Different Environmental Temperatures in A Day And Its Impact on Physical Performance among Students

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Abstract

The investigator made an attempt to find out the different environmental temperatures in a day and its impact on physical performance among students. Fifteen undergraduate female students were selected as subjects and the age ranged between 17 and 20 years. Speed was selected as criterion variable and that was collected at three different temperatures (i.e. 24.7^{o}C, 34.1^{o}C, 27.3^{o}C) in morning, afternoon and evening respectively from each subject. The collected data was statistically analysed by using analysis of variance (ANOVA) and Scheffe's test was applied as a post hoc test to determine the significant differences between the mean. The result of the study shows that the speed was better in evening time i.e. (27.3^{o}C) rather than the other two temperatures such as morning and afternoon.

KEYWORDS: Environmental temperature, female students, speed.

Introduction

Exercise in hot climate or hot environment causes a magnification of normal response to physical work, and increase in core, and skin temperature, metabolic heat production sweat rate, pulse rate and systolic blood pressure. That response assists the body in shedding excess heat by convection, radiation, conduction, and evaporation (David, 1986). Women generally have ten percent to twelve percent greater surface area to mass ratio than men. This greater ratio helps to increase heat loss in moderate heat stress. But in cold or extreme heat, the larger area may provide too little protection from the ambient temperature. Women with large subcutaneous fat deposits have greater resistance to heat loss in air or water. Tolerance to exercise in heat appears to be related to the degree of acclimation and conditioning. When the environmental temperature rises above the skin temperature, (normally around 34^{O}C) the circulatory adjustments are not sufficient for heat dissipation by convection and negative gradient between the skin and environment (Benjamin, 1967). When external temperatures are greater than the skin temperature and a negative gradient appears, the body is actually gaining heat by radiation and convection. The temperature gradient from the inner core to heat outer shell is smaller for women; the physiological and physical cost of maintaining heat balance in hot weather is greater and hence seems to be more limited in terms of physical performance (Larry, 1981). Body temperature is usually at its lowest (about 36.1^{O}C) in the early morning hours and at its highest

(about 37.4^{o}C) in the late afternoon or early evening. The temperature regulation during exercises in hot climate involves vasodilatation and sweating as a function of anterior hypothalamus of the brain. Vasodilatation (expansion of blood vessels) increases skin blood flow, and thus enhances the transfer of metabolic heat from the deep core to the skin surface (Karpovich, 1973). Secretion of sweat on the other hand provides water for evaporative cooling. The atmospheric or environment temperature, physical and physiological factors are very important for achieving the physical performance.

Speed is an ability to execute motor action under given condition in maximum possible time (Clarke & Clarke, 1987). Muscles are made up of a combination of fast-twitch and slow-twitch fibers. Fast-twitch fibers contract rapidly and slow-twitch fibers contract more slowly and with lower level of force. If all other things are equal, athletes with longest muscle fibers and greater percentage of fast twitch fiber should have the ability to run faster (Jarver, 1978) than an athlete with shorter slow -twitch fibers. Speed is the product of two factors, stride length and stride frequency. Increasing either factor automatically increases a runners sprinting speed. Stride frequency is an inborn quality; it might be possible to improve it slightly through training. But the stride length can be increased by increasing the leg strength and power (Eicher, 1975). Hence the investigator made an attempt to determine the physical fitness component such as speed of female students at various environmental temperatures.

Methodology

Fifteen female students studying in the 1st year Bachelor of Physical Education, Department of Physical Education, Christ College Irinjalakkuda, Kerala were selected as subjects for this study. They were between 17 to 20 years of age group. The variables selected for this study was speed and it was measured by using 50 mts. run. It was collected at three different temperatures (i.e. 24.7^{o}C, 34.1^{o}C, 27.3^{o}C) in morning, afternoon and evening such as 6 am, 1 pm and 5.45 pm respectively from each subject of this study. The obtained data from the variable were statistically analysed with one-way analysis of variance (ANOVA). Whenever the *F* ratio was found to be significant, Scheffe's test was applied as a post hoc test to determine the mean differences. The level of confidence was fixed at 0.05 levels of all the cases to find out the significance.

Results and Discussion

Table – I

Analysis of Variance of the Environmental Temperature of Morning, Afternoon and Evening of Speed

Mean			SOV	Sum of Squares	df	Mean Squares	*F* Ratio
Morning	Afternoon	Evening					
11.09	10.84	10.71	Between	1.11	2	0.56	5.16*
			Within	4.52	42	0.12	

* Significant F = (2, 42) (0.05) = 3.22, $p \leq 0.05$

From the table-I, the mean values of the speed of morning, afternoon and evening are 11.09, 10.84 and 10.71 respectively. The obtained *F* ratio of 5.14 is greater than the table value of 3.22 required for significant at 0.05 level of confidence.

The results of the study indicate that there is a significant difference between the mean of morning, afternoon and evening environmental temperature on speed. To determine which of the mean had a significant difference, Scheffe's test was applied as a pot-hoc test and the results are presented in table-II.

Table – II

Scheffe's Test for the Difference between the Mean of Environmental Temperature of Morning, Afternoon and Evening on Speed

Mean			Mean Difference	Confidence Interval (*C.I*)
Morning	Afternoon	Evening		
11.09	10.84		0.25	0.30
11.09		10.71	0.38*	
	10.84	10.71	0.13	

* Significant, $p \leq 0.05$

Table-II shows the mean difference in speed between morning and evening is 0.25. This value is higher than the required confidence interval value 0.30, which shows significant difference at the 0.05 level of confidence. However the mean difference in speed between morning and afternoon and afternoon and evening are 0.25 and 0.13 respectively. These values are lesser than the confidence interval value of 0.30, which shows there was no significant difference at 0.05 levels.

Kleiber (1961) suggests that two types of human beings may be distinguished by the pattern of their temperature fluctuations during a day: the early risers and the late risers. The early risers have a relatively high blood in the morning and are barbarically cheerful before breakfast. The larger groups are those who have difficulty in getting up in the morning and have unfriendly dispositions, at least until after the first cup of tea. Their body temperature is low in the morning but high at night. Then they are wide awake while the early risers are tired and sleepy. In this study we can see the speed at different times in a day such as morning @ 24.7^{o} (6am), afternoon @ 34.1^{o} (1pm) and evening @ 27.3^{o} (5.45pm) respectively. The result showed that evening is the best time to perform the maximum speed of undergraduate female students. The mean values of speed of different atmospheric temperature such as morning, afternoon and evening are graphically presented in figure 1.

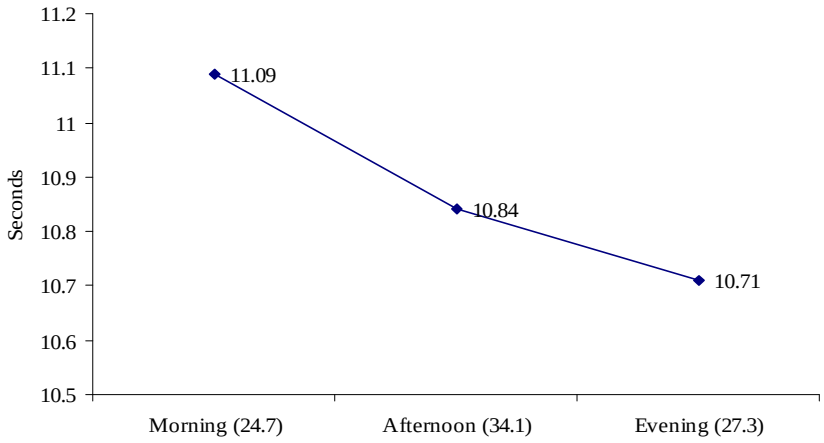

Figure 1: The mean values of speed at different temperatures in a day such as morning 6 am (24.7^{o}), afternoon 1 pm (34.1^{o}) and evening 5.45 pm (27.3^{o})

Conclusion

This study we can see the variable; speed at different temperature variations in a day such as morning 6 am (24.7^{o}), afternoon 1 pm (34.1^{o}) and evening 5.45 pm (27.3^{o}) respectively. The result of the study concluded that there was a significant difference between the speed of morning and evening atmospheric temperature. However there was no significant difference between morning and afternoon as well as afternoon and

evening atmospheric temperature. So that from the result we can say evening is the best time to take speed performance of undergraduate female students.

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