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**STUDY ON SOME FACTORS AFFECTING THE EFFICIENCY
OF AND THE RECOVERY FROM MUSCULAR EXERCISE**



This is dedicated to my parents and husband

**THE THESIS
SUBMITTED TO
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IN PHYSIOLOGY**

BY

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Abstract

Sri Lanka being a tropical country, prevailing day time ambient temperatures are too high to allow dissipation of body heat by non evaporative methods. The heat loss by evaporation is also limited by high humidity. Therefore, these limitations to thermoregulation could lead to poor work performance. Accordingly, this study focused on the effect of two different ambient temperatures and relative humidities on the efficiency, inclination to stop exercise, recovery from a standard exercise and the inclination to recommence exercise after a period of rest following exercise. The research programme consisted of two main studies.

Study I was designed to investigate the effect of 29°C ($28.5 \pm 1.16^\circ\text{C}$) with relative humidity of $73.4\% \pm 5.37\%$ and 23°C ($22.6 \pm 1.19^\circ\text{C}$) with relative humidity of $64\% \pm 4.47\%$ ambient temperatures on recovery from muscular exercise. It was conducted on 20 male first year dental and medical students with a mean age of 22.5 ± 0.94 years. They were made to perform standard exercise for six minutes on a bicycle ergometer at two different ambient temperatures 29°C and 23°C, on two different occasions. Physiological parameters including heart rate, pulmonary ventilation, oral and axillary temperatures, systolic and diastolic blood pressures were measured at rest and during recovery at five minute intervals up to 20 minutes.

Results showed that although, ambient temperature had no significant effect on recovery from a standard exercise significantly higher values were shown for heart rate, pulmonary ventilation and systolic blood pressure at the end of exercise at higher ambient temperature.

Study II was designed to study the effect of ambient temperatures 29°C (mean 28.5°C±1.01°C) with relative humidity of 74%±5.00% and 23°C (mean 22.7°C±1.21°C) with relative humidity of 65%±6.02% on the efficiency as indicated by the time to exhaustion. In addition an attempt was made to investigate the effect of ambient temperature on the inclination to stop exercise and inclination to recommence exercise at two different ambient temperatures by monitoring some cardio-respiratory and body temperature measurements. This study was conducted on 10 male third year dental and medical students with a mean age of 24.5±0.85 years. They were made to perform standard exercise on a bicycle ergometer for a maximal possible period of time. Thereafter, they were asked to rest till they felt like recommencing exercise. Pulse rate, respiratory rate, oral and axillary temperatures and systolic and diastolic blood pressures were measured at rest, at the end of maximal exercise and at the time when they felt like recommencing exercise. Exercise time and duration of resting period were also measured.

It was found that efficiency of exercise as indicated by the time to exhaustion, was higher at 23°C ambient temperature compared with 29°C ambient temperature.

It is possible to say that pulse rate, respiratory rate, blood pressure and body temperature are among many other factors which determine exercise cessation point. Since the exercise time is longer at 29°C it is possible that ambient temperature has an effect on the exercise cessation point as shown by cardio-respiratory factors in the present study. Although, exercise re-commencing times for 29°C and 23°C are identical, only the pulse rate was significantly different in the two groups at re-commencement. Therefore, inclination to recommence exercise is not significantly affected by 29°C and 23°C ambient temperatures in this study according to the cardio-respiratory factors investigated. Results of the study I and II showed that strain from muscular exercise is less in a relatively cooler environment (23°C Dry bulb temperature) than a relatively warmer environment (29°C Dry bulb temperature) in a group of young male dental and medical students.

Therefore, it is important to consider about planning different work-rest schedules for in-door workers at 23°C and 29°C ambient temperatures and to maintain a comfortable ambient temperature to get the maximum efficiency, as shown by cardio-respiratory changes in this study.

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