Influence of Different Environmental Temperatures on Power Output among Female Education Students

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Abstract

The aim of this study was to find out the influence of different environmental temperatures on power output among female education students. Fifteen bachelors (n = 15) of education female students were selected as subjects and the age ranged between 20 and 26 years. Explosive power was selected as dependent variable and that was collected by using standing long jump 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 explosive power was better in evening time ($p \leq 0.05$) i.e. (27.3^{o}C) rather than the other two temperatures such as morning and afternoon.

KEYWORDS: Environmental temperature, education students, power output.

Introduction

In the early stages, the most common changes involve long, tiring journeys, sometimes combined with a stay for a number of days in an unfamiliar place. Later in the athlete's career, there are more serious changes to take note of, and to prepare for. During an athlete's career numerous things happen which bring changes in his environment. There are three environmental conditions which an athlete will have to learn how to acclimatize to, these are altitude, temperature and time change (Costill et al., 1970). On the other hand, the Winter Olympics invariably call for protection against the cold. During exercise the body produces a great deal of heat. In extreme circumstances this can elevate its core temperature from 37^{o} C to beyond 40^{o} C. When the surrounding air is cool heat can be lost from the body by the process of radiation (transfer of heat by electromagnetic waves), convection (by air movement), conduction (by contact), and evaporation (by sweating). As the surrounding temperature increases it becomes more and more difficult to lose heat by radiation, convection, and conduction. Other than air temperature, both humidity and radiant heat should be assessed before athletes engage in hard training or competition in hot weather conditions (Pyke & Hahu, 1981). It has been shown that physical training in cool conditions improves tolerance to hot conditions. However, full adaptation to heat can only be achieved by actually working in hot conditions.

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). Tolerance to exercise in heat appears to be related to the degree of acclimation and conditioning. 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 seating 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). Heat stress generates a need for sweating and circulatory responses to dissipate body heat, especially when the environment is warmer than skin, and may push the body's homeostatic systems to their limits.

The ability of the neuromuscular system to overcome resistance with a high speed of contraction is defined as explosive power (Frank, 1992). The most peculiar factors for explosive power development must be formed in neuromuscular properties (Bosco et al., 1992). Explosive power refers to an individual's ability to exert a maximal amount of force in the shortest possible time interval. Muscle fiber hypertrophy has been shown to require more than 16 workouts to produce significant effects. In addition, fast-twitch (glycolytic) muscle fiber has the potential to show greater increases in size as compared to slow-twitch (oxidative) muscle fiber. The length of the jump will depend to a greater degree upon the force or push the jumpers can generate the ability to outline the force is explosive power (Kamalakannan et al., 2010). The length of the jump will depend to a greater degree upon the force or push the jumpers can generate the ability to outline the force is explosive power. Standing broad jump is used as a test to measure the explosive power and that is improved through resistance training.

Materials and Methods

The purpose of this study was to find out the influence of different environmental temperatures on power output among female education students. Fifteen female (n = 15) bachelor of education students were studying in Patriarch Ignatius Zakka I Training College, Malecruz, Puthancruz, Ernakulam district, Kerala were selected as subjects for this study. They were between 20 to 26 years of age group. The variables selected for this study was explosive power and it was measured by using standing broad jump. 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 significance was fixed at 0.05.

Results and Discussion

Table – I

Analysis of Variance of the Environmental Temperature of Morning, Afternoon and Evening of Explosive Power

Mean			SOV	Sum of Squares	df	Mean Squares	F Ratio
Morning	Afternoon	Evening					
1.51	1.61	1.77	Between	0.50	2	0.25	9.28*
			Within	0.13	42	0.03	

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

From the table-I, the mean values of the explosive power of morning, afternoon and evening are 1.51, 1.61 and 1.77 respectively. The obtained F ratio of 9.28 is higher 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 explosive power. 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 Explosive Power

Mean			Mean Difference	Confidence Interval (C.I)
Morning	Afternoon	Evening		
1.51	1.61		0.1	0.16
1.51		1.77	0.26*	
	1.61	1.77	0.16*	

* Significant, $p \leq 0.05$

Table-II shows the mean difference in explosive power between morning and afternoon is 0.1. This value is lower than the required confidence interval value 0.16, which shows insignificant difference at the 0.05 level of confidence. However the mean difference in explosive power between morning and evening and afternoon and evening are 0.26 and 0.16 respectively. These values are higher than the confidence interval value of 0.16, which shows there was a significant difference at 0.05 levels.

Shivering raises the resting metabolism about fourfold but in the process interferes with the expression of skill. Extra heat can be produced either by shivering or by exercising.. Rensburg et al (1984) studied breaststroke swimming in water temperatures of 18, 26, and 33^{o} C and attributed the extra oxygen cost of performing in the cold water to the shivering response. Depending on the endurance fitness level of the individual, metabolism can be elevated twelve or fifteen fold during intensive exercise. 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 test the explosive power of education students. Burke et al (1996) find out that the heat climate improves the sports performance. The mean values of explosive power of different

atmospheric temperature such as morning, afternoon and evening are graphically presented in figure 1.

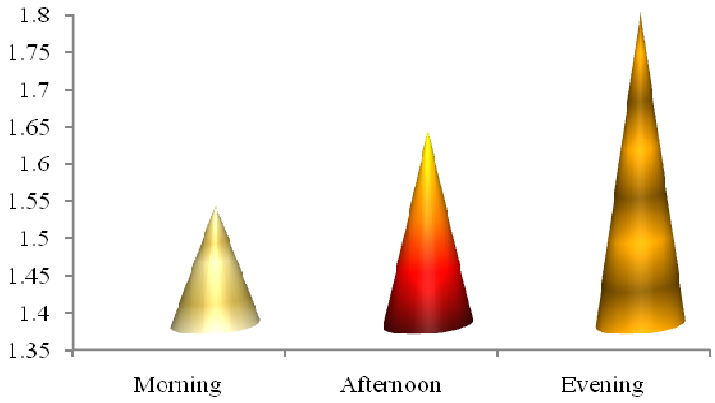

Figure 1: The mean values of explosive strength at different temperatures in a day such as morning 6 am (24.7^{o}), afternoon 1 pm (34.1^{o}) and evening 5.45 pm (27.3^{o})

Conclusion

Explosive power is one of the important qualities to get the maximum physical performance. In this study explosive power measured 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 explosive power of morning and evening and afternoon and evening atmospheric temperature. However there was no significant difference between morning and afternoon atmospheric temperature. So from the result we can say evening is the best time to take explosive power performance of female education students.

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