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Effects of Different Exigencies on Physical Parameters Among Elite Women

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Abstract:
A planned, systematic physical and physiological training regimen will always leads to significant adaptations in the body, based on this the investigator is focusing on how a long distance running, middle distance running and weight lifting training protocol leads to a favorable impact on selected physical parameters. To meet the purpose the investigator has chosen (N=45) women volunteered elite athletes of each (N=15) of long distance running, middle distance running and weight lifting athletes between 18 and 22 years. All the volunteered elite athletes are trained by their coaches for about 7 to 9 years. The selected criterian parameters are Speed, Explosive Power and Muscular Endurance, and they were measure by 50 mts Dash run, standing broad jump and bent knee sit-ups respectively. The level of significance is set at 0.05 level of assurance. The study concluded that a regular and systematic long distance running and middle distance running and weight lifting training significantly brought changes in selected variables as compared to the normal, healthy, and untrained women. Further, it is concluded that middle distance running has significantly improved speed, weight lifting has significantly enhanced explosive power, and long distance running has improved muscular endurance as compared to other training groups. In ordered to find out the significant difference analysis of variance (ANOVA) is employed. When the 'F' ratio is significant, the Scheffe's post-hock test was used to find the paired mean significant difference, if any, among the groups of each parameter separately.

Keywords: Long Distance Running, Middle Distance Running, Weightlifting, Speed, Explosive Power, Muscular Endurance

Introduction:

Sports training consists of exercise performance systematically to improve physical abilities and to enquire the skills associated with the performance of the sports event. A chronic training leads to concerned changes which reflects an integral action of various exercise, training methods and regimens. Systematically performed physical exercise results in a great many changes in the organism and these changes will be expressed by the trained body through improved physical abilities.

Most of the training induced changes express adaptations to the conditions of enhanced muscular activity. Even change in the organism and physical abilities depends on the exercise nature, intensity and volume. Thus, every training regimen results in specific changes in the body and on its related physical ability and it strongly serve as means for the operative feedback control of the training effectiveness. The designer of a training regimen should workout on most favourable periods to induce the necessary structural, metabolic and functional changes to bring alteration in the selected physical abilities. The chronic

adaptation to muscular activity of endurance types is based on the transcription control of the adaptive protein synthesis. A single exercise is usually insufficient to evoke a training response. To obtain sufficient stimuli for training effects, a certain number of stimuli for training effects, a certain number of repetitions has to be performed during a training session.

In other cases, the training effects is based on the short rest intervals between exercise bouts, and thus the exercise session have a cumulative effect. In still other cases, a long period of continuous exercise is necessary to obtain the training effect. Accordingly, three principles of training can be discriminated.

1. The principle of repetition
2. The principle of summation
3. The principle of duration. **Atko viru and mehis viru (2000).**

High volumes of aerobic training can lead to muscle adaptations that are not conducive to explosive power, while some explosive power training like plyometrics may be included to improve overall performance. Athlete can get benefit from a balanced approach that includes aerobic and anaerobic training, incorporating plyometrics and strength training to enhance explosive power.

Elite female long-distance runners have a high VO2 max, which supports sustained speed over long distances. Efficient oxygen delivery to muscles is crucial for maintaining speed. Efficiency in running mechanics and economy allows long-distance runners to maintain a steady pace for extended periods. Factors like stride length, frequency, and technique play a crucial role. Training to improve the lactate threshold helps runners maintain a faster pace without accumulating fatigue-inducing lactate. **Wilmore, J.H., Costill, D.L., & Kenney, W.L. (2008).**

Elite female middle-distance runners incorporate both aerobic and anaerobic training, which includes components of explosive power development. Their training often includes plyometric exercises and sprint work, which help in developing fast-twitch muscle fibers and explosive power. Incorporating strength training, particularly focusing on lower body strength, helps improve muscle power and overall explosive capability. Middle distance runners training often includes intervals and tempo runs that enhance speed endurance, allowing for faster overall race paces. Incorporating strength and power exercises, such as plyometrics, helps improve muscle power and running speed. Elite female weightlifters prioritize explosive power in their training. This includes Olympic lifts like snatches and cleans, which are inherently explosive movements. Their training heavily targets fast-twitch muscle fibers, which are crucial for generating explosive power. Regular weightlifting improves neuromuscular coordination, allowing for more effective and powerful muscle contractions. Elite female weightlifters develop high levels of explosive power through their training, which can translate into improved short-distance speed. Increased muscle strength and hypertrophy enable greater force production, contributing to faster sprinting capabilities. Elite female weightlifters typically focus on short, intense bursts of power rather than prolonged activities, resulting in lower muscular endurance compared to endurance athletes. Some weightlifters incorporate high-repetition strength training to improve muscular endurance, but this is usually secondary to maximal strength and power development. **Zatsiorsky, V.M., & Kraemer, W.J. (2006).**

Long distance running is a physical endurance event. The physical fitness of long distance runners is a critical factors in determining competition performance. In recent years, Chinese long distance runners have made breakthroughs in a series of domestic and international competitions, the training and development of long distance running sports is a process of constantly digging out the maximum physical strength of the human body. **Teng, Y,Xie, Z,Chen, A,Zhang,J., &Bao,Y.(2022).** Physical activity is not

just an option but a necessity for health. There is more to a weight training workout which is how it can be a "stress relief and enhanced health; the muscular physique would be valued and aesthetically appreciated **Shurley & Todd, (2012**). **Nowak (2008**), women are subjected to the use of weights and are frequently found doing more cardio than weight training. Women need to train more with weights if they want to see the effects of a toned body and an improved overall health and sports performance.

Methodology:

To fulfill the study's aim, the primary objective of this inquiry is to determine how physical parameters are influenced by a regular training elite female athletes. To achieve the purpose of this study 45 (N=45) women elite National varsity athletes were randomly selected as subjects of fifteen each, Group I - fifteen athletes (n=15) from long distance running (5000/10000 mtr race) Aerobic. Group II - fifteen athletes (n=15) from middle distance running (800/1500 mtr race) Aerobic and Anaerobic. Group III- fifteen athletes (n=15) from weight lifting (any weight category) Anaerobic, age of 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. Subjects enthusiastically participated in prescribed test. Athletes of three sporting activities basically need the cardiovascular systems effectiveness is crucial to success in competitive sports and activities. For top-level performance, each sport has particular physical parameters and requirements. To excel better in their specialized sports parameters such as Speed, Explosive power, and Muscular endurance. Limitations associated with the study includes no special motivation techniques were 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 the 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
3	Muscular Endurance	Bent knee sit-ups	Seconds

Statistical analysis:

SPSS v25 and Microsoft Excel were used to analyze the data. The quantitative variables were analyzed by Using ANOVA, the numerical data on physical parameters from each of the three 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. The data is given below for analysis on criterion variables. When

the F-Ratio is significant, the Scheffe's post hock test was used to find the paired mean significant difference, if any, among the groups of each parameter separately.

TABLE -II
ANALYSIS OF VARIANCE FOR THE SPEED OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Test	Long Distance Running	Middle Distance Running	Weight lifting	Source of Variance	df	Sum of Squares	Mean Squares	Obtained 'F' Ratio	Table 'F' Ratio
$\bar{X}$	7.613	6.640	7.820	B:	2	11.912	5.956	70.904*	**3.222**
σ	0.371	0.202	0.267	W:	42	3.513	0.084		

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

The table value for purport at 0.05 level with df 2 and 42 is 3.222.

The table II displays that the means of long distance running group, middle distance running group and weight lifting groups are 7.613, 6.640 and 7.820 Seconds severally. The attained 'F' ratio of 70.904 is much greater than the table value of 3.222 for df 2 and 42 requisite for significant at 0.05 level.

The results of the study indicates that the significant difference exists among Long distance running group, middle distance running group and weight lifting group on Speed. To define the noteworthy variation among the means of three experimental groups, the Scheffe'S test was employed as post-hoc test and the outcomes were exhibited in table II A.

TABLE-IIA
SCHEFFE'S POST HOC TEST FOR SPEED ON THE MEAN DIFFERENCE BETWEEN LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Long Distance Running	Middle Distance Running	Weight Lifting	Mean Difference	Confidence Interval Value
7.613	6.640	--	0.973	1.038
7.613	--	7.820	0.207	1.038
--	6.640	7.820	1.18*	1.038

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

The table II A displayed the test mean difference on Speed between long distance running and middle distance running group is 0.973, and mean difference between long distance running group and weight lifting group is 0.207 which are less than the confidence interval value 1.038 at 0.05 level of assurance. Hence, the insignificant difference existed between long distance running group and middle distance running group, long distance running group and weight lifting groups on speed. The mean difference on Speed between middle distance running group and weight lifting group is 1.18 which is greater than the confidence interval value is 1.038 at 0.05 level assurance. Hence, it is concluded from the consequence that the noteworthy difference existed between middle distance running group and weight lifting group on Speed. From the results it was concluded that, middle distance running group has increased the Speed as compared to the long distance running group and weight lifting group. Further it is concluded that highest

mean difference existed between middle distance running group and weight lifting group. The tests mean values on Speed of three experimental groups are graphically depicted in Figure I.

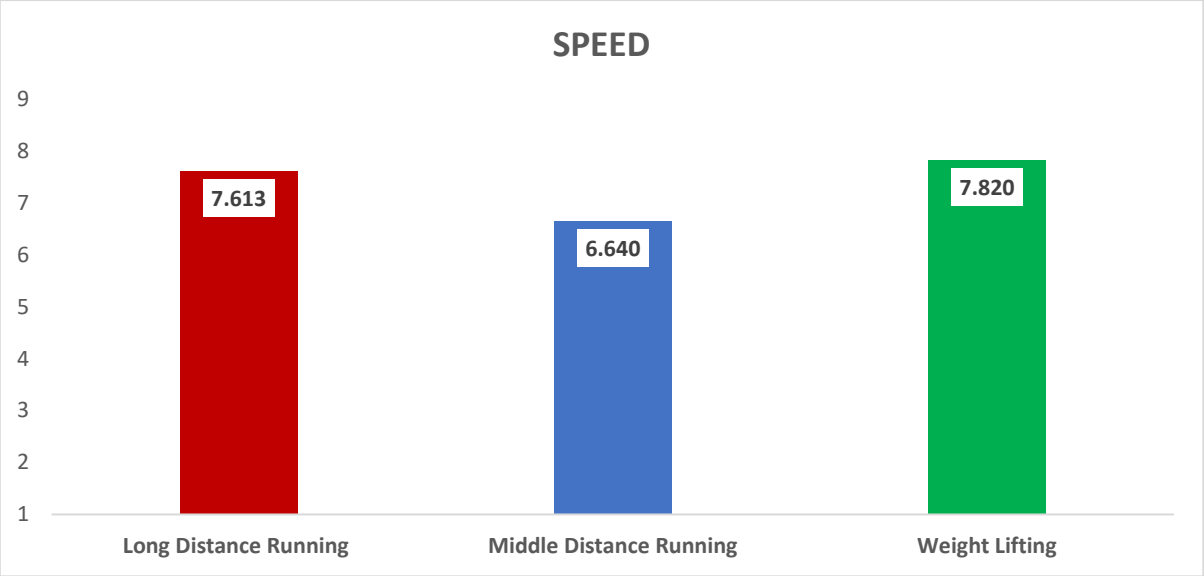

FIGURE I: BAR CHART ON SPEED MEANS OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

TABLE-III
ANALYSIS OF VARIANCE FOR THE EXPLOSIVE POWER OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Test	Long Distance Running	Middle Distance Running	Weight lifting	Source of Variance	df	Sum of Squares	Mean Squares	Obtained 'F' Ratio	Table 'F' Ratio
$\bar{X}$	1.913	2.133	2.192	B:	2	0.650	0.325	325*	**3.222**
σ	0.020	0.022	0.027	W:	42	0.023	0.001		

***Significant at 0.05 level of assurance.**
The table value for purport at 0.05 level with df 2 and 42 is 3.222.

The table III displayed the means of long distance running group, middle distance running group and weight lifting groups are 1.913, 2.133 and 2.192 centimetres severally. The attained 'F' Ratio of 325 is much greater than the table value of 3.222 for df 2 and 42 required for significant at 0.05 level.
The result of the study indicates that the significant difference exists among long distance running group, middle distance running group and weight lifting groups on Explosive power. To define the noteworthy variation among the means of three experimental groups, the Scheffe'S test was employed as post-hoc test and the outcomes were exhibited in Table III-A.

TABLE-III A
SCHEFFE'S POST HOC TEST FOR EXPLOSIVE POWER ON THE MEAN DIFFERENCE BETWEEN LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Long Distance Running	Middle Distance Running	Weight Lifting	Mean Difference	Confidence Interval Value
1.913	2.133	--	0.22*	0.034
1.913	--	2.192	0.279*	0.034
--	2.133	2.192	0.059*	0.034

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

The Table III A displayed the test mean difference on Explosive power between long distance running group and middle distance running group is 0.22, mean difference on Explosive power between long distance running group and weight lifting group is 0.279 and the mean difference on Explosive power between middle distance running group and weight lifting group is 0.059 which are all greater than that of the confidence interval value 0.034 at 0.05 level of assurance. Hence, it is concluded from the results that the noteworthy difference existed among three experimental groups on Explosive power.

From the results it was concluded that, weight lifting group has increased the Explosive power as compared to the long distance running group and middle distance running group. Further it is concluded that highest mean difference existed between long distance running and weight lifting group.

The test mean values on Explosive power of long distance running group, middle distance running group and weight lifting groups were graphically potrayed in Figure II.

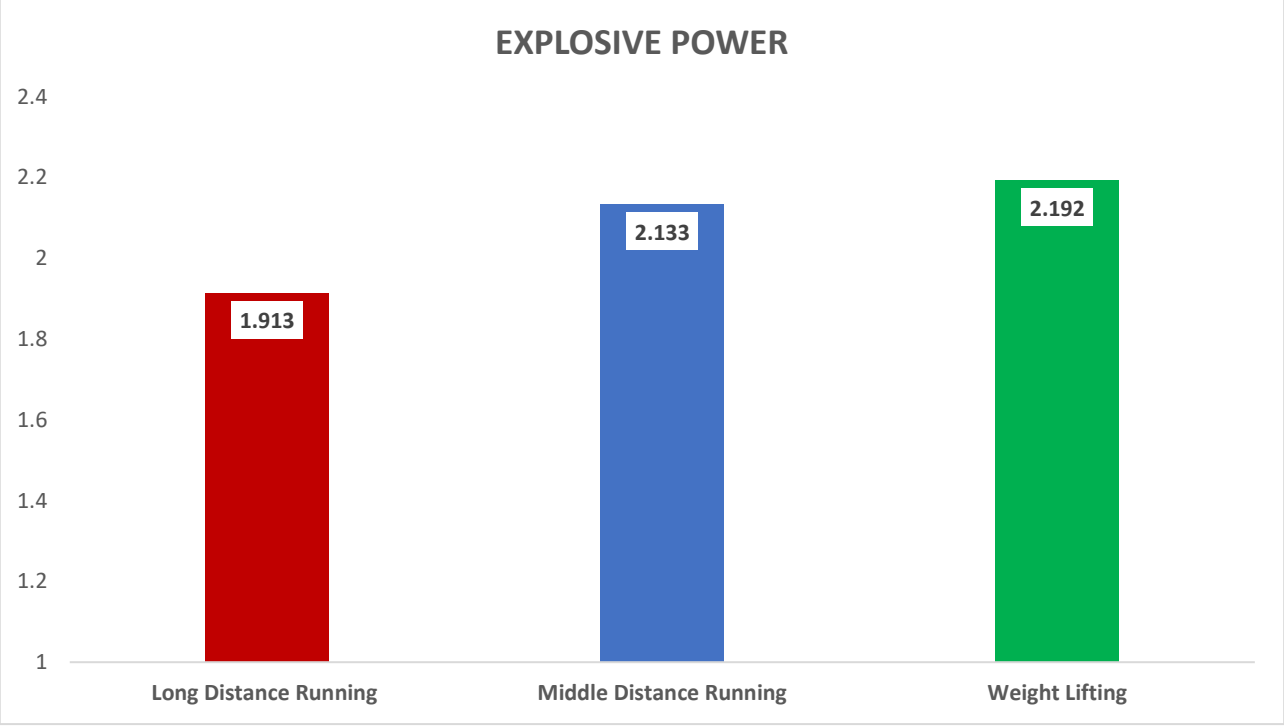

FIGURE II: BAR CHART ON EXPLOSIVE POWER MEANS OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

TABLE-IV
ANALYSIS OF VARIANCE FOR THE MSCULAR ENDURANCE OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Test	Long Distance Running	Middle Distance Running	Weight lifting	Source of Variance	df	Sum of Squares	Mean Squares	Obtained 'F' Ratio	Table 'F' Ratio
$\overline{X}$	29.066	26.133	25.066	B:	2	128.711	64.356	75.891*	**3.222**
σ	0.961	0.833	0.961	W:	42	35.600	0.848		

***Significant at 0.05 level of assurance.**
The table value for purport at 0.05 level with df 2 and 42 is 3.222.

The Table IV displayed the means of long distance running group, middle distance running group and weight lifting groups are 29.066, 26.133 and 25.066 Seconds severally. The attained 'F' Ratio of 75.891 is much greater than the table value of 3.222 for df 2 and 42 required for significant at 0.05 level. The consequences of the study indicates that the significant difference exists among long distance running group, middle distance running group and weight lifting groups on Muscular endurance. To define the noteworthy variation among the means of three experimental groups, the Scheffe'S test was employed as post-hoc test and the outcomes were exhibited in Table IV-A.

TABLE-IV A
SCHEFFE'S POST HOC TEST FOR MUSCULAR ENDURANCE ON THE MEAN DIFFERENCE BETWEEN LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Long Distance Running	Middle Distance Running	Weight Lifting	Mean Difference	Confidence Interval Value
29.066	26.133	--	2.933*	0.972
29.066	--	25.066	4.0*	0.972
--	26.133	25.066	1.067*	0.972

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

The Table IV-A displays the test mean difference on Muscular endurance between long distance running group and middle distance running group is 2.933, the mean difference on Muscular endurance between long distance running group and weight lifting group is 4.0 and the mean difference on Muscular endurance between middle distance running group and weight lifting group is 1.067 which are all greater than the confidence interval value 0.972 at 0.05 level of assurance. Hence, it is concluded from the results of the study that the significant difference existed among three experimental groups on Muscular endurance.

From the results it was concluded that, the long distance running group has increased the Muscular endurance as compared to the middle distance running group and weight lifting group. Further, it is concluded that highest mean difference existed between long distance running group and weight lifting group.

The test means values on Muscular endurance of long distance running group, middle distance running group and weight lifting groups were graphically illustrated in Figure III.

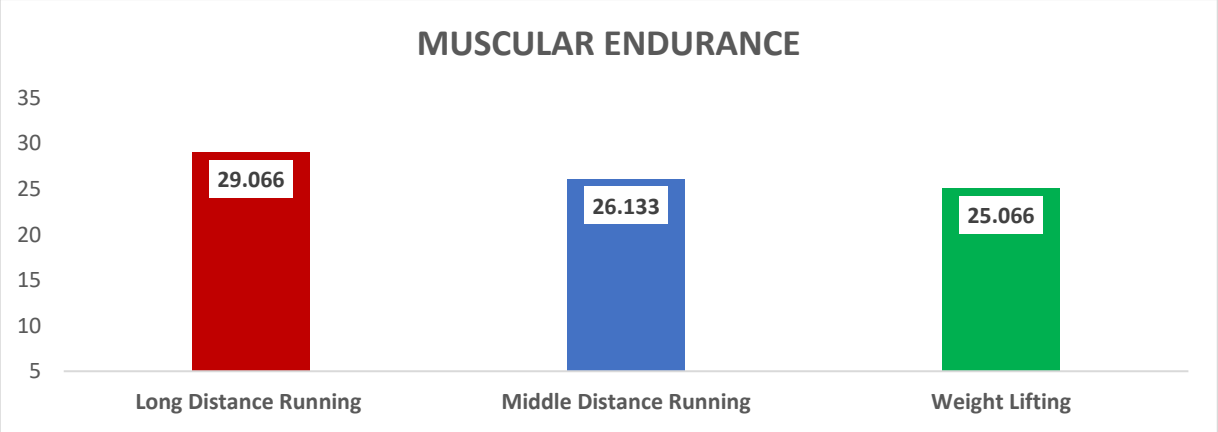

FIGURE III: BAR CHART ON MUSCULAR ENDURANCE MEANS OF LONG DISTANCE RUNNING, MIDDLE DISTANCE RUNNING AND WEIGHT LIFTING GROUPS.

Discussion:

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

Conclusion and implication:

Based on the finding the investigator implied that long distance running is good for improving muscular endurance, 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, long distance running, middle distance running and weight lifting trainings in a isolated or in a united mode can be adapted for better development of physical abilities.

Conflict of interest: No

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