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Effect of short and long interval running on aerobic and anaerobic capacities

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Abstract

This study investigates the comparative effects of short-interval running (SIRA) and long-interval running (LIRA) on the aerobic and anaerobic capacities of female college students. Thirty female students, aged 18-21, from Lakshmbai National Institute of Physical Education were randomly selected and divided into two equal groups, each undergoing different interval training regimes. SIRA involved 300m runs with active recovery on Mondays, Wednesdays, and Fridays, while LIRA comprised 600m runs with active recovery on Tuesdays, Thursdays, and Saturdays, both for four weeks. Pre- and post-tests, including a 50m dash and a 12-minute Cooper run/walk test, were administered to assess the impact on aerobic and anaerobic capacities. T-test results revealed significant improvements in both training methods, indicating that interval running effectively enhances physical fitness. The findings contribute to the understanding of structured interval training's role in athletic performance improvement and provide insights for optimizing training programs for female athletes.

Keywords: Interval training, aerobic capacity, anaerobic capacity and exercise

Introduction

Sports competition has evolved into a social demand of contemporary civilization that all cultures and governments must meet. Sports can be classified into several categories based on the goal to be achieved: School sports, rehabilitation sports, recreation and fitness sports, industry sports, competitive sports, and so on. Sports have exploded in popularity over the last few decades all across the world. Sport's popularity continues to rise at a rapid rate, and this positive trend is expected to continue in the future. Each sport has its own set of goals and appeals to different segments of society. Sports play critical social and cultural roles, the importance of which cannot be overstated. The following statements summarize the contribution of sports to the general welfare of human society:

- Sports aid in the overall development of a person's personality.
- Provide ample and healthy means for recreation and relaxation of human mind and body.
- Are effective for rehabilitation and social adjustment of the injured, sick and handicapped.
- Provide opportunities for social interaction thereby fostering peace and understanding among different people, nations, races, religion etc.
- Perform preventive and curative functions for several diseases and ailments inflicting human body and mind.
- Provide healthy and socially acceptable opportunities for the people and nations to compete against each other thereby touching heights of excellence of human endeavors and attainment.

Interval Running: A Comprehensive Guide to Effective Workouts

Interval training is a structured approach to fitness that involves alternating between high-intensity exercise and periods of rest or lower-intensity activity. It has evolved into a systematic and scientific method for improving physical performance. Effective interval training programs carefully control the intensity and duration of work intervals, as well as the length of rest periods.

It has become a sophisticated way to track fitness progress. Unlike Fartlek training, which results in a transient buildup of lactic acid, interval training involves well-defined intervals of effort and recovery, aiding in faster clearance of waste products. Interval training regimens are customized to suit the specific needs of athletes. Factors such as activity duration, intensity, and recovery intervals are determined based on an athlete's sport and fitness level. Techniques like anaerobic threshold testing help determine the appropriate intensity and duration of intervals. Training methods have evolved over the last few decades to become more systematic and evidence-based. Interval training has played a significant role in this evolution, offering a more structured and controlled approach to improving athletic performance. Interval training can be classified based on variables like load duration and speed. Load duration categories include short-interval, medium-interval, and long-interval methods, with potential modifications for beginners. Interval training is defined by six key variables, including distance or duration, speed or intensity, repetitions, interval length, recovery type, and training frequency. Manipulating these variables can enhance aerobic and anaerobic capacity and physiological changes.

Load duration is further subdivided into

- **Short-interval method:** Duration of single loads from about 50 seconds to 2 minutes.
- **Medium-interval method:** Duration of single loads from about 2 to 8 minutes.
- **Long-interval method:** Duration of single loads from about 8 to 15 minutes.

Aerobic and Anaerobic capacities

Aerobic capacity is a measurement of your maximum oxygen consumption during physical activity, also known as cardiopulmonary capacity, cardio respiratory fitness, or VO₂ max. It's a measure of your aerobic capacity and your body's ability to perform at a high level for prolonged periods of time. The science behind it is as follows: Your lungs take in oxygen and transport it to your heart, cells, and muscle groups throughout your body while you exercise. The oxygen-rich blood combines with glucose to produce ATP (adenosine triphosphate), an organic chemical that aids in the contraction of your working muscles. You can now run large distances, swim laps, and ride your bike thanks to this procedure.

Anaerobic capacity is built on top of aerobic capacity. Lactic acid generation begins at a slower rate or with a lower intensity if aerobic capacity is limited. As a result, the activity must be halted after a short period of time or the speed reduced. Significant lactic acid accumulation begins at the VO₂ Max in non-athletes. It begins at 80 percent of VO₂ Max or later in endurance athletes. A well-developed aerobic capacity minimizes the organism's anaerobic burden and contributes greatly to the elimination of lactic acid from the circulation, i.e. anaerobic capacity restoration.

To perform aerobic and anaerobic activity, the muscle cells of the human body are provided with energy by different systems, namely

1. The ATP-CP system.
2. The lactic-acid (LA) system and
3. The Oxidative system.

Materials and Methods

The selection of subjects, the experimental design, the tester's competency and data reliability, the criterion measures, the data collection, the administration of tests and the training programme, the pilot study, and the statistical techniques used

to analyse the data are all discussed in this chapter.

Subjects

For the aim of this study, 30 female students, ranging in age from 18 to 21, and their average age is 19.33 years, studying Bachelors in Physical Education at Lakshmbai National Institute of Physical Education, were chosen as subjects. A meeting of all the selected subjects was convened prior to the delivery of pre-tests. The goal of this study, as well as the numerous testing processes and training programmes, were thoroughly explained to them so that there was no uncertainty in their minds about the efforts they would be expected to make and the amount of hard work they would be expected to put in. All of the subjects were persuaded and agreed to fully participate in the experiment after it was described to them.

Experimental Design

This study used a simple random group design because it was believed to be the most appropriate. The 30 subjects were divided into two equal groups, each with 15 participants. Following the assignment of treatment components to both experimental groups, a simple random sample procedure was used. The experimental groups were labeled as follows:

- SIRA (Short-Interval Running, Active Recovery).
- LIRA (Long-Interval Running, Active Recovery).

Short-interval running and long-interval running were 300m and 600m distances, respectively, for training and data analysis. Walking and jogging as active recovery during the recovery phase between short and long periods. In order to provide minute supervision to the entire training programmed and make it more meaningful, the investigator administered the training programmed in such a way that one experimental group focused on short-interval running with active interval running on Mondays, Wednesdays, and Fridays, and the other experimental group focused on long-interval running with active interval running on Tuesdays, Thursdays, and Saturdays. The training will be provided from 6 a.m. to 8 a.m., as per the training timetable. On Mondays through Fridays, and Tuesdays through Saturdays, a simple random system of drawing lots selected which groups would be instructed. The experimental groups were trained three times a week for four weeks.

Administration of training schedule

The training schedules for short-interval running and long-interval running with active recovery was prepared by the investigator. The students participated in their training programme under the supervision of the investigator.

Results

T-Test

Sira: The SIRA group were tested on pre and post-test based on 50m dash for which they were given treatment on Monday, Wednesday and Friday of 300m at 6am to 8am. The Table below explains the difference between the pre and post-test and the value of t-test.

Table 1: The table below explains the difference between the pre and post-test and the value of t-test.

	Mean	Median	SD	T-Value
Pre-test	8.26	8.04	0.58	0.017
Post-test	7.98	7.9	0.339	

Since the p-value < α , H₀ is rejected. The p-value equals 0.01724, ($P(x < -2.7004) = 0.008622$).

In the above Table, based on mean, standard deviation, t value was computed that is 0.017 which is less than -2.70. This states that null hypothesis (H₀) is rejected.

Lira: The LIRA group were tested on pre and post-test based on 12min cooper run/walk test for which they were given treatment on Tuesday, Thursday and Saturday of 600m at 6am to 8am.

Table 2: The table below explains the difference between the pre and post-test and the value of t-test

	Mean	Median	SD	T-Value
Pre-Test	2163.33	2100	297.88	0.0004
Post-Test	2300	2250	261.86	

Since the p-value < α , H₀ is rejected. The p-value equals 0.0004319, (P(x<4.5758) = 0.9998)

In the above Table, based on mean, standard deviation, t value was computed that is 0.0004 which is less than -4.57. This states that null hypothesis (H₀) is rejected.

Conclusion

There is a significant difference in Short interval running and Long Interval running with active recovery was instrumental in bringing about a significant improvement in the anaerobic capacity and aerobic capacity respectively. Short Interval running (300m) and long Interval running (600m) with active recovery results in statistically significant improvement in the running performances in 12 minutes cooper test and 50m dash.

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