



Original Research Article

## Promotion of Stair Climbing Exercise in Medical Students to Achieve Physical Fitness with Student's Normal Routine.

Shital Rameshrao Mankar, Dhangauri N. Shenvi, Geeta Rohit Hegde, Vinny Ghansham Kaurani

Dept. of Physiology, Seth G.S. Medical College and K.E.M Hospital, Mumbai

Corresponding Author: Shital Rameshrao Mankar

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### ABSTRACT

**Aims and Objectives:** There will be inadequate time for the establishment and perpetuation of physical fitness in medical students. The study was aimed to analyze and compare Physical Fitness in medical students who were staircase climber and non-climber.

**Methods:** The study was conducted on medical students of tertiary health centre of Municipal Corporation Greater Mumbai in 2009.

One twenty students (mean age=18.26± 0.695years) were assigned in this study. Study group of(n= 60) students who were regularly climbing 100 steps 3 to 4 times a day for eight weeks and in control group(n= 60) students where nonclimber. Heart rate was found out. Physical fitness index was found out by Harvard's Step Test. Physical Fitness Index (PFI) was compared by "Chi-square test in terms of excellent, good, average and poor. Physical Fitness Index (PFI) and resting heart rate was found out by Unpaired "t" test.

**Result:** The results of this study have indicated statistically significant ( $p = 0.000$ ) difference in physical fitness index (PFI) in the climbers group compared to the non-climbers. . Also there was statistically significant ( $p < 0.05$ ) difference in heart rate in the climbers group compared to the non-climbers.

**Conclusion:** The importance of physical exercise like stairs climbing performed regularly helps to improve the cardiovascular endurance in the form of more economical heart functioning. Stair climbing is an efficient, discrete, and well tolerated form of exercise in daily activity.

**Keywords:** stair case climber, non-climber, physical fitness index, Harvard's Step Test, heart rate.

### INTRODUCTION

There is danger at present time for cramming of the brains of students with various new facts which causes inadequate time for development of physical fitness.

Physical Fitness is the basis of creative intellectual activity. The intellectual and skillful work performance can only get at the peak of their capacity when the body is healthy and strong. In the present situation

there is need for the students to measure and analyze their physical fitness for their own benefit and improvement. The increased mechanization of work make maximum sedentary phase in working hours. To minimize this sedentary phase promotion of physical fitness program is required which should not interfere with work, accessible, effective, sustainable, easy.

The inclusion of stair walking into the daily schedule at working places will give simple forms of exercise. So, climbing staircase regularly [1-3] is a type of exercise to maintain Fitness and improve cardiovascular endurance. The current study looks into comparison made in cardiovascular functional abilities of medical student using stairs to climb regularly (climber group) and non climber.

**Aim:** To study and compare Physical Fitness Index (PFI) obtained using Harvard's step Test in staircase climber and non-climber.

## MATERIALS AND METHODS

The ethical committee was informed about the nature of the current study and a permission to conduct the study had been obtained.

**METHODOLOGY:** The methods adopted for the present study were described under the following headings: Selection of the subjects, Consent taking, History taking, General and systemic examination, Cardiovascular endurance assessment, Equipment used, Test procedure.

**Selection of participants:** The Study was carried out on medical students from Mumbai. Stratified sampling approach was used to select participants. Random allocation method was used. Students with history of any acute or chronic respiratory problems or gastroenteritis at the time of study, known cases of hypertension or any other cardiovascular abnormality, congenital heart disease, CNS disorder or Musculo-skeletal disorders like polio, scoliosis, kyphosis were excluded.

120 medical students of age group 18 - 25 years (mean age=18.26± 0.695years) fulfilling the inclusion criteria were included in present study. They were divided in 2 groups.

**Group I:** study group, comprising of 60 individuals who regularly climbed  $\geq 100$

stairs, 3 to 4 times a day, for at least eight weeks.

**Group II:** control group, comprising of 60 individuals who neither climbed regularly nor were involved in exercise  $>20$  min/day and  $\geq 3$ days /week.

Harvard step test. [4-6]

Written informed consent was taken from all the participants before the procedure. Students were asked to come 3 hours after a light breakfast. They were asked not to indulge in any kind of vigorous exercise within 24 hours prior to test. They were asked to wear loose and comfortable clothing. Their resting heart rate and blood pressure were recorded after giving adequate rest in supine position.

Harvard step test was done in a well-lit and ventilated room. Prior to the test, required instructions were given and the test was properly explained. Demonstration of the correct stepping procedure was given. They were asked to stand barefoot close to the stepping bench which was 18 inches in height and then place the foot completely onto the bench while stepping. The students were asked to do a four step cadence, "up-up-down-down" on the bench for few seconds to make them familiar with the procedure.

Then after warming up and practicing the procedure, they were asked to step up and down on the bench at a rate of 20 steps per minute for 5 minutes. The lead leg was allowed to change during the test but they were instructed not to break the rhythm. After completion of the test, numbers of heart beats were counted between 1 to 1.5 minutes, 2 to 2.5 minutes, and 3 to 3.5 minutes. The Physical Fitness Index score was determined by the following equations.

Physical Fitness Index (PFI) Score =  $(100 \times \text{test duration in seconds}) / (2 \times \text{sum of heart beats in the recovery periods})$ .

**According to Fitness score is classified as follows:**

Physical Fitness Index (PFI)	Fitness category (Physical condition)
>90	Excellent
80-90	Good
55-79	Average
<55	Poor

(Ref. Brouha et al ; 1943 )[4]

**Statistical analysis:** The data entry was done in MS-Excel and analysis was done by SPSS-IS software. The descriptive statistics was used i.e. mean and standard deviation (SD) for describing parameters. Physical Fitness Index (PFI) in two groups was compared in terms of excellent, good, average and poor by "Chi-square test". The significance of difference between mean values of resting heart rate of the two groups was found out by unpaired "t" test. The P-value < 0.05 was considered as significant.

**RESULTS AND ANALYSIS**

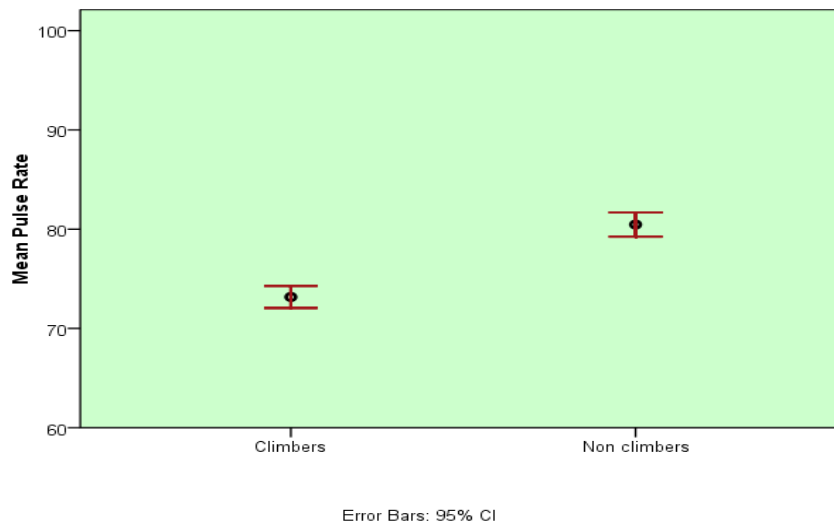
As shown in the table no. I, there were no significant difference between groups for age, weight. Resting heart rate was significantly higher in non climbers than climbers ( $p < 0.05$ ). The climbers have a significantly higher PFI score than the non-climbers. The results of this study have indicated statistically significant difference in physical fitness index (PFI) in the case of the climbers group compared to the non-climbers.

As depicted in table III, for climbers PFI of 41 students was Excellent, for 18 students it was good and only 1 student had average PFI. While for non climbers

**Table 1: COMPARISON BETWEEN PARAMETERS USED IN STUDY IN CLIMBER AND NON CLIMBER GROUP**

	Climber n=60 mean±SD	Non climber n=60 mean±SD	P value obtained	P value
Age (years)	18.133 ±.430	18.400±.867	0.01	> 0.05
weight(Kg)	57.98±10.640	57.7 ±29.059	0.883	> 0.05
Heart rate (Beats/min)	73.17±4.279*	80.47±4.714	0.000	<0.05
PFI	92.17±6.331*	74.16±5.215	0.000	<0.05

\* Significant



**Fig.1: HEART RATE IN CLIMBERS AND NONCLIMBERS**

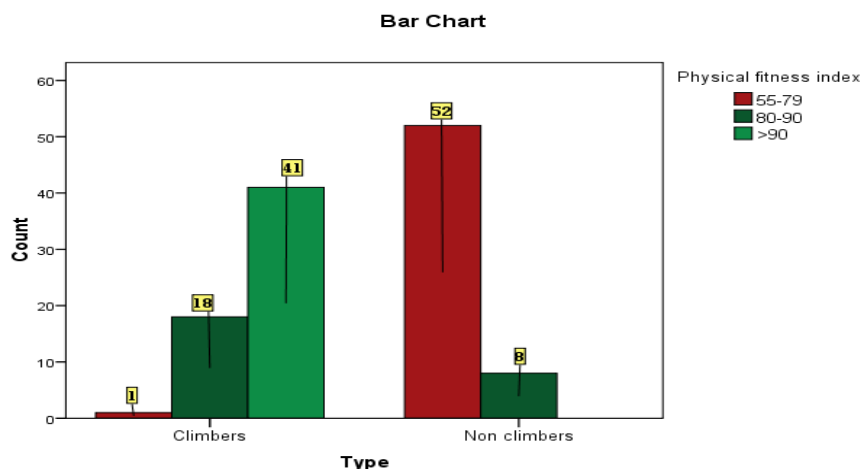
**TABLE 2: CHI -SQUARE TEST**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	93.922 <sup>a</sup>	2	.000
N of Valid Cases	120		

a. Grouping Variable: type

**Table 3: PFI CATEGORY-WISE DISTRIBUTION OF CLIMBERS AND NON-CLIMBERS**

	Type	Type			
		Climbers n=60		Non climbers n=60	
		Count	Column N %	Count	Column N %
pfi (Binned)	<55	0	.0%	0	.0%
	55-79	1	1.7%	52	86.7%
	80-90	18	30.0%	8	13.3%
	>90	41	68.3%	0	.0%
	Total	60	100.0%	60	100.0%



**Fig.2: COMPARISON OF PHYSICAL FITNESS INDEX (CATEGORY) IN CLIMBERS AND NON-CLIMBERS.**

## DISCUSSION

Sedentary lifestyle habits lead to gradual deterioration of physical well-being which will ultimately affect endurance and then work performance. A physically active lifestyle is established as an important component in the maintenance of healthy disease free life. In an urban working places inclusion of stair walking into the daily schedule provide good forms of exercise. Stair climbing is a familiar mode of physical activity which provides fitness and enthusiasm in population. The stairs can be anywhere- at home, in an office building, an apartment building, a park, college building.

The present study emphasizes on the physical fitness of the college students. There is need for the students to measure their physical fitness for their own benefit and improvement. The present study is taken

with the objective to analyse the physical fitness of the college going students. Physical Fitness Index (PFI) obtained using Harvard's step Test was also done by Hettinger [7] et al, Ganeriwala and Khandare. [8] Fitness Index was calculated in medical students from the post exercise heart rate recorded which correlated with different parameters like height, weight, surface area and resting heart rate. [8]

In this study the Physical Fitness Index (PFI), Resting Heart Rate was estimated in both the groups. Maximum 41 Students of the climber group were found to be of excellent category and 18 have good category and one student was found to be of average score. Thus student's who were climbing stairs have PFI increased than non climber (Table 3).

In the non-climber group 52 student was found to have average score, 8 students with good score (Table 3).

Out of 120 students the total number of students belonging to excellent score were 41(34.2%), those belonging to good score were 26(21.7%), those belonging to average score were 53 (44.2%) (Table 3)

In the present study, mean value of resting heart rate is significantly lower in the climbers as compared to non climbers( $p < 0.05$ ). Similar results were found in studies of Keen E N and Sloan A W <sup>[9]</sup> (1958), Boreham C et al. <sup>[2]</sup> (2005), Wilmore JH and Costill DL <sup>[10]</sup> (2005).

In the present study, excellent physical fitness index (PFI) of climber group and average to good in non-climbers indicates the active life style with regular training of climber group. The climbers have a significantly higher PFI score than the non-climbers. The results of this study have indicated statistically significant difference in physical fitness index (PFI) in the case of the climbers group compared to the non-climbers. Similar studies were done by Hasalkar Set al <sup>[11]</sup> (2005), Keen E. N. and Sloan A. W. <sup>[9]</sup> (1958), Boreham Cet al. <sup>[2]</sup> (2005), Bishanbindu Bandyopdhyay; Haripada Chattopadhyay (1981). <sup>[12]</sup>

People spend an estimated two-thirds of their lives at their place of employment. In order to stay healthy, we need to find ways to incorporate physical activity into our workday. Recommendations for a stair-climbing training program are given. <sup>[2,3]</sup>

Physical activities like stair climbing are a great way to cope with job-related stress. Short bouts of stair climbing five days a week provide sufficient stimulus to positively influence in previously sedentary young groups. Stair climbing appears to be an efficient, discrete, and well tolerated form of exercise. <sup>[2]</sup>

Stair climbing can also add life to your years. Those who climb stairs on a

daily basis have greater leg strength and aerobic capacity, allowing them to participate more fully in a wide range of daily activities.

Stair climbing uses the muscles of the legs, in particular the quadriceps <sup>(13,14)</sup> (front of the thighs) and the buttocks. It can be an intense activity both for the heart and leg muscles because you are carrying your body weight against gravity. It is low impact and safe for the knee joints.

Opportunities for stair climbing in workplaces, public buildings, and the home are frequently available to most population groups. Promotional studies by using stair riser banners and posters are another important way to encourage stair use. <sup>[15]</sup>

The noted statistically significant differences occurred under the influence of the applied recreational aerobic exercise model i.e. stairs climber on the basis of which it can be concluded that the applied exercise model does have a positive effect on the transformation of the functional abilities of the subjects of the climbers group.

## CONCLUSIONS

Regular stair climbing selected for its widespread applicability, has been shown to positively enhance an important component of health-related fitness, namely cardio-respiratory fitness. This study shows the importance of physical exercise like stairs climbing performed regularly helps to improve the cardiovascular endurance in the form of more economical heart functioning. **Scope of the Study:** - Encouraging stair use at work is places. Stair climbing may be the fastest and most convenient way to get an excellent aerobic workout, no matter what your fitness level.

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