

Research Paper :

## Comparison of cardio respiratory and metabolic responses to maximal exercise among sprint middle and long distance runners

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### ABSTRACT

The study was designed to investigate the comparison of cardiorespiratory and metabolic responses to maximal exercise among sprint, middle and long distance runners. The subjects for this investigation were 18 volunteers. All were physically fit athletes between the age of 18 to 24 years. The subjects were selected from different colleges and athletic clubs in Chennai. The athletes who had represented the state or university in sprint, middle and long distance events were selected as subjects for the research study. The variables chosen were namely, cardio respiratory variables (heart rate minute ventilation) and metabolic variables (maximal oxygen consumption respiratory quotient). The one way analysis of variance was used to determine if any significant difference was present among the three groups of athletes in each of the dependent variable. The study revealed that the maximal oxygen uptake and maximal minute ventilation values of long distance runners was higher than the middle distance runners and sprinters. The maximal heart rate of long distance runners was lower as compared with that of middle distance runners and sprinters.

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The control of cardio respiratory system is a complex process. This is true even under resting conditions. Many respiratory and circulatory adjustments are necessary during exercise in order to meet the increased metabolic demands of the working muscles. Furthermore, to do this most efficiently, all of these adjustments must be controlled and co-ordinated with each other. In this study an attempt has been made to find out the comparison of cardiorespiratory and metabolic responses to maximal exercise among sprint middle and long distance runners.

Allen Thomas (1974) investigated the possibility of occurring circulo respiratory endurance. Its related benefits from 12 week of high resistance, low repetition circuit weight in training. The parameters selected for observation were HR, Cardiac output, stroke volume, systolic and diastolic blood pressure, and max  $VO_2$ . Ss were selected from fresh volunteers at the University of North Carolina at Wilmington who were novice to weight training and who had not participated in any form of endurance training during six months before the experiments. The study ended with 33 subjects each in the experimental group and control group. The training programme consisted of 12 week of heavy resistance - low repetition training. Testing was accomplished by pedaling and cranking a bicycle ergometer cardiac output was estimated by a  $CO_2$  rebreathing technique. It was

concluded that the circuit weight training programme used in this study did not provide the - necessary stimulus for enhancement of circulorespiratory endurance.

### METHODOLOGY

The subject was made to stand on the tread mill. The nose was clipped for prevention of inhalation and exhalation through nose. The inspiratory module was attached to the mouth of the subject. The subject was allowed to settle down for a few minutes with all the equipments being set for exercise testing. As the subject inhaled the atmospheric air during the test, the volume of atmospheric air and the frequency of breathing the air was measured with the help of the inspiratory module. The expected air was sent to the gas mixing chamber which collected the gas samples during the exercise. The gas samples were analysed by Paramagnetic (Oxygen) infrared Carbon-dioxide ( $CO_2$ ) analyzer. These analyzers measured the percentage of the gases in the expired air samples. The following metabolic variables were sampled namely, oxygen consumption ( $VO_2$ ), maximal oxygen consumption ( $VO_2$  max), minute ventilation (VE) and Respiratory Quotient (RQ). The above variables were measured by the computerized metabolic cart every 30 seconds during the course of the exercise and till the subject reached the exhaustion stage. The end point of