# CHAPTER IV

# RESULTS AND DISCUSSIONS

## 4.1 OVERVIEW

The purpose of this study was to find out the isolated and combined effect of physical training and psychotonic training on selected physical fitness, physiological and psychological variables among college men students. To achieve the purpose of this study the investigator randomly selected 120 college men from different colleges in Vellore. The age group of the subjects were between 19 to 25 years. In order to ensure the full cooperation from the subjects, the scholar had a meeting with them and explained the purpose of the study. It was made clear by explanation in order to ascertain that there was no ambiguity among the players regarding the effort, which they had to put in for the successful completion of this investigation.

The research scholar reviewed the various scientific literature pertaining to the physical training and psychotonic training on selected physical fitness, physiological and psychological variables from books, journals, periodicals, magazines and research papers. Taking into consideration of feasibility criteria, availability of instruments and the relevance of the variables of the present study, the following dependent variables were selected.

**Physical Fitness Variables**

1. Speed

2. Agility

3. Cardiovascular Endurance

**Physiological Variables**

4. Resting Pulse Rate

5. Mean Arterial Blood Pressure

6. Vital Capacity

**Psychological Variables**

1. Self Concept

2. Achievement Motivation

3. Anxiety

Random group design was used for this study. Randomly selected 120 college men students were divided into four groups, namely, physical training group (PG), psychotonic training group (PTG), combined training group (CTG) and control group (CG). Initial levels of the subjects on their physical fitness, physiological and psychological variables were determined using standard tests. The experimental groups were given the respective treatments, namely, physical exercise, psychotonic and combined training for a period of twelve weeks. The control group was not given any treatment. After the experimental period, final scores of the subjects were collected on selected physical fitness, physiological and psychological variables of the subjects. The difference between the initial and final scores was the effect of experimental

treatment. ANCOVA was used to test the statistical significance. In all cases 0.05 level was be fixed to test the hypothesis.

**4.2 TEST OF SIGNIFICANCE**

This is the vital portion of thesis achieving the conclusion by examining the hypotheses. The procedure of testing the hypotheses was either by accepting the hypotheses or rejecting the same in accordance with the results obtained in relation to the level of confidence. The test was usually called the test of significance since the scholar tested whether the differences within many groups scores were significant or not. In this study, if the obtained F-value were greater than the table value, the hypotheses were accepted to the effect that there existed significant difference among the means of the groups compared and if the obtained values were lesser than the required values, then the null hypotheses were accepted to the effect that there existed no significant differences among the means of the groups under study.

**4.2.1  LEVEL OF SIGNIFICANCE**

The subjects were compared on the effect of isolated and combined physical fitness and psychotonic training on selected physical, physiological and psychological variables among college men students. The differences between means of initial and final scores on selected criterion variables, speed, agility, cardiovascular endurance, resting pulse rate, mean arterial blood pressure and vital capacity and psychological variables self concept,

achievement motivation and anxiety were subjected to statistical treatment using analysis of covariance (ANCOVA). In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

### 4.3 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST HOC TEST

### 4.3.1 RESULTS ON SPEED

The statistical analysis comparing the initial and final means of Speed due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table V

**Table V**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON SPEED**

| | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 7.15 | 7.15 | 7.12 | 7.08 | B | 0.11 | 3 | 0.04 | 1.19 |
| Std Dev | 0.19 | 0.19 | 0.17 | 0.13 | W | 3.47 | 116 | 0.03 | |
| Post Test Mean | 7.03 | 6.96 | 6.85 | 7.06 | B | 0.81 | 3 | 0.27 | 10.61* |
| Std Dev | 0.15 | 0.19 | 0.17 | 0.13 | W | 2.97 | 116 | 0.03 | |
| Adjusted Post Test Mean | 7.02 | 6.95 | 6.85 | 7.08 | B | 0.85 | 3 | 0.28 | 12.26* |
| | | | | | W | 2.67 | 115 | 0.02 | |

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05), (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table V, the pre test mean on Speed of physical training group was 7.15 with standard deviation $\pm$ 0.19 pre test mean of psychotonic training group was 7.15 with standard deviation $\pm$ 0.19, the pre test mean of combined group consisting of physical training and psychotonic training was 7.12 with standard deviation $\pm$ 0.17, the pre test mean of control group was 7.08 with standard deviation $\pm$ 0.13. The obtained F ratio of 1.19 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As the results presented in Table V, the post test mean on Speed of physical training group was 7.03 with standard deviation $\pm$ 0.15 post test mean of psychotonic training group was 6.96 with standard deviation $\pm$ 0.19, the post test mean of combined group consisting of physical training and psychotonic training group was 6.85 with standard deviation $\pm$ 0.19, the post test mean of control group was 7.06 with standard deviation $\pm$ 0.14. The obtained F ratio of 10.61 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Speed on physical training group was 7.02, psychotonic training group was 6.95, combined training group was 6.85 and control group was 7.08. The obtained F value on adjusted means was 12.26. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Speed of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table VI

**Table VI**

**Multiple Comparisons between Physical Training, Psychotonic,
Combined and Control Groups  and Scheffe's Post Hoc
Analysis on Speed**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 7.02 | 6.95 | | | 0.07 | 0.11 |
| 7.02 | | 6.85 | | 0.17* | 0.11 |
| 7.02 | | | 7.08 | 0.06 | 0.11 |
| | 6.95 | 6.85 | | 0.10 | 0.11 |
| | 6.95 | | 7.08 | 0.13* | 0.11 |
| | | 6.85 | 7.08 | 0.23* | 0.11 |

 * Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.11. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Combined Training Group (MD: 0.17)

Psychotonic Training Group Vs Control Group (MD: 0.13)

Combined Group Vs Control Group (MD: 0.23)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

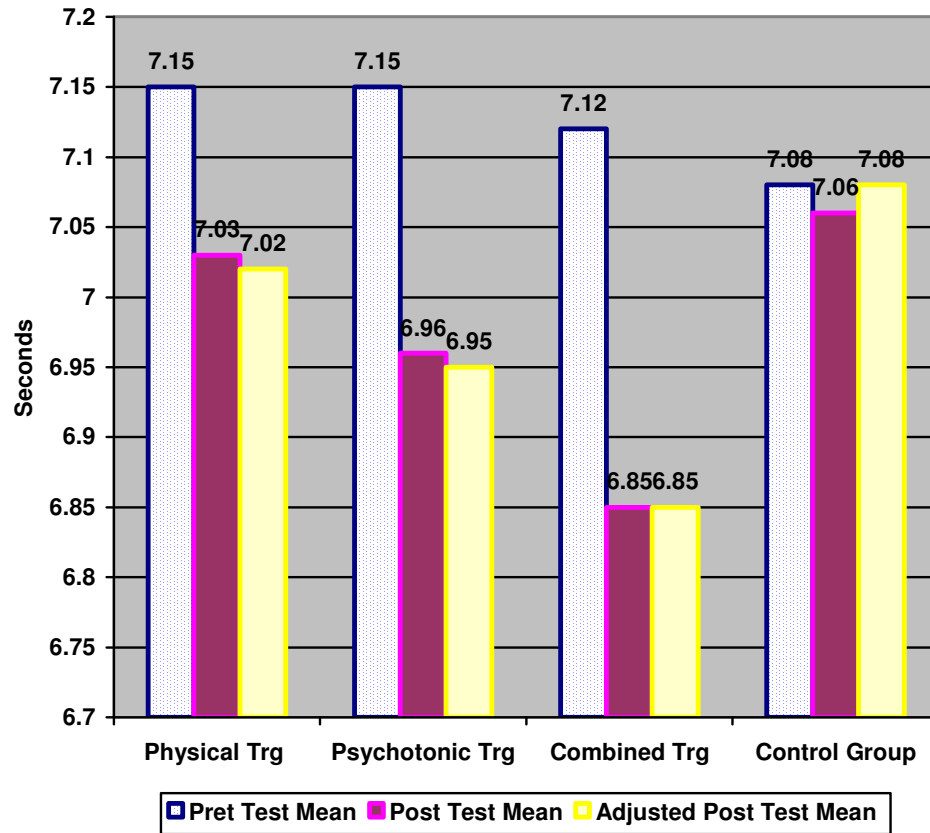Physical Training Group Vs Psychotonic Training Group (MD: 0.07)

Physical Training Group  Vs Control Group (MD: 0.06)

Psychotonic Training Group Vs Combined Training Group (MD: 0.10)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure I.

**Figure I**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON SPEED**

## 4.3.2 RESULTS ON AGILITY

The statistical analysis comparing the initial and final means of Agility due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table VII

**Table VII**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON AGILITY**

| | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 10.85 | 10.87 | 10.66 | 10.95 | B | 0.90 | 3 | 0.30 | 1.60 |
| Std Dev | 0.44 | 0.46 | 0.39 | 0.45 | W | 14.35 | 116 | 0.19 | |
| Post Test Mean | 10.22 | 10.24 | 9.97 | 10.95 | B | 9.92 | 3 | 3.31 | 23.61* |
| Std Dev | 0.30 | 0.46 | 0.39 | 0.45 | W | 10.65 | 116 | 0.14 | |
| Adjusted Post Test Mean | 10.21 | 10.23 | 10.03 | 10.87 | B | 7.73 | 3 | 2.58 | 23.00* |
| | | | | | W | 8.40 | 115 | 0.11 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence.

As shown in Table VII, the pre test mean on Agility of physical training group was 10.85 with standard deviation $\pm$ 0.44 pre test mean of psychotonic training group was 10.87 with standard deviation $\pm$ 0.46, the pre test mean of combined group consisting of physical training and psychotonic training was 10.66 with standard deviation $\pm$ 0.39, the pre test mean of control group was 10.95 with standard deviation $\pm$ 0.45. The obtained F ratio of 1.60

on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As the results presented in Table VII, the post test mean on Agility of physical training group was 10.22 with standard deviation $\pm$ 0.30 post test mean of psychotonic training group was 10.24 with standard deviation $\pm$ 0.46, the post test mean of combined group consisting of physical training and psychotonic training group was 9.97 with standard deviation $\pm$ 0.46, the post test mean of control group was 10.95 with standard deviation $\pm$ 0.41. The obtained F ratio of 23.61 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Agility on physical training group was 10.21, psychotonic training group was 10.23, combined training group was 10.03 and control group was 10.87. The obtained F value on adjusted means was 23.00. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Agility of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table VIII

**Table VIII**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups and Scheffe's Post Hoc Analysis on Agility**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 10.21 | 10.23 | | | 0.01 | 0.30 |
| 10.21 | | 10.03 | | 0.18 | 0.30 |
| 10.21 | | | 10.87 | 0.65* | 0.30 |
| | 10.23 | 10.03 | | 0.19 | 0.30 |
| | 10.23 | | 10.87 | 0.64* | 0.30 |
| | | 10.03 | 10.87 | 0.84* | 0.30 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.30. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group  Vs Control Group (MD: 0.65)

Psychotonic Training Group Vs Control Group (MD: 0.64)

Combined Group Vs Control Group (MD: 0.84)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.
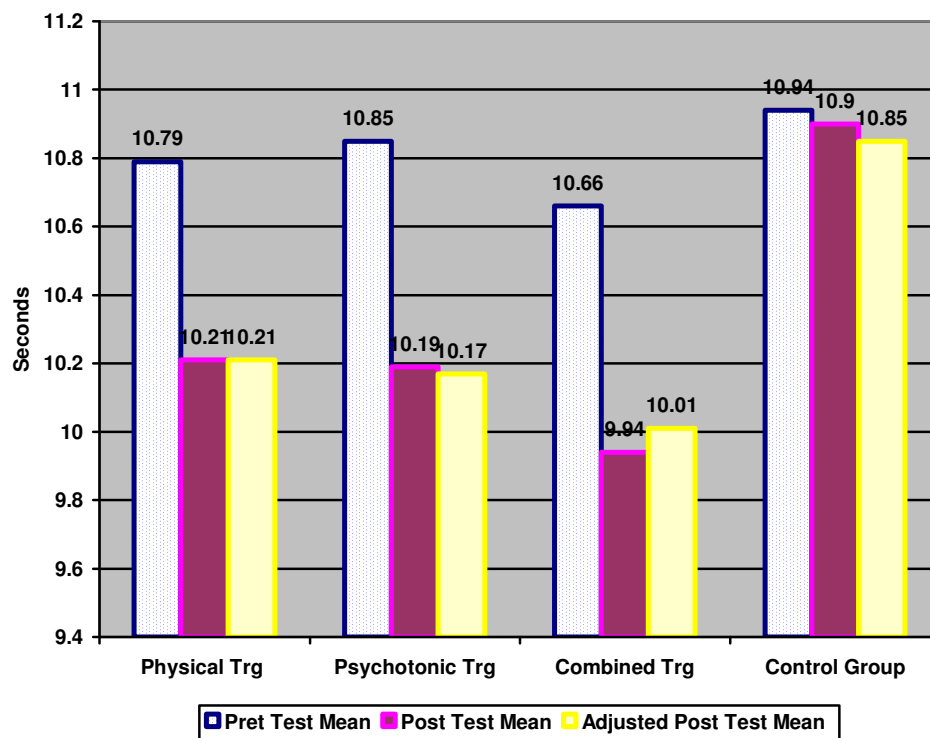
Physical Training Group Vs Psychotonic Training Group (MD: 0.01)
Physical Training Group Vs Combined Training Group (MD: 0.18)
Psychotonic Training Group Vs Combined Training Group (MD: 0.19)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure II.

**Figure II**
**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON AGILITY**

### 4.3.3 RESULTS ON CARDIOVASCULAR ENDURANCE

The statistical analysis comparing the initial and final means of Cardiovascular Endurance due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table IX

**Table IX**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON CARDIOVASCULAR ENDURANCE**

|  | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 2085.17 | 2088.00 | 2095.67 | 2135.33 | B | 48807.29 | 3 | 16269.10 | 1.12 |
| Std Dev | 73.15 | 82.09 | 108.93 | 184.12 | W | 1677887.50 | 116 | 14464.55 | |
| Post Test Mean | 2254.33 | 2276.00 | 2258.33 | 2163.67 | B | 229489.17 | 3 | 76496.39 | 5.21* |
| Std Dev | 56.49 | 86.73 | 108.93 | 184.12 | W | 1704370.00 | 116 | 14692.84 | |
| Adjusted Post Test Mean | 2267.96 | 2287.20 | 2262.95 | 2134.23 | B | 429201.98 | 3 | 143067.33 | 35.17* |
| | | | | | W | 467869.37 | 115 | 4068.43 | |

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05), (df\ 3,116)} = 2.45$
* Significant at 0.05 level of confidence

As shown in Table IX, the pre test mean on Cardiovascular Endurance of physical training group was 2085.17 with standard deviation $\pm$ 73.15 pre test mean of psychotonic training group was 2088.00 with standard deviation $\pm$ 82.09, the pre test mean of combined group consisting of physical training

and psychotonic training was 2095.67 with standard deviation $\pm$ 108.93, the pre test mean of control group was 2135.33 with standard deviation $\pm$ 184.12. The obtained F ratio of 1.12 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As the results presented in Table IX, the post test mean on Cardiovascular Endurance of physical training group was 2254.33 with standard deviation $\pm$ 56.49 post test mean of psychotonic training group was 2276.00 with standard deviation $\pm$ 86.73, the post test mean of combined group consisting of physical training and psychotonic training group was 2258.33 with standard deviation $\pm$ 86.73, the post test mean of control group was 2163.67 with standard deviation $\pm$ 164.91. The obtained F ratio of 5.21 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Cardiovascular Endurance on physical training group was 2267.96,  psychotonic training group was 2287.20, combined training group was 2262.95 and control group was 2134.23. The obtained F

value on adjusted means was 35.17. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Cardiovascular Endurance of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table X

**Table X**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups  and Scheffe's Post Hoc Analysis on Cardiovascular Endurance**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 2267.96 | 2287.20 | | | 19.23 | 47.04 |
| 2267.96 | | 2262.95 | | 5.01 | 47.04 |
| 2267.96 | | | 2134.23 | 133.73* | 47.04 |
| | 2287.20 | 2262.95 | | 24.25 | 47.04 |
| | 2287.20 | | 2134.23 | 152.97* | 47.04 |
| | | 2262.95 | 2134.23 | 128.72* | 47.04 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was

47.04. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group  Vs Control Group (MD: 133.73)

Psychotonic Training Group Vs Control Group (MD: 152.97)

Combined Group Vs Control Group (MD: 128.72)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

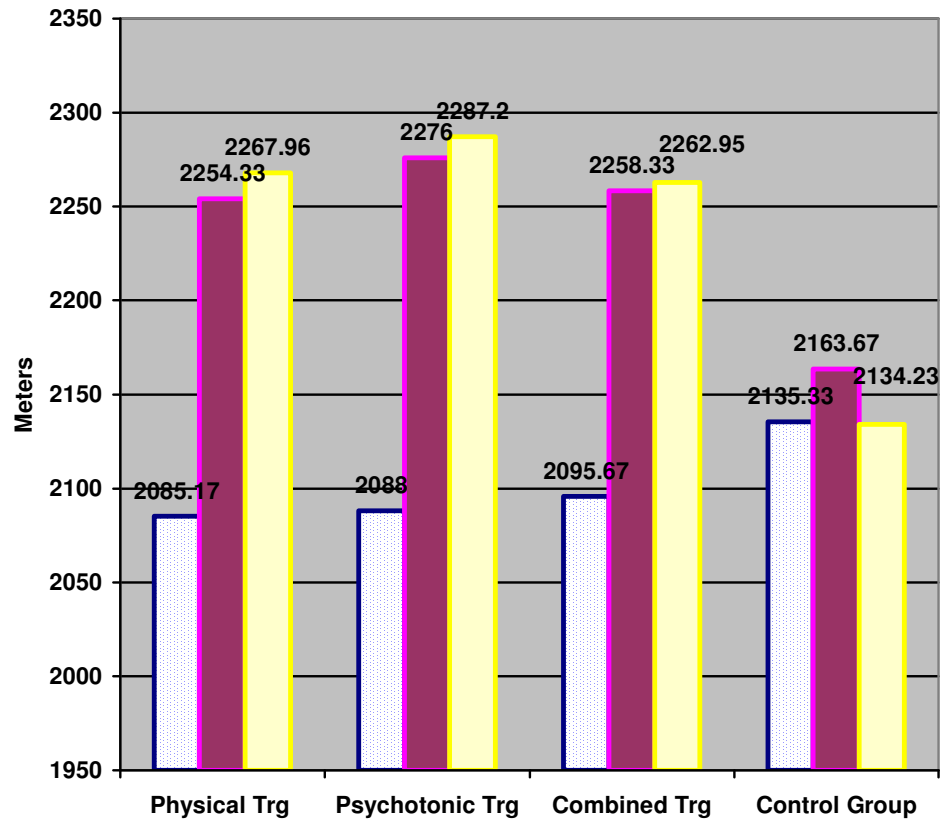Physical Training Group Vs Psychotonic Training Group (MD: 19.23)

Physical Training Group Vs Combined Training Group (MD: 5.01)

Psychotonic Training Group Vs Combined Training Group (MD: 24.25)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure III.

**Figure III**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON CARDIOVASCULAR ENDURANCE**

#### 4.3.4 RESULTS ON RESTING PULSE RATE

The statistical analysis comparing the initial and final means of Resting Pulse Rate due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XI

**Table XI**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON RESTING PULSE RATE**

| | Physical Training Group | Psychotonic Training Group | Com- bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 72.40 | 73.13 | 72.83 | 73.33 | B | 14.82 | 3 | 4.94 | 1.26 |
| Std Dev | 2.21 | 1.59 | 2.23 | 1.81 | W | 453.50 | 116 | 3.91 | |
| Post Test Mean | 70.70 | 70.23 | 69.47 | 73.03 | B | 212.49 | 3 | 70.83 | 17.33* |
| Std Dev | 1.29 | 2.34 | 2.23 | 1.81 | W | 474.10 | 116 | 4.09 | |
| Adjusted Post Test Mean | 70.75 | 70.21 | 69.48 | 72.99 | B | 205.17 | 3 | 68.39 | 16.75* |
| | | | | | W | 469.50 | 115 | 4.08 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XI, the pre test mean on Resting Pulse Rate of physical training group was 72.40  with standard deviation $\pm$ 2.21 pre test mean of psychotonic training group was 73.13 with standard deviation $\pm$ 1.59, the pre test mean of combined group consisting of physical training and psychotonic training was 72.83 with standard deviation $\pm$ 2.23, the pre test mean of control group was 73.33 with standard deviation $\pm$ 1.81. The

obtained F ratio of 1.26 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As the results presented in Table XI, the post test mean on Resting Pulse Rate of physical training group was 70.70 with standard deviation $\pm$ 1.29 post test mean of psychotonic training group was 70.23 with standard deviation $\pm$ 2.34, the post test mean of combined group consisting of physical training and psychotonic training group was 69.47 with standard deviation $\pm$ 2.34, the post test mean of control group was 73.03 with standard deviation $\pm$ 2.06. The obtained F ratio of 17.33 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Resting Pulse Rate on physical training group was 70.75, psychotonic training group was 70.21, combined training group was 69.48 and control group was 72.99. The obtained F value on adjusted means was 16.75. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Resting Pulse Rate of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Schaffer's Confidence Interval test. The results were presented in Table XII

**Table XII**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups and Schaffer's Post Hoc Analysis on Resting Pulse Rate**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 70.75 | 70.21 | | | 0.54 | 1.49 |
| 70.75 | | 69.48 | | 1.28 | 1.49 |
| 70.75 | | | 72.99 | 2.24* | 1.49 |
| | 70.21 | 69.48 | | 0.74 | 1.49 |
| | 70.21 | | 72.99 | 2.78* | 1.49 |
| | | 69.48 | 72.99 | 3.52* | 1.49 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 1.49. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Control Group (MD: 2.24)

Psychotonic Training Group Vs Control Group (MD: 2.78)

Combined Group Vs Control Group (MD: 3.52)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.
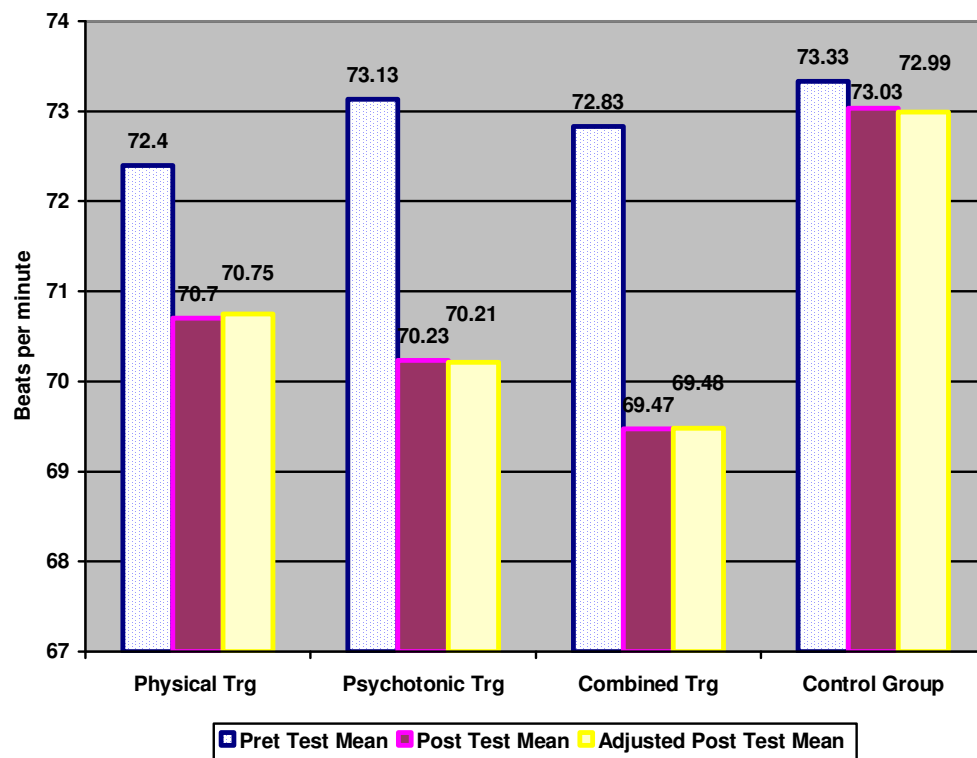
Physical Training Group Vs Psychotonic Training Group (MD: 0.54)

Physical Training Group Vs Combined Training Group (MD: 1.28)

Psychotonic Training Group Vs Combined Training Group (MD: 0.74)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure IV.

**Figure IV**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON RESTING PULSE RATE**

### 4.3.5 RESULTS ON MEAN ARTERIAL BLOOD PRESSURE

The statistical analysis comparing the initial and final means of Mean Arterial Blood Pressure due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XIII

**Table XIII**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON MEAN ARTERIAL BLOOD PRESSURE**

| | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 98.40 | 93.43 | 95.20 | 94.22 | B | 428 | 3 | 143 | 6.72* |
| Std Dev | 2.48 | 5.27 | 4.98 | 5.13 | W | 2463 | 116 | 21 | |
| Post Test Mean | 97.85 | 98.03 | 97.48 | 94.33 | B | 273 | 3 | 91 | 9.35* |
| Std Dev | 2.30 | 2.47 | 4.98 | 5.13 | W | 1131 | 116 | 10 | |
| Adjusted Post Test Mean | 96.48 | 98.87 | 97.53 | 94.82 | B | 261 | 3 | 87 | 15.55* |
| | | | | | W | 643 | 115 | 6 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XIII, the pre test mean on Mean Arterial Blood Pressure of physical training group was 98.40  with standard deviation $\pm$ 2.48 pre test mean of psychotonic training group was 93.43 with standard deviation $\pm$  5.27, the pre test mean of combined group consisting of physical training

and psychotonic training was 95.20 with standard deviation $\pm$ 4.98, the pre test mean of control group was 94.22 with standard deviation $\pm$ 5.13. The obtained F ratio of 6.72 on pre test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups at initial stage.

As the results presented in Table XIII, the post test mean on Mean Arterial Blood Pressure of physical training group was 97.85 with standard deviation $\pm$ 2.30 post test mean of psychotonic training group was 98.03 with standard deviation $\pm$ 2.47, the post test mean of combined group consisting of physical training and psychotonic training group was 97.48 with standard deviation $\pm$ 2.47, the post test mean of control group was 94.33 with standard deviation $\pm$ 4.58. The obtained F ratio of 9.35 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Mean Arterial Blood Pressure on physical training group was 96.48, psychotonic training group was 98.87, combined training group was 97.53 and control group was 94.82. The obtained F value

on adjusted means was 15.55. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Mean Arterial Blood Pressure of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XIV

**Table XIV**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups  and Scheffe's Post Hoc Analysis on Mean Arterial Blood Pressure**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 96.48 | 98.87 | | | 2.39* | 1.74 |
| 96.48 | | 97.53 | | 1.06 | 1.74 |
| 96.48 | | | 94.82 | 1.66 | 1.74 |
| | 98.87 | 97.53 | | 1.34 | 1.74 |
| | 98.87 | | 94.82 | 4.05* | 1.74 |
| | | 97.53 | 94.82 | 2.71* | 1.74 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was

1.74. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Psychotonic Training Group (MD: 2.39)

Psychotonic Training Group Vs Control Group (MD: 4.05)

Combined Group Vs Control Group (MD: 2.71)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

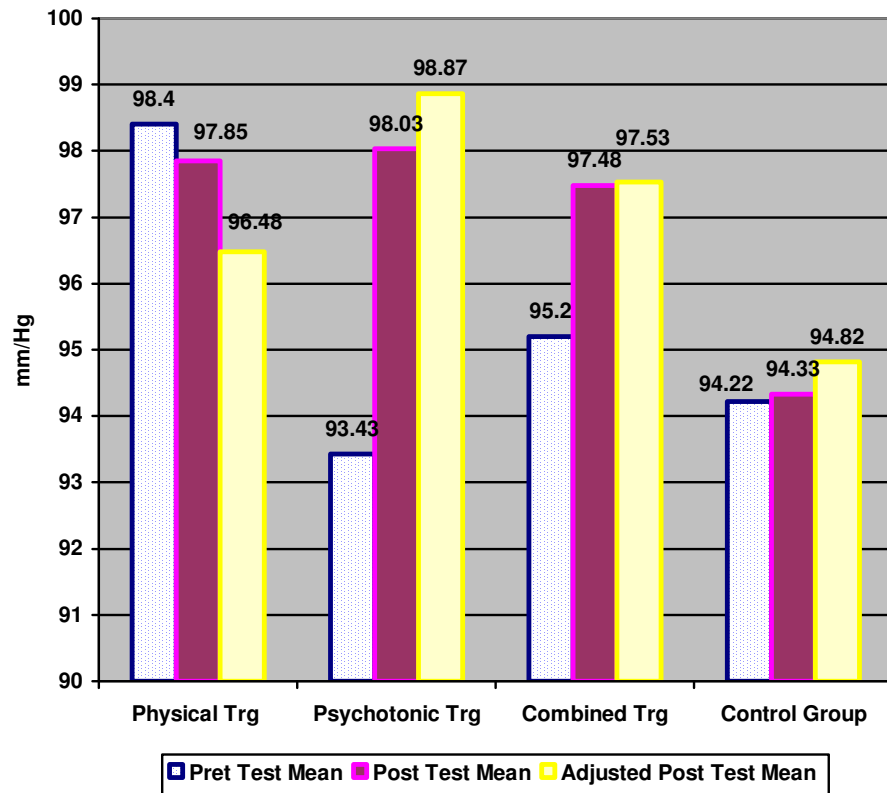Physical Training Group Vs Combined Training Group (MD: 1.06)

Physical Training Group  Vs Control Group (MD: 1.66)

Psychotonic Training Group Vs Combined Training Group (MD: 1.34)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure V.

**Figure V**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON
MEAN ARTERIAL BLOOD PRESSURE**

### 4.3.6 RESULTS ON VITAL CAPACITY

The statistical analysis comparing the initial and final means of Vital Capacity due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XV

**Table XV**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON VITAL CAPACITY**

| | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 3716.67 | 3606.67 | 3411.67 | 3576.67 | B | 1431562.50 | 3 | 477187.50 | 2.01 |
| Std Dev | 447.47 | 583.50 | 470.45 | 435.24 | W | 27592416.67 | 116 | 237865.66 | |
| Post Test Mean | 3791.67 | 3769.17 | 3607.50 | 3630.00 | B | 799270.83 | 3 | 266423.61 | 1.19 |
| Std Dev | 414.62 | 577.21 | 470.45 | 435.24 | W | 26049458.33 | 116 | 224564.30 | |
| Adjusted Post Test Mean | 3661.44 | 3742.18 | 3763.54 | 3631.17 | B | 354568.48 | 3 | 118189.49 | 7.80* |
| | | | | | W | 1742839.73 | 115 | 15155.13 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XV, the pre test mean on Vital Capacity of physical training group was 3716.67  with standard deviation $\pm$ 447.47 pre test mean of psychotonic training group was 3606.67 with standard deviation $\pm$  583.50, the pre test mean of combined group consisting of physical training and psychotonic training was 3411.67 with standard deviation $\pm$  470.45, the pre

test mean of control group was 3576.67 with standard deviation $\pm$ 435.24. The obtained F ratio of 2.01 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As per the results presented in Table XV, the post test mean on Vital Capacity of physical training group was 3791.67 with standard deviation $\pm$ 414.62 post test mean of psychotonic training group was 3769.17 with standard deviation $\pm$ 577.21, the post test mean of combined group consisting of physical training and psychotonic training group was 3607.50 with standard deviation $\pm$ 577.21, the post test mean of control group was 3630.00 with standard deviation $\pm$ 391.42. The obtained F ratio of 1.19 on post test means of the groups was significant at 0.05 level as the obtained F value was lesser than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Vital Capacity on physical training group was 3661.44, psychotonic training group was 3742.18, combined training group was 3763.54 and control group was 3631.17. The obtained F value on adjusted means was 7.80. The obtained F value was greater than the required value of

2.45 and hence it was accepted that there was significant differences among the adjusted means on the Vital Capacity of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XVI

**Table XVI**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups and Scheffe's Post Hoc Analysis on Vital Capacity**

| Physical Training Group | Psychotonic Training Group | Com- bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 3661.44 | 3742.18 | | | 80.74 | 90.80 |
| 3661.44 | | 3763.54 | | 102.10* | 90.80 |
| 3661.44 | | | 3631.17 | 30.27 | 90.80 |
| | 3742.18 | 3763.54 | | 21.35 | 90.80 |
| | 3742.18 | | 3631.17 | 111.01* | 90.80 |
| | | 3763.54 | 3631.17 | 132.36* | 90.80 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 90.80. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Combined Training Group (MD: -102.10)

Psychotonic Training Group Vs Control Group (MD: 111.01)

Combined Group Vs Control Group (MD: 132.36)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.
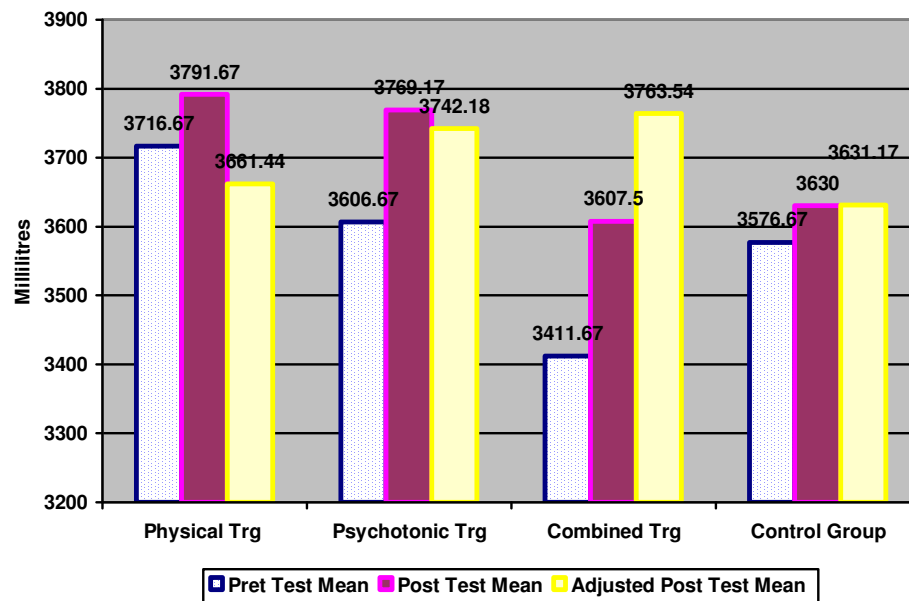
Physical Training Group Vs Psychotonic Training Group (MD: -80.74)

Physical Training Group  Vs Control Group (MD: 30.27)

Psychotonic Training Group Vs Combined Training Group (MD: -21.35)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure VI.

**Figure VI**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON VITAL CAPACITY**

### 4.3.7   RESULTS ON SELF CONCEPT

The statistical analysis comparing the initial and final means of Self Concept due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XVII

**Table XVII**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON SELF CONCEPT**

|  | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 48.50 | 49.87 | 50.63 | 49.70 | B | 70 | 3 | 23 | 0.43 |
| Std Dev | 5.41 | 8.46 | 9.25 | 5.74 | W | 6362 | 116 | 55 | |
| Post Test Mean | 51.50 | 53.23 | 54.57 | 51.17 | B | 226 | 3 | 75 | 1.67 |
| Std Dev | 5.41 | 7.49 | 9.25 | 5.74 | W | 5222 | 116 | 45 | |
| Adjusted Post Test Mean | 52.55 | 53.06 | 53.71 | 51.14 | B | 107 | 3 | 36 | 21.77* |
| | | | | | W | 189 | 115 | 2 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XVII, the pre test mean on Self Concept of physical training group was 48.50  with standard deviation $\pm$ 5.41 pre test mean of psychotonic training group was 49.87 with standard deviation $\pm$  8.46, the pre test mean of combined group consisting of physical training and psychotonic training was 50.63 with standard deviation $\pm$  9.25, the pre test mean of control group was 49.70 with standard deviation $\pm$  5.74. The obtained F ratio of 0.43

on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As the results presented in Table XVII, the post test mean on Self Concept of physical training group was 51.50 with standard deviation $\pm$ 5.41 post test mean of psychotonic training group was 53.23 with standard deviation $\pm$ 7.49, the post test mean of combined group consisting of physical training and psychotonic training group was 54.57 with standard deviation $\pm$ 7.49, the post test mean of control group was 51.17 with standard deviation $\pm$ 5.84. The obtained F ratio of 1.67 on post test means of the groups was insignificant at 0.05 level as the obtained F value was lesser than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Self Concept on physical training group was 52.55, psychotonic training group was 53.06, combined training group was 53.71 and control group was 51.14. The obtained F value on adjusted means was 21.77. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Self Concept of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XVIII

**Table XVIII**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups  and Scheffe's Post Hoc Analysis on Self Concept**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 52.55 | 53.06 | | | 0.52 | 0.94 |
| 52.55 | | 53.71 | | 1.17* | 0.94 |
| 52.55 | | | 51.14 | 1.40* | 0.94 |
| | 53.06 | 53.71 | | 0.65 | 0.94 |
| | 53.06 | | 51.14 | 1.92* | 0.94 |
| | | 53.71 | 51.14 | 2.57* | 0.94 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.94. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Combined Training Group (MD: 1.17)

Physical Training Group  Vs Control Group (MD: 1.40)

Psychotonic Training Group Vs Control Group (MD: 1.92)

Combined Group Vs Control Group (MD: 2.57)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Physical Training Group Vs Psychotonic Training Group (MD: 0.52)

Psychotonic Training Group Vs Combined Training Group (MD: 0.65)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure VII.

**Figure VII**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON SELF CONCEPT**
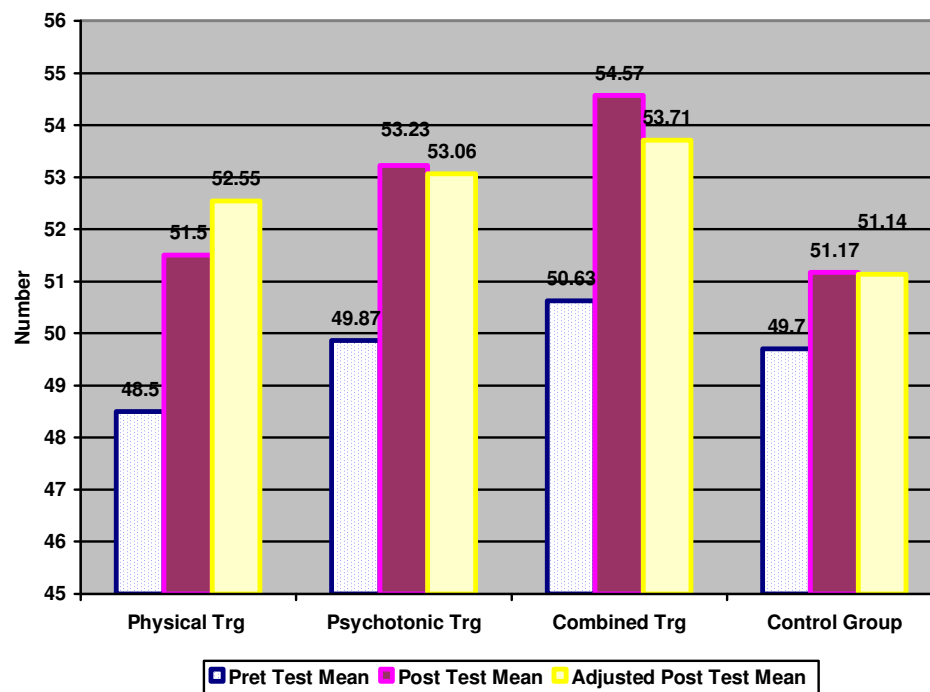
### 4.3.8   RESULTS ON ACHIEVEMENT MOTIVATION

The statistical analysis comparing the initial and final means of Achievement Motivation due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XIX

**Table XIX**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON ACHIEVEMENT MOTIVATION**

|  | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 24.00 | 24.27 | 22.27 | 22.20 | B | 109.43 | 3 | 36.48 | 1.33 |
| Std Dev | 3.79 | 4.98 | 5.77 | 6.11 | W | 3182.53 | 116 | 27.44 |  |
| Post Test Mean | 27.47 | 27.27 | 24.67 | 22.60 | B | 482.80 | 3 | 160.93 | 6.24* |
| Std Dev | 3.71 | 5.16 | 5.77 | 6.11 | W | 2991.20 | 116 | 25.79 |  |
| Adjusted Post Test Mean | 26.69 | 26.24 | 25.54 | 23.53 | B | 171.05 | 3 | 57.02 | 56.50* |
|  |  |  |  |  | W | 116.06 | 115 | 1.01 |  |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05), (df 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XIX, the pre test mean on Achievement Motivation of physical training group was 24.00  with standard deviation $\pm$ 3.79 pre test mean of psychotonic training group was 24.27 with standard deviation $\pm$  4.98, the pre test mean of combined group consisting of physical training and

psychotonic training was 22.27 with standard deviation $\pm$ 5.77, the pre test mean of control group was 22.20 with standard deviation $\pm$ 6.11. The obtained F ratio of 1.33 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As per the results presented in Table XIX, the post test mean on Achievement Motivation of physical training group was 27.47 with standard deviation $\pm$ 3.71 post test mean of psychotonic training group was 27.27 with standard deviation $\pm$ 5.16, the post test mean of combined group consisting of physical training and psychotonic training group was 24.67 with standard deviation $\pm$ 5.16, the post test mean of control group was 22.60 with standard deviation $\pm$ 5.73. The obtained F ratio of 6.24 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Achievement Motivation on physical training group was 26.69, psychotonic training group was 26.24, combined training group was 25.54 and control group was 23.53. The obtained F value on

adjusted means was 56.50. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Achievement Motivation of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XX

**Table XX**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups  and Scheffe's Post Hoc Analysis on Achievement Motivation**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 26.69 | 26.24 | | | 0.45 | 0.74 |
| 26.69 | | 25.54 | | 1.15* | 0.74 |
| 26.69 | | | 23.53 | 3.16* | 0.74 |
| | 26.24 | 25.54 | | 0.70 | 0.74 |
| | 26.24 | | 23.53 | 2.70* | 0.74 |
| | | 25.54 | 23.53 | 2.00* | 0.74 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.74. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Combined Training Group (MD: 1.15)

Physical Training Group  Vs Control Group (MD: 3.16)

Psychotonic Training Group Vs Control Group (MD: 2.70)

Combined Group Vs Control Group (MD: 2.00)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Physical Training Group Vs Psychotonic Training Group (MD: 0.45)

Psychotonic Training Group Vs Combined Training Group (MD: 0.70)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure VIII.

**Figure VIII**
**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON ACHIEVEMENT MOTIVATION**
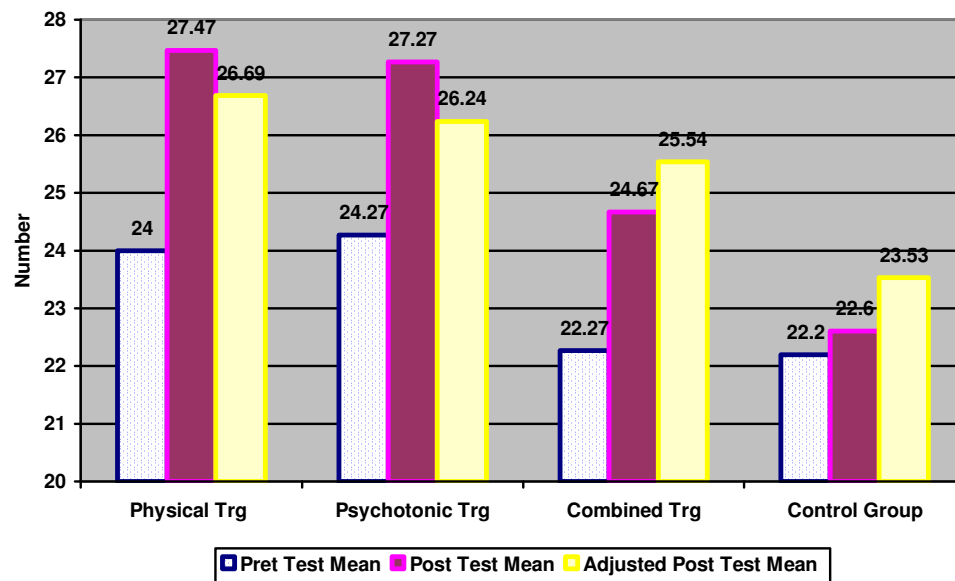
### 4.3.9   RESULTS ON ANXIETY

The statistical analysis comparing the initial and final means of Anxiety due to physical training, psychotonic training and combined training and control groups of among college men is presented in Table XXI

**Table XXI**

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO PHYSICAL TRAINING, PSYCHOTONIC TRAINING AND COMBINED TRAINING ON ANXIETY**

|  | Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | SOV | Sum of Squares | df | Mean Squares | Obtained F |
|---|---|---|---|---|---|---|---|---|---|
| Pre Test Mean | 53.83 | 55.27 | 54.07 | 55.47 | B | 61.63 | 3 | 20.54 | 0.71 |
| Std Dev | 4.72 | 4.68 | 4.17 | 7.34 | W | 3345.37 | 116 | 28.84 | |
| Post Test Mean | 51.67 | 50.83 | 51.63 | 53.43 | B | 108.42 | 3 | 36.14 | 1.82 |
| Std Dev | 2.56 | 4.44 | 4.17 | 7.34 | W | 2309.17 | 116 | 19.91 | |
| Adjusted Post Test Mean | 52.25 | 50.40 | 52.05 | 52.86 | B | 99.27 | 3 | 33.09 | 6.00* |
| | | | | | W | 633.93 | 115 | 5.51 | |

SOV: Source of Variance;  B: Between  W: Within
Required $F_{(0.05),\ (df\ 3,116)}$ =2.45
* Significant at 0.05 level of confidence

As shown in Table XXI, the pre test mean on Anxiety of physical training group was 53.83  with standard deviation $\pm$ 4.72 pre test mean of psychotonic training group was 55.27 with standard deviation $\pm$  4.68, the pre test mean of combined group consisting of physical training and psychotonic training was 54.07 with standard deviation $\pm$  4.17, the pre test mean of control group was 55.47 with standard deviation $\pm$  7.34. The obtained F ratio of 0.71

on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

As per the results presented in Table XXI, the post test mean on Anxiety of physical training group was 51.67 with standard deviation $\pm$ 2.56 post test mean of psychotonic training group was 50.83 with standard deviation $\pm$ 4.44, the post test mean of combined group consisting of physical training and psychotonic training group was 51.63 with standard deviation $\pm$ 4.44, the post test mean of control group was 53.43 with standard deviation $\pm$ 6.39. The obtained F ratio of 1.82 on post test means of the groups was significant at 0.05 level as the obtained F value was lesser than the required table F value of 2.45 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups among post test means.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Anxiety on physical training group was 52.25, psychotonic training group was 50.40, combined training group was 52.05 and control group was 52.86. The obtained F value on adjusted means was 6.00. The obtained F value was greater than the required value of 2.45 and hence it was accepted that there was significant differences among the adjusted means on the Anxiety of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XXII

**Table XXII**

**Multiple Comparisons between Physical Training, Psychotonic, Combined and Control Groups and Scheffe's Post Hoc Analysis on Anxiety**

| Physical Training Group | Psychotonic Training Group | Com-bined Group | Control Group | MEAN DIFF | C.I |
|---|---|---|---|---|---|
| 52.25 | 50.40 | | | 1.85* | 1.73 |
| 52.25 | | 52.05 | | 0.20 | 1.73 |
| 52.25 | | | 52.86 | 0.61 | 1.73 |
| | 50.40 | 52.05 | | 1.65 | 1.73 |
| | 50.40 | | 52.86 | 2.46* | 1.73 |
| | | 52.05 | 52.86 | 0.81 | 1.73 |

**\*** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 1.73. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Physical Training Group Vs Psychotonic Training Group (MD: 1.85)

Psychotonic Training Group Vs Control Group (MD: -2.46)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Physical Training Group Vs Combined Training Group (MD: 0.20)

Physical Training Group  Vs Control Group (MD: -0.61)
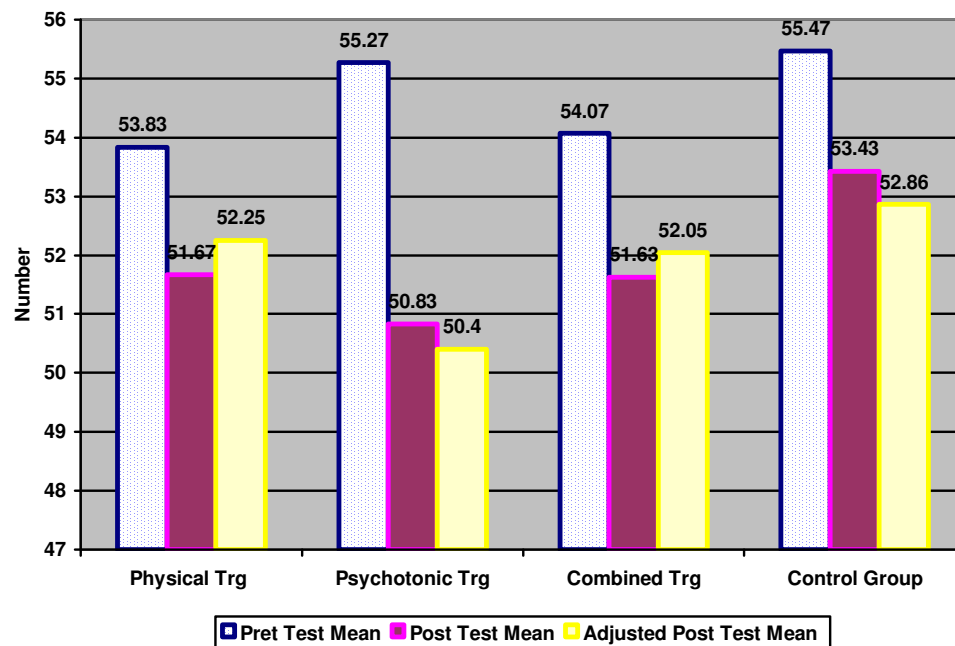
Psychotonic Training Group Vs Combined Training Group (MD: -1.65)

Combined Group Vs Control Group (MD: -0.81)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure IX.

**Figure IX**

**LINE GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON ANXIETY**

**4.4  DISCUSSIONS ON RESULTS**

Regular physical exercise enhance the function of the joints; increase the sense of physical well-being and promotes a sense of feeling good; increases physical working capacity by increasing cardio respiratory fitness, muscle strength and endurance and decreases the risk of serious diseases that could lead to early disability and death. (Hardayal Singh, 1991). Researches has proved that psychotonic training, normally known as psychological training is the most critical to improve overall playing ability in a game. Knowing when to shoot and being able to do it effectively under pressure distinguishes the great shooter from the ordinary. Regardless of how much the player practices or how well the player conditions himself through different physical training, only a modest amount of improvement is possible in speed, reflexes, or strength. And the theoretical knowledge based on different researches proved players were able to achieve greatness despite mediocre physical talent. Usually, however, such successes are due to determination. (Mohan 2005). However, there were dearth of researches that can high light whether isolated physical fitness training and psychotonic training or combined training are beneficial for the improvement of selected physical fitness variables, speed, agility and cardiovascular endurance, physiological variables resting pulse rate, mean arterial blood pressure and vital capacity and psychological variables self concept, achievement motivation and anxiety among college men students.

**4.4.1  Discussions on Physical Fitness Variables**

The results presented on speed proved that combined training consisting of physical exercises and psychotonic training significantly contributed for improving speed of the college men students comparing to control group. And combined group was significantly better than physical training group. (Table VI).  The results on agility proved that physical training, psychotonic and combined training significantly improved agility of the college men comparing to control group and there was no significant differences among treatment groups, even though combined group was considered better than physical and psychotonic training groups (Table VIII). Cardiovascular endurance of the college men students were found to be significantly improved due to physical, psychotonic and combined training compared to control group.  However, there was no significant difference among treatment groups on cardiovascular endurance (Table X).

Rhea et al. (2009), Ghigiarelli  et al. (2009) and Watt (2004) studied the effect of different physical activities such as, varied resistance training, elastic band weighted chain programme, and three strength trainings and found significant improvement in power, maximum upper body strength, explosive power and running strength.  Kraemer, et al. (2003)  and Green and Dowson (2002) found effect of periodization of resistance training can enhance strength and motor performance anaerobic power, VO2(max), speed, agility, maximal strength, jump height. Caudill et al. (1983) performed two

experiments dealing with the method of "psyching up" prior to a sprint race. Although research at the time held that psych up techniques did not improve speed, both experiments indicated that speed did improve with psych up techniques. These theoretical foundations proved that physical activities and psychotonic training can improve lower and upper body strength and power, which resulted in improvement in speed, agility and cardiovascular endurance of college men. The findings of this study are in agreement with these previous researches.

### 4.4.2 Discussions on Physiological variables

The results presented on resting pulse rate proved that isolated and combined training consisting of physical exercises and psychotonic training significantly contributed for stabilizing resting pulse rate of the college men students compared to control group. And there was no significant difference between treatment groups, namely, isolated and combined groups (Table XII). The results on agility proved that isolated physical training, psychotonic and combined training significantly improved stabilized mean arterial blood pressure of the college men compared to control group and comparisons among treatment groups proved that psychotonic training was significantly better than physical training in altering mean arterial blood pressure (Table XIV). Vital Capacity of the college men students were found to be significantly improved due to psychotonic and combined training compared to control group. Comparing treatment groups, it was found that combined

training was significantly better than isolated physical exercises in improving vital capacity of the college men (Table XVI).

Kraemer et al. (2003) and Green and Dowson (2002) found effect of periodization of resistance training can enhance strength and motor performance anaerobic power, VO2(max), speed, agility, maximal strength, jump height. Caudill et al. (1983) performed two experiments dealing with the method of "psyching up" prior to a sprint race. Harinath (2004) demonstrated psychotonic training such as hatha yoga and Omkar Meditation resulted in an improvement in cardiorespiratory performance and psychologic profile. Peng et. al. (2004) found different meditative/breathing protocols may evoke common heart rate effects, as well as specific responses. Ditto (2006) research suggests that the Mindfulness-Based Stress Reduction program has positive effects on health, and indicated both similarities and differences in the physiological responses to body scan meditation and other relaxing activities. The previous researches showed positive effects on health and physiological conditions.  The findings of this study are in agreement with these previous researches.

### 4.4.3    Discussions on Psychological Variables

The results presented on self concept proved that isolated and combined training consisting of physical exercises and psychotonic training significantly contributed for improving self concept of the college men students compared to control group. Comparing the treatment groups,

combined group was significantly better than isolated physical activities group in improving self concept (Table XVIII). The results on achievement motivation proved that isolated physical training, psychotonic and combined training significantly improved achievement motivation of the college men comparing to control group and comparisons among treatment groups proved that combined training was significantly better than physical training in altering achievement motivation (Table XX). Anxiety of the college men students was found to be significantly controlled due to psychotonic training comparing to control group. Comparing between treatment groups, it was found that psychotonic training was significantly better than isolated physical exercises managing anxiety of the college men (Table XXII).

Glaser et al. (2010) found the ability to minimize inflammatory responses to stressful encounters influences the burden that stressors place on an individual. Knapen et al. (2005) compared the changes in physical self-concept, global self-esteem, depression and anxiety after participation in one of two 16-week psychomotor therapy programs found improvements in physical self-concept and enhancements in global self-esteem, depression and anxiety supports the potential role of the physical self-concept in the recovery process of depressed and anxious psychiatric inpatients. These theoretical foundations proved that psychotonic can significantly alter psychological variables and the findings of this study were in agreement with the previous studies.

### 4.5  DISCUSSIONS ON HYPOTHESES

For the purpose of the study, the following were hypothesized:

1. There would be no significant difference among physical training group, psychotonic group, combined training group and control group on speed, agility and cardiovascular endurance.

2. There would be no significant difference among physical training group, psychotonic group, combined training group and control group on resting pulse rate, mean arterial blood pressure and vital capacity.

3. There would be no significant difference among physical training group, psychotonic group, combined training group and control group on self concept, achievement motivation and anxiety.

The formulated hypothesis No. 1 stated that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on speed, agility and cardiovascular endurance. The results presented in Tables V, VII and IX shows results on ANCOVA on physical fitness variables speed, agility and cardiovascular endurance and the obtained F values on adjusted means proved to be significant at 0.05 level as obtained F values were greater than the required table F value. Since significant results were obtained, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test and the results presented in Tables VI, VIII and X on speed, agility and cardiovascular

endurance respectively.The results proved that there was significant difference between physical training group and combined group on speed (Table VI); there was no significant differences between treatment groups on agility (Table VIII) and cardiovascular endurance (Table X) and the formulated hypothesis No. 1 that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on speed, agility and cardiovascular endurance. was accepted for agility and cardiovascular endurance.  And the null hypothesis was rejected at 0.05 level for physical fitness variable speed as there was significant difference between combined group and isolated physical training group on speed at 0.05 level.

The formulated hypothesis No. 2 stated that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on resting pulse rate, mean arterial blood pressure and vital capacity.  The results presented in Tables XI, XIII and XV shows results on ANCOVA on physiological variables resting pulse rate, mean arterial blood pressure and vital capacity and the obtained F values on adjusted means proved to be significant at 0.05 level as obtained F values were greater than the required table F value.   Since significant results were obtained, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test and the results presented in Tables XII, XIV, and XVI on resting pulse rate, mean arterial blood pressure and vital capacity respectively. The results proved that there was no significant difference between treatment groups on resting pulse rate (Table XII) there was

significant difference between physical training group and psychotonic group on mean arterial blood pressure (Table XIV); and there was significant difference between combined group and physical training group on vital capacity (Table XVI) and the formulated hypothesis No. 2 that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on resting pulse rate, mean arterial blood pressure and vital capacity was accepted for resting pulse rate And the null hypothesis was rejected at 0.05 level for physiological variables mean arterial blood pressure and vital capacity as there were significant differences between experimental groups.

The formulated hypothesis No. 3 stated that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on self concept, achievement motivation and anxiety. The results presented in Tables XVII, XIX and XXI shows results on ANCOVA on psychological variables, self concept, achievement motivation and anxiety and the obtained F values on adjusted means proved to be significant at 0.05 level as obtained F values were greater than the required table F value. Since significant results were obtained, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test and the results presented in Tables XVIII, XX and XXII on self concept, achievement motivation and anxiety respectively. The results proved that there was significant difference between combined group and physical training groups on self concept (Table XVIII) there was significant difference between

combined group and physical training group on achievement motivation (Table XX); and there was significant difference between psychotonic training group and physical training group on anxiety (Table XXII) and the formulated hypothesis No. 3 that there would be no significant difference among physical training group, psychotonic group, combined training group and control group on self concept, achievement motivation and anxiety was rejected at 0.05 level as there were significant differences. And the null hypothesis was rejected at 0.05 level and alternate hypothesis that there would be significant differences due to experimental treatments, physical training group, psychotonic group, combined training group and control group was accepted at 0.05 level.