Volume-5, Issue-6, June - 2016 • ISSN No 2277 - 8160 IF : 3.62 | IC Value 70.36

Research Paper Physical Education

Effect of Speed Training at Diffrent Times of Day on Recovery on Sprinters

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ABSTRACT

The purpose of this study was to investigate the effect of speed training at different times of day on recovery on sprinters. The subjects undertaken for the study (N=8), age ranging from 18-22 years, were from elite athlete of Rabindra Mahavidyalay, Champadanga, Hooghly. The data for the physiological responses and recovery pattern of athletes was obtained with the help of various measures of cardio-respiratory parameters. The data on Heart rate, Respiratory rate, were taken prior to the experimental programme at resting condition. The subjects were then asked to perform various exercises which were pre planned. The exercise programme was administered for three days and at different times of day (first day- morning; second day- afternoon; third day- evening). Immediately after the finish of the training the data was collected on both the variables. First time the heart rate and respiratory rate was measured just after the cessation of exercise. The data as recorded for thirty seconds. After rest of 90 seconds again second recording was made for 30 seconds. Third recording was again made for 30 seconds after the rest of 90 seconds. The subjects kept sitting in maintained stationary position without making any movement throughout the period of data collection. In order to analyze and compare the physiological responses of recovery pattern, one way analysis of variance (ANOVA) and multiple range test (LSD) for significance of the differences between means was applied. The level of significant was set at 0.05 level of significance. Based on the analysis and within the limitation of present study, following conclusion may be drawn: Performing speed training exercises in the morning results in better recovery of the athlete and allows him to prepare quickly for next training session. Performing exercises in afternoon may result in slower recovery rate and more fatigue which may impair the performance of athletes in next training session. Performing speed training exercises in evening also results in better recovery.

KEYWORDS : speed training, different time, recovery

Introduction

The science of sport and preparation of athletes is continuously evolving. This evolution is based on an ever expanding understanding of how the body adapts to different physical and psychological stresses. Contemporary sport scientists continue to explore the physiological and performance effects of different training interventions, recovery modalities, nutritional countermeasures and biomechanical factors on performance in order to increase it. As our understanding of body's response to different stressors has grown, contemporary training theorists, sport scientists, and coaches have been able to expand upon the most basic concept of training.

Athletics is the basic sport for all and so it has assumed great importance in recent years. The physical educationists, coaches and sports scientists seek information related to the athletes, potential proficiency in sports. Research in nutrition, psychology, biochemistry and physics have contributed much to the improvement of performance level of athletics in various competitive sports of today. In recent years the sports scientists have taken interest in the analysis of human movement in various sports activities making use of the laws of physics. Man as a moving living body obeys the scientific laws of the universe. With adequate knowledge of scientific truth and application of them to his effort, man can move more efficiently.

As a result the field of exercise physiology has become increasingly sophisticated. New research procedure and measurements techniques coupled with advances in equipment, computer technology, and other related disciplines such as biochemistry have contributed to the rapid advancement of the knowledge base. Exercise biochemistry involves examination of the effects of exercise at the cellular level, specifically within the muscle. Although the field of exercise physiology is becoming increasingly specialized, many professionals in this field recognize that to fully investigate and understand human performance an interdisciplinary approach is necessary.

Speed plays a vital role for sprinters to give performance. He must possess acceleration speed. Speed of movement and reaction time. Even though these focus component; of speed affect the performance. Sprinters yet the contribution made by reaction time to enact performance Is still not very certain. There is no doubt regarding the contribution of acceleration speed, sprinting speed and speed of movement to bring about better performance on the part of sprinters. Therefore, to certain optimum performance in activities, where the speed is the main factor; acceleration speed; sprinting speed; speed of movement and reaction time should move together.

When an athlete is subjected to particularly hard training session such as a 100% sprint session or tough weight training or interval workout around 48 hrs or rest is needed for full regeneration and recovery. During this period glycogen stores are replenished, muscle protein is restored, and new muscles are built. This necessarily does not mean that no training should take place but rather workout intensity shall be reduced. The next intense session should be scheduled to take place 48 to 72 hrs after first intense workout to maximize training adaptation in cyclic fashion.[1] Failure to maintain balance, especially by short-changing.

PROCEDURE AND METHODOLOGY

In order to acquaint the subjects with the specific purpose of the research being conducted, all the subjects were assembled in the athletic track of Rabindra Mahavidyalaya , Chapadanga, Hooghly, West Bengal. All the necessary information pertaining to the requirement of the testing procedure was imparted to them. To make the research findings more authentic, positive attitude towards investigation was emphasized. The data for the physiological responses and recovery pattern of athletes was obtained with the help of various measures of cardio-respiratory parameters. The data on Heart rate, Respiratory rate, were taken prior to the experimental programme at resting condition. The subjects were then asked to perform various exercises which were pre planned. The exercise programme was administered for three days and at different times of day (first day- morning; second day- afternoon; third day- evening). Immediately after the finish of the training the data was collected on both the variables. First time the heart rate and respiratory rate was measured just after the cessation of exercise. The data as recorded for thirty seconds. After rest of 90 seconds again second recording was made for 30 seconds. Third recording was again made for 30 seconds after the rest of 90 seconds. The subjects kept sitting in maintained stationary position without making any movement throughout the period of data collection. The test administrations of all the physiological variables are as follows:

Heart Rate

Purpose: To measure the heart rate.

Equipments: Digital Stop watches, record sheets, pen, and pencil.

Procedure: The heart rate was determined by pulse counts. Pulse count was taken from radial artery of wrist, on the palm side directly in line with thumb. The tips of index and middle fingers were used to feel the pulse. Due care was taken to apply appropriate pressure on artery, so that reaction to pressure did not produce an alteration in beat.

Scoring: The heart rate was recorded in beats/ minutes

Respiratory Rate
Purpose: To measure the respiratory rate

Equipments: Stop watches, record sheets, pen, and pencil.

Procedure: The number of breaths taken in each minutes was referred as breathing frequency or Respiratory rate and this was assessed keeping the hand on each subjects stomach and reading were taken for complete one minute.

Scoring: The respiratory rate was recorded in numbers / minutes

STATISTICAL TECHNIQUE
In order to analyze and compare the physiological responses of recovery pattern, one way analysis of variance (ANOVA) and multiple range test (LSD) for significance of the differences between means was applied. The level of significant was set at 0.05 level of significance

Finding of the study
The statistical analysis of data collected on 8 male athletes of Rabindra Mahavidyalaya, Champadanga, Hooghly,West Bengal on selected variables i.e. Heart Rate and Respiratory Rate are presented in this chapter.

FINDINGS
Finding pertaining to the descriptive Statistics in Heart Rate phase I, Heart Rate Phase II, Respiratory Rate Phase I and Respiratory Rate Phase II have been presented in table 1 to table 4.

Table 1
DESCRIPTIVE STASTISTICS OF RECOVERY PHASE I (HEART RATE) IN DIFFERENT TIMES OF DAY

Times of day	Mean	S.D.
Morning	54.3	6.74
Afternoon	36.93	20.25
Evening	52.03	10.87

Table 1 above shows that mean Heart Rate of Phase I during morning, afternoon and evening are 54.3, 36.93 and 52.03 respectively, which implies that rate of recovery is better in morning and evening in comparison to afternoon. However, SD of heart Rate of Phase I is 6.74, 20.25 and 10.87 respectively. This reflects that variation in recovery rate of phase1 is higher in afternoon.

Table 2
DESCRIPTIVE STASTISTICS OF RECOVERY PHASE II (HEART RATE) IN DIFFERENT TIMES OF DAY

Times of Day	Mean	S.D.
Morning	67.07	13.8
Afternoon	49.96	15.57
Evening	67.38	6.15

Table 2 above indicates that mean heart rate of Phase II during morning, afternoon and evening are 67.07, 49.96 and 67.38 respectively, which implies that rate of recovery is better in morning and evening in comparison to afternoon. However, SD of heart rate of Phase II is 13.8, 15.57 and 6.15 respectively. This reflects that variation in recovery rate of phase II is higher in afternoon.

Table 3
DESCRIPTIVE STASTISTICS OF RECOVERY PHASE I (RESPIRATORY RATE) IN DIFFERENT TIMES OF DAY

Times of Day	Mean	S.D.
Morning	38.04	11.7
Afternoon	34.24	9.76
Evening	30.62	10.53

Table 3 above reveals that mean respiratory rate of Phase I during morning, afternoon and evening are 38.04, 34.24 and 30.62 respectively, which implies that rate of recovery is better in afternoon and evening than morning. However, SD of respiratory rate in Phase I is 11.7, 9.76 and 10.53 respectively. This reflects that variation in recovery rate of phase I is higher in morning.

Table 4
DESCRIPTIVE STSTISTICS OF RECOVERY PHASE II (RESPIRATORY RATE) IN DIFFERENT TIMES OF DAY

Times of Day	Mean	S.D.
Morning	60.11	15.28
Afternoon	52.27	11.81
Evening	49.79	11.29

Table 4 above indicates that mean respiratory rate of Phase II during morning, afternoon and evening are 60.11, 52.27 and 49.79 respectively, which implies that rate of recovery is better in afternoon and evening than morning. However, SD of respiratory rate in Phase II is 15.28, 11.28 and 11.29 respectively. This reflects that variation in recovery rate of phase II is higher in morning.

Fig. 1 GRAPHICAL REPRESENTATION OF MEAN SCORES OF RECOVERY PHASE I (H.R), RECOVERY PHASE II (H.R), RECOVERY PHASE I (R.R), RECOVERY PHASE II (R.R)

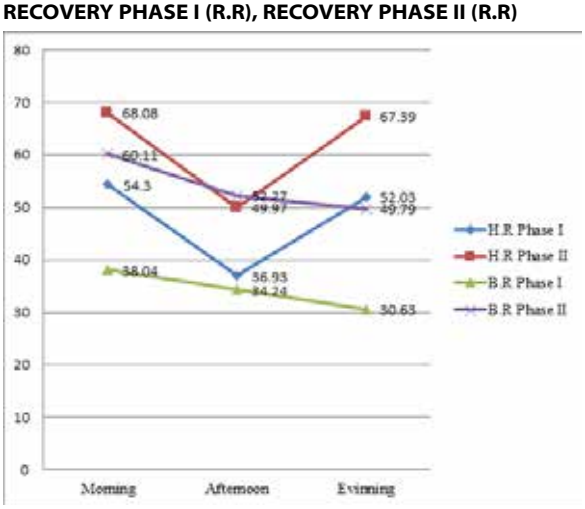

Figure 1 shows that Recovery rate is higher in the morning and evening in terms of heart rate in both the phase I and phase II and there is steep decrease during the afternoon. i.e. Phase I and Phase II follows the same pattern. However, for breathing rate the recovery rate follows a decline pattern from morning to evening and here also both phase I and phase II follows the same pattern.

Findings pertaining to heart rate phase I, heart rate Phase II, respiratory rate Phase I and respiratory rate Phase II have been subjected to Analysis of Variance are presented in table 5 to table 9.

Table 5
ANALYSIS OF VARIANCE OF RECOVERY PHASE I (HEART RATE) IN DIFFERENT TIMES OF DAY

		Sum of Squares	df	Mean Square	F	Sig.
Recovery Phase I(H.R)	Between Groups	1248.36	2	624.177	3.263	0.062
	Within Groups	3443.06	18	191.281		
	Total	4691.41	20			

Table 5 above indicates that Calculated F-Value is insignificant at 0.05 level of significance (p>0.05). Thus, no significant difference exists in recovery pattern for initial 2 minutes in different times of day.

Table 6
ANALYSIS OF VARIANCE OF RECOVERY PHASE II (HEART RATE) IN DIFFERENT TIMES OF DAY

		Sum of Squares	df	Mean Square	F	Sig.
Recovery Phase II(H.R)	Between Groups	1474.08	2	737.041	4.693	0.023
	Within Groups	2826.74	18	157.041		
	Total	4300.82	20			

Table 6 above signifies that Calculated F-Value is significant at 0.05 level of significance ($p<0.05$). Thus, significant difference exists in recovery pattern for initial 4 minutes in different times of day.

Table 7
LEAST SIGNIFICANT DIFFERENCE OF RECOVERY PHASE II (HEART RATE) IN DIFFERENT TIMES OF DAY

Time of day			Mean Difference	SE	Sig.
Morning	Afternoon		18.10*	6.69	0.015
	Afternoon	Evening	17.41*	6.69	0.018
Morning		Evening	00.69	6.69	0.910

Table 7 above reveals that significant difference exists in the recovery pattern of phase II between morning- afternoon ($p<0.05$) and afternoon-evening ($p<0.05$). However, no significant difference exists between morning and evening ($p>0.05$). This reflects that recovery rate is higher during morning and evening and is almost equal.

Table 8
ANALYSIS OF VARIANCE OF RECOVERY PHASE I (RESPIRATORY RATE) IN DIFFERENT TIMES OF DAY

		Sum of Squares	df	Mean Square	F	Sig.
Recovery Phase I(B.R)	Between Groups	192.44	2	96.22	0.838	0.449
	Within Groups	2066.35	18	114.797		
	Total	2258.79	20			

Table 8 above indicates that Calculated F-Value is insignificant at 0.05 level of significance ($p>0.05$). Thus no significant difference exists in recovery pattern for initial 2 minutes in different time of day in terms of respiratory rate.

Table 9
ANALYSIS OF VARIANCE OF RECOVERY PHASE II (HEART RATE) IN DIFFERENT TIMES OF DAY

		Sum of Squares	df	Mean Square	F	Sig.
Recovery Phase II(B.R)	Between Groups	406.59	2	203.295	1.218	0.319
	Within Groups	3005.01	18	166.945		
	Total	3411.6	20			

Table 9 above shows that Calculated F-Value is insignificant at 0.05 level of significance ($p>0.05$). Thus no significant difference exists in recovery pattern for initial 4 minutes in different time of day in terms of Breathing Rate.

DISCUSSION OF FINDINGS

The results of mean recovery heart rate phase 1 of studied groups are shown in Table 1. Mean recovery heart rate (phase 1) in morning, afternoon and evening were 54.3 ± 6.74, 36.93 ± 20.25 and 52.03 ± 10.87 respectively.

The results of mean recovery heart rate phase 2 of studied group are shown in Table 2. Mean recovery HR phase 2 in morning, afternoon and evening were 67.07 ± 13.8, 49.96 ± 15.57 and 67.38 ± 6.15 respectively.

The results of mean recovery respiratory rate phase 1 of studied group are shown in Table 3. Mean recovery RR phase 1 in morning, afternoon and evening were 38.04 ± 11.7, 34.24 ± 9.76 and 30.62 ± 10.53 respectively.

The results of mean recovery respiratory rate phase 1 of studied group are shown in Table 3. Mean recovery RR phase 1 in morning, afternoon and evening were 60.11 ± 15.28, 52.27 ± 11.81 and 49.79 ± 11.29 respectively.

ANOVA (table 5) of recovery phase 1 for HR in different times of day signifies that there is no significant difference lies in recovery. It may be attributed to recovery pattern during first phase in which replenishment of energy reserves takes place rapidly due to oxygen debt.

ANOVA (table 6) of recovery phase 2 for heart rate in different times of day signifies that there is a significant difference lies in recovery. It may be attributed to individual's level of health and fitness. Since there is a significant difference lies between recovery phases 2 for heart rate in different times of day, the post hoc test (LSD) was applied to the data to compare the means for the significance.

The LSD (Table 7) shows that the mean of recovery heart rate in the morning and afternoon is significantly different, likewise, in afternoon and evening also, there is a difference in recovery heart rate. This significant difference may be attributed to the different environmental conditions at these two different times. There are variations in temperatures between these two times as morning and evening are cooler than afternoon. It may also be attributed to the rest taken by the subjects during night and after lunch which results in the sufficient energy reserve in the subjects. But no significant difference was found in the means of recovery heart rate phase II taken at morning and evening. It may be attributed to the same type of environment at these two times are approximately similar. It may also be caused due to habits of the subjects to practice in these two sessions only.

ANOVA (Table 8) of recovery phase I for respiratory rate in different times of day shows that no significant difference lies in recovery. It may be attributed to the greater demands of oxygen in initial phase of recovery after exercise due to oxygen debt.

ANOVA (table 9) of recovery phase 2 for respiratory rate in different times of day signifies that there is no significant difference in recovery.

CONCLUSION

Based on the analysis and within the limitation of present study, following conclusion may be drawn:

Performing speed training exercises in the morning results in better recovery of the athlete and allows him to prepare quickly for next training session.

Performing exercises in afternoon may result in slower recovery rate and more fatigue which may impair the performance of athletes in next training session.

Performing speed training exercises in evening also results in better recovery.

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