

Original research article

## Physical Fitness Index of Medical Students in a Tertiary Health Institution

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### Abstract

**Back ground & Aim:** The main aim of this study was to determine the physical fitness index of the medical students using the modified Harvard step test and to compare the physical fitness between male and female medical students.

**Methods:** The study was conducted in department of Physiology, GMC Kathua (J&K). A total of 94 subjects were selected, of whom. 48 were male and 46 were female medical students, whose age varied from 17 to 24 years. The subjects selected for this study were medical students admitted for 1<sup>st</sup> year MBBS Course. Descriptive data for age (years), gender height (m) and weight (Kg) were obtained and Body Mass Index was calculated.

Physical fitness index (PFI) was measured using the modified Harvard step test.

**Results:** In the present study, 29.8% students had Excellent Harvard Index, 38.9% good, 16.8% Average, 12.6% low average Harvard Index and 1.1% poor Harvard Index, 33.3% male showed excellent Harvard Index. On comparing the physical fitness between male and female medical students 47.8% female showed good Harvard Index indicating that on an average female were having a better PFI.

**Conclusions:** The study of population which were MBBS students had proportionally good and Excellent PFI this can be attributed to the fact that the medical students are having awareness about the alarming rise in lifestyle diseases and are more conscious about maintaining their physical fitness, physical appearance along with academics and want to excel in all spheres of life.

**Keywords:** Physical fitness Index (PFI), Medical students, Modified Harvard step test.

## Introduction

Physical fitness is defined as ability to carry out daily tasks with vigor and alertness, without undue fatigue with ample energy to enjoy leisure time pursuits, to meet unusual situations and unforeseen emergencies<sup>1</sup>. Determination of physical fitness index is one of the important criteria to assess the cardiopulmonary efficiency of the subject.

Application of Harvard Step Test (HST)<sup>2</sup> in the physical performance capacity of an individual has aroused interest because of its simplicity veracity of the test but for Indians with short stature, it is felt necessary to modify HST and its physiological and anthropometric relations are yet to be explored<sup>3</sup>

The height of the step which was 20" (50.8cm) in the Harvard step test is lowered to (16.5 i.e., 41cm) in the modified HST that is used in India<sup>4</sup>.

The measurement of physical fitness is influenced by many factors. For e.g., Total body fat, habitual physical activity, and socio-economic status and gender have been independently correlated to Physical fitness<sup>5</sup>

Therefore, aim of our study is to further explore the gender differences of physical fitness among medical students. Physical activity in form of exercise helps to attain physical fitness by development of muscles, increases cardiorespiratory strength and endurance in adolescents. Physically fit students can easily adapt to stressful conditions and perform better in all spheres of their life<sup>6</sup>.

Medical students, as further health care providers are responsible for the good health of our citizens. So, to provide better health care they also need to keep themselves fit and healthy. The aim of our study is to find the physical fitness level of our medical students.

## Methods & Materials:

1. Study design: Cross –sectional study.
2. Study setting: GMC, Kathua
3. Sample size: 94.
4. Mode of selection of subjects.

### (a) Inclusion Criteria

- (1). Healthy young male and female medical students.
- (2). Age between 17 to 24 years
- (3). BMI – 18.5 - 30Kg/m<sup>2</sup>.

### (b) Exclusion Criteria

- (1). Students with locomotor and musculoskeletal deformity.
- (2). Other systemic disorders like Diabetes Mellitus, hypertension, bronchial asthma, Cardiovascular disorder and autonomic dysfunctions.
- (3). H/O alcohol, smoking habits.
- (4). H/O of any major surgeries.
- (5). Presence of anemia, drug intake, obesity and chronic diseases.
- (6). Exclusion: - Students not willing to provide his/her voluntary consent for participation in the present study.

## Equipment's: -

- (1). Modified Harvard Step Test bench (dimensions: Height = 41cm, Breadth = 51cm).
- (2). Stopwatch.
- (3). Digital weighing machine.
- (4). Height scale.

**Method for Data Collection: -**

- The detail of procedure was explained to the subjects & demonstrated to allay any apprehension.
- Before the test, anthropometric & physiological parameters were recorded.
- Height (Ht in cms) measured with the subject, standing without shoes, nearest to 0.1 cm error by using a Standard Height measuring Scale. Weight (Wt in kg) measured with the subject, wearing minimum clothing, nearest to 0.1 kg error by using a standard weighing machine.
- Body Mass Index (BMI) in kg/m<sup>2</sup>: It is calculated using a Quetelet's index.<sup>7</sup>
- Subjects were made comfortable and asked to take rest for 5min.
- Subject were asked to step up & down on the platform (without shoes) at the rate of 30steps per minute for 5min or till exhaustion.
- Subjects were asked to immediately sit down on completion of the test for 1 minute.
- Pulse rate for 30sec (PR1) -1minute after finishing the test.
- Pulse rate for 30sec (PR2) - 2 minute after finishing the test.
- Pulse rate for 30 seconds (PR3)-3 minutes after finishing the test.
- PFI was calculated using the formula

$$PFI = \frac{100 \times \text{Total duration of exercise in seconds}}{2 (PR1 + PR2 + PR3)}$$

**The outcome of equation is rated as follows <sup>8</sup>.**

Rating	Fitness index
1.Excellent	>96
2.Good	83-96
3.Average	68-82
4.Low Average	54-67
5.Poor	<54

**Statistical Analysis: -**

- Data was entered in the excel sheet.
- Data analysis was done by SPSS version 21.0.
- Proportions and mean with standard deviation were calculated.
- Chi-square test was used to find a difference in proportions.

**Results:**

**The present study was conducted among medical students of a medical college of North India. In our study, total males were 48(51.1%) and 46(48.9%) were females.**

**Table 1: Table showing characteristics of participants**

Variables	N	%age
1.Gender		
a. Male	48	51.1
b.Female	46	48.9
2.Age		
a.18	10	10.6
b.19	35	37.2
c.20	38	40.4
d.21	9	9.6
e.22	2	2.1
3.BMI		
a. Below 18.5(underweight)	8	8.6
b.18.5-24.9(healthy weight)	69	74.2
c.25.0-29.9(Overweight)	11	11.8
d.>30(Obesity)	6	5.4
4.Pulse per min		
a.<60	0	0
b.60-80	84	89.4
c.80-100	10	10.6
d>100	0	0
5.Diastolic BP(mmHg)		
a.<60	0	0
b.60-80	44	47.3
c.80-100	50	52.7
d.>100	0	0
6.Systolic BP(mmHg)		
a.<80	0	0
b.80-100	0	0
c.100-120	32	34
d.>120	62	66

**Table 2: Table showing gender wise association of participants with different variables**

Variables	Male (mean+SD)	Female(mean+SD)	p value
1.Age(years)	19.65±0.934	19.46±0.836	0.101
2.Height (m)	1.75±0.058	1.58±0.064	0.000
3.Weight(kg)	67.52±10.858	57.09±11.39	0.000
4.BMI	22.02±3.45	22.68±4.08	0.008
5. PFI	3.833±1.837	8.71±1.8927	0.011

P<0.05 statistically Significant

**Table 3: Table showing association of gender of participants and Harvard index**

Harvard index	Gender	
	Male	Female
1.Excellent (>96)29.8%	169 (33.3%)	12 (26.1%)
2.Good (83-96)38.9%	15 (38.9%)	22 (47.8%)
3.Average (68-82)16.8%	11 (16.8 %)	5 (10.9%)
4.Low Average (54-67)12%	6 (12.6%)	6 (13%)
5.Poor (<54)1%	0 ( 1%)	1 (2.2%)

P<0.05 statistically Significant

The present study group comprised 94 MBBS students, with mean age of  $19.65 \pm 09$  years for the determination of PFI. Out of these 94 students, there were 48(51.1%) males and 46(48.9%) females. Distribution of BMI among the participants was 8.6% (8) underweight, 74.2% (69) having normal or healthy weight, 11.8% (11) overweight and 5.4% (6) were found to be obese. (Table 1) 29.8% (28) students had excellent physical fitness, 38.9%(37) students good physical fitness, 16.8%(16) students average, 12% and 1% students had low Average and poor physical fitness index respectively.

Among the male participants distribution of PFI was observed as (33.3%) excellent, (38.9%) good (16.8%) average, (12.6%) low average and (1%) poor PFI respectively. (Table 3)

Among the female participants distribution of PFI was observed as (26.1%) excellent, (47.8%) good, (10.9%) average, (13%) low average and (2.2%) poor PFI respectively. (33.3%) male had excellent fitness as compared to (26.1%) females and (47.8%) females had good PFI as compared to (31.3%) males. (Table 3)

There was statistically significant association between height and gender; weight and gender; BMI and gender; overall PFI for females was (8.71) as compared to males (3.83) which was found to be statistically significant, showing that overall females were physically more fit as compared to the males in this particular subgroup of populations.(Table 2)

### Discussion: -

In today's digital world, most of people following sedentary lifestyle (lack of physical activity), health awareness and achieving physical fitness has become an important goal for young adolescent population. During ancient times even in the Vedas, physical fitness was considered as one of the top priorities for achieving a healthy, happy and long life. Similarly, due to widespread awareness to alarming rise in lifestyle diseases, exercise physiology has become an upcoming and fast-growing branch of physiology<sup>9</sup>.

The present study was aimed to find the physical fitness index of the medical students using the modified Harvard step test and to compare the physical fitness between male and female medical students. The study of population which were MBBS students had proportionally good and Excellent PFI this can be attributed to the fact that the medical students are having awareness about the alarming rise in lifestyle diseases and are more conscious about maintaining their physical fitness, physical appearance along with academics and want to excel in all spheres of life. They are pursuing some sort of physical activity and influenced by the modern Gym culture followed in males along with calorie control especially seen in females.

When the excellent PFI was compared (33.3%) male students had better result as compared to (26.1%) females. Similar findings were seen in some of the studies who stated that males are more aggressive accepts challenges better than the females<sup>10,11</sup>. Another study by PK Banerjee mentioned that PFI was affected by body size, evidenced in positive correlation between PFI with height and weight<sup>12</sup>.

In the present study it was observed that there was significant difference in height and weight between males and females. These findings were consistent with the observation made on male college students.<sup>13, 14</sup>

As far as good PFI is concerned (47.8%) females were having better PFI than (31.3%) males. PFI of female ( $8.71 \pm 1.8$ ) as compared to ( $3.8 \pm 1.8$ ) for males which is found to be statistically significant. Similar results were seen, in Inner Mongolian students in China that female had better physical fitness level as compared to males, obesity being the main reason affecting the PFI.<sup>15</sup>

The result of present study, are consistent with another study showing similar results which postulated that in females being calorie conscious indulged in more physical activities<sup>16</sup> making them more physically fit and in a better state of health<sup>17</sup>.

The study has some limitation because the study group included only the young adolescent medical students rather than students from other spheres of the population. This study has opened up many windows of further research, one of the probable research projects can be done by involving a wider group of students from different geographical regions including students from different fraternity.

Another research can be done on larger Indian population comparing different heights of Harvard step test to standardize the height of Harvard step test for different age groups of Indian populations.

### Conclusions:

The study of population which were MBBS students had proportionally good and Excellent PFI this can be attributed to the fact that the medical students are having awareness about the alarming rise in lifestyle diseases and are more conscious about maintaining their physical fitness, physical appearance along with academics and want to excel in all spheres of life.

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