

# Study of Physical Fitness Index Using Modified Harvard Step Test in Relation with Gender in Physiotherapy Students

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**Abstract:** ***Background & Objectives:** The Physical Fitness index measures the physical fitness for Muscular work & the ability to recover from the work. The present study was undertaken to assess the physical fitness index using Modified Harvard Step Test in young adult in the age group of 17 to 24 years with varying degree of physical activities. **Method:** Cross sectional study was done on 105 physiotherapy students and Physical Fitness Index was measured using Modified Harvard step test. **Data Analysis:** Statistical analysis was done using descriptive analysis and Chi square test. **Result:** Statistical analysis shows that physical fitness in physiotherapy students is not satisfactory. And there is significant difference in physical fitness index between boys & girls. **Conclusion:** Physical fitness of physiotherapy students in Ahmedabad Physiotherapy College is not satisfactory and Female are having better physical fitness.*

**Keywords:** Physical Fitness Index, Modified Harvard Step Test, Physiotherapy Students

## 1. Introduction

Physical fitness implies not only the absence of disabling deformity or disease and the capacity to perform a sedentary task efficiently but also a sense of physical well-being and the capacity to deal with emergencies demanding unaccustomed physical effort.

Physical activity relates to any movement produced by the individual's skeletal muscles that results in energy expenditure<sup>1</sup>. Physical fitness is a set of attributes a person has or achieves, which is linked to the person's capability to do physical activity<sup>2</sup>. Fitness is divided into health and skill related components, with the health component further consisting of cardiorespiratory endurance, muscular endurance, muscular strength, and flexibility<sup>1</sup>.

An individual is considered to be fit for a particular task or activity when he can accomplish it with a reasonable degree of efficiency without undue fatigue and with rapid recovery from the effect of exertion. Physiological fitness implies the capacity for skillful performance and rapid recovery<sup>7</sup>. Physiological effort is estimated from the magnitude of the heart rate change during exercise and from the rapidity of return of the heart rate to normal following the exercise<sup>3</sup>.

Physiotherapy students during the course of physiotherapy education are subjected to different kinds of stressors predominantly the pressure of academics leading to the successful completion of the educational course. Physical & mental fitness are the key to such a successful outcome. Physical fitness is used in two close meanings: general fitness-a state of health and well-being and specific fitness-a task-oriented definition based on the ability to perform specific aspects of sports or occupations. It is the result of regular exercise, proper diet and nutrition, and proper rest for physical recovery. There has been a decrease in physical activity due to a more sedentary lifestyle. However evolution has not kept pace with automation and humans

have not adapted effectively to the sedentary lifestyles. Inadequate physical activity is responsible for approximately 30% of all deaths mainly due to heart disease, diabetes & colon cancer<sup>4</sup>. Rising levels of obesity are also contributing to these diseases. This has reached epidemic proportions in many parts of the developing world and is beginning to affect developing countries like India as well. Obesity, if present in adolescence leads to obesity in adult life. There is substantial evidence that obesity in childhood lays the metabolic groundwork for adult cardiovascular disease<sup>5</sup>. Beginning an active lifestyle could significantly reduce mortality from these events<sup>6</sup>. Regular physical exercise is known to have beneficial effects even in the untrained person and in diseased states like Diabetes, Obesity & Hypertension.

It was therefore thought to evaluate cardiopulmonary efficiency in physiotherapy students to determine the physical efficiency in these students and plan suitable strategies if necessary.

There is a need to know the physical fitness level of our future Physiotherapist. They can be sensitized to pursue a healthy life style right from the beginning of their career. The physical fitness index (PFI) measures the physical fitness for muscular work and the ability to recover from the work. The study was undertaken to assess (PFI) using modified Harvard step test

## 2. Material & Methodology

**Study design:** Cross sectional study

**Study setting:** Ahmedabad Physiotherapy College, Bopal, Ahmedabad

**Sample size:** 105

**Sampling:** Convenient sampling

**Inclusive Criteria:**

1. Healthy young male & female Physiotherapy students
2. Age between 17 to 23 years

**Exclusive Criteria:**

1. Student with Locomotor & Musculoskeletal disability
2. History of Cardiovascular disorder
3. History of Respiratory disorders
4. History of Diabetes mellitus, Hypertension
5. History of Major surgery in the recent past
6. History of Drug intake
7. History of Alcohol & Smoking

**Table 1:** Profile of subjects

Gender	Number	Age <sup>¥</sup>	BMI <sup>¥</sup>
Male	48	20.4±2.24	21.2±3.01
Female	57	20.1±2.79	21.9±3.10

¥: Mean ± SD

**Material:** Modified Harvard step bench = 33cm, Stop watch, Metronome, Weight & Height measurement machine  
 PFI was calculated by using following formula.

**Physical fitness Index (%) (PFI %)<sup>8</sup>**

PFI = Duration of exercise in seconds x 100/2(pulse 1+2+3)  
 Procedure: The Subject was advised to step up on the modified Harvard steps of 33cms height once every two seconds (30 per minute) for 5 minutes, a total of 150 steps. At one, three and five minutes during the test, pulse rate was recorded as

- (a) PR1 (Pulse Rate 1) – 1 min after exercise
- (b) PR2 (Pulse Rate 2) – 3 min after exercise.
- (c) PR3 (Pulse Rate 3) – 5 min after exercise.

**Table 2:** Physical Fitness Index rating<sup>8</sup>

PFI Rating	Physical Fitness Index	
	Male	Female
Excellent	>115	>91
Good	103-115	84-91
Fair	91-102	77-83
Poor	<91	<77

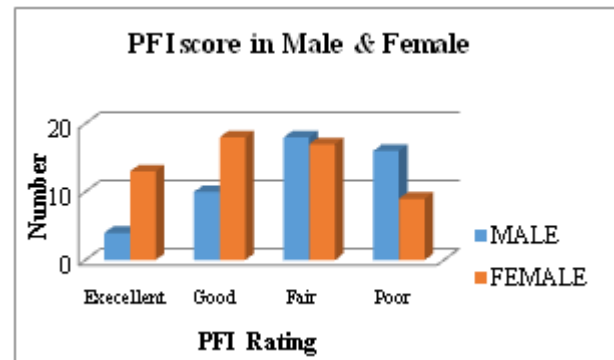
**Table 3:** PFI scoring

	Male	Female	Total
Excellent	4	13	17
Good	10	18	28
Fair	18	17	35
Poor	16	9	25
TOTAL	48	57	105

**Result:** The chi-square is 8.3288. The P-Value is 0.039684. df=3. The result is significant at p < 0.05.



**Figure 1:** Harvard Step Test



**Figure 2:** Comparison of PFI score in Male & Female

According to the inclusion & exclusion criteria subjects were included in study. The subjects were given rest for 5 min in a chair. Resting pulse rate was measured in that resting position. After explanation subjects were told to do modified harvard step test in a rhythmic manner & the data were recorded. The detail procedure of exercise test was explained to the subjects & actual demonstration was given before starting test in order to allay apprehension<sup>2</sup>.

**Data Analysis:** Statistical analysis was done using descriptive analysis and Chi square test

**3. Discussion**

Several studies have established that physical fitness is necessary to carry out daily task. The effect of regular exercise is known to have beneficial effect on health. Importance of physical fitness has been mentioned in the history of mankind including Vedas. Yet, physiology of exercise is a recent advancement and is an open field for research<sup>9</sup>.

The present study evaluated the physical fitness of young physiotherapist students using modified Harvard step method. This method has four grades of physical fitness based on the scoring obtained after performing step test. This is proven to be a suitable method for assessing physical fitness of Indians<sup>10</sup>.

The present study showed that fitness of Physiotherapy students is less. And females are having excellent physical fitness when compared to their male counterparts. 45% of female subjects had excellent physical fitness whereas only 12% of males studied had excellent physical fitness. 33% percent of the males had poor physical fitness whereas only 16% of females had poor physical fitness. It was found that 32% of females studied had grade '2' physical whereas only 21% of males studied had grade '2' physical activity.

This study has clearly established that physical activity is an important determinant and predictor of physical fitness. Pulse rate variability (pre and post exercise) was minimum among subjects who had excellent physical fitness and it was maximum among subjects who had poor physical fitness index.

It is important for future Physiotherapist to know their level of present fitness and try to improve it.

#### 4. Conclusion

1. Physical fitness of physiotherapy students in Ahmedabad Physiotherapy college is not satisfactory. This may be due to the sedentary life style and lack of sporting activities & also over emphasis on academic pursuits.
2. Females are having better physical fitness as most of them are pursuing in some physical activity.

#### References

- [1] Caspersen CJ, Powell KE, Christenson GM: Physical activity, exercise, and physical fitness: definitions and distinctions for health related research. *Public Health Rep* 1985, 100(2):126-131.
- [2] Pescatello L, American College of Sports Medicine: *ACSM's guidelines for exercise testing and prescription*. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins Health; 2014.
- [3] Francis KT. Fitness assessment using step tests. *ComprTher* 13:36-41.1987.
- [4] Powell K.E. and Blair S.N: The public health burdens of sedentary living habits :theoretical but realistic estimates. *Med.Sci.Sports Exerc*.1994;26:851
- [5] Gidding S.S.: A perspective on obesity. *Am J Med Sci* 1995;310,568-571.
- [6] Paffenberger R.S. ,KampertJB, LeeIN, HydeRT, Leung RW, Wing AL: Changes in physical activity and other lifeway patterns influencing longevity. *Med Sci Sports Exec*;1994;26;857-865.
- [7] Shashiala L., Geetanjali H. Efficiency of Recovery pulse rate as an index of physical fitness. *Indian Journal of fundamental and applied life science*. 2014 vol 4(2), april-june, pp 216-219
- [8] Edward L. Fox. Charles E. Billings. Robert L. Robert Bason and Donald Mathews. Fitness standards for

college students. *European Journal of Applied Physiology and Occupational physiology*. Volume 31. Number 3. 231-236.1973.

- [9] Wuest DA, Bucher CA. Historical foundations of physical education and sport. 13<sup>th</sup> Ed. Boston, Mass: WCB/McGraw Hill; 1999:146-193.
- [10] Das S.K., Mahapatra S. — Determination of physical fitness index (PFI) with modified Harvard Step Test (HST) in young men and women. *Ind J Physiol and Allied Sci*. Vol 47(2): 73-75, 1993.