# EFFECT OF CONTINUOUS TRAINING AND INTERVAL TRAINING ON SELECTED PHYSIOLOGICAL VARIABLES AMONG DELHI UNIVERSITY COLLEGE MEN STUDENTS

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## ABSTRACT

The aim of this study was to finding out the effect of Continuous Training and Interval training on Resting pulse rate, Vital capacity and VO2 Max among university college men students. To achieve the purpose of the study (n=45) Delhi university college men students were selected as subject at random from the Delhi University College, Delhi, India. The age ranged of the subject is between 18 to 25 years. The subject was divided into three group namely experimental group I, experimental group II, and Control group III. Experimental group I underwent to Continuous training, experimental group II underwent to Interval training and group III act as a control group they did not participate in any of the training programme other than their regular activates. The following physiological variables were assessed by using standard test. Resting Pulse Rate measured by Digital Heart Rate Measuring Machine, Model No. EW 243 unit of measurement beats per minute, Vital Capacity measured by Spirometer unit of measurement milliliters and $VO_2$ Max measured by Astrand-Rhyming Nomogram Test unit of measurement ml/kg/min. The data was collected from three groups' pre and post of the experimental period. The raw data on Resting pulse rate, Vital capacity and VO2 Max was statistically analyzed by using Analysis of Covariance (ANCOVA). Scheffe's post hoc test was applied to determine the significant differences between the paired adjusted means. In all the cases 0.05 level of significance was fixed. The result of the study showed that there was as significantly improvement was found in Resting pulse rate, Vital capacity and VO2 Max among the experimental group when compared with control group.

**Keywords:** Continuous Training, Interval Training, Resting Pulse Rate, Vital Capacity and VO2 Max.

## INTRODUCTION

Continuous training as the name implies, involves continuous activity, without rest intervals. This has varied from high intensity, Continuous activity of moderate duration to low-intensity activity of an extended duration, i.e. long, slow distance training is probably the most widely used from of endurance conditioning for jogger who want to stay in condition for health-related purpose, the athlete who participate in team sports and endurance trains for general condition, and the athlete who wants to maintain his endurance condition during the off-season (Ajmer Singh, 2003). One of the biggest benefits of a continuous exercise plan is slow but steady improvement most athletes see over time. Someone who may only be able to jog for eight minutes at the start may find, after enough weeks or months have passed, jogging for 12 minutes is achievable. Before long, 20 or even 30 minutes may become normal. Usually at least three or four workouts per week are required to see improvement (Lamina, 2011).

The key to success in interval training is utilizing the proper intensity of exercise followed by a rest interval (Fox & Mathews, 1974). The rest interval prevents accumulation of fatigue products permitting more intensive workouts with the additional pain of fatigue. The theoretical metabolic profile for exercise and rest intervals stressing anaerobic metabolism, fast glycolysis and phosphogen system is based on the knowledge of which energy systems predominate during exercise and time 9 of substrate recovery. By choosing appropriate exercise intensities, exercise duration and rest interval, the appropriate energy systems can be trained (Baechle, 1994). Interval training is a series of repeated bouts of exercise alternated with period of lighter work or rest (Gray Kumar. 2002).

### Experimental Design & Methodology

To achieve the purpose of the presented study, forty five men students were selected randomly (simple random sample) from the Delhi University College, Delhi, India. Their age ranged between 18 to 25 years. The selected subject was divided into three group namely experimental group I, experimental group II, and Control group III. Experimental group I underwent to Continuous training, experimental group II underwent to Interval training and

group III act as a control group they did not participate in any of the training programme other than their regular activates. The following physiological variables were assessed by using standard test. Resting Pulse Rate measured by Digital Heart Rate Measuring Machine, Model No. EW 243 unit of measurement beats per minute, Vital Capacity measured by Spirometer unit of measurement milliliters and $VO_2$ Max measured by Astrand-Rhyming Nomogram Test unit of measurement ml/kg/min. Training was given for twelve weeks and alternative days in a week. The data was collected from four groups' pre and post of the experimental period and raw data was statistically analyzed by using Analysis of Covariance (ANCOVA). Scheffe's post hoc test was applied to determine the significant differences between the paired adjusted means. In all the cases 0.05 level of significance was fixed.

**Data Analysis & Results**

**TABLE – I**

**ANALYSIS OF COVARIANCE OF DATA ON RESTING PULSE RATE BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP**

| Test | CTG | ITG | CG | SOV | SS | Df | MS | F-ratio |
|---|---|---|---|---|---|---|---|---|
| **Pre-test** | | | | | | | | |
| **Mean** | 81.13 | 80.87 | 81.20 | **B.M** | 0.93 | 2 | 0.467 | 0.05 |
| **SD(±)** | 4.12 | 4.62 | 4.78 | **W.G** | 413.87 | 42 | 9.85 | |
| **Post-test** | | | | | | | | |
| **Mean** | 70.20 | 69.93 | 78.47 | **B.M** | 706.13 | 2 | 353.07 | 23.13* |
| **SD(±)** | 2.13 | 3.21 | 4.11 | **W.G** | 641.07 | 42 | 15.26 | |
| **Adjusted post-test** | | | | | | | | |
| **Mean** | 70.18 | 69.98 | 78.43 | **B.S** | 696.61 | 2 | 348.30 | 23.26* |
| | | | | **W.S** | 613.884 | 41 | 14.97 | |

* Significant at 0.05 level of confidence

(The table value required for significant at 0.05 level with df 2 and 42 & 2 and 41 are 3.22 and 3.23 respectively)

**CTG**-Continuous Training group **ITG** – Interval Training Group **CG** –Control Group **SOV** – Sum of variance, **SS** - Sum of Squares **df** – degrees of freedom **MS** - Mean Square **B.M** –Between means **W.G** – Within groups **B.S** – Between sets **W.S** – Within sets

The post-test mean values on continuous training group, interval training group and control groups are 70.20, 69.93 and 78.47 respectively. The obtained 'F' ratio 23.13 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on resting pulse rate. The adjusted post-test means of continuous training group, interval training group and control groups and control groups are 70.18, 69.98 and 78.43 respectively. The obtained 'F' ratio of 23.26 for adjusted post-test means was greater than the table value of 3.23 for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on resting pulse rate.

The result of the study showed that there was significant difference among Continuous training group (CTG), Interval training group (ITG) and control groups (CG) on resting pulse rate. Since the three groups were involved the Scheffe's post hoc test was applied to find out the paired mean differences if any, and it is presented in table II.

**TABLE-II**

**SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF RESTING PULSE RATE**

| Interval Training Group | Continuous Training Group | Control group | MD | CI |
|---|---|---|---|---|
| - | 70.18 | 78.43 | **8.25*** | 3.52 |
| 69.98 | - | 78.43 | **8.45*** | |
| 69.98 | 70.18 | - | **0.20** | |

* Significant at 0.05 level of confidence

Table II shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 69.98, 70.18 and 78.43 respectively which are greater than the confidence interval value 3.52 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group

& control group, interval training group & continuous training group on resting pulse rate. From that it can be clearly noticed that continuous training group responded to the training with more positive influences of resting pulse rate when compared with the interval training group and control group. The interval training group responded better when compared with the control group.

**Figure 1: Bar diagram showing the pre, post and adjusted post test means values of Continuous training group (CTG), Interval training group (ITG) and Control group (CG) on Resting Pulse Rate.**

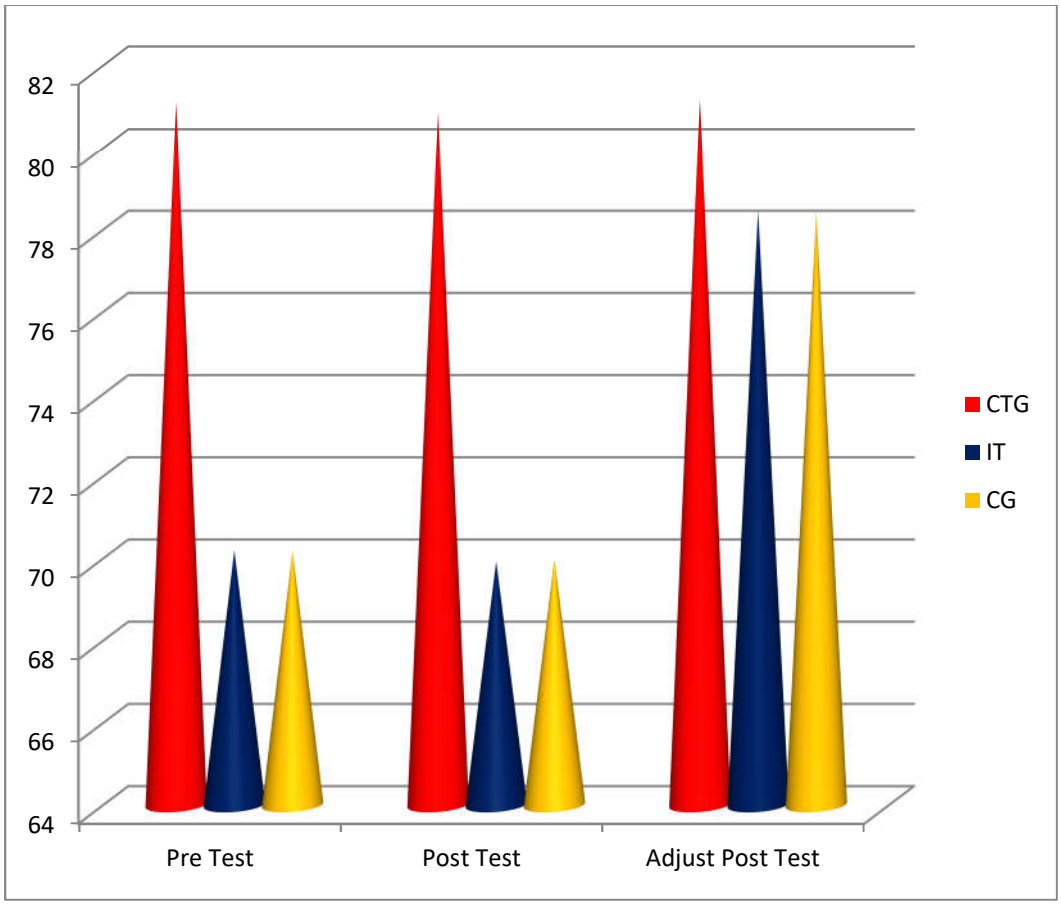


**TABLE – III**

**ANALYSIS OF COVARIANCE OF DATA ON VITAL CAPACITY BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP**

| Test | CTG | ITG | CG | SOV | SS | Df | MS | F-ratio |
|---|---|---|---|---|---|---|---|---|
| **Pre-test** | | | | | | | | |
| **Mean** | 3230 | 3233.3 | 3266.67 | **B.M** | 12333.33 | 2 | 6166.66 | 0.07 |
| **SD(±)** | 32.97 | 33.56 | 38.95 | **W.G** | 3670666.7 | 42 | 87396.83 | |
| **Post-test** | | | | | | | | |
| **Mean** | 3846.66 | 3813.3 | 3280 | **B.M** | 3033333.3 | 2 | 1516666.6 | 12.81* |
| **SD(±)** | 27.34 | 31.45 | 36.87 | **W.G** | 4973666.6 | 42 | 118420.63 | |
| **Adjusted post-test** | | | | | | | | |
| **Mean** | 3858.16 | 3821.9 | 3259.88 | **B.S** | 3364588.2 | 2 | 1682294.1 | 30.72* |
| | | | | **W.S** | 2244960.7 | 41 | 54755.14 | |

* Significant at 0.05 level of confidence

(The table value required for significant at 0.05 level with df 2 and 42 & 2 and 41 are 3.22 and 3.23 respectively)

Table III shows that the pre-test mean values on continuous training group, interval training group and control groups are 3230, 3233.30 and 3266.67 respectively. The obtained 'F' ratio 0.07 for pre-test scores was less than the table value, 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on vital capacity. The post-test mean values on continuous training group, interval training group and control groups are 3846.66, 3813.3 and 3280 respectively. The obtained 'F' ratio 12.81 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on vital capacity. The adjusted post-test means of continuous training group, interval training group and control groups and control groups are 3858.16, 3821.9 and 3259.88 respectively. The obtained 'F' ratio of 30.72 for adjusted post-test means was greater than the table value of 3.23

for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on vital capacity.

The result of the study indicates that there was a significant difference among the adjusted post-test means of continuous training group, interval training group and control groups and control group on vital capacity. Since the three groups were involved the Scheffe's post hoc test was applied to find out the paired mean differences if any, and it is presented in table IV.

**TABLE-IV**

**SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF VITAL CAPACITY**

| Interval Training Group | Continuous Training Group | Control group | MD | CI |
|---|---|---|---|---|
| - | 3858.16 | 3259.88 | 598.28* | 212.75 |
| 3821.96 | - | 3259.88 | 562.07* | |
| 3821.96 | 3858.16 | - | 36.21 | |

* Significant at 0.05 level of confidence

The table IV shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 3821.96, 3858.16 and 3259.88 respectively which are greater than the confidence interval value 212.75 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group & control group, interval training group & continuous training group on vital capacity.

From that it can be clearly noticed that continuous training group responded to the training with more positive influences of vital capacity when compared with the interval training group and control group. The interval training group responded better when compared with the control group.

**Figure 2: Bar diagram showing the pre, post and adjusted post test means values of Continuous training group (CTG), Interval training group (ITG) and Control group (CG) on Vital Capacity.**

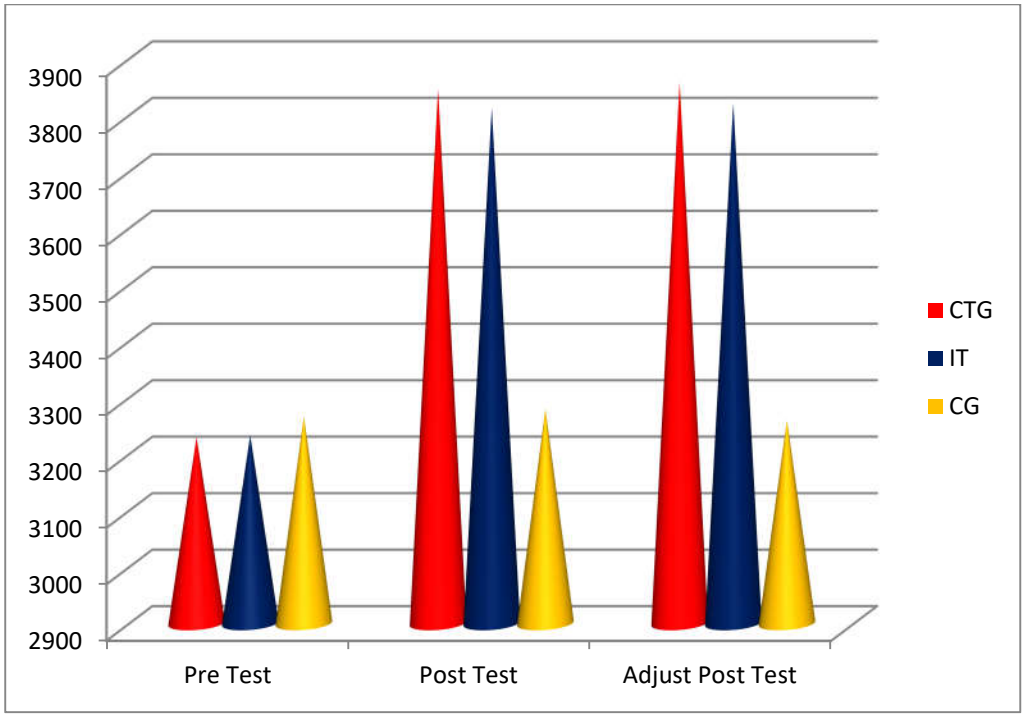



**TABLE – V**

**ANALYSIS OF COVARIANCE OF DATA ON VO2 MAX BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP**

| Test | CTG | ITG | CG | SOV | SS | Df | MS | F-ratio |
|---|---|---|---|---|---|---|---|---|
| **Pre-test** | | | | | | | | |
| **Mean** | 47.61 | 47.88 | 46.77 | **B.M** | 9.02 | 2 | 0.467 | 0.29 |
| **SD(±)** | 3.78 | 3.81 | 4.21 | **W.G** | 662.45 | 42 | 9.85 | |
| **Post-test** | | | | | | | | |
| **Mean** | 52.88 | 51.97 | 46.82 | **B.M** | 320.31 | 2 | 353.07 | 9.07* |
| **SD(±)** | 2.62 | 2.30 | 3.81 | **W.G** | 741.63 | 42 | 15.26 | |

| Adjusted post-test | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mean** | 52.69 | 51.60 | 47.38 | **B.S** | 233.42 | 2 | 348.30 | 22.69* |
| | | | | **W.S** | 210.87 | 41 | 14.97 | |

* Significant at 0.05 level of confidence

(The table value required for significant at 0.05 level with df 2 and 42 & 2 and 41 are 3.22 and 3.23 respectively)

Table V shows that the pre-test mean values on continuous training group, interval training group and control groups are 47.61, 47.80 and 46.77 respectively. The obtained 'F' ratio 0.29 for pre-test scores was less than the table value, 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on $VO_2$ max. The post-test mean values on continuous training group, interval training group and control groups are 52.88, 51.97 and 46.82 respectively. The obtained 'F' ratio 9.07 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on $VO_2$ max. The adjusted post-test means of continuous training group, interval training group and control groups and control groups are 52.69, 51.60 and 47.38 respectively. The obtained 'F' ratio of 22.69 for adjusted post-test means was greater than the table value of 3.23 for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on $VO_2$ max.

The result of the study indicates that there was a significant difference among the adjusted post-test means of continuous training group, interval training group and control groups and control group on $VO_2$ max. Since the three groups were involved the Scheffe's post hoc test was applied to find out the paired mean differences if any, and it is presented in table VI.

**TABLE-VI**

**SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF $VO_2$ MAX**

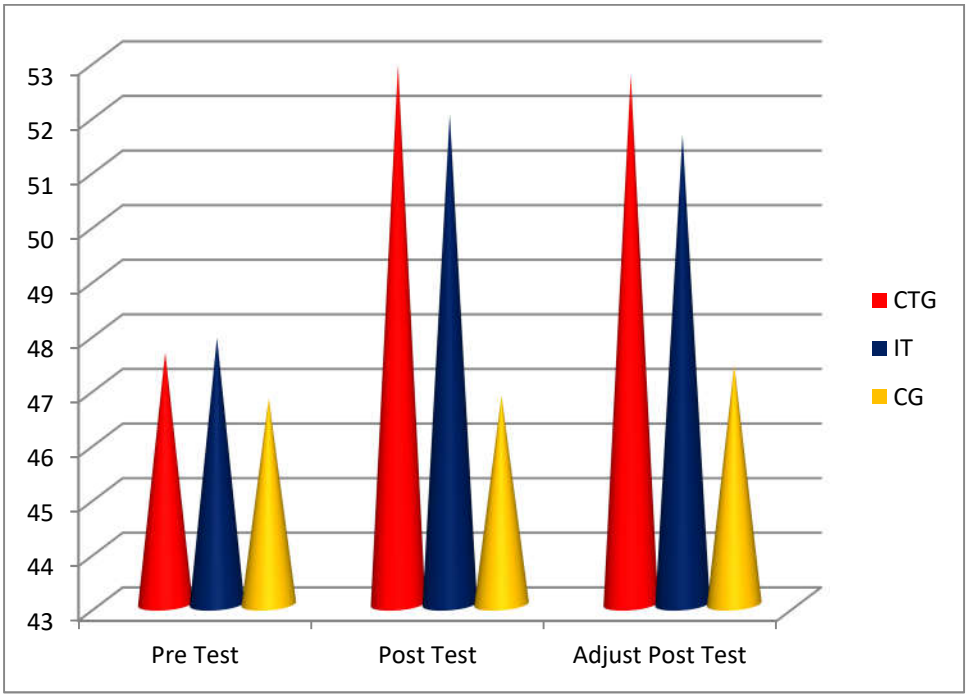
| Interval Training Group | Continuous Training Group | Control group | MD | CI |
|---|---|---|---|---|
| - | 52.69 | 47.38 | 5.31* | 2.06 |
| 51.60 | - | 47.38 | 4.22* | |

| | | | | |
|---|---|---|---|---|
| 51.60 | 52.69 | - | 1.09 | |

The table VI shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 51.60, 52.69 and 47.38 respectively which are greater than the confidence interval value 2.06 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group & control group, interval training group & continuous training group on $VO_2$ max.

From that it can be clearly noticed that continuous training group responded to the training with more positive influences of $VO_2$ max when compared with the interval training group and control group. The interval training group responded better when compared with the control group.

**Figure 3: Bar diagram showing the pre, post and adjusted post test means values of Continuous training group (CTG), Interval training group (ITG) and Control group (CG) on $VO_2$ max.**



## Conclusion

The experimental group college men students showed significant improvement on selected physiological variables such as resting pulse rate, vital capacity and $VO_2$ max due to the effect of twelve weeks continuous training and interval training. The control group college men students did not show significant improvement in any of selected variables.

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