT is an exercise regimen that uses force or stationary weights to increase muscle strength, power, and endurance in order to enhance ability.

These days, resistance training (RT) is a crucial part of a comprehensive fitness regimen. Understanding how training factors, such as load, volume, rest intervals between sets and exercises, frequency of sessions, exercise modality, repetition velocity, and, lastly, exercise order, interact is crucial for a proper training regimen (Robert *et al.*, 1993).

METHODOLOGY

The study was conducted on forty-five (N=45) women athletes who were participated in the inter collegiate athletic meet in Bharathidasan University, Tiruchirappalli, Tamil Nadu, India during the year 2025-2026 were randomly selected as subjects. The age of the subjects was ranged from 18 and 21 years. The subjects were divided into three groups of fifteen in each (n=15). Group-I underwent Large and Progressed toward Small Muscle group Exercises (LG-SM) and group-II underwent Small and Advanced to Large Muscle group Exercises (SM-LG) and group -III was act as the Control group (CG). Experimental groups underwent their training programme for 12 weeks in addition to the training program designed by the college curriculum. The control group was no underwent any specific training. Speed, Stride Length and Acceleration Speed were selected as dependent variables. Speed and Stride Length were assessed by 50 Meters Sprint Test; and Acceleration Speed was measured by 30 Meters Acceleration Sprint Test. The data collected from the experimental groups and control group on prior and after experimentation on selected variables were statistically examined by analysis of covariance (ANCOVA) was used to determine differences, if any among the adjusted posttest means on selected criterion variables separately. Whenever they obtained f-ratio value was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases 0.05 level of significance was fixed.

Analysis of the Data

The influence of independent variables on each criterion variable has been analyzed and presented below.

Table 1: Pre and Post Comparison of Experimental and Control Group

Variables	LG-SM Group			SM-LG Group			Control Group		
	Pre Test Mean & SD	Post Test Mean & SD	t-value	Pre Test Mean & SD	Post Test Mean & SD	t-value	Pre Test Mean & SD	Post Test Mean & SD	t-value
Speed	7.75±0.10	6.79±0.13	22.11*	7.70±0.12	6.24±0.21	23.71*	7.60±0.30	7.59±0.09	0.13
Stride Length	1.36±0.03	1.45±0.03	8.45*	1.38±0.04	1.51±0.04	10.22*	1.37±0.05	1.38±0.08	0.25
Acceleration Speed	3.58±0.12	3.44±0.10	3.29*	3.59±0.11	3.30±0.10	7.40*	3.00±0.14	3.58±0.12	0.29

**Statically Significant*

Table-1 shows that the pre-test means and standard deviation on Speed of LG-SM group, SM-LG group and Control group are 7.75±0.10, 7.70±0.12 and 7.60±0.30 respectively. The post-test means are 6.79±0.13, 6.24±0.21 and 7.59±0.09 respectively. The obtained dependent t-ratio values are 22.11, 23.71 and 0.13 respectively. The table value required for significant difference with df 14 at 0.05 level is 2.15. It was concluded that experimental groups such as LG-SM group, SM-LG group had registered significant

improvement in Speed. Further the Control group had registered no significant improvement in Speed.

The pre-test means and standard deviation on Stride Length of LG-SM group, SM-LG group and Control group are 1.36±0.03, 1.38±0.04 and 1.37±0.05 respectively. The post-test means are 1.45±0.03, 1.51±0.04 and 1.38±0.08 respectively. The obtained dependent t-ratio values are 8.45, 10.22 and 0.25 respectively. The table value required for significant

difference with df 14 at 0.05 level is 2.15. It was concluded that experimental groups such as LG-SM group, SM-LG group had registered significant improvement in Stride Length. Further the Control group had registered no significant improvement in Stride Length.

The table-1 also shows that the pre-test means and standard deviation on Acceleration Speed of LG-SM group, SM-LG group and Control group are 3.58 ± 0.12 , 3.59 ± 0.11 and 3.00 ± 0.14 respectively. The post-test means are 3.44 ± 0.10 , 3.00 ± 0.14 and 3.58 ± 0.12 respectively. The obtained dependent t-ratio values are

3.29 7.40 and 0.29 respectively. The table value required for significant difference with df 14 at 0.05 level is 2.15. It was concluded that experimental groups such as LG-SM group, SM-LG group had registered significant improvement in Acceleration Speed. Further the Control group had registered no significant improvement in Acceleration Speed.

The results of the Analysis of Covariance on Speed of the pre, post, and adjusted test scores of Pilates Exercises group, Yoga Practices group, & Combined Pilates Exercises and Yogic Practices group are presented in Table – 4.2.

Table 2: Comparison of Adjusted Mean Improvement Between all Groups (ANCOVA)

Variables	LG-SM Group	SM-LG Group	Control Group	F-value	p-value
Speed	6.73	6.22	7.66	273.07*	0.0001
Stride Length	1.46	1.51	1.37	59.68*	0.0001
Acceleration Speed	3.45	3.30	3.58	137.41*	0.0001

**Statically Significant*

The table-2 reveals that, when comparing the adjusted posttest mean changes in Speed among the LG-SM group, SM-LG group and Control group, ANCOVA testing revealed significant differences notably, the SM-LG group and SM-LG group exhibited a significant reduction in the adjusted posttest mean score in Speed (6.22, 6.73) ($F = 273.07$; $p = 0.0001$), Stride Length

(1.51, 1.46) ($F = 59.68$; $p = 0.0001$), and Acceleration Speed (3.30, 3.45) ($F = 137.41$; $p = 0.0001$).

To determine which of the paired means had a significant difference, Scheffe's test was applied as Post hoc test and the results are presented in Table 2.

Table 3: Scheffe's Post Hoc Analysis of All Groups

Variables	Adjusted Post-test Means			Mean Difference	Confidence Interval
	LG-SM Group	SM-LG Group	Control Group		
Speed	6.73	6.22		0.51*	0.15
	6.73		7.66	0.93*	0.15
		6.22	7.66	1.44*	0.15
Stride Length	1.46	1.51		0.05*	0.03
	1.46		1.37	0.08*	0.03
		1.51	1.37	0.13*	0.03
Acceleration Speed	3.45	3.30		0.15*	0.04
	3.45		3.58	0.12*	0.04
		3.30	3.58	0.27*	0.04

**Statically Significant*

In the table-3 indicated that their significant differences were found in Speed of LG-SM group and SM-LG group (0.51), LG-SM group and Control group (0.93) & SM-LG group and Control group (1.44). The values are greater than the confidence interval value 0.15, which shows significant differences.

Significant differences were found in Stride Length of LG-SM group and SM-LG group (0.05), LG-SM group and Control group (0.08) & SM-LG group and Control group (0.13). The values are greater than the confidence interval value 0.03, which shows significant differences.

In the table-3 also revealed that their significant differences were found in Acceleration Speed of LG-SM group and SM-LG group (0.15), LG-SM group and Control group (0.12) & SM-LG group and Control group (0.27). The values are greater than the confidence interval value 0.04, which shows significant differences.

The graphical representation of pretest, post-test and adjusted posttest mean values of LG-SM group, SM-LG group and Control Group on selected variables are presented in Figure-1 to Figure 3.

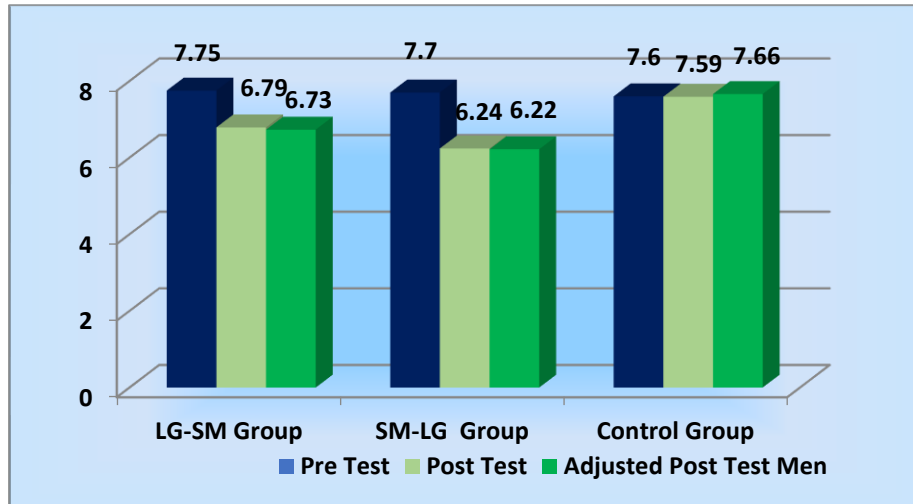


Fig. 1: Bar Diagram on Ordered Pre Post and Adjusted Post Test Means of Speed

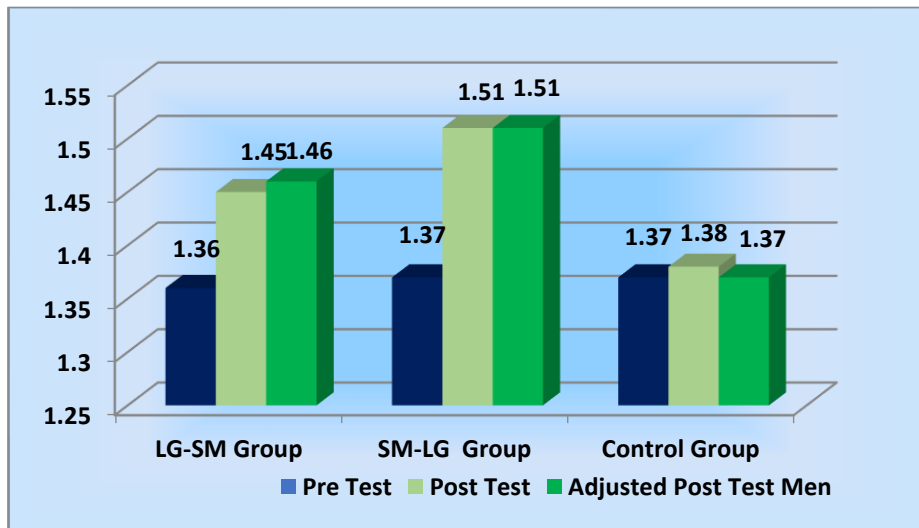


Fig. 2: Bar Diagram on Ordered Pre Post and Adjusted Post Test Means of Stride Length

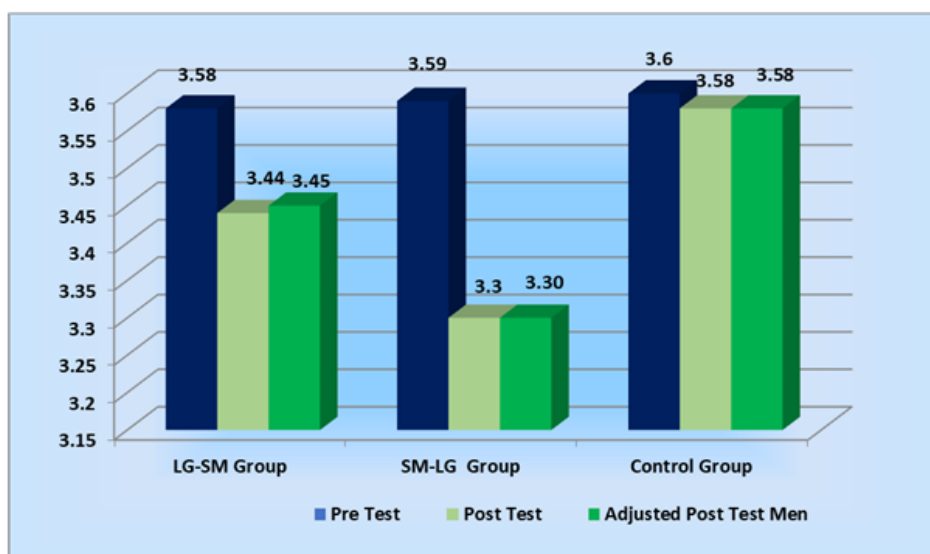


Fig. 3: Bar Diagram on Ordered Pre Post and Adjusted Post Test Means of Acceleration Speed

CONCLUSIONS

From the analysis of the data, the following conclusions were drawn.

1. Significant differences were found between Large and progressed toward small muscle group exercises (LG-SM) group, small and advanced to large muscle group exercises (SM-LG) group and Control group in Speed, Stride Length and Acceleration Speed.
2. The Experimental groups namely, Large and progressed toward small muscle group exercises (LG-SM) group, small and advanced to large muscle group exercises (SM-LG) group, had significantly showed improvement in Speed, Stride Length and Acceleration Speed.
3. The results further inferred that small and advanced to large muscle group exercises (SM-LG) group was found to be more effective than the Large and progressed toward small muscle group exercises (LG-SM) group in developing Speed, Stride Length and Acceleration Speed.

REFERENCES

- Coakely J.J. (1988), *Sports in Society Issues and Controversies*, (3rd) St. Louis Times Mirror Mosby College Publishing Company.
- Frank W. Dick (1980), *Sports Training Principle*, Henry Kimpton Publishers: London.
- Gary Moran and George Mc Glynn (1990), *Dynamics of Strength Training*, San Francisco: Wm. C. Publisher.
- Hardayal Singh (1991), *Science of Sports Training*, DVS Publications, New Delhi.
- John Parthiban. I & Meenakshi, S, (2025), Effectiveness of Different Intensity of Resistance Training: An Empirical Study, *Lex Localis-Journal of Local Self-Government*, Vol. 23, No. S6.
- Khan K, Brown J, Way S (1995), Overuse Injuries in Classical Ballet. *Sports Med.* 19(5):341-57.
- Robert. V. Hockey (1993), *Physical Fitness, the Path Way to Healthful Living* (7th Ed), Saint Louis: Mosby year Book Inc.
- Roberto Sima O, Belmiro Freitas de Salles, Tiago Figueiredo, Ingrid Dias and Jeffrey M. Willardson (2012). Exercise Order in Resistance Training, *Sports Med.* 42 (3).