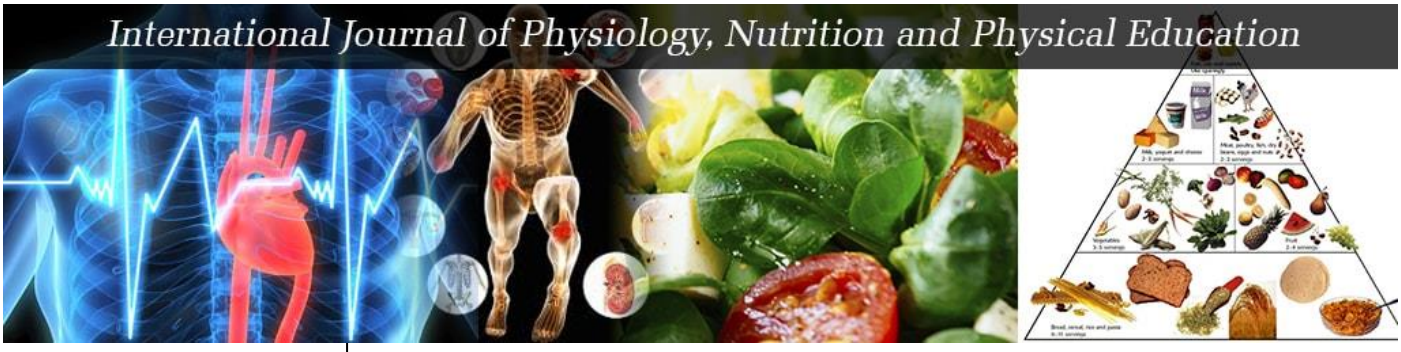


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# A comparative study on the effects of 12 weeks training on peak expiratory flow rate of NCC SD cadets

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**Abstract**
Respiratory function has direct relation with the physical training and exercise. Unusual cardiorespiratory activity of a human being can affect the balance of his or her physiological homeostasis. Study shows that regular physical training or organised exercise can improve lung function. Peak expiratory flow rate (PEFR) is a parameter to observe lung function. The purpose of the present study was an endeavor to the best method of improvement of Peak expiratory flow rate which is one of the physiological attributes. Out of 96 selected participants from fluvio coastal zone of west Bengal, India on the basis of BMI, 80 NCC SD Cadets (average age:20) were consider for the study. The subjects were divided into four groups (20 for each group) randomly namely Weight Training Group (WTG), Aerobic Training Group (ATG), Graded Circuit Training Group (GCTG) and Control Group (CG). Separately designed 12 weeks training programme for WTG, ATG and GCTG was applied on the subjects at morning between 8.00 am to 9.15am for three alternative days per week. After every four weeks, total load was increased. Pre and post-test on the groups were conducted to measure the training effect on peak expiratory flow rate (PEFR). The collected data were statistically analyzed by using the analysis of Co-variance ($p$<0.05) to determine differences, the LSD test was applied as a post hoc test to find out the paired mean differences. From the obtaining result, it was concluded that weight training, aerobics and graded circuit training are found to be effective for improving the peak expiratory flow rate (PEFR) of NCC SD Cadets.

**Keywords:** NCC SD cadets, weight training, aerobics, graded circuit training, peak expiratory flow rate (PEFR)

## Introduction
Regular Organised physical activity or training can be a medium for improvement the function of the organs of the human body. Special attention is being given to the vital organs of the body such as the heart, brain, and lungs to know the effect of exercise on these organs (Ward J-1994) [4]. When exercising regularly, the body's muscles work together to increase muscle strength, muscle flexibility, agility, movement coordination, and cardiorespiratory system endurance (Tucker M *et al*. 2017) [1] Respiratory function and physical training have a reciprocal relationship. Lung function has direct effects on the physical training, and, on the other hand, physical training can develop the lung function. As pulmonary function is a long-term indicator of overall survival rates in both the sexes, it forms a vital tool in general health assessment (Schünemann HJ. *et al*.) [5]. Exercise gives rise to remarkable changes in bodily conditions owing to its stressful nature, and lungs are not excluded. On the contrary, inactive lifestyles could result in lesser effective pulmonary functions. Many studies have shown that effect of exercise exerts noteworthy enhancements in pulmonary functions (Nourry C. 2005) [6]. One of the parameters used to assess lung function is the peak expiratory flow rate (PEFR). PEFR is an important parameter to measure how strong the maximum airflow can be expelled when performing a maximum expiration. The peak expiratory current value can be measured using a simple tool in the form of a small tube that is practical and easy to carry, namely the Peak Flow Meter (Tierney W. *et al*. 2004) [2]. A study by Chaitra B. and Maitri V. -2011 [3] proved that there is a relationship between aerobic exercise and increased lung function, an increase in PEFR value of 17% was found in 40 healthy people aged 17-20 years who were given a running intervention.

As PEFR analyzes how quick a person can breathe out (exhale) air, it is one of the many tests that measure how well your airways work (Johns DP & Pierce R. 2003) [7]. A widely acknowledged fact is that people with more physical activity inclined to possess greater degree of fitness and that physical activity can enhance cardiorespiratory health and pulmonary function in healthy sedentary people (Burchfiel CM. *et al*. 1997 and Cheng YJ. *Et al*-2003) [8, 9]. Here the author has tried find out some path for improving the peak expiratory flow rate level of the NCC SD Cadets. NCC cadets are the aspirant of future soldiers of our country. They have to face a lot of huddles and challenges through out life. Their lung's ability plays a vital role in their day-to-day life.

**Statement of the problem**

The intention of the research work was to find out the effects of 12 weeks separately designed three different types of training-i.e., i) Weight Training ii) Aerobics Training and iii) Graded Circuit Training on peak expiratory flow rate (PEFR). And compare the results to identify the impacts of those training on NCC SD Cadets.

**Materials and Methods**

Ninety-six NCC SD Cadets of "Fluvio-Coastal morphological zone" at Purba Medinipur district of West Bengal, India, were chosen randomly from Bajkul Milani Mahavidyalaya. Eighty students were finalised as "selected subject" and their average age was 20 years. 4 equal groups namely – WTG, ATG, GCTG and CG were formed at random. Students underwent Weight Training (WT), Aerobics (AT) and Graded Circuit Training (GCT). All the tests of peak expiratory flow rate (PEFR) were conducted in the gymnasium of Bajkul Milani Mahavidyalaya before the beginning of the training (Pre-Training) and at the end of training (Post Training). The training programmed was scheduled at 8.00 A.M to 9.15 A.M including warm up and cool down in order to minimize the effect of diurnal variation. Separately designed 12 weeks training programmes for all the independent variables were applied on subjects for three alternative days per week. Peak expiratory flow rate was measured by using the peak flow meter. After every 4 weeks of the experimental period, further load was increased by considering individual ability through test-retest method for all the experimental groups. After end of 12 weeks' training programme, peak expiratory flow rate data was collected. Co-variance (ANCOVA) was used to analyse the collected data to determine the differences (if any) among the groups of dependent variables. LSD test is applied for post hoc test to identify difference between paired mean. 0.05 level of confidence was set as the level of significance.

**Result of the study**

**Table 1:** Analysis of co-variance on peak expiratory flow rate of NCC SD Cadets

| Test | | WTG | ATG | GCTG | CG | Source of Variance | Sum of Square | Degree of Freedom | Mean Square | F |
|---|---|---|---|---|---|---|---|---|---|---|
| Pre test | Ms | 499.35±84.14 | 502.05±85.20 | 500.5±85.25 | 500.8±85.58 | AMG | 73.85 | (K-1)=3 (N-K) =76 | 24.61 | 0.003 |
| | S D | | | | | WI | 549751.7 | | 7233.57 | |
| Post-test | Ms | 497.25±84.11 | 499.95±85.12 | 498.3±85.11 | 500.85±85.44 | AMG | 156.93 | | 52.31 | 0.007 |
| | S D | | | | | WI | 548487.4 | | 7216.94 | |
| Adjusted Post Test MS | | 498.57 | 498.57 | 498.47 | 500.72 | AMG | 71.65 | (K-1)=3 (N-K-1) =75 | 23.884 | 14.81 |
| | | | | | | WI | 120.87 | | 1.61 | |

* Significant table value: $F_{0.05}$ (3, 76) = 2.72; N = 80 (N= subjects' number); F = 'F' ratio; Ms = Means; S D = Standard Deviation; AMG = Among; WI = Within.

Above table presented the Pre-Test "F" ratio '0.003' was found lower than table value [0.003<tab$_{0.05}$ (3, 76)=2.72]. The Post-test "F" ratio '0.007' was also lower than table value [0.007<tab$_{0.05}$ (3,76)=2.72]. The calculated Adjusted Post-test Mean "F" value '14.81' was found statistically significant [$F_{0.05}$ (3, 75)<14.81]. To identify the critical difference of Adjusted Post-test Means, LSD test has been used and it has been analysed in Table no. 2.

Figure No.1 Graphical presentation of result on peak expiratory flow rate of NCC SD Cadets

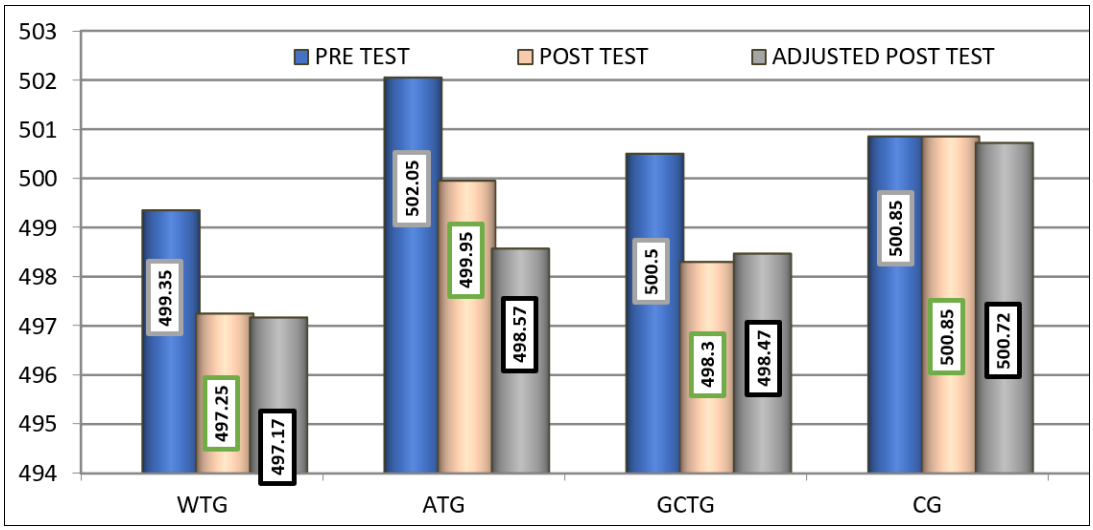


**Fig 1:** Mean of result on peak expiratory flow rate of NCC SD Cadets

**Table 2:** Analysis of critical difference of adjusted post-test means on peak expiratory flow rate of NCC SD Cadets

| WTG | ATG | GCTG | CG | MD | CD (5%) |
|---|---|---|---|---|---|
| 498.57 | 498.57 | | | 0.003NS | 0.794 |
| 498.57 | | 498.47 | | 0.098NS | |
| 498.57 | | | 500.72 | 2.151* | |
| | 498.57 | 498.47 | | 0.101NS | |
| | 498.57 | | 500.72 | 2.148* | |
| | | 498.47 | 500.72 | 2.250* | |

Significant level: 0.05; NS=Not Significant; MD= Mean Difference; CD=Critical Difference

The Adjusted Post-test Mean analysis of peak expiratory flow rate presented at above table has confirmed that the difference between WTG & CG, ATG & CG and GCTG & CG were significant. The results of this table have also provided evidence that Adjusted Post-test Mean Difference between GCTG and CG was higher significant than other pair groups.

**Discussion of the findings**

Finding of this research work has revealed that (Table no. 1) the significant differences between WTG & CG, ATG & CG and GCTG & CG were found. This finding on peak expiratory flow rate has also reflected that (Table no. 2) the difference between GCTG and CG has confirmed highest significant result. Besides, the results were assisted by some related findings of different researchers (Monique Mendelson *et al*. 2012) [12]. Based on the results of statistical tests, the treatment group that was given an intervention of HICT exercise for eight weeks showed a significant increase in the PEFR value. Meanwhile, in the control group who were not given the HICT exercise intervention and only carried out their usual daily activities, there was no significant difference in their PEFR values. A study was carried by Chitra *et al*., in 2011 [3] to explore the effect of aerobics on pulmonary function in general population. The observations were, improvement in lung volumes and flow rates due to better mechanical factors and lower airway resistance influenced during the training period. One of the clear-cut benefits of exercise regime is psychological, people who exercise regularly 'feel better'. Such effects may also be attributed to release of endorphins during exercise. (Indu Khurana-2014) [11]. Here, in case of resting heart rate, GCTG has shown better result than other two experimental groups may be due to the application of proper load that improve the Respiratory Function and its activity. The improvement of ATG and WTG group also impressive and this result also indicates that the activity opted for those training is suitable for improvement of heart related parameters. In contrary, no significant difference in peak expiratory flow rate of NCC SD Cadets has been identified between the weight training groups may be due to the trainings applied for those two groups of this study were suitable and statistically the improvement of all the groups were almost identical. Therefore, different types of specific training plans may be enough to improve the peak expiratory flow rate of NCC SD Cadets

**Conclusion**

From the obtaining result, it was concluded that weight training, aerobics and graded circuit training are found to be effective for improving the peak expiratory flow rate of NCC SD Cadets.

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