# Effect of Treadmill Training and Physical Training on Selected Physical Physiological and Bio Chemical Variables among College Students

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**Abstract:** *The purpose of this study was find out the effect of Treadmill training and Physical training on selected physical physiological and bio-chemical variables among college men students. The forty five subjects were randomly selected from Agricultural Engineering College and Research Institute, kumulur, Trichy Dist. Tamil Nadu, during the academic year 2018 - 2019. The subject's age ranged between 17-23 years only. They were randomly divided into three equal groups. Treadmill training group and Physical Training group were considered as two experimental groups and the other group was control groups. The subjects on selected variables such as speed, Resting heart Rate, Blood Sugar. Analysis of co-variance statistical Technique was used to test. The scheffe's post hoc was used to determine the significance of the period mean difference. Physical training group and treadmill training group had significantly improved speed and significantly reduced, resting heart rate and blood sugar of the college men students compared to control group. Treadmill training group had better improvement compared to physical training group on speed, resting heart rate and blood sugar. There was no significant difference between Physical training and treadmill training groups on speed and blood sugar.*

**Keywords:** Treadmill, Speed, Resting heart rate and Blood Sugar

## 1. Introduction

Physical activity is any bodily movement produced by skeletal muscles; such movement results in an expenditure of energy. Physical activity is a critical component of energy balance, a term used to describe how weight, diet, and physical activity influence health, including cancer risk. (**Slattery, ML, 2004**).Physical fitness is the very basis of our daily life. It is the development of a body to a state or conditions which permits the performance of a given amount of physical effort. The efficiency of physical effort depends upon the mutual development of the muscular, respiratory and circulatory system and co-ordinates with the activity of central nervous system which leads to top class performance in games and sports. Exercise has a number of effects that benefit the heart and circulation. These benefits include improving cholesterol and fat levels, reducing inflammation in the arteries, helping weight loss programs, and helping to keep blood vessels flexible and open. Studies continue to show that physical activity and avoiding high-fat foods are the two most successful means of reaching and maintaining heart-healthy levels of fitness and weight (**Brown WJ et al, 2007**).

Physical activity is an important component of your treatment plan. It's also important to have a healthy meal plan and maintain your blood glucose level through medications or insulin, if necessary. If you stay fit and active throughout your life, you'll be able to better control your diabetes and keep your blood glucose level in the correct range. Controlling your blood glucose level is essential to prevent long-term complications, such as nerve pain and kidney disease. Exercise has so many benefits, but the biggest one is that it makes it easier to control your blood glucose (blood sugar) level. In either case, exercise can reduce the glucose in your blood. Muscles can use glucose without insulin when you're exercising. In other words, it doesn't matter if you're insulin resistant or if you don't have enough insulin: when you exercise, your muscles get the glucose they need, and in turn, your blood glucose level goes down. If you're insulin resistant, exercise actually makes your insulin more effective. Your insulin resistance goes down when you exercise, and your cells can use the glucose more effectively. Exercise can also help people with blood sugar avoid long-term complications, especially heart problems. People with diabetes are susceptible to developing blocked arteries, which can lead to a heart attack. Exercise helps keep your heart healthy and strong. Plus, exercise helps you maintain good cholesterol and that helps you avoid arteriosclerosis.

## 2. Methodology

The purpose of this study was to find out the effect of Treadmill training and Physical training on selected physical physiological and bio-chemical variables among college men students. The Forty five subjects were randomly selected from Agricultural Engineering College and Research Institute, kumulur, Trichy Dist, Tamil Nadu, during the academic year 2018 - 2019. The subject's age ranged between 17-23 years only. They were randomly divided into three equal groups. Treadmill training group and Physical Training group were considered as two experimental groups and the other group was control group. All the subjects were healthy and physically fit. The nature and importance of the study was explained to the subjects and subjects expressed their willingness to serve as subjects in this study. The study was formulated as pre and post test random group design. The Pretest was conducted for all the subjects on selected variables such as Speed, Resting heart Rate, Blood Sugar. The experimental groups participated in their respective Treadmill training and Physical Training for a period of 12 weeks. The post test was conducted on the above said dependent variables after a period of 12 weeks in

the respective treatments. The training Program was scheduled from 6.30 am to 8.00 am on alternative three days in progression. During this period the subjects were not allowed to participate in any training.

**Dependent Variables**
1) Speed,
2) Resting Pulse Rate
3) Blood Sugar

**Independent Variables**
Experimental group I **-**      Treadmill Training group
Experimental group II **-**     Physical Training group
Control group**-**   No Any other Training

**Tools used for the study**

| Sl. No | Criterion Variables | Test Items | Unit of measurements |
|---|---|---|---|
| 1. | Speed | 50 mts run | Seconds |
| 2. | Resting pulse rate | Stethoscope | Beats per minutes |
| 3. | Blood sugar | Blood Test | Mg/dl |

**Training Programme**
The Treadmill and Physical training Programmes ware developed after consulting various experienced coaches and sports training experts. The Training was given three days in a week and the duration of the period was twelve weeks. The training program began with low volume and progressively increased in volume and intensity until the completion of the study. The physical training workout was 3 days per week. This includes Warm up, stretching, at least ten minutes and Cool down, stretching, at least ten minutes.

**Statistical Analysis**
Analysis of co-variance (ANCOVA) statistical Technique was used to test adjusted post-test means difference among the experimental groups. If the adjusted post rest result was significant the scheffe's post hoc was used to determine the significance of the period mean difference **(Clarke. H Harrison and divid. H.Clarke).**

# 3. Results

The analysis of covariance on speed of the pre and post test scores of control group, Treadmill Training group and Physical Training Group have been analyzed and presented in Table I.

**Table I:** Analysis of Covariance on Speed of Control Group, Treadmill Training Group and Physical Training Groups

| | Treadmill training group | Physical training group | Control group | Source of Variance | Sum of Squares | Df | Mean Squares | 'F' Ratio |
|---|---|---|---|---|---|---|---|---|
| Pre test | 7.00 | 7.00 | 7.01 | B | 0.44 | 2 | 0.022 | 0.318 |
| | | | | W | 2.933 | 42 | 0.070 | |
| Post test | 6.33 | 6.67 | 7.07 | B | 4.04 | 2 | 2.02 | 11.17* |
| | | | | W | 7.600 | 42 | 0.181 | |
| Adjusted Post test | 6.34 | 6.67 | 7.05 | B | 3.76 | 2 | 1.882 | 10.56* |
| | | | | W | 7.303 | 41 | 0.178 | |

* Significant at 0.05.
(The table values required for significance at 0.05 level of confidence for 2 and 42, 2 and 41 are 3.22 and 3.23)

The Table -1 shows the analyzed data on speed performance of accessed through 50 meters run test. Pre test means of speed for control group, physical training group and treadmill training group were 7.01, 7.00 and 7.00 respectively. The obtained F ratio 0.318 was less than the required table value of 3.22. Hence the pre test was not significant. The post test means for control group, physical training group and treadmill training groups were, 7.07, 6.67 and 6.33 respectively. The obtained F ratio was 11.17 was greater than the required table value of 3.22.

Hence the post test was significant at 0.05 level of confidence for the degrees of freedom 2 and 42.The adjusted post test means for control group, physical training group and treadmill training group were 7.05, 6.67, and 6.34 respectively. The obtained F ratio 10.56 was greater than the required table value of 3.23. Hence it was significant at 0.05 level of confidence for the degrees of freedom 2 and 41.
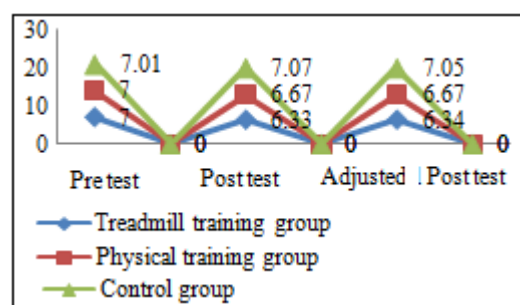


**Figure 1:** Liner Diagram on Speed of Control Group, Treadmill Training Group and Physical Training Groups

**Table II:** Analysis of Covariance on Resting Heart Rate of Control Group, Treadmill Training Group and Physical Training Groups

| | Treadmill training group | Physical training group | Control group | Source of Variance | Sum of Squares | Df | Mean Squares | 'F' Ratio |
|---|---|---|---|---|---|---|---|---|
| Pre test | 71.67 | 71.53 | 72.33 | B | 5.511 | 2 | 2.756 | 0.621 |
| | | | | W | 186.400 | 42 | 4.438 | |
| Post test | 63.13 | 67.20 | 72.67 | B | 686.533 | 2 | 343.267 | 45.99* |
| | | | | W | 313.467 | 42 | 7.463 | |
| Adjusted Post test | 63.28 | 67.47 | 72.24 | B | 591.197 | 2 | 295.599 | 70.00* |
| | | | | W | 173.136 | 41 | 4.223 | |

* **Significant at .05 level of confidence.** (The table values required for significance at 0.05 level of confidence for 2 and 42, 2 and 41 are 3.22 and 3.23)

The Table -II shows the analyzed data on resting heart rate. The Pre test means of control group, physical training group and treadmill training group were 72.33, 71.53 and 71.67 respectively. The obtained F ratio 0.621 was less than the required table value of 3.22. Hence the pre test was not significant. The post test means for control group, physical training group and treadmill training groups were, 72.67, 67.20 and 63.13 respectively. The obtained F ratio was 45.99 was greater than the required table value of 3.22.Hence the post test was significant at 0.05 level of confidence for the degrees of freedom 2 and 42.The adjusted post test means for control group, physical training group and treadmill training group were 72.24, 67.47, and 63.28 respectively. The obtained F ratio 70.00 was greater than the required table value of 3.23. Hence it was significant at 0.05 level of confidence for the degrees of freedom 2 and 41.
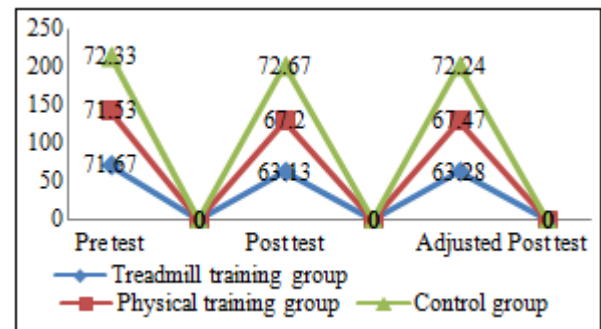


**Figure 2:** Liner Diagram on Resting Heart Rate of Control Group, Treadmill Training Group and Physical Training Groups

**Table III:** Analysis of Covariance on Blood Sugar of Control Group, Treadmill Training Group and Physical Training Groups

|  | Treadmill training group | Physical training group | Control group | Source of Variance | Sum of Squares | Df | Mean Squares | 'F' Ratio |
|---|---|---|---|---|---|---|---|---|
| Pre test | 111.67 | 117.33 | 111.47 | B | 332.844 | 2 | 166.422 | 0.770 |
|  |  |  |  | W | 9082.400 | 42 | 216.248 |  |
| Post test | 95.87 | 101.53 | 112.40 | B | 2117.733 | 2 | 1058.867 | 4.98* |
|  |  |  |  | W | 8919.067 | 42 | 212.359 |  |
| Adjusted Post test | 97.61 | 97.83 | 114.34 | B | 2735.785 | 2 | 1367.892 | 108.58* |
|  |  |  |  | W | 516.512 | 41 | 12.598 |  |

* **Significant at .05 level of confidence.** (The table values required for significance at 0.05 level of confidence for 2 and 42, 2 and 41 are 3.22 and 3.23)

The Table -III shows the analyzed data on resting heart rate. The Pre test means for control group, physical training group and treadmill training group were 111.47, 117.33 and 111.67 respectively. The obtained F ratio 0.770 was less than the required table value of 3.22. Hence the pre test was not significant. The post test means for control group, physical training group and treadmill training groups were, 112.40, 101.53 and 95.87 respectively. The obtained F ratio was 4.98 was greater than the required table value of 3.22.Hence the post test was significant at 0.05 level of confidence for the degrees of freedom 2 and 42.The adjusted post test means for control group, physical training group and treadmill training group were 114.34, 97.83 and 97.61 respectively. The obtained F ratio 108.58 was greater than the required table value of 3.23. Hence it was significant at 0.05 level of confidence for the degrees of freedom 2 and 41.
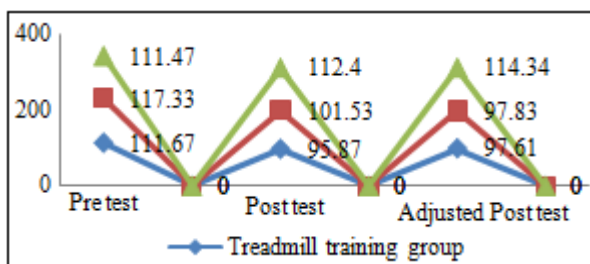


**Figure 3:** Liner Diagram on Blood Sugar of Control Group, Treadmill Training Group and Physical Training Groups

**Table IV:** Scheffe's Post - hoc Test for Mean Differences between Groups of speed, resting heart rate and blood sugar

|  | Treadmill training group | Physical training group | Control group | Mean Differences | C.I value |
|---|---|---|---|---|---|
| Speed | 6.34 | - | 7.05 | 0.71* | 0.35 |
|  | 6.34 | 6.67 | - | 0.33 |  |
|  | - | 6.67 | 7.05 | 0.38* |  |
| Resting heart rate | 63.28 | - | 72.24 | 8.96* | 1.77 |
|  | 63.28 | 67.47 | - | 4.19* |  |
|  | - | 67.47 | 72.24 | 4.77* |  |
| Blood sugar | 97.61 | - | 114.34 | 16.73* | 3.09 |
|  | 97.61 | 97.83 | - | 0.22 |  |
|  | - | 97.83 | 114.34 | 16.51* |  |

∗ Significant

Table IV shows that the speed mean difference values between control and treadmill training group , control and physical training group  0.71 and 0.38 are greater than confidence interval value 0.35.hence significance difference between groups. The means difference between Physical training group and treadmill training groups 0.33 was less than confidence interval value of 0.35. There is no significant difference between groups. The resting heart rate mean difference values between control and treadmill training group, physical training groups and treadmill training group, Physical training group and control groups were 8.96, 4.19 and 4.77 are greater than confidence interval value 1.77.There is significant difference between groups. The Blood sugar mean difference values between control and treadmill training group, control and physical training

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group 16.73 and 16.51 are greater than confidence interval value 3.09.hence significance difference between groups. The mean difference between Physical training group and treadmill training groups was 0.22 was less than confidence interval value of 3.09. There is no significant difference between groups.

## 4. Discussion on Finding

The aim of this study was to find out the effect of Treadmill training and Physical training on selected physical physiological and bio-chemical variables among college men students. Previous studies did not found in any significance difference of Treadmill training group and Physical training group on speed.

**Rajan Balakrishnan et al (2016)** compared the heart rate responses during stair climbing versus treadmill walking and determined whether the responses were of sufficient magnitude to elicit cardio respiratory training effects. The treadmill walking had equivalent effect on the heart rate with significant difference. **Deuk-Ja et al (2016)** reported this study is to investigate the effects of strenuous exercises on resting heart rate, blood pressure, and maximal oxygen uptake. As a result, there were significant differences in resting heart rate and maximal oxygen uptake.

**George Abraham and Sankaranarayanan (2012)** analyzed the impact of yoga and physical exercise on resting heart rate among diabetes patients. From the results of the study, it was found that there was a significant reduction in resting heart rate of training groups when compared to control group. **Manna I et al (2012)** the suggested training on anthropometric, physiological and biochemical variables of U-19 volleyball players The training programme is effective for improving Vo2 max and total cholesterol for volleyball players. According to **Chinnasamy (1992),** a study on effect of asanas and physical exercise on six week training showed that it had significantly reduced the pulse rate.Vo$_2$max means the individual's uppermost level of aerobic metabolism, i.e. the ability to utilize oxygen for energy during maximal physical effort. Aerobic fitness level has been strongly and positively associated with reduced disease and humanity risk, good quality of life, performance level, and functional ability **Ortega FB et al (2008), Fogelholm M (2010).Ferley et al (2014)** integrated documenting the effects of incline and level-grade interval treadmill training on indices of running economy. This study proved to treadmill training effective for improving vo$_2$ max. **Koepp and Janot JM. (2008)** conducted a study to determine differences in Vo$_2$ max and metabolic variables between treadmill running and treadmill skating. Its Vo$_2$ max is significant improvement of treadmill running. **Shivananda et al (2005)** the role of treadmill exercise on blood glucose homeostasis in non insulin dependent diabetes mellitus were studied using males between age of 45 and 60 years. The means decrease in blood sugar for the control group. He said the treadmill training group and physical training group reduced resting heart rate and blood sugar level on the post test compared to the control group. The above researcher's findings strongly recommend that treadmill training group and physical training group of resting heart rate and blood sugar level on college students.

The current study resulting in resting heart rate and blood sugar among treadmill training group and physical training group of college students due to the effect of twelve weeks of training programme showed significant improvement. Overall the main finding of this study is that treadmill training group and physical training group shows the significant improvement on speed, resting heart rate and blood sugar among college students and the second finding of this study states that while comparing the two different training protocols due to the effect of 12 week of training, treadmill training group was better improved than physical training on resting heart rate of college students, there is no significant difference between treadmill training group and treadmill training group on speed and blood sugar due to the effect of 12 week of training programme.

## 5. Conclusions

Physical training group and Treadmill training group had significantly improved speed and significantly reduced, resting heart rate and blood sugar of the college men students compared to control group. Treadmill training group had better improvement compared to physical training group on speed, resting heart rate and blood sugar. There was no significant difference between Physical training and treadmill training groups on speed and blood sugar.

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