

Effect of circadian rhythm on selected motor fitness and physiological parameters in track and field athletes

Abstract

Background & objectives: Circadian rhythm is a 24-hour physical, psychological and physiological fluctuations. The present investigation was made to find out the effect of circadian rhythm on selected motor fitness and physiological parameters in track and field athletes. It was also aimed to study the interrelationships among the parameters.

Methods: In the present study 30 male athletes in each group of sprinters and jumpers were selected having the age range 22-25 years from different training institution of West Bengal. The subjects were studying in college and universities and have represented in Athletic Championship. Data were collected at two seasons (winter and summer) of the year at three time periods of a day (8.00am, 12.00pm, and 4.00pm). The following motor fitness parameters were tested on the subjects: Speed, Explosive leg power, Muscular strength endurance of arm and shoulder, Muscular strength endurance of abdominal muscle, Basic endurance, Agility and the following physiological parameters were tested on the subjects: Resting pulse Rate, Resting diastolic blood pressure (DBP), Resting systolic blood pressure (SBP) and Body temperature. One way repeated measure ANOVA was used to find out mean difference is significant or not at three time of day. Post hoc test was used to identify difference between three time of day. Degree of relationship was measured with the help of correlation coefficient.

Results: The results showed that there was a significant difference (** $p < 0.05$) of systolic BP (SBP), diastolic BP (DBP) and body temperature in different time of the day in both athletes. Some component of motor fitness such as agility, explosive leg power and basic endurance showed significant (** $p < 0.05$) circadian variation. But no significant difference was observed on pulse rate, speed and strength. In both the season almost all the physiological parameters (except pulse rate) showed significant positive correlation with total physical fitness parameters in case of both the sprinters and jumpers at different time of the day.

Conclusion:

Results of the present investigation lead to draw the following conclusion: (i) Total motor fitness shows circadian rhythm with changing values at different periods of the day. This circadian rhythm becomes different with seasonal variation. (ii) During winter the motor fitness reaches its peak value in afternoon and lowest in the morning. In summer also the motor fitness becomes highest in afternoon but it becomes lowest at noon. (iii) Specific motor fitness components of sprinters and jumpers – the agility, power and endurance exhibit circadian rhythm with their peak values in afternoon. (iv) Other motor fitness components of both the groups considered in this study – the speed, arm strength and abdominal strength endurance do not exhibit circadian rhythm either in winter or summer. (v) Physiological parameters in resting condition – the systolic, diastolic blood pressures and body temperature show circadian rhythm with the trend of increasing from morning to afternoon in both the seasons. But, the trend becomes a decreasing one from evening (vi) The pulse rate at resting condition does not show any circadian variation. (vii) In both the season almost all the physiological parameters (except pulse rate) showed significant positive correlation with total physical fitness parameters in case of both the sprinters and jumpers at different time of the day. Hence, further investigations are needed to determine the mechanisms of the cause of circadian variation in these parameters.

Keywords: Circadian rhythm, blood pressure, pulse rate, motor fitness, sprinters, jumper