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Effects Of Different Load Dynamics On Physical Variables Among Elite Women

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Abstract:

The researcher is concentrating on different load dynamics on physical variables and how middle distance running and weightlifting training protocols effects on specific physical parameters. A well-thought-out, methodical physical and physiological training program will always result in notable changes in the body. In order to achieve this goal, the investigator has chosen (N=30) women-volunteered elite athletes of each (n=15) of middle distance running and weight lifting athletes age 18 and 22 years. All the volunteered elite athletes were trained by their coaches for about 7 to 9 years. The selected criterion parameters are Speed and explosive power and they were measured by 50-meter dash and standing broad jump. The level of significant is set at 0.05 level of assurance. The study concluded that regular and systematic middle distance running training and weight lifting training significantly brought changes in selected variables as compared to each other training protocols. Further, it is concluded that middle distance running is good for improving speed and weight lifting is good for improving explosive power. In ordered to find out the significant difference 't' ratio is employed.

Keywords: middle distance running, weightlifting, speed, explosive power.

INTRODUCTION:

Speed is a fundamental performance component in a wide range of sports and physical activities. The ability to generate rapid acceleration, reach maximum velocity, and maintain high-speed efforts over time is critical for optimal performance in sports such as sprinting, football, and basketball. While numerous studies have explored the impact of training intensity on speed development, much of the research has focused on male athletes, leaving a gap in understanding the specific effects of varying training intensities on speed-related

outcomes in women. Training intensity is known to be a key factor influencing the development of speed-related variables, such as acceleration, maximum velocity, and speed endurance. Typically, high-intensity training, including sprints, high-intensity interval training (HIIT), and resistance training, has been shown to yield improvements in explosive power, muscle strength, and neuromuscular coordination all of which are essential for enhancing speed performance **(Buchheit & Laursen, 2013).** On the other hand, low to moderate-intensity training, which emphasizes endurance and aerobic capacity, may provide foundational benefits, such as increased cardiovascular efficiency and enhanced stamina for sustaining speed over longer periods **(Buchheit & Laursen, 2013).** The balance between aerobic and anaerobic adaptations is crucial for optimizing performance in activities requiring both short bursts of maximal speed and longer efforts at elevated intensities.

In women, factors such as hormonal fluctuations, muscle fiber composition, and the higher relative proportion of body fat compared to men can influence the way speed variables are developed and maintained **(Fleck & Kraemer, 2014).** However, the physiological mechanisms behind women's response to different training intensities, particularly in terms of speed development, remain underexplored. For example, research has demonstrated that women may exhibit different patterns of recovery and muscle adaptation to high-intensity interval training (HIIT) compared to men, suggesting that training programs for speed development in women may need to be adapted to accommodate these differences **(LaMonte et al., 2005).**

There is also a growing interest in how different training modalities affect specific speed variables among women. For instance, studies examining sprint performance, both in terms of acceleration and maximum speed, have shown that high-intensity training tends to yield more significant improvements in these variables **(Beckham et al., 2018).** Moreover, it is becoming increasingly evident that not only the intensity but also the duration, frequency, and recovery periods between training sessions play important roles in shaping the speed capabilities of athletes **(Sperlich et al., 2017).**

Given the limited research focusing specifically on the effects of varying training intensities on speed variables in women, this thesis aims to investigate how different levels of training intensity (low, moderate, and high) influence key speed-related variables such as acceleration, peak speed, and speed endurance in women. This research will help to develop a deeper understanding of the physiological adaptations to training in women and inform the design of gender-specific training programs for enhancing speed and athletic performance.

Explosive power, defined as the ability to exert maximal force in the shortest possible time, is a crucial component of athletic performance and functional movement. It plays a pivotal role in activities requiring quick, dynamic movements such as sprinting, jumping, throwing, and rapid changes of direction. In women, explosive power is not only important for athletic endeavors but also for enhancing everyday functional tasks, improving muscle coordination, and reducing the risk of injury. Training to improve explosive power typically involves exercises that integrate strength, speed, and coordination, often utilizing training

modalities such as plyometrics, resistance training, and high-intensity interval training (HIIT). However, despite the importance of explosive power, the effects of different training intensities on explosive power variables in women remain an under-researched area.

Training intensity refers to the degree of difficulty or load used during exercise, which is commonly quantified in terms of the percentage of maximum strength, effort, or the intensity of the training session itself (e.g., load, sets, repetitions, and rest intervals). In the context of explosive power, high-intensity training, particularly at near-maximal loads, is generally considered the most effective for stimulating neuromuscular adaptations that enhance power output. Conversely, low-to-moderate intensity training may target endurance components and contribute to the development of a base of strength and conditioning, but its direct impact on explosive power remains unclear. Previous research has shown that high-intensity training involving low repetitions (such as Olympic lifts, heavy squats, and sprint training) promotes neural adaptations that are integral to improving power. On the other hand, plyometric exercises and other high-speed, high-intensity movements may stimulate the stretch-shortening cycle, further enhancing explosive power performance.

While the role of training intensity in power development has been well established, there are significant gender differences that must be considered. Women often demonstrate lower absolute levels of explosive power compared to men, due to factors such as muscle mass, hormonal differences, and muscle fiber composition. However, women exhibit comparable relative gains in power following resistance and explosive training, and evidence suggests that with appropriate programming, women can achieve significant improvements in explosive performance. Research on how different training intensities specifically influence explosive power variables such as peak power, rate of force development (RFD), and jump height has been less focused on female populations. Therefore, understanding how varying training intensities affect these variables in women is critical for developing gender-specific, effective training protocols.

This doctoral thesis seeks to examine the effects of different training intensities on explosive power variables in women. Specifically, it will investigate how low, moderate, and high-intensity training regimens influence power output, rate of force development, muscle recruitment patterns, and neuromuscular adaptations. By comparing the outcomes of different training intensities, this research will provide valuable insights into the optimal approaches for maximizing explosive power in women, with applications for both athletic performance and general physical fitness.

Explosive power, a determinant of athletic performance, is significantly influenced by the type of load and training regimen. High-load training emphasizes strength, while low-load, high-velocity training prioritizes speed and power production. Research by **Granados et al. (2008)** highlighted the relationship between power-load dynamics and performance improvements among elite female handball players, emphasizing the importance of individualized loading protocols **(Granados et al., 2008). Similarly, Tsolakis et al. (2011**)

demonstrated that dynamic contractions under varying loads enhance post-activation potentiation, thereby increasing explosive strength in elite female fencers **(Tsolakis et al., 2011).**

Speed training in combination with plyometrics and moderate resistance also plays a pivotal role in elite sports. **Ozbar (2015**) found that plyometric training significantly improved speed and explosive strength in female soccer players **(Ozbar, 2015).** Meanwhile, the optimal balance between force and velocity determined by load calibration was emphasized in the work of **Giroux et al. (2016),** who noted that elite athletes exhibit a unique force-velocity as compared to non-elite counterparts **(Giroux et al., 2016).**

Methodology:

To fulfill the study's aim, the primary objective of this inquiry is to determine how physical parameters are influenced by the regular training of elite female athletes. To achieve the purpose of this study thirty (N=30) women elite National varsity athletes were randomly selected as subjects of fifteen each, Group I - fifteen athletes (n=15) from middle distance running (800/1500 mtr race) Aerobic and Anaerobic. Group II- fifteen athletes (n=15) from weight lifting Anaerobic, aged 18 to 22 years, and all the athletes were in top form. The investigator informed to all volunteered elite athletes about the requirements of the study, and they all agreed to participate in the testing procedure. All of the subjects were in good health and trained by their coaches, and they competed at a national level and the subject's sports age is between 7 and 9 years. There was no need for ethical committee approval because all the tests were invasive. clients enthusiastically participated in the prescribed test. For top-level performance, each sport has particular physical parameters and requirements. To excel better in their specialized sports parameters such as Speed and explosive power. Limitations associated with the study include no special motivation techniques used during tests, therefore the difference that occurred in performance was due to the lack of motivation. the quantum of physical exertion, lifestyle and physiological stress, and other factors that affect metabolic function, were considered as limitations. No thought was given to the social, economic, or cultural background of the subjects. Only female elite athletes and physical parameters measures are included in this study.

SELECTION OF TESTS

Selected Physical parameters and their respective tests are given below in Table I

TABLE- I

S. No	Variables	Tests	Units
1	Speed	50-meter dash run	Seconds
2	Explosive power	Standing broad jump	Centimeters

Statistical analysis:

SPSS v25 and Microsoft Excel were used to analyze the data. The quantitative variables were analyzed by using the t ratio, and the numerical data on physical parameters from each of the two experimental groups were statistically analyzed to look for any suggestive variance. The whole data set was analyzed by using 25 version of the Indian Business Management Statistical Package for Social Sciences. The degree of

conviction for purport was set at 0.05 level of conference. The data is given below for analysis on criterion variables.

TABLE -II

't' RATIO FOR THE SPEED OF MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

est	middle distance running	weight lifting	dm	df	σdm	obtained 't' ratio	table 't' ratio
$\bar{X}$ σ	6.640 0.202	7.820 0.267	1.18 ---	1 28	-- 0.085	13.88*	**2.048**
se	0.052	0.068	--	--	--		

***significant at 0.05 level of assurance.**

The table value for purport at 0.05 level with df 1 and 28 is 2.048.

The table II displays that the means of middle distance running group and weight lifting groups are 6.640 and 7.820 Seconds severally. The attained 't' ratio of 13.88 is much greater than the table value of 2.048 for df 1 and 28 requisite for significance at 0.05 level of confidence.

The results of the study indicates that the significant difference exists between middle distance running group and weight lifting group on Speed**.** Further, it is concluded that there is a significant difference observed between middle distance running group and weight lifting group on speed in favor of middle distance running group. The mean values are depicted in Figure I.

FIGURE I: BAR CHART ON SPEED MEANS OF MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

TABLE-III

't' RATIO FOR THE EXPLOSIVE POWER OF MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

est	Middle Distance Running	Weight lifting	DM	df	σDM	Obtained 't' Ratio	Table 't' Ratio
$\bar{X}$	2.133	2.192	0.059	1	--	7.375*	**2.048**
σ	0.022	0.027	--	28	0.008		
SE	0.005	0.006	--	--	--		

***Significant at 0.05 level of assurance.**

The table value for purport at 0.05 level with df 1 and 28 is 2.048.

The table III displayed the means of middle distance running group and weight lifting groups are 2.133 and 2.192 centimetres severally. The attained 't' Ratio of is much greater than the table value of 2.048 for df 1 and 28 required for significance at 0.05 level of confidence.

The result of the study indicates that the significant difference exists between middle distance running group and weight lifting groups on Explosive power. Further, it is concluded that there is a significant difference observed between middle distance running group and weight lifting group on explosive power in favour of weight lifting group. The mean values are portrayed in Figure II.

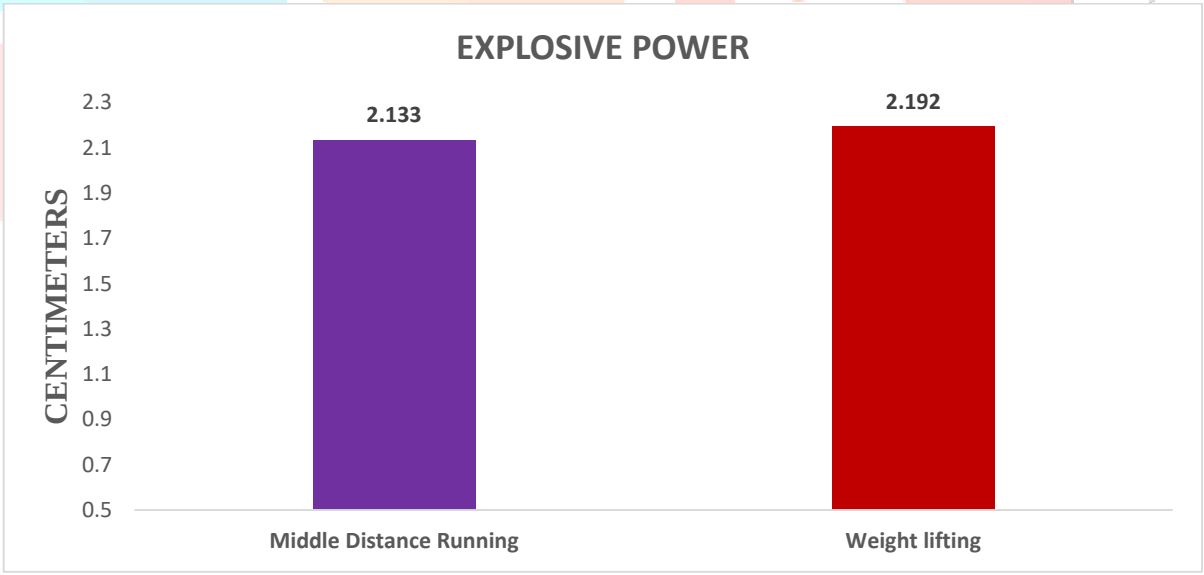

FIGURE II: BAR CHART ON EXPLOSIVE POWER MEANS OF MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Discussion:

The results of the study shows that distinct categories of aerobic and anaerobic and anaerobic demands cause a significant change in selected physical parameters. Based on the findings there is a significant difference existed among the two experimental groups. The speed is significantly improved by middle distance running group, as compared weight lifting group whereas the Explosive power is significantly improved by the weight lifting group as compared to middle distance running group.

Conclusion and implications:

Based on the findings the investigator implied that middle distance running is good to improve speed and weight lifting is good to improve explosive power. Finally, no single training is complete enough to develop the required physical ability at optimum. Hence, middle distance running and weight lifting training in an isolated or in a united mode can be adapted for better development on selected physical abilities.

Conflict of interest: No

References:

- **Baker, D. (2003).** Improving vertical jump performance with weight training. Strength and Conditioning Journal, 25(2), 16-23. https://doi.org/10.1519/1533-4287(2003)025<0016:IVJPWT>2.0.CO;2.
- **Beckham, S. G., Thomas, C. A., & Burnett, A. F. (2018).** The effects of high-intensity interval training on speed performance: A review. International Journal of Sports Physiology and Performance, 13(5), 561-568.
- **Buchheit, M., & Laursen, P. B. (2013).** High-intensity interval training, solutions to the programming puzzle: Part I: Cardiopulmonary emphasis. Sports Science & Medicine, 12(3), 155-165.
- **Fleck, S. J., & Kraemer, W. J. (2014).** Designing resistance training programs (4th ed.). Human Kinetics.
- **Gamble, P. (2006).** The physiology of power training: Maximizing explosive performance. Strength and Conditioning Journal, 28(5), 14-20. https://doi.org/10.1519/1533-4287(2006)28<14:TPOPTM>2.0.CO;2.
- **Garthe, I., & Maughan, R. J. (2018).** Resistance training and explosive power: Effects of intensity on neuromuscular adaptations. Journal of Strength and Conditioning Research, 32(9), 2672-2680. https://doi.org/10.1519/JSC.0000000000002670.
- **Haff, G. G., & Nimphius, S. (2012).** Training for power and explosive strength. *In* Essentials of Strength Training and Conditioning (3rd ed., pp. 751-785). Human Kinetics.
- **LaMonte, M. J., Blair, S. N., & Church, T. S. (2005).** Physical activity and diabetes prevention. Current Diabetes Reports, 5(1), 5-11.
- **Markovic, G., & Mikulic, P. (2010).** Neural and physiological adaptations to explosive strength training. Sports Medicine, 40(4), 257-275. https://doi.org/10.2165/11531390-000000000-00000.
- **McBride, J. M., Triplett, N. T., & Davie, A. J. (2002).** The effect of heavy-resistance training on the relationship between strength and power. Journal of Strength and Conditioning Research, 16(1), 82-87. https://doi.org/10.1519/00124278-200202000-00014.
- **Mizrahi, J., & Verbitsky, O. (2000).** The effect of plyometric training on vertical jump height: A review of the evidence. Sports Medicine, 29(4), 271-281. https://doi.org/10.2165/00007256-200029040-00002.
- **Sperlich, B., Zinner, C., & Holmberg, H. C. (2017).** High-intensity interval training in women: A critical review. Sports Medicine, 47(3), 497-509.
- **Young, W. B., & Farrelly, M. R. (2000).** The effects of resistance training on explosive strength and speed: A review. Journal of Sports Science and Medicine, 3(2), 3-21. https://doi.org/10.1055/s-2000-7028.
- **Granados, C., Izquierdo, M., & Ibanez, J. (2008).** Effects of an entire season on physical fitness in elite female handball players. Medicine & Science in Sports & Exercise, p. 345.

- **Tsolakis, C., & Bogdanis, G. (2011).** Influence of type of muscle contraction and gender on post-activation potentiation of upper and lower limb explosive performance in elite fencers. Journal of Sports Medicine, p. 9.
- **Ozbar, N. (2015).** Effects of plyometric training on explosive strength, speed, and kicking speed in female soccer players. The Anthropologist, p. 87.
- **Giroux, C., & Rabita, G. (2016).** Optimal balance between force and velocity differs among world-class athletes. Journal of Applied Biomechanics, p. 62.
- **Mora-Custodio, R., Rodríguez-Rosell, D., & González-Badillo, J. (2016).** Effect of low- vs. moderate-load squat training on strength, jump, and sprint performance in women. International Journal of Sports Medicine, p. 47.