

## THE COMPARATIVE STUDY OF ANAEROBIC CAPACITY IN TRAINED AND UNTRAINED SUBJECTS

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### ABSTRACT

**Aim:** To evaluate anaerobic capacity in trained and untrained subjects

**Methods and Materials:** In the present study 40 healthy male subjects were selected between the age group 20-22 years. Average Weight is 65 kg  $\pm$ 2. Average height is 167 cm  $\pm$ 2. One group is not having any regular specific physical exercise and the second group which includes subjects who regularly do the cycling for 30 minutes all days in a week since 6 months. Subjects attended the physiology department daily between 8-8.30 am without breakfast. The subjects were asked to warm up by peddling the bicycle ergo meter for 2-4 minutes. Next the subjects were asked to rest for 3-5 minutes. Then the subjects were peddled the bicycle ergo meter all-out as fast as they can without any resistance applied to the fly wheel once the subjects reaches full speed now we have applied predetermined resistance to the fly wheel, subjects are peddled the bicycle ergo meter with full speed for 30 seconds. An electrical counter records the number of fly wheel revolutions for 30 seconds.

AC = Force x Distance<sup>4</sup>

**Results:** P value of AC is 0.001

**Conclusion:** AC is higher in trained subjects than in untrained subjects.

**Keywords:** Anaerobic capacity (AC), Bicycle ergo meter (Martin)

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### 1. INTRODUCTION

Worldwide man's life style is changed radically with the advances in science and technology in the past two decades. All the sections of people are affected with more of sedentary life style. In most cases manual work is replaced with machinery.

There are so many research works which shows that lack of physical exercise contributes to occurrence of many diseases<sup>4</sup>. Several sports programmes are being prescribed for the people to overcome these diseases.

Now the reason why we have chosen cycling is its cost effective high productive simple, easily available to the common man. Anaerobic capacity is mainly place a big role in sprinters and its capacity can be increased in normal individuals also by regular cycling<sup>5</sup>.

Anaerobic capacity is the capacity produced without consumption of oxygen by the muscles. Sprinting and other high energy outputs like jumping and attacking are

powered by the ATP-Phosphocreatinine energy system (anaerobic system).

Phosphocreatinine system is exhausted even before the body utilises stored glucose. When glucose is used as fuel in the absence of oxygen lactic acid is produced. When acid build up becomes debilitating anaerobic capacity stops and ATP-Phosphocreatinine stores refreshes<sup>2</sup>.

### 2. MATERIALS

Bicycle Ergo meter (Martin) which is having a bicycle frame that is supported by a wooden stand from the front of which two uprights ascend and carry a desk and cross piece and they provide for the attachment of the tension balance and other piece of apparatus.

It is also having a cost iron wheel with circumference 158cm or 1.58 m. It is also having spring balance which can adjust the resistance. It is also having an electrical counter which can record the number of revolution of the wheel per specific time.

Subjects; the present study was carried in physiology department of Sri Venkateshwara Institute of Medical Sciences Thirupathi after permission from medical ethical committee of the institute. 40 healthy volunteers were selected between the age group of 20-22 years. Height is 167cm±2. Weight is 65kg±2.

Height and weight were measured without shoes and with minimal clothes to the nearest 0.5cm and 0.1kg respectively before the test.

One group includes 20 subjects who were students of BPT course in the institute not doing any specific exercise. Second group includes 20 subjects who were doing daily cycling for 30 minutes for all days in a week since 6 months.

Exclusion criteria; alcoholics, smoking, diabetes, handicapped, cardiovascular and pulmonary diseases.

**2.1 Method:** The subjects were attended the physiology lab at morning hours between 8-8.30 AM. Prior to the study each subject was informed in detail about the objectives of the study. The subjects are instructed about procedure and test.

The subjects were asked to warm up by peddling the bicycle ergo meter for 2-4

minutes. Next the subjects were asked to rest for 3-5 minutes.

Then the subjects were peddled the bicycle ergo meter all-out as fast as they can without any resistance applied to the fly wheel once the subjects reaches full speed now we have applied predetermined resistance to the fly wheel, subjects are peddled the bicycle ergo meter with full speed for 30 seconds.

Fly wheel resistance is equivalent to 0.075 kg per kg body mass of the subject. For 65 kg weight persons the fly wheel resistance is equals to 4.875 kg (0.075 X 65).

Predetermined resistance is equivalent to 0.1 kg per kg body mass of the subject. An electrical counter records the number of fly wheel revolutions for 30 seconds.

Total distance of peddling bicycle is calculated by multiplying the wheel circumference with number of revolutions per 30 seconds.

$$AC = \text{Force} \times \text{total distance}^4$$

**2.2 Statistics:** Obtained data was analysed statistically by Student's t- test. The P value less than 0.05 are considered significant.

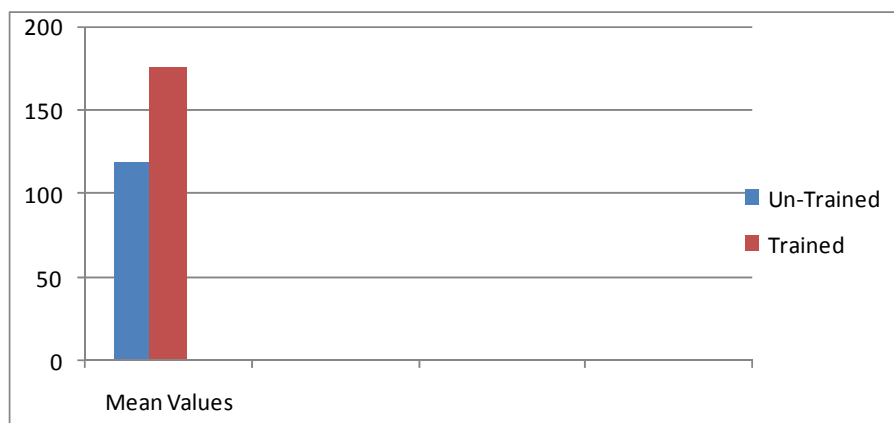
### 3. RESULTS

The p value is 0.001 which is highly significant.

**Table – 1 The mean values of anaerobic capacity in un-trained & trained subjects**

Variables	Number	Un-trained	Trained
Mean	20	118.5385	174.8695
Std. Deviation	20	25.02437	37.40783
Std. Error Mean	20	5.59562	8.36464

**Graph – 1 The mean values of anaerobic capacity in un-trained and trained subjects**



#### 4. DISCUSSION & CONCLUSION

Trained subjects peddled bicycle ergo meter for longer distance i.e., more number of revolutions in 30 seconds than untrained subjects when we applied same resistance to both the groups. And this is because trained subjects are having more skeletal muscle mass so the ATP-phosphocreatinine stores are also more in trained subjects than in untrained subjects.

After consumption of stored ATP muscle will extract the energy for contraction from the stored ATP-phosphocreatinine when the muscle is contracting anaerobically<sup>3</sup>.

As ATP-phosphocreatinine levels are more in trained subjects because of more muscle mass they peddled the bicycle ergo metre for longer distance.

Cycling is a rhythmic exercise and can make it anaerobic exercise in nature by asking the subject to peddle the bicycle ergo meter all-out as fast as he can peddle it for shorter durations with application of predetermined resistance.

By doing regular cycling there will be hypertrophy of the muscles which are involved in cycling.

These hypertrophied muscles will have more ATP-phosphocreatinine stores and this is why anaerobic capacity of trained subject's is more than that of the untrained subject's<sup>1</sup>.

#### REFERENCE

1. S Chatterjee, P Chatterjee, P.S Mukherjee, A. Bandyopadhyay British Journal of Sports Medicine 2004; 38; 289-291.
2. Scott K. Power, Edward T. Howley Exercise Physiology 3<sup>rd</sup> edition. McGraw-Hill page number 243.
3. Scott K. Power, Edward T. Howley Exercise Physiology 3<sup>rd</sup> edition. McGraw-Hill page number 382.
4. W.D. McArdle, F.I. Katch, V.L Katch, Exercise Physiology 5<sup>th</sup> edition; Lippincott Williams and Wilkins; Energy, nutrition and human performance page no 228 and 245
5. Withers R.T, Roberts R.G.D, Davies GJ The maximum aerobic power, anaerobic power and body composition of south Australian male representatives in athletics, basketball, field hockey and soccer. Journal of Sports Medicine 1977; 17; 391-400.